

# State of the Art of RRI in the Five UNESCO World Regions

**Deliverable 3.1-5**

*30/04/2021*



**DELIVERABLE 3.1-5**

<b>Title</b>	State of the Art of RRI in the Five UNESCO World Regions
<b>Dissemination Level</b>	Public
<b>Document Reference</b>	RRING-D3.1-5
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## ACKNOWLEDGEMENTS

The work described in this publication has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 788503.

The contributing authors would also like to thank other partners for their contribution throughout the development of this deliverable. Professor Alexander Gerber (HSRW) and Dr Gordon Dalton (UCC) for their advice and support, Emmet Fox and Rihab Khalid (ARU) for assistance in writing of the global interview research report sections, Monica Racovita for development of interview protocols, guidance materials and planning, and everyone leading on country-specific interview data collection: Shari Reiss (Technion, Israel), Amr Radwan (ASRT, Egypt), Tharwh Qutaish (RSS, Jordan), René Baptista (CEP, Bolivia), Bryan Mthiko (Bintel Analytics, Malawi), Abdelhak Chaibi (R&D Maroc, Morocco).

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### FUNDING

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 788503.

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# 1 INTRODUCTION

This report presents findings to address the objectives of RRING Work Package 3 by providing an overview on the state of the art of RRI in the five UNESCO world regions.

The overall project aim is to bring RRI into the linked up global world to promote mutual learning and collaboration in RRI. This will be achieved by the formation of the global RRING community network and by the development and mobilisation of a global Open Access RRI knowledge base. RRING will align RRI to the Sustainable Development Goals (SDGs) as a global common denominator.

The RRING project acknowledges that each region of the world is advancing its own agenda on RRI. Therefore, RRING will not be producing a Global RRI framework or strategy that is meant to be enforced in a top-down manner. Rather, increased coherence and convergence will be achieved via a bottom-up approach, learning from best practices in RRI globally and from linkages, via the new RRING community, to develop the RRI linked-up world.

## 1.1 BACKGROUND AND CONTEXT

The overall research objectives of Work Package 3 in the RRING project are summarised as follows in the Description of Action:

No.	Objective
1	Understand the policies and drivers for R&I currently and in the medium term
2	Establish the governance and regulatory frameworks for RRI, the entities responsible for the RRI and the SoA on RRI
3	Clarify how RFOs and RPOs operate within this environment
4	Perform sampled key domain studies covering Digital (ICT), Energy, Bio-economy and Waste Management
5	Identify the key platforms, spaces and players
6	Explore the roles and interaction of the stakeholders

Different aspects of Work Package 3 address different aspects of these objectives. WP3 provides a baseline for the Project, in particular, analysis in WP4. It establishes the context within which the overall project aim of global RRI mutual learning and cooperation must emerge. It facilitates the other WPs. Desk research includes a literature review of published reports, guidelines, policies and other grey literature, scholarly literature and results from RRI related projects. Empirical research includes qualitative interviews and surveys conducted with

a global sample of researchers and innovators to understand policies and practices of socially responsible research and innovation<sup>1</sup>.

RRING adopts an open approach to gain an understanding how each world geography approaches RRI concepts and approaches. This is in line with the RRING concept of bottom-up learning in RRI, rather than top-down approach or only using European model understanding of RRI.

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<sup>1</sup> The full dataset for the survey research component of this deliverable is openly accessible on Zenodo.  
DOI: [10.5281/zenodo.4719937](https://doi.org/10.5281/zenodo.4719937)

## 2 STATE OF THE ART: TOP-DOWN REVIEW OF POLICIES AND DRIVERS FOR RESEARCH AND INNOVATION

This section presents results from RRING consortium research to establish the state of the art in research and innovation policies and drivers for this report's region, as well as investigating RRI governance and regulatory frameworks. While it is not the primary focus of the project overall, understanding a region's research and innovation drivers and policies is important to clarify how RRI fits into this context and also where another region's RRI policies or practices may be relevant and helpful to address similar challenges. That is, this initial element of the analysis is designed to reveal opportunities for mutual learning across global regions.

This section of the report addresses the Work Package 3 objectives:

No.	Objective
1	Understand the policies and drivers for R&I currently and in the medium term
2	Establish the governance and regulatory frameworks for RRI, the entities responsible for the RRI and the SoA on RRI

### 2.1 LITERATURE REVIEWS

#### 2.1.1 SUMMARY

This desk-based literature review is an analysis of the grey and white literature in the global regions and countries of interest in RRING. In particular the review seeks to understand what drives research and innovation (R&I) currently and in the medium term.

**Section 2.1.1** marks the start of the main section of this document. **Section 2.1.2** briefly states the objectives of this literature review. **Section 2.1.3** describes its methods and the piloting of the data entry form prior to the main data collection. This section also lists which partners and individuals were responsible for pilot and main stages, reviewing sources and analysing results.

**Section 2.1.4** reports the results of pilot testing of the data entry form on several Dutch R&I organisations. **Section 2.1.5** details the main results and is broadly divided into quantitative and qualitative data subsections. The section notes several similarities in the global responsible research and innovation (RRI) discourse with EU conceptions of RRI. In particular, the global discourse is compared to well-defined EU conceptions such as the five or six key RRI conception, and the process-based (anticipation, reflection, inclusive deliberation, responsiveness) conception. From sub-section 2.1.5.6 and following, the findings turn to differences in how literature sources conceive of RRI and relevant RRI-like aspects. Such

differences have the potential to enrich understanding of RRI as a concept and policy aim at the global level.

**Section 2.1.6** discusses the findings from the previous two sections, commenting on the quality of the review and suggesting how to interpret findings given some quality limitations. **Section 2.1.7** draws some broad-brush conclusions about global variation in RRI conceptions. It suggests that a process-based approach to RRI might accommodate and manage varied understanding of what means to do RRI, while in the longer term being a vehicle to help unify aspects of global RRI policy and practice. This section also suggests some improvements for further literature reviews in global RRI.

## 2.1.2 OBJECTIVES

This literature review aims to analyse literature on RRI in the regions covered by RRING. The review then aims to bring findings from the regional literature together in order to understand RRI-like approaches, frameworks and initiatives around the world. In particular the review seeks to understand what drives research and innovation (R&I) currently and in the medium term.

This ‘reconnaissance of literature (grey/white) on RRI-like approaches, frameworks and initiatives around the world is meant as a qualitative probe of what is out there. It does not focus on statistic validity nor completeness, since elucidating global RRI-type parameters is the aim of this review, rather than being its departure point.’<sup>2</sup>

## 2.1.3 METHODS

This aspect of the State of the Art Review involved analysis of literature on research and innovation in the regions covered by the project and appropriate domains. This reconnaissance of literature (grey/white) on RRI-like approaches, frameworks and initiatives around the world is designed as a qualitative probe to uncover what is already known on the topics addressed by the RRING project. It does not focus on statistical validity nor completeness, since elucidating global research and innovation parameters is the aim of this review, rather than being its departure point. Focusing on the concepts of RRI contained therein, this review forms the basis for governance and regulatory frameworks. Within the context of this scope, we have aimed for a selection of texts that is informed by, but not limited by the project’s country selection for the interview research in Task 3.3.

Firstly, two authors of this literature review (LL and HZ) conducted a pilot review of different RRI-related policies from various Dutch organisations. This was in order to test the data entry form named ‘Document Review Format’ (attached as Appendix III) and demonstrate to

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<sup>2</sup> This description is taken from the T3.2.2.2 literature review methodology, see Appendix II.

partners how to complete the form. Secondly, they invited seven project partners to take part in reviewing literature sources from the following regions:

*Table 1: Partners and regions covered.*

<b>Short partner name</b>	<b>Long Partner name</b>	<b>Region(s) to cover</b>
UNESCO & CEDLA	United Nations Educational, Scientific and Cultural Organization Centro de Estudios y Documentación Latinoamericanos (Centre for Latin American Research and Documentation)	Latin America + Caribbean
MEIJI & SFFRU	MEIJI University, Tokyo, Japan State Fund for Fundamental Research, Ukraine	Asia
CPN	Angela Ruskin University, UK CPN, Centre for the Promotion of Science, Serbia	Europe & North America
SAASTA-NRF	South African Agency for Science and Technological Advancement (part of National Research Foundation)	Africa
UniBrad	University of Bradford, UK	Arab Countries

Partners were to complete the following field entries in the data entry form for the literature source:

1. Bibliographic data
2. Summary about the document
3. Which stakeholders it involves<sup>3</sup>, and which geographic regions it applies to
4. Key R&I domains covered (ICT, Energy, Bio-Economy, Waste Management), RRI-related keywords the source uses

They were then to complete RRI dimension-specific fields (ethics, governance, open access, public engagement, science education) as well as dimensions or keys specific to the region if applicable.

## 2.1.4 PILOT RESULTS

LL and HZ completed five review forms as a pilot, using three Dutch organisations and two pan-European organisations (these last two were considered as part of the main analysis of n=57 sources).

The three pilot sources specific to the Netherlands were the Erasmus Rotterdam Real-Estate Sustainability Policy (P1), Unilever's 'Kansen voor vrouwen (Opportunities for women)'

<sup>3</sup> We were interested in involvement of the following types of stakeholder: RPOs, RFOs, industry large and SME, civil society, policy makers, national and international bodies, NGOs and researchers.

policy (P2) and the NWO (Netherlands Organisation for Scientific Research) Gender diversity policy. These sources were entered onto review forms but were not entered onto the Excel worksheet. One of these, P1, refers to one of RRING's project-specific domains of interest (energy). The others, P2 and P3, apply respectively to broader industry working and broader research activities. Below I give a short summary from each of the three pilot sources specific to the Netherlands.

P1 describes the Erasmus University Rotterdam (EUR) approach to sustainability in real estate. The source focuses on energy and how to improve sustainability of EUR campus buildings. Stakeholders involved are the public, researchers and EUR itself. Its policy has been formed with respect to the Dutch Societally Responsible Innovation movement (the 'Maatschappelijk Verantwoord Ondernemen' or MVO for short). This document aims to be starting point for ongoing expert and stakeholder consultation in realising a sustainable campus. Measures to realise this are assessed on their contribution to the three P's: planet, people, profit. Measuring the sustainability impact is done via a system called GPR which is a digital instrument for measuring the sustainability of buildings. The instrument uses five pillars: energy, environment, wellbeing and health, quality of use and future value. For each one a building is rated on a scale of 1-10. In the penultimate section, the source describes evaluation measures. To facilitate the transition to a more sustainable campus, it is proposed to create a "transition group sustainability" (in Dutch: "transitiegroep duurzaamheid"). Some actions will be taken under the umbrella of the MVO policies.

P2 comes from an industry source and a multi-national company (Unilever) which owns over 400 brands in the food and cleaning products sector. It is not specific to a geographic region, even though it is a Dutch company. Nor is it specific to RRING's project domains. Interestingly, '[t]he menu of the specific page [containing the source] shows that this document on Gender fits in a more general framework of activities by Unilever entitled "Sustainable Living Plan"'. This is consistent with the general thrust of the source which compares its gender efforts with the Sustainable Development Goals (SDGs). 'Unilever believes that strengthening the position of women and changing the norms and stereotypes that act as a barrier, will have a positive effect on society and the company.'

It then lists certain targets for improving women's opportunities. These include 'creating more chances' for women, improving safety (including measures against sexual harassment), skills' improvement, gender balance (especially in management), collaborating on improvements for women in other local institutions and other networks, improving training for women (but not training for all in gender for example).

It also gives a specific example of increasing the position of women in retail: the Shakti project. This is 'an initiative to financially empower rural women and create livelihood opportunities

for them. It provides a regular income stream for the Shakti entrepreneurs and their families.’<sup>4</sup> It originated in India and ‘is now used in South East Asia, Latin America and Africa as well’.

P3 is a source arising from a prominent national research funding organisation in the Netherlands. The source applies to RFO and RPO stakeholders. It does not mention any of RRING’s project-specific domains. It is oriented towards better gender balance both within its own staff cohort and in the cohort of researchers which it funds. It has monitored this and set targets for improvement based on increasing ‘gender awareness of reviewers in its processes and procedures’. Together with other government ministries, universities and other academic organisations, ‘NWO will also examine how it can support the career progression of female scientists in the coming years’. These efforts are to be measured quantitatively by the share of women on relevant committees and boards. Also proportion of men to women applying for and being awarded grants.

## 2.1.5 MAIN RESULTS

Partners submitted completed review forms for n=57 sources. An Excel worksheet was also completed for a proportion of these sources. A third author of this literature review (KS) filled partial or missing rows in the worksheet to provide a complete dataset for all sources for analysis. In some cases, partners assigned IDs to sources which they reviewed, but in other cases no IDs were used. KS therefore assigned each source a unique ID (UID) in the Excel and in the file name of the completed Word review forms (see template review form in Appendix III). These UIDs are used in sections discussing qualitative data. This is in order to identify passages from review forms.

In this main results section, we (KS, LL, HZ) firstly present quantitative results for the data. This indicates how well the sources which were reviewed were representative of countries, geographic regions, stakeholders and domains of interest to the RRING project. Secondly, at 2.1.5.5 and following sections, we present some qualitative results using relevant excerpts from sources. The qualitative results aim to deepen understanding of the concepts and ideas discussed in sources which are similar to EU RRI conceptions, or which contrast with EU RRI conceptions.

### 2.1.5.1 SOURCE COVERAGE OF COUNTRIES AND GEOGRAPHIC REGIONS SELECTED FOR ANALYSIS IN RRING

Partners above could choose which countries to select literature sources from, but we encouraged them to choose sources referring to countries and geographic regions of interest to RRING, as listed in Appendix I. The countries to which sources referred, and extent of

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<sup>4</sup> This definition is not used by P2. However, an independent link gives this definition.  
<https://www.hul.co.in/sustainable-living/case-studies/enhancing-livelihoods-through-project-shakti.html>

coverage is set out below (from n=57 sources). Figure 1 and Table 2 show which country or countries sources refer to, and whether they are in RRING country selection.

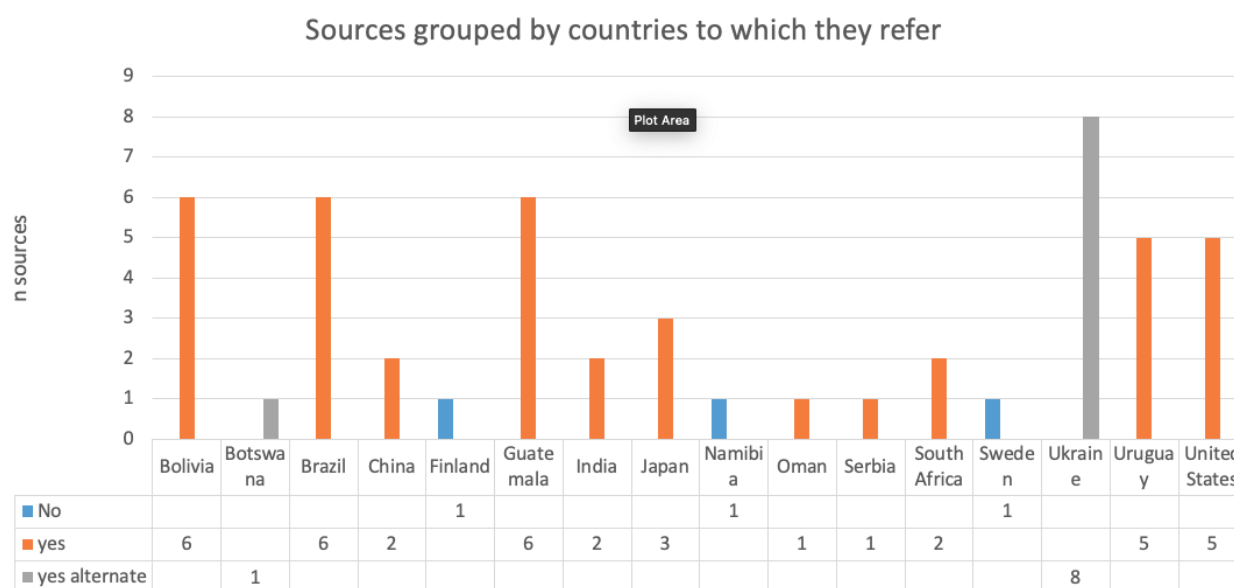


Figure 1: n of references within sources to countries of interest (yes, yes alternate) or to non-interest countries (No).

In Figure 1 and Table 2, sources could refer to more than one country. N=39 references are to first choice countries in the RRING project selection (yes), n=9 are the alternate not first choice country, and n=3 are not in the selection as either the first choice or alternate country. Overall, n=12 out of n=57 sources were not specific to any country.

Table 2: Full breakdown and percentages. NB some sources referred to multiple countries, hence a count of n=63 countries referenced or not referenced in sources.

No	Not country specific	Yes	Yes alternate	Grand Total
3	12	39	9	63
5%	19%	62%	14%	100%

Figure 2 shows the share of sources by geographic regions of interest (see Appendix I for details).

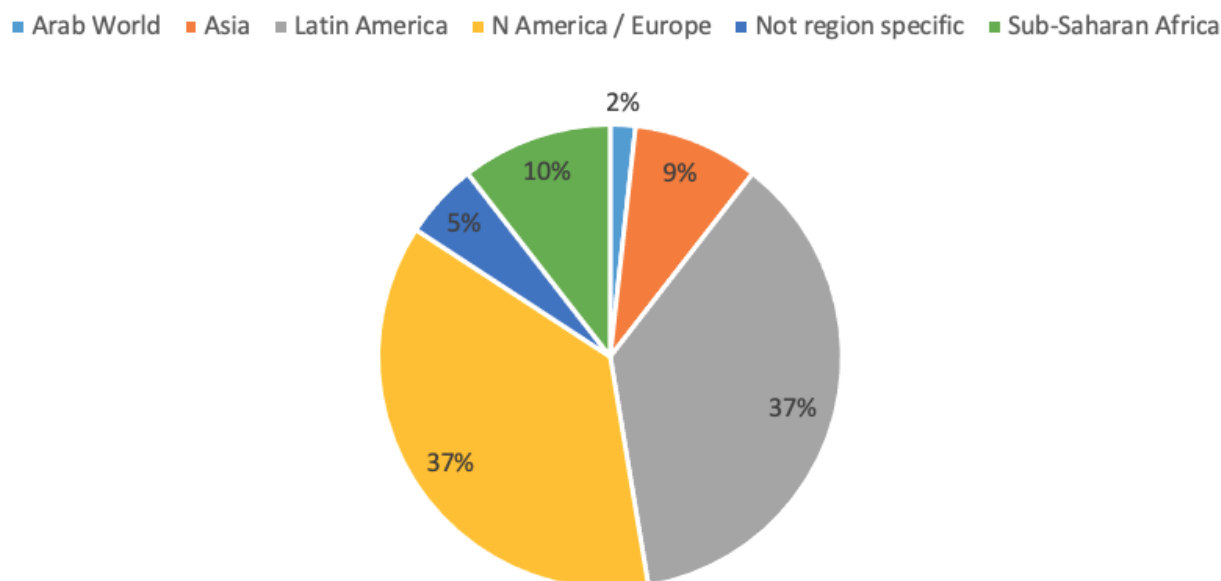


Figure 2: Sources by RRING geographic regions of interest.

Figure 3 below shows the proportion of sources referencing different gross domestic product (GDP) and Gross domestic expenditure on R&D (GERD) wealth/development rankings within the project's country selection. For all rankings, see Appendix I. 'Must select' countries are India and China. This shows a reasonable spread of sources over low-high wealth/development countries.

### Sources by GDP or GERD ranking

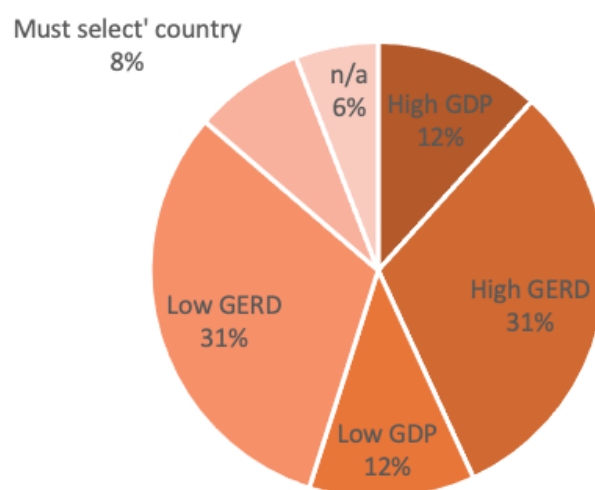


Figure 3: RRING country source share by GDP/GERD ranking.

However, overall few regions were represented in sources for all four rankings (high/low GDP, high/low GERD). Only the Latin America region was represented for all four rankings (see third column along in Figure 4 below).

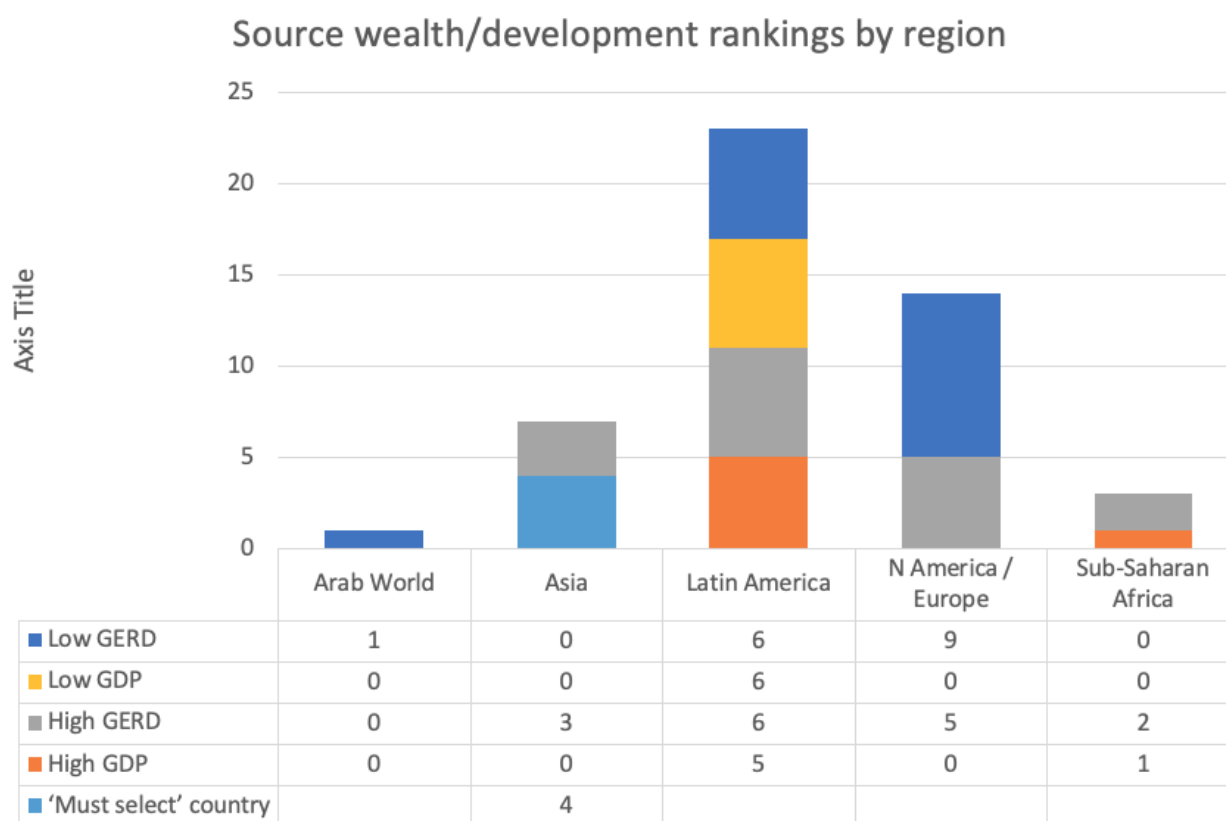


Figure 4: References within sources to RRING countries of interest, references grouped by region and stratified by their GDP and GERD ranking.

Figure 4 shows the number of references within sources to RRING selection countries, given that one source could refer to multiple countries. It is grouped by region and stratified by different GDP and GERD rankings. Notably, even the North America and Europe region does not have good coverage of different rankings. This is because even though a number of pan-European publications were reviewed, they did not reference, nor apply specifically to, the RRING N America / Europe countries selected (see Appendix I for details).

### 2.1.5.2 SOURCE APPLICABILITY TO STAKEHOLDERS

Table 3 shows the number and percentage of sources which applied to different types of stakeholder. Note one source could apply to multiple stakeholders, hence n=123 instances of stakeholders to which n=57 sources applied. There are a number of limitations with Excel data in this field. Firstly, the Excel worksheet had only 3 columns for stakeholders, hence only the first three stakeholders referred to in each review form were entered in the table. Secondly, some reviewers introduced new categories of stakeholder, making it difficult to group the data. Thirdly, some types of stakeholder referred to two types of stakeholder (e.g. international organisations and NGO, civil society and NGO). Fourthly, some categories of stakeholder overlapped (e.g. grass roots and civil society and NGO; public and community). It was also difficult to resolve this by simply reporting the term which the source used, since often sources

were not in English, so involving interpretation as to whether, for example, the source originally referred to public or community.

*Table 3: Applicability of sources to different types of stakeholder.*

Type of Stakeholder	Count of references within sources (n and %)	
All	3	2%
Civil Society and NGOs	19	15%
Community	2	2%
Governments	8	7%
Grassroots associations	1	1%
Industry	19	15%
International Organisations and NGO	1	1%
Policy makers	22	18%
Public	7	6%
Researchers	19	15%
RFO	8	7%
RPO	14	11%
Grand Total	123	100%

### 2.1.5.3 SOURCE ORIGIN BY STAKEHOLDER

Figure 5 below shows which stakeholder groups were responsible for producing the source reviewed. This responds to the suggested coverage ratio for sources to be picked by reviewers in the T3.2.2.2 protocol.

The following suggested coverage ratio for the origin of sources to be reviewed was given in the T3.2.2.2 protocol:

- RPOs: 3 leading universities from a country, 3 leading private/non-university RPOs
- RFOs: 3 leading RFOs of the country.
- Industry large: 2 leading companies from each of the 4 domains.
- Industry small, i.e. SME: 2 representatives from each of the 4 domains

For each of the other following stakeholders, the protocol suggested that at least one source should originate from:

- Civil society
- Policy makers
- National and international bodies,
- NGOs
- Researchers

To assess coverage, one review author (KS) added a field to the Excel sheet (column I) and filled entries, based on the ‘About the authors’ section of the review form. This field is potentially useful in order to show whether the sources selected met this coverage ratio. Figure 5 below shows source origins by region and the coverage ratio. This shows that the suggested

coverage ratio was not met in most cases (values below 0 means sources did not cover these stakeholder groups).

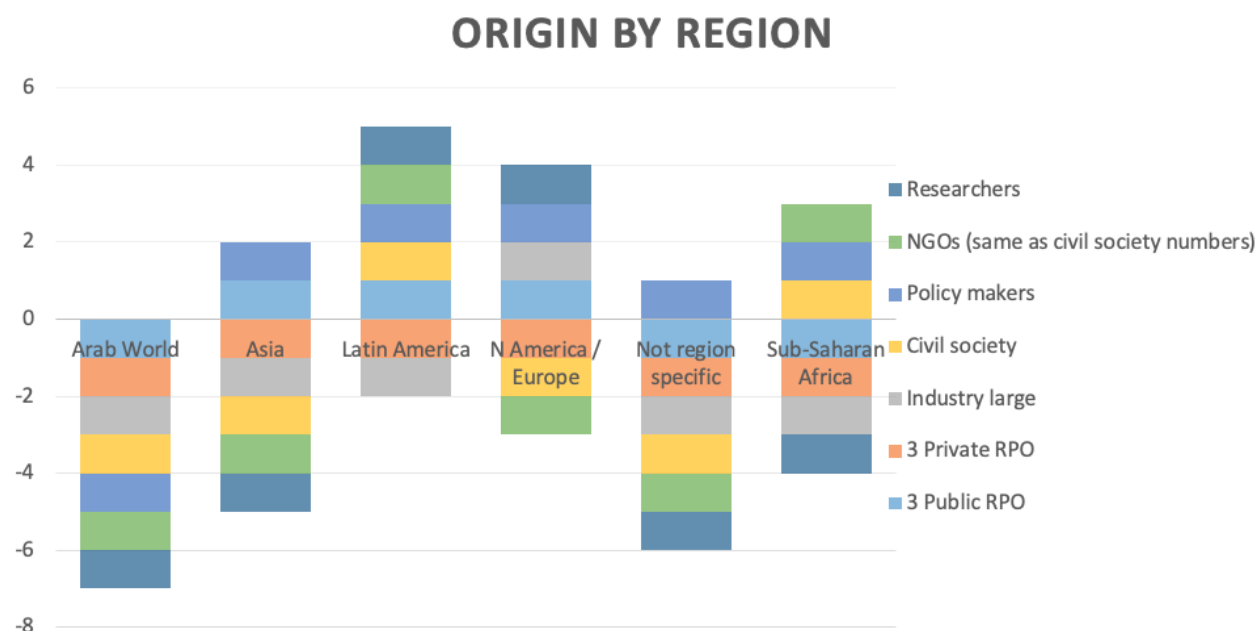


Figure 5: Coverage ratio of stakeholders publishing sources by region.

In particular, Figure 5 indicates that no regions had 3 or more sources published by or originating from private RPOs (but this also related to a difficulty in defining and identifying a private RPO). The field ‘Policy makers’ is, on the face of it, well-represented (present in 5 out of 6 of regions’ sources) but is a combined value of sources published by ‘Civil Society and NGOs’ and ‘National and International bodies’. These dual-title stakeholders also mean double counting is occurring between civil society, NGO and Policy-maker types of stakeholder.

In general, there are a number of limitations in interpreting the data entered for this field. Firstly, and in similarity with the previous section, the categories above are not mutually exclusive (e.g. researchers are to an extent the same as RPOs (private and public)). Secondly, it was difficult to work out whether a RPO was public or private, and how these types should be defined. Thirdly, it was unclear whether, for example, sources written by a group of researchers represented issues relevant to their institution, or just their own individual research interests. Fourthly, group-authored publications could involve multiple researchers from multiple institutions. To address this, the first author and his/her institution was entered as the stakeholder type, but this will have introduced an accuracy issue. Finally, it was not possible to comment on coverage of large industry or SMEs, since only one source (UID 26) originated from a large industry stakeholder and did not reference any of the 4 domains of interest.

### 2.1.5.4 SOURCES BY DOMAINS

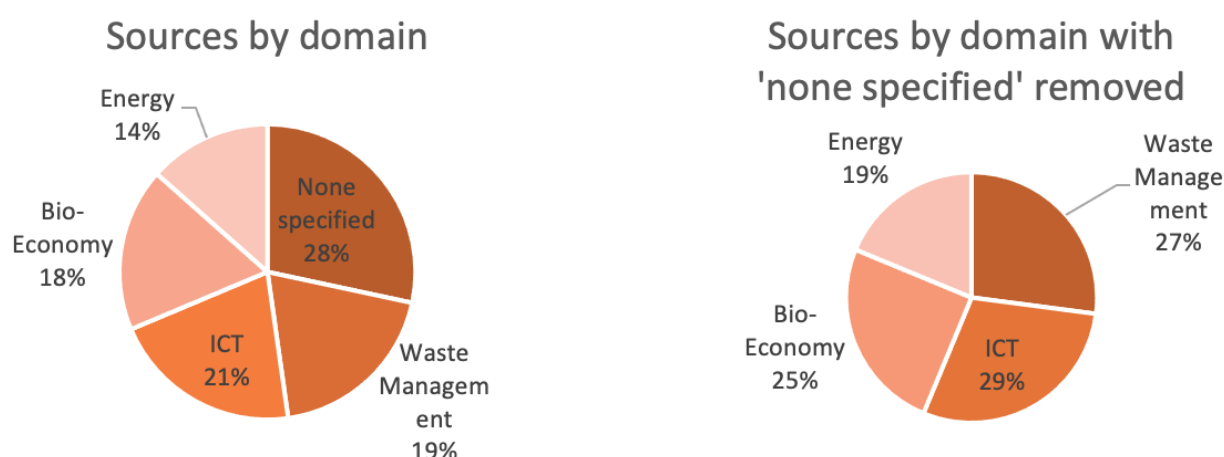


Figure 6 a and b: % instances of domains applying to sources, with and without 'none specified'.

Figure 6 a and b show percentage of sources which applied to the four domains of interest (waste management, ICT, Bio-Economy and Energy), firstly showing percentages including where no domains were specified, secondly without including that figure. Their accompanying table is below. Note that some sources referred to multiple domains leading to n=48 references to specific domains from n=38 sources. N=19 sources did not specify any domains.

Table 4: n of instances of domains applying to sources.

Sources by domain	n
None specified	19
Waste Management	13
ICT	14
Bio-Economy	12
Energy	9
Total	67

### 2.1.5.5 SOURCE SIMILARITIES TO EU CONCEPTIONS OF RRI

This subsection marks the beginning of the qualitative presentation of results. Here and in the sections below, we use written excerpts from the reviews of the n=57 literature sources. This in order to illustrate source similarities to and differences from EU conceptions of RRI in the domains of interest. It is also to illustrate aspects from sources which are relevant to RRI, but not captured in current EU RRI frameworks and conceptions.

We have grouped excerpts based largely on reviewers' own categorization of RRI keys. Quotation marks refer to the reviewer's or source's text. We have also clarified certain aspects in square brackets, or in text standing outside quotation marks. In places we have underlined key concepts of interest. UIDs identify the sources.

Before each excerpt, the UID is listed, the country or region specified, and relevant domain(s) are also specified. At the end of each subsection, there is a summary of themes arising within the sources which have been discussed.

Within this subsection, a number of sources indicate whether EU RRI conceptions have been adopted, and how they have been understood and applied in particular national or regional contexts. Sources varied in whether they referred to RRI as a whole, or as a particular type of conception (the five or six key or process-based conception, see 2.1.5.5.2 and 2.1.5.5.3 respectively.) Furthermore, one source took EU RRI to involve different keys or dimensions which may indicate a nascent ‘other’ type of RRI conception entirely (see 2.1.5.5.4 Other conceptions).

### 2.1.5.5.1 General similarities

Some sources compared national or regional policies in R&I to the EU RRI conception as a whole.

ID 31, Ukraine, no domains specified: ‘development of the action plan though figuring out the legislative background to have opportunities for integration of Ukraine in European Research actions.’ It seems the move here is to integrate Ukraine’s R&I action plans with the EU conception of RRI.

ID 55, South Africa, no domains specified: notes that ‘The OECD group is further setting up an agenda to advance responsible research and innovation. A South African focus on responsible research and innovation would help local researchers to collaborate and compete with their foreign counterparts in a world where ethical concerns (for example, fair trade) and environmental concerns (such as emission standards) are increasingly influencing competitiveness’ pdf p4

ID 55 ‘Science, technology and innovation can help build a basis for a knowledge-based society and a healthy economy, but it can also cause harm. Although determining what is responsible is not an easy exercise as different stakeholders, with often opposing agendas, have to be taken into account, South Africans should develop a shared normative understanding of what is appropriate for our reality. A South African responsible research and innovation (RRI) approach would rest on the following pillars: (i) engagement of all societal actors throughout the process of framing societal challenges and developing joint solutions; (ii) addressing racial and gender transformation to unlock the full potential of South African society; (iii) improving the educational and skills profile of South Africans; (iv) increasing open access to STI; (v) maintaining a high level of ethics in terms of the relevance and acceptability of STI to society and environmental sustainability; and (vi) developing the required governance framework to drive the RRI agenda across the NSI.’ pdf p13.

**In summary**, n=2 sources from Ukraine and South Africa respectively aspire to the RRI conception as a general concept, but in at least in part this is to retain competitiveness in the EU market.

### 2.1.5.5.2 The five or six key RRI conception

Other sources or source reviewers compare their policies to the five or six key RRI conception. Reviewers were also asked to indicate where sources referred to the five or six keys, referred to in Appendix III as ‘Dimensions’. Figure 7 shows coverage of RRI keys by sources by region, noting that one source could refer to multiple keys.

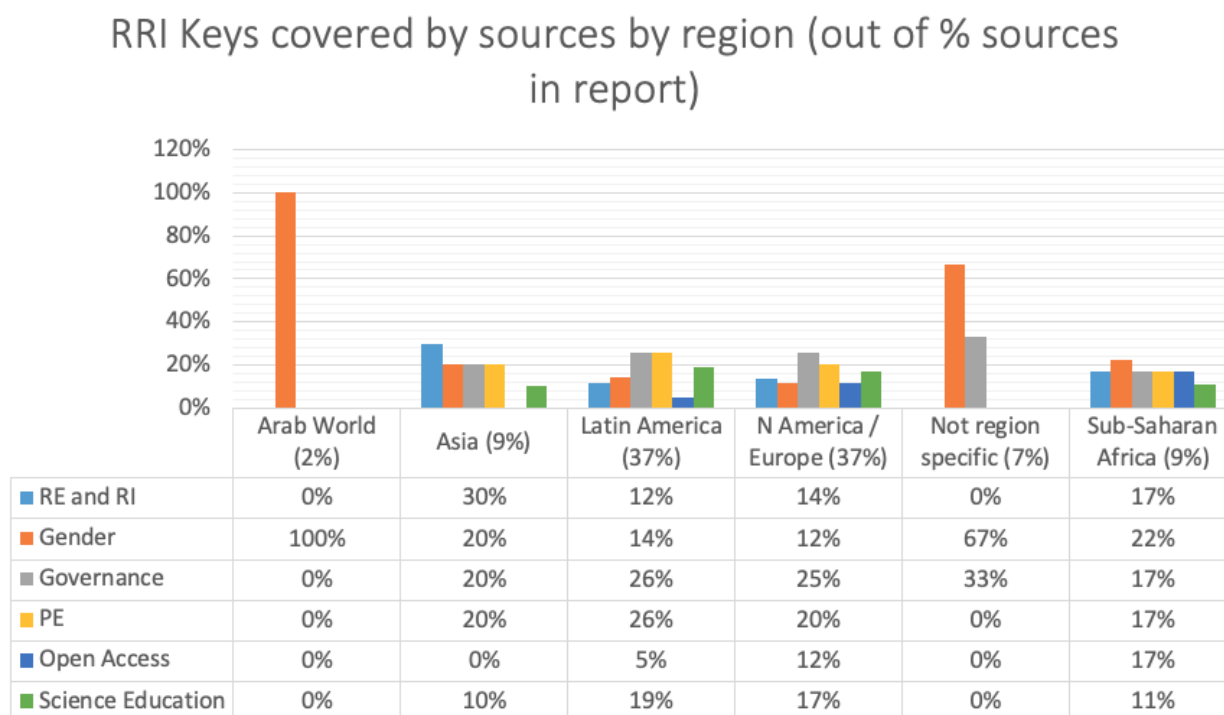


Figure 7: Source coverage of RRI keys by region.

However, it is hard to derive a meaningful sense of coverage, given the uneven regional source representation. For example, the Arab World makes up only 2% of sources reviewed. Therefore, it would be misleading to conclude that its RRI-related literature only focuses on gender and gender equality. Perhaps the results for Latin America and N America / Europe (both 37% of sources) can be taken as more representative of which keys are more/less prominent in each region, however.

Figure 8 below shows how reference to RRI keys varies based on the year of source publication.

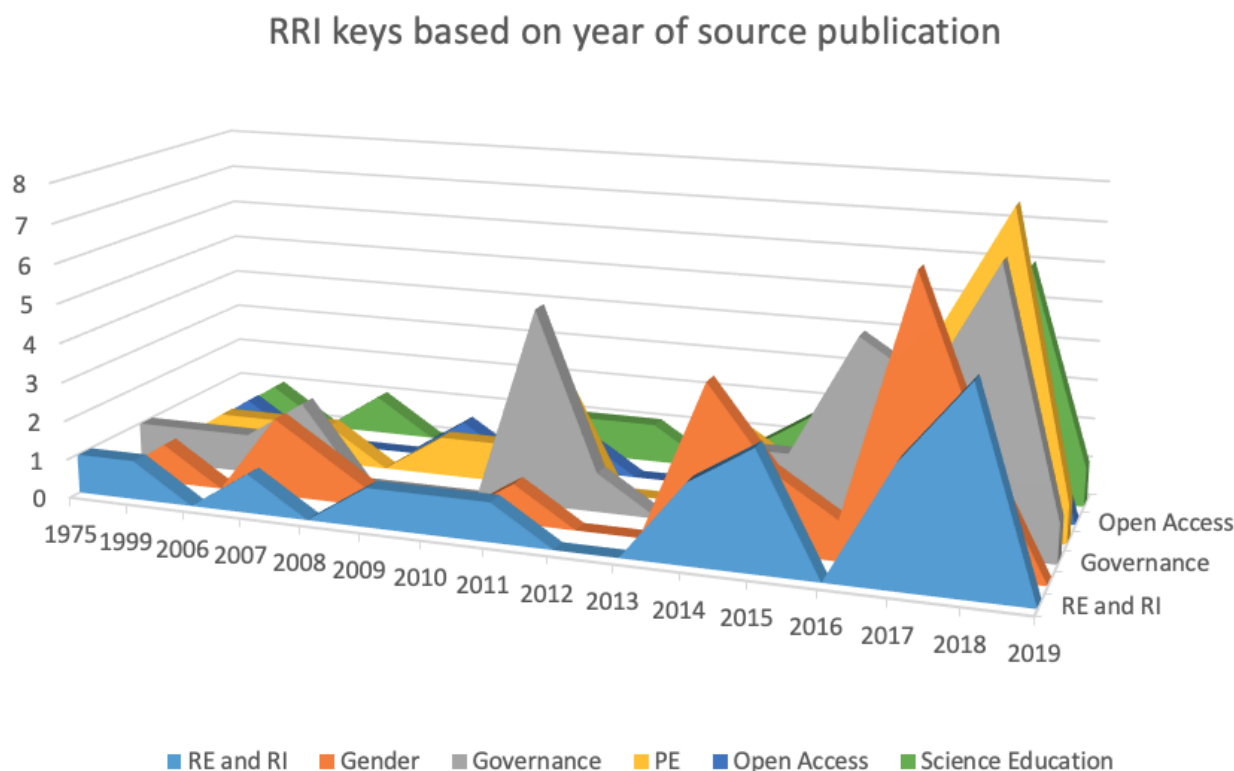


Figure 8: Variation of RRI keys depending on year of publication.

Figure 8 shows how the five or six key conception of RRI becomes more developed in sources from 2016-19, which may be due to development of the concept over that time period in the scholarly literature and other EU reports or projects. The particular focus on **gender** (see orange spike in 2017) may correspond to the parallel development of gender and empowerment policies such as the UN MDGs or SDGs (see qualitative data on gender below at 2.1.5.5.2.2). This focus may also be explained by broadening of gender as a key to include other equality and equity considerations (again see 2.1.5.5.2.2), namely not only equal treatment for women, but also for other minority groups (socio-economic, racial, sexual, and generational groups). **Public engagement** (yellow spike in 2018) is also very prominent in sources published over the last 4-5 years, as well as being a consistent theme of interest between regions in Figure 7 (see yellow columns). This finding may denote agreement globally about the value of public engagement or participatory approaches in governing R&I. However, it could also denote an interpretation error of sources (see 2.1.5.7.5.2 below) and refer to a one-off participatory research method, not a sustained public engagement RRI policy. **Governance** is also a consistent feature across regions (see section 2.1.5.5, Figure 7). However, there are key differences between governing research, good (efficient) governance and good (ethical) governance, which the qualitative excerpts below do not necessarily register (see 2.1.5.5.2.3). These differences deserve more scrutiny as the global RRI conception is mapped in RRING. Perhaps surprisingly, given the increasing importance of research ethics as an academic discipline and policy focus from the 1970s onwards, **research ethics and research integrity** (RE and RI) is not particularly important. This could be because sources do not for the most part describe primary research on human or animal subjects. Nevertheless, this indicates that

even the societal relevance and acceptability aspect of RE and RI is not widely understood to be important in the sources reviewed. Similarly, **Open access** and **science education** initiatives are less of a focus among sources overall, although a select number of sources offer detailed rationales for the importance of such initiatives (see 2.1.5.5.2.5-6 below).

In the below sub-sub sections, we elaborate each of the six keys in greater detail using qualitative excerpts from sources.

#### 2.1.5.5.2.1 Research ethics and research integrity (RE and RI)

ID 68, India and China. Information and communications technology (ICT) and Bio-Economy domains. This source is a wide-ranging book bringing together the major outputs of an EU Project (Global Ethics in Science and Technology, GEST). It includes chapters on public perceptions of and engagement with Science, Technology and Innovation (STI) in Europe, India and China; various specific investigations into the concept of ethical oversight of STI as part of governance structures including the constitution of China; case studies on food technology, nanotechnology and synthetic biology.

Using risk and innovation, power and control, reflective ethics, and lay morality discourse approaches, the source determines that in Europe risk governance dominates and ‘innovation for common good sometimes suffers’. In comparison, in China public discourse around innovation, risk and power and control is weak. In India there is a lack of ‘risk governance, and a [tension between] national equity versus international competitiveness.’

ID 68 ‘The Indian example also stresses the importance of the indigenous knowledge base, particularly in bio-resources (important for the bio-economy domain)’. ‘India’s STI “policy tone” stresses inclusion and equity, but there are doubts about the strong implementation of this in actual policy and practice.’

ID 72, Japan, ICT domain: ‘The proper inclusion of true collaboration between ICT researchers and SSH (Social Science and Humanities) researchers on an equal footing is suggested as the appropriate way forward for suitably socially and ethically beneficial AI development. The author criticises the standard model of senior ICT researchers employing junior SSH researchers as either figleaves or post hoc add-ons to their technical research.’ [Note ID 72 reviewer discussed this under the research ethics / research integrity section of the data entry form, but this discussion may properly belong to the gender section.]

ID 75, USA, Bio-economy domain: ‘A scientist’s sense of social responsibility is increasingly relevant for new technologies...There are significant differences [based on this survey of US nano scientists] in researchers’ sense of social and ethical responsibility depending on their demographic characteristics, job affiliation, attention to media content, and their risk and benefit perceptions of towards their work.’

**In summary**, source ID 68 makes explicit reference to ethical oversight. ID 72 also refers to embedded staffing to achieve socially and ethically beneficial R&I. However, perhaps surprisingly among the sources, RE and RI (either conceived as oversight and risk protection,

or as societal relevance and acceptability of R&I, or as the integer ‘good’ researcher), is not a common part of the source discourse about RRI approaches. ID 75 suggests that the integer researcher is also one who is socially responsible, but this is contained within the researcher’s own, self-governed sense of social and ethical responsibility. This seems counter to bottom-up and participatory conceptions of RRI.

#### 2.1.5.5.2.2 Gender

ID 41, Oman, ICT domain. This source is a ‘gender-sensitive assessment of the ICT space in Oman and the status of women within it, and to develop the seeds of an information base that provides gender analysis of the opportunities and challenges in the ICT space.’

ID 44, China and India, Waste management domain. Source references the UN Millennium Development Goals (MDGs). These cover (1) promoting gender equality and empowering women, (2) reducing child mortality, (3) improving maternal health, (4) ensuring environmental sustainability and (5) securing global partnerships for development.

ID 55, South Africa, no domains specified. Gender is ‘gender equity’ and includes black people, women, youth, disabled, those with lower education attainment. Policy and implementation measures are listed. E.g. on policy, ‘The White Paper adopts a broad view of human resource development in higher education, recognising the urgent need to: • Take cognisance of the multidimensional nature of black students’ lived realities (such as university fees, accommodation, nutrition and transport)...’

ID 58, Guatemala, Waste Management and Bio-Economy domains. Based on an equity approach (gender, ethnic and generational), equitable and equal participation in decision-making spaces and access to resources is promoted.

ID 72, Japan, ICT domain. An aim of gender equality is to ‘to improve equality of gender representation in AI-related research partly by recruiting from multiple disciplines including those which are female-dominated (SSH) to balance the male domination of CS [computer science?] research. To improve the representation of female inputs and outputs in AI research in both substantive and conceptual ways... One of the primary motivating factors for the development of the approach described was a gender-insensitive academic magazine cover in AI.’

**In summary**, gender can be conceived just as promoting gender equality between men and women (as in the ID 41 and 72 example). Or it can be conceived more widely as gender equality and diversity, with equality and equity approaches towards several minority groups.

#### 2.1.5.5.2.3 Governance

ID 53, South Africa, ICT. Governance includes committing to eGovernment or digital government, whereby ‘ICTs and digital technologies...make government processes more

efficient, strengthen public service delivery and enhance participation by citizens in governance.'

ID 58, Guatemala, Waste Management and Bio-Economy domains. 'The experience of the Project on Innovations in Value Chains of Special Vegetables is analysed and highlights the main achievements and lessons learned, which serve as a tangible example of a positive impact on the linkage of ARD [Agricultural research for development] with innovation, development and the role that can be achieved by policies and institutional mechanisms to promote this relationship... Based on an equity approach (gender, ethnic and generational), equitable and equal participation was promoted in the areas of decision making and access to resources. In the institutional scope, extensive areas of dialogue were created, necessary for the establishment of governance and governability.'

ID 58 also emphasizes the role of municipalities in sustaining innovation procedures. This is because central government lacks the capacity to do this.

ID 70, Japan, Energy domain: 'Using Action Research, the academics involved in the project identified a large scale STI policy exercise and engaged with policymakers to provide them with suitable mechanisms to obtain relevant public input on their deliberations. In doing so, they identified initial science communication to the public, methods of recruiting public participants, approaches to synthesis useful input for policymakers, and persuasive arguments aimed at policymakers to regard such input as useful for their deliberations. A highly encouraging note for this area is that many policymakers expressed frustration with existing policymaking processes, providing fertile ground for change, which may be managed to include greater public input.'

ID 71, Japan, ICT, Bio-economy and Energy domains. Despite the reviewer's view that the program in this source has generally failed to achieve RRI standards (see comments under 2.1.5.6.2), governance of funding streams in several R&I areas, including 3 of the domains of interest (ICT, bioeconomy and energy), has improved: 'Since the program has been running since 2013, this aspect [governance using independent academic experts to review outcomes not just approve funding proposals] has been successfully implemented to guide each year's program of work within the scheme.' [Success is indicated to be whether funding solves identified social problems].

ID 75, USA, bio-economy domain. The source notes that 'The regulatory process in the United States is designed to be slow moving and incremental. Often policy cannot keep pace with the advancements of emerging technologies (i.e. nanotechnology).'

ID 76, USA, no domains specified. This primer for policy makers argues for the concept of responsible innovation. This 'seeks to imbue in the actors of the innovation system a more robust sense of individual and collective responsibility. RI [responsible innovation], like

permissionless innovation<sup>5</sup>, appreciates the power of free markets in organizing innovation and realizing social expectations but differs with it in being self-conscious about the social costs that markets do not internalize.’

**In summary**, governance is seen as serving the aims of other RRI keys (PE in ID 53, gender equality in ID 58, Science Education and PE in ID 70), as well as being valuable in itself. Local governance (ID 58) is seen as important. ID 71 also indicates the importance of a monitoring and evaluation aspect to governance using relevant stakeholders. Ethical governance is described by ID 76 in the concept of responsible innovation.

#### 2.1.5.5.2.4 Public engagement (PE)

ID 53, South Africa, ICT: ‘Government is committed to promoting active citizenship. To further this, the author [the Ministry] has established a National ICT Stakeholders Forum to facilitate participation by a broad range of stakeholders in implementation of ICT-related policies and plans. This Forum provides a platform for dialogue and engagement between government, the private sector, academia and civil society. Its focus is on accelerating implementation of all policies and sectoral plans. Membership of the Forum and participation in its meetings is open to all those interested in participating in fast-tracking implementation of government policies to build a people-centred and inclusive digital society and economy.’

ID 55, South Africa, no domains specified. PE is taken to be covered under open access initiatives.

ID 58, Guatemala, Waste Management and Bio-Economy domains. This source emphasizes the importance of brokers or facilitators of creation processes of skills and knowledge management. In the source’s case, the broker was the Tropical Agronomic Research and Development Centre (CATIE) (which ran or hosted the research project described in ID 58). These brokers help link up different levels in the engagement process (farmers, producing families, farmer organisations and municipalities).

ID 59, Bolivia, Bio-Economy domain. ‘The investigative process was oriented to development of proactive and transformative knowledge around the dynamics of rural farmers agroindustry, generated from reflection and debate between local and indigenous knowledge and academic scientific knowledge. To facilitate this interactive process of knowledge dialogue, between researchers and small-scale farmers, Local Research Committees were established for each of the thematic areas of rural farming agroindustry: organizational development, development of new processed products and market development. These committees were made up of local farming promoters, the figure of the yachaj (local knowledge generators), who later became applicators and diffusers of knowledge to the rest of the community, assuming the role of

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<sup>5</sup> Permissionless innovation ‘cautions that “ex ante (pre-emptive and precautionary) regulation is often highly inefficient, even dangerous” and “likely to come at the expense of innovation and growth opportunities” (Thierer, 2014, p. 75)’

vachachej (those who teach), actively supported by researchers and university students, also assigned by thematic areas.’

ID 70, Japan, Energy domain. ‘Offering [during an action research project] free policy design workshops to STI policymakers which included public engagement processes alongside existing and other new aspects, in relatively informal settings, provided an excellent base for encouraging new approaches by policymakers.’

ID 71, Japan, ICT, Bio-economy and Energy domains. ‘Civil servants coordinated public meetings and public comment periods on the initial creation of the program [SIP program in Japan] in 2013... Some useful concepts for including the public in deciding the main targets for a major public investment in R&D, but disappointing that this was not followed up with public engagement in the conduct of the work or the outcomes of the projects.’

**In summary**, public engagement is seen as adding value to planning and policy (ID 53 and 70). However, there is the slight suggestion from ID 71 that these engagements can be seen more as instrumentally valuable, rather than the right thing to do for broader societal reasons. ID 59 is the most ambitious of the sources here in institutionalizing public engagement via local research ethics committees (RECs), in particular to capture the insights of local knowledge generators, who also provided means of communicating issues more widely in the community.

#### 2.1.5.5.2.5 Open access

ID 49 Latin America and Caribbean regions. Not country-specific. ICT domain. The ‘overarching and inclusive approach to science publication could be considered a similarity between SciELO [the Scientific Electronic Library Online] and EU-RRI policy.’ SciELO came about to bridge knowledge production across different platforms. It not only complies with other national and international guidelines (e.g. the Committee on Publication Ethics (COPE), the Council of Science Editors (CSE), the Equator Network, and the International Committee of Medical Journal Editors (ICMJE)). It also promotes inclusivity among different scientific communities, critical reflection on how to improve science communication, and aims to decolonise perspectives on research.

ID 53: South Africa, ICT domain. eGovernment is designed to be transparent, and ‘[to make] it more possible to ensure that key non-personal public information and data is freely available to everyone to use, reuse and republish as they wish, subject only to restrictions to protect privacy, confidentiality and security in line with the Constitution. South Africa is one of the founding members of the global Open Government Partnership and took over the chair of this in 2015. As one of the signatories to this partnership, South Africa has committed to developing an open data policy framework and action plan.’ ‘In order to realise South Africa’s developmental objectives, transform society and the economy, encourage broadband deployment, and preserve and promote the open and interconnected nature of the Internet, an open access regime will be implemented’.

ID 55, South Africa, no domains specified. South Africa lacks licensing for depositing data and use of open data. This is to be put in place. Compliance with FAIR principles is mentioned. ‘Contemporary open science and open innovation requires data to be findable, accessible, interoperable and reusable (FAIR) in the long-term, and these objectives are rapidly becoming expectations of funding agencies and publishers.’ ‘The DST will develop a long-term sustainable business model for a South African research data cloud. Institutional data repositories will be encouraged. More support is also needed for the harmonisation of repositories...’

Also ID 55 on open science: ‘Incentives for open science will be fostered through education programmes and career development programmes for researchers. A focus on citizen science will also be introduced.’

Also ID 55 on wider networks ‘As part of its commitment to African STI cooperation, South Africa will also work to advance the open science agenda elsewhere on the continent and within regional frameworks. The strategic role of the African Open Science Platform, hosted by the Academy of Science of South Africa,’

**In summary**, open access (OA) is the dominant comparative key concept among the sources here, though open science (OS) is also mentioned by ID 55. Furthermore, ID 55 regards OA as linked to Science Education. ID 53 sees OA as facilitating broader development goals. A particular novel and improved model of OA is proffered by ID 49 and the SciELO approach.

#### 2.1.5.5.2.6 Science education

ID 53 South Africa, ICT domain: ‘There will be a focus on developing programmes which focus specifically on ICT innovations such as skills for cloud computing, big data and Internet of Things. The ICT policy review noted the fragmented nature of the skills sector, making it difficult to maximise the value of the existing interventions to develop new e-skills across the ICT sector.’

ID 55 South Africa, no domains specified. ‘In the current global “post-factual” society, raising science awareness is of increasing importance in efforts to provide credible alternatives to dubious sources of information. However, with growing access to the Internet and the proliferation of unverified information across digital media, these efforts are even more difficult. In South Africa, the problem is compounded by issues in the education system and the fact that the spatial development patterns of apartheid have to a large degree persisted, particularly in rural areas, which means that many people live beyond the reach of science awareness campaigns.’

ID 58 Guatemala, Waste Management and Bio-Economy domains. Innovation teams were consolidated in each organization that participated in knowledge exchange tours, training workshops on agroecological vegetable management, and in technology evaluation processes.

ID 71 Japan, ICT, Bio-economy and Energy domains: ‘Cybersecurity is well-known in ICT to be an area that has not received enough attention in education. Specifically providing funding

to enable cybersecurity researchers to produce useful educational material for broader use was an interesting proposal as part of the [SIP Japan government funding] scheme.’

ID 75, USA, Bio-economy domain: ‘The authors put forwards that scholars have argued that concepts of social responsibility should be at the core of training and education for scientists and engineers. They suggest that scientific disciplines should change the way scientists are trained to better address issues of social responsibility.’

**In summary**, improvements in education are seen as helping the future workforce (ID 53 and 71) and addressing fake news (ID 55). ID 75 argues for changes in which nano scientists are trained such that they think about their social responsibility (although such training might either refer to scientists’ education in ethics, or to their becoming integer researchers). Sources therefore differ in whether they conceive of science education more strictly as educating future scientists, or more broadly as educating society, and being socially-valuable because of gains such as greater human or societal flourishing.

### 2.1.5.5.3 The process-based conception (anticipation, reflection, inclusive deliberation, responsiveness)

So far in this section we have examined source similarities to the EU RRI conception as a whole, or the five or six key conception specifically. Still other sources indicated use of the process-based conception of RRI. This conception is based on procedural legitimacy or how certain procedural standards for thinking about R&I will lead to responsible decision-making outcomes. Four sources (IDs 24, 27, 49 and 59) mentioned anticipation, reflexivity, inclusive deliberation and/or responsiveness. Details of sources are below:

*Table 5: Details of sources by review ID and partner*

Review Unique ID	RRING Partner who reviewed	Source title	Year
24	CEDLa	RRI-Practice: Report from National Case Brazil	2018
27	CPN	Constructing future scenarios as a tool to foster responsible research and innovation among future synthetic biologists	2018
49	CEDLa	The SciELO [(Scientific Electronic Library Online] Open Access: A Gold Way from the South	2009
59	UNESCO	Investigación participativa revalorizadora e innovación tecnológica Enfoque transdisciplinar en la innovación de saberes agropecuarios Experiencia piloto de producción y mercadeo de pito de Cañahua y Charque de llama en la comunidad Tallija-Confital (Cochabamba-Bolivia)	2010

The four IDs above reference only partial aspects of the process-based conception of RRI. In ID 24 reflexivity and anticipation are mentioned. In ID 27 scenarios were constructed in terms of the four dimensions: anticipation, inclusion, reflexivity and responsiveness. In ID 49 the reviewer says that ‘The projects’ normative [basis], although indirectly, can be deeply

connected to RRI four dimensions of inclusion, anticipation, reflexivity, and responsiveness as described by Heintz et al. (2013).’ However, this is not evident from project text. Finally, in ID 59, reflection is mentioned.

#### 2.1.5.5.4 Other conceptions

Finally, in this subsection, one source compared policies in Bolivia and Brazil to EU RRI policy without specifically touching on any keys or processes in the conceptions above.

ID 45, Bolivia and Brazil. ICT and Bio-Economy domains. ‘The transnational dimension of this program can be seen as a similarity to EU-RRI policy which requires a well concerted organization which is not well addressed in the paper. Likewise, the Amazon Creative Lab is a variant of Living Labs which are popular in EU.’

**In summary**, the source reviewer here suggests the EU RRI conception entails good organisation (or perhaps cooperation) between different countries. It also suggests the Amazon Creative Lab is a type of living lab, defined as ‘a user-centred, open-innovation ecosystem, often operating in a territorial context (e.g., city, agglomeration, region), integrating concurrent research and innovation processes within a public-private-people partnership’<sup>6, 7</sup>.

#### 2.1.5.6 OTHER CONCEPTIONS

Here we describe alternative conceptions of responsible, or otherwise ethically-oriented approaches to research and innovation which reviewers flagged as particularly different from the EU RRI conception. These data are important for developing understanding in RRING of what it means to act responsibly in R&I, where such understanding should move beyond euro-centric conceptions. This subsection is divided into two parts. The first part illustrates ‘keys’ (i.e. standards or conceptions) of responsible R&I practice which are different from EU conceptions and are specific to particular geographic regions or sources themselves (see 2.1.5.6.1). The second part illustrates differences in conceptions or policy initiatives relating to RRI which particularly contrast with dominant EU RRI policy, or with other EU political and economic conditions (see 2.1.5.6.2).

##### 2.1.5.6.1 Other conceptions

See ID 17, Brazil, Bio-Economy and Energy domains: ‘a remarkable and striking difference is the focus on innovation for social-justice. - ‘(...) there are more pressing challenges of socio-

<sup>6</sup> Wikipedia definition: [https://en.wikipedia.org/wiki/Living\\_lab](https://en.wikipedia.org/wiki/Living_lab)

<sup>7</sup> Public private and people may seem tautologous. An explanation is given here of the 4P concept <https://www.nordregio.org/nordregio-magazine/issues/people-and-cities/public-private-people-partnerships-a-new-concept-to-bring-public-and-private-actors-and-citizens-together/>

economic and urban development than science-based innovation (unless RI can seek to develop ways to bring these together)’ (p.1)’

ID 44, China and India, Waste management domain. The source references the ‘wider climate discourse’ of the UN Millennium Development Goals (MDGs). These cover (1) promoting gender equality and empowering women [similar to EU RRI conceptions, but also...], (2) reducing child mortality, (3) improving maternal health, (4) ensuring environmental sustainability and (5) securing global partnerships for development.

ID 46, Brazil, Waste management and Bio-Economy domains. The source introduces eco-industrialism and inclusive growth concepts. ‘In short, eco-industrialism holds on to the concept of industrial activities that prioritize eco-efficiency whilst using resources, though not necessarily rooted in renewable sources. Inclusive growth in the other hand, is perceived as the direction of wealth created by economic growth to peripheral spheres of society.’ There are limitations to the concepts of eco-industrialism and inclusive growth. One does not necessarily involve renewable resources, the other not sufficiently consultative e.g. around labour rights. Furthermore, eco-industrialism, by relying on quantitative variables of success, prioritizes economic aspects of material and energy flows over social implications. Possibly combining the two source-specific keys is mutually beneficial, however. Namely, inclusive growth stems the damaging focus on economic aspects ‘within the concept of eco-industrialism’ since it ‘directly speaks to sustainable poverty alleviation strategies’, for example by contributing to ‘minimizing energy poverty and creating new employment opportunities.’

ID 46 may also adopt a regional variation of RRI by referring to biotechnology and bioeconomy as RRI keys rather than domains.

ID 50, Bolivia, Brazil, Guatemala, Uruguay. Waste Management domain. ‘Collection of recycling material in Latin America is a key source of money for the urban poor in Latin America. Mainly carried out as informal activity, social mobilization for the inclusive governance of waste management is a particular feature in many Latin American countries.’

ID 60, Uruguay, no domains specified. The source mentions responsibility and social commitment, participative management, labour security and local added value.

ID 63, Bolivia, Bio-Economy domain. ‘Investigación Participativa Revalorizadora (IPR) is a methodology that consists in the generation of new knowledge in a participatory manner (between local actors and external researchers) linking, in addition, research processes with local development actions...IPR focuses on understanding of the daily life of the communities through the relationship participation between the researcher and peasant actors, under a transdisciplinary, intra and intercultural integral vision and in function of different local issues involved in the consolidation of sustainable endogenous development. Search for the generation of knowledge and actions for development, within the framework of the horizontal dialogue between the native indigenous wisdom and Western [modern] science, through the insertion and participation of the researcher in the daily life of the communities.’

ID 68 India and China. ICT and Bio-Economy domains: ‘India: Equity, particularly indigenous knowledge issues, and the competing pressures of internal equity and international competitiveness, are considered. China: The difficulty of engaging the public in discourse about risk, power and control within an authoritarian political frame.’

ID 76, USA, no domains specified. This source describes the concept of responsible innovation. This is a way to ‘imbue in the actors of the innovation system a more robust sense of individual and collective responsibility.’ It involves reform of: 1) industry towards better CSR-type working with a long-term view; 2) RPOs which should establish centres for responsible innovation to formalize ‘a process of consideration of impacts of research proposals on legal and regulatory frameworks, economic opportunity and inequality, sustainability, and ethical questions’; and 3) the US Federal government towards better protection and support of science as well as better mechanisms of public accountability.

**In summary**, social and economic justice were important to some (IDs 17 and 46). As part of, or separate from social justice, wider climate discourses were important to others (ID44 and 46). As part of, or separate from economic justice, one source also cited ‘labour security’ (ID 60). Concepts are seen as opposed by some sources (see ID 46 eco industrialism versus inclusive growth, and ID 68 internal equity is contrasted with international competitiveness).

#### 2.1.5.6.2 Differences in comparison with EU RRI or with EU political and economic conditions

See ID 46, Brazil, Waste management and Bio-Economy domains. ‘Given the fact that Brazil has a consistent agribusiness history based on an extremely unequal distribution of land and wealth, perhaps the dimension of biotechnology might, after all, act as eco-friendly non-transformative element of reproduction of inequalities in case [possibly means ‘unless’] public polic[y] does not prioritize inclusive aspects of social justice over economic growth.’ Here the source seems to indicate that the environmental value of biotechnology is in opposition to improving social inequality or injustice unless policy makes social justice a priority. This would temper what could otherwise be an untrammelled economic growth which perpetuates inequalities.

ID 46 ‘A striking difference within EU-RRI policy could be the fact that while elements of biotechnology and bioeconomy have only recently been integrated to research and innovation governmental frameworks within a larger European context, such programmes have been a reality within the Brazilian context since the 1970’s. - the first Brazilian patent on biodiesel was granted in 1983. During the same year, a pioneering flight from São José dos Campos to Brasília, in an Embraer bio-kerosene fuelled Bandeirante Aircraft, showcased the technological capabilities of biodiesel’. Possibly this source takes ‘bio’ to have a normative sense e.g. of being environmentally responsible. It might even suggest biotechnology and bioeconomy should be used as alternative RRI keys rather than as domains (as they are conceived of in RRING i.e. domains of waste management, ICT, bio-economy, or energy).

ID 49, Latin America and Caribbean regions. Not country-specific. ICT Domains. The source discusses SciELO, the Scientific Electronic Library Online, which consists of a cooperative electronic publishing database and ‘an advanced Latin American-designed model of open access journals. With respect to open access, the source reviewer notes ‘a striking difference is the fact that open access, a concept that only recently has been more seriously addressed by the European R&D frameworks, has been a reality in the Latin America for more than two decades. In contrast with the Global North reality where private publishing houses control the business, in LA academic publication has been traditionally supported by public funding agencies which makes the collaboration towards a full open access model more feasible.’ A particular difference is in how SciELO overcomes scientific journal barriers to dissemination, opens up ‘unknown fluxes of knowledge-exchange amongst scientists and civil society, and position[s] research literature as a public good’. This means it ‘not only fits into the RRI DNA but can also provide experience-based lessons and practices to the European RRI approach.’

ID 50, Bolivia, Brazil, Guatemala, Uruguay. Waste Management domain: ‘While recycling in EU is mainly structured around engagement of consumers and disposal and processing facilities, in Latin America, the role of collectors is key to improve recycling, and provide job opportunity for the urban poor.’

ID 59, Bolivia, Bio-Economy domain. The book critiques the theoretical and methodological conception of science, development, technology and the formation of economic farmers’ organizations who undertook ‘more than 20 years of neoliberal processes in which they considered science and the Western technological advance as the only valid way to generate the desired "development"’. It contrasts this with ‘the methodological process and the lessons learned from the experience of innovation implemented in the Community Tallita Confital, demonstrating the relevance and possibilities for the application of participatory, revalorizing and transdisciplinary research to generate technological innovations, value-added products and special markets for the benefit of indigenous communities.’

ID 60, Uruguay, no domains specified. ‘Possibly the most interesting and innovative [aspect] is that this project not only emphasises economic aspects, such as the efficiency, growth and currency savings, but also the joint, permanent and coordinated effort of the different social actors, in an equitable distribution of development achieved, as well as in the integration of concepts of responsibility and social commitment, participative management, labour security and local added value’.

ID 63, Bolivia, Bio-Economy domain. The source focuses on the socioeconomic reproduction of high Andean communities which engage in llama production and derivatives: ‘development of socio-economic and cultural aspects of the communities [sits] within the "co-determination" of the market system (western) and the system of reciprocity (original [meaning the Bolivian or LAC system of reciprocity]) in productive and reproductive decisions of families.’

ID 68 India and China. ICT and Bio-Economy domains: ‘China: The difficulty of engaging the public in discourse about risk, power and control within an authoritarian political frame.’

ID 71 Japan, ICT, Bio-economy and Energy domains. ‘The inclusion of this document in the review is primarily to show that Japanese government STI funding and policies, although aimed to solve “social” problems as well as generate economic benefits, are missing almost all of the responsible research concepts that are present even in Japanese research and innovation dialogues generally.’ ‘The lack of RRI language in such a major “solving social problems” research program shows how limited the attention to RRI and RRI-like concepts is in Japan.’

ID 71 continued. On ethics: ‘This document shows the weakness of ethical involvement in Japanese STI strategy. Despite multiple academic research scandals, the only addressing of ethical questions is the use of independent international reviewers to oversee the success of the projects funded by this mechanism.’ On gender: ‘Although other Japanese government documents regarding research and innovation (and other government policies) stress that Japan lags well behind all other OECD nations in gender equality broadly and specifically in R&D roles, getting worse in more senior roles, there is no mention of women or gender equality in this document.’

ID 74, USA, no domains specified. ‘This document [the 1975 AAAS report on scientific freedom and responsibility] argues a balance between the freedoms of scientific researchers and their social responsibility. Different from the EU-RRI policy, the protections of the researcher are held in equal regard to their responsibility to conduct research ethically...’ On the role of researcher stakeholders, the source notes that: ‘The researcher is the primary enforcer of ethical scientific conduct; the government should only regulate when necessary and in a way that does not endanger the special rights of scientists.’

**In summary**, the excerpts in this subsection are wide-ranging in how they explore different approaches to the decision-making about, and practice of R&I. Sometimes differences are framed in terms of ethical trade-offs. For example, in ID 46 pursuing an environmentally responsible approach to R&I should be balanced against minimising negative societal impacts. Similarly in ID 49, the open access model is different from EU conceptions because it has beneficial societal impacts as a core part of its founding rationale. This is implied to be more forward-thinking than EU R&I approaches which have only recently incorporated a societal dimension to R&I policy. At other times, differences reflect different political and economic conditions or norms in the countries or regions involved. The difference is thus a function of EU political, economic and social approaches (largely thought to be market-oriented alongside political democracy), as compared with other regional approaches. These include Latin American approaches where there is a greater prevalence of bottom-up and socialist traditions, and East Asian (Chinese and Japanese) top-down approaches. A North American approach is also described by ID 74 but given the source is from 1975 it would be interesting to see whether researcher protections still feature so prominently in current North American thinking and policy about social responsibility.

### 2.1.5.7 RELEVANT RRI ASPECTS NOT YET CAPTURED BY EU RRI FRAMEWORKS

Here we cite and group themes from sources which are thought to be relevant to the concepts involved in RRI, but which are not evident in current EU RRI frameworks. The themes arising are: sustainability and the environment; bottom up, local and participatory aspects; cross-disciplinary or cross-stakeholder approaches; and top-down approaches. The concluding part of this subsection also notes some aspects which may be of questionable relevance to this review (see 2.1.5.7.5 below).

#### 2.1.5.7.1 Sustainability and environment

ID 43, Africa region, ICT domain. The source references the Sustainable Development Goals (SDGs).

ID 45, Bolivia and Brazil. ICT and Bio-Economy domains. ‘Research and innovation not only as a market-based catalyst of socioeconomic inclusion but also as an element of socio-environmental justice and cultural contextualization.’

Sustainability and environment are also raised as key concepts in IDs 25 (Serbia, no domains specified), 33 (Ukraine, ICT domain), 34 (Ukraine, no domains specified), 38 (South Africa, waste management domain), 46 (Brazil, waste management and bio-economy domains), ID 58 (Guatemala, waste management and bio-economy domains), and ID 66 (Guatemala, waste management domain).

In addition, ID 46 (Brazil, Waste management and Bio-Economy domains) raises the concept of ‘eco-industrialism and inclusive growth’ as a conceptual framework (see also Section 2.1.5.6.1 above).

ID 46 also says ‘Perhaps a relevant RRI-like element yet not capture[d] is the versatility that biotechnology brings when materials that before were being disposed of are included in the added-value chain. Waste management - ‘It is worth noting in passing that some of the low-carbon benefit of using sugarcane ethanol as a fuel for vehicles arises from the use of waste bagasse as a fuel that is burnt to drive electricity generator turbines on-site at the refineries, with excess electricity able to be sold to the national grid (Goldemberg et al., 2008)’ (pp. 6)’. The source reviewer thus suggests that the circular economy approach is relevant to the RRI biotechnology discourse.

ID 66, Guatemala, Waste Management domain: ‘The document also has a focus on sustainability and multiculturalism and interculturality.’ On sustainability: ‘The Strategy has a sustainability focus because within the short-, medium- and long-term goals, actions are contemplated to guarantee the satisfaction of the communities that make up the basin [the river or lake basin level. NB separate level from regional and national level]. In this sense, within this approach the sustainability of the projects is linked to the identification of collective benefits, promoting the value chains approach...’

**In summary**, sustainability is an important aspect to the sources above, either associated with the environment or with other factors such as development, justice, culture, and context. Sustainability can also refer to economic approaches within R&I such as the circular economy and closing production loops.

#### 2.1.5.7.2 Bottom up, local and participatory aspects

ID 47, Bolivia, Energy domain. ‘The article highlights the relevance of traditional knowledge (e.g. Pachamama) and cosmologies for the development of appropriate innovations in Bolivia. Every attempt to promote a sustainable development that does not consider this element is bound to fail’. This is said to be particularly important when developing governance of R&I.

There is also a general theme in ID 47 of living well as opposed to living better (p6698 pdf).

ID 49, Latin America and Caribbean regions. Not country-specific. ICT Domains. The reviewer notes the ability of SciELO, the Latin American open access initiative, to be flexible with spinning out to different countries without impeding their national-level autonomy: ‘Although maintaining a pivotal connection with Scielo Brazil (the founders of the ICT project), Scielo manages to sustain relationships with Scielo members in other countries without interfering in their autonomous publication pathway.’

Also on 49: ‘The projects’ vision can be tailored into two pillars regarding the evolution of scientific communication. First, the gradual erasing of the divide between North-America/European (mainstream) and regional journals. Second, the consolidation of its open access model, in which online collections are conceived as ‘public goods’ instead of commercial features.’

ID 58, Guatemala, Waste Management and Bio-Economy domains: ‘A key aspect was the strengthening of human capital in the process (capacity building), thus providing key people with tools for participatory processes of knowledge management with the subsequent promotion and reinforcement of local knowledge.’

ID 66, Guatemala, Waste Management domain: ‘The document also has a focus on sustainability and multiculturalism and interculturality.’ This is ‘not only because it promotes the strengthening of ethnic identity, but also because it promotes respect and harmonious coexistence of different cultures and linguistic communities such as the Kaqchikel, Tzutujil, K'iché and mestiza. Within the concept of ethnic identity, knowledge and use of the mother tongue as the best expression of indigenous cultural identity will be considered, which is the basis for establishing social relations of solidarity among the inhabitants of the communities within the Lake Basin.’

ID 67, Guatemala, Energy domain: ‘The behaviour shown by the inhabitants towards the environment is of interest to preserve the natural resources. The generation of energy and the forest cover that is maintained, is due to the ASOCHEL [Asociación Hidroeléctrica Chelense]. The inhabitants have realized that they obtain environmental benefits. This environmental culture, accepted by the new generations, is perceived in changes in the life of the Ixils; the

relationship between the population and the forest is even closer when the women are involved in the reforestation, management and protection of species.

ID 68, India and China, ICT and Bio-Economy domains: ‘Equity and indigenous knowledge issues [may be relevant] lessons from India, particularly in the bio-economy domain. See Chapter 9: New Food Technologies in Europe, India and China, particularly.’

ID 74, USA no domains specified. ‘This document [the 1975 AAAS report on scientific freedom and responsibility] recognizes the necessity for whistle-blower protections while also respecting due process.’

**In summary**, sources and reviewers are advocates for participatory approaches (see ID 47 and the ‘bound to fail’ observation). Three sources indicate the importance of indigenous and traditional knowledge. Two (ID 49 and ID 74) indicate the importance of autonomy (at a national or individual level).

#### 2.1.5.7.2.1 Bottom up, local and participatory aspects

ID 55 South Africa, no domains specified. ‘In South Africa, the problem [of science education] is compounded by issues in the education system and the fact that the spatial development patterns of apartheid have to a large degree persisted, particularly in rural areas, which means that many people live beyond the reach of science awareness campaigns.’

#### 2.1.5.7.3 Cross- disciplinary or cross-stakeholder approaches

##### 2.1.5.7.3.1 Cross disciplinary

ID 55, South Africa, no domains specified. The source discusses the importance of the fourth industrial revolution. ‘The lines between physical, digital and biological systems are becoming blurred, and governments around the world are planning for the Fourth Industrial Revolution. [This is the fourth major industrial era since the initial Industrial Revolution of the 18th century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital and biological spheres, collectively referred to as cyber-physical systems.] In particular, it is necessary to prepare for the ways in which artificial intelligence (AI) and advances in ICT will change the way society and the economy function.’ Pdf pg4

ID 72 Japan, ICT domain. Cross disciplinary recruitment into the field of AI R&I is discussed. There is an ‘Openness to multiple disciplines, non-traditional backgrounds, and a less hierarchical approach to research and innovation... The group uses names without titles (very unusual for Japan) and recruits mid-career researchers primarily, in order to avoid barriers of high status from senior researchers.’

### 2.1.5.7.3.2 Cross stakeholder

See ID 45, Bolivia and Brazil. ICT and Bio-Economy domains. '[T]he Amazon Creative Lab is a variant of Living Labs which are popular in EU.' The source reviewer suggests the Amazon Creative Lab is a type of living lab, defined as 'a research concept. A living lab is a user-centred, open-innovation ecosystem, often operating in a territorial context (e.g. city, agglomeration, region), integrating concurrent research and innovation processes within a public-private-people partnership'

ID 70 Japan, Energy domain: 'Academics as bridges between the public and policymakers.' This contains the idea of brokerage between two stakeholders by academics to help public engagement be integrated into policy making.

**In summary**, sources note the importance of crossing traditional demarcation lines of discipline, and stakeholder to facilitate R&I. Both such crossings may echo the notion of the Triple and Quadruple Helix<sup>8</sup>.

### 2.1.5.7.4 Top-down approaches

ID 71 Japan, ICT, Bio-economy and Energy domains. The source gives the example of promoting public acceptance of autonomous vehicles. 'Inclusion of a goal of not only developing the technology but promoting public acceptance is interesting. This is guiding the public to accept the outcomes of R&D instead of guiding the R&D to be socially acceptable a-priori.'

**In summary**, this source suggests that if we make public acceptance a goal alongside technology development, we may guide or frame the debate. This speaks to framing issues, top-down RRI, one way communication and instrumental RRI. This risks social acceptability in RRI becoming a mere matter of advice about or compliance with R&I, rather than being a fundamental part of its governance and decision-making. This includes society having the power to decide to halt or abandon R&I.

### 2.1.5.7.5 Questionable relevance aspects

During the analysis of results, some sources appeared of unclear or questionable relevance. In some cases, sources referred to R&I, but did not give a sense of a moral component to R&I (see the example of economic-oriented approaches below). In other cases, sources were not related to the RRING domains of interest (energy, waste management, bio-economy or ICT), even though referring to responsible research or responsible innovation. In still other cases, the source was a piece of qualitative research which did not appear related to the 6-key RRI conception, other than to the public engagement (PE) key. The qualitative research method

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<sup>8</sup> The Quadruple Helix is the addition of societal actor stakeholders to the triple helix concept of university-industry-government relationships.

(semi-structured interviews, participatory action research) is taken to be PE as part of a sustained policy, but this may not be the case.

These sources are therefore of questionable relevance to the literature review. Two main areas of questionable relevance follow below which are evidenced by multiple sources:

#### 2.1.5.7.5.1 The example of economic-oriented approaches

IDs 34, 35 and 37, all Ukraine, all with no domains specified. These sources describe general R&I measurement using economic indicators, the efficiency of how the triple helix works together, and market-based aspects of innovation. The focus is on economic outcomes without an overt sense of ethics or sustainability. In ID 36 (also Ukraine), Public Engagement is mentioned but just refers to consumers of the products arising from R&I. Either these sources are outside the scope of this review, or they may reflect different political or social ideologies which are important to keep in mind for RRING's global understanding of the context of RRI.

#### 2.1.5.7.5.2 The example of qualitative social science methodology

In these examples, a possible source interpretation error is made, where the social scientific research method (SSIs, participatory action research) is taken to be PE. Namely, a qualitative research intervention is undertaken once or as part of a discrete research project to understand attitudes. However, this is not embedded PE, i.e. part of a deliberate RRI system for deciding about research or innovation in the given domain(s). It is unclear whether a one-off participatory or qualitative review method should count towards the findings in this review.

Examples of this are found in: ID 57 (Uruguay, Bio-Economy domain); ID 61 (Uruguay, Waste Management); possibly also ID 63, Bolivia, Bio-Economy. In ID 63, the methodology described under the PE section may have been a one-off PE exercise to answer a research question about South American camelids. Or it might represent part of the Bolivian variant of RRI in action (i.e. a sustained programme of 'Investigación Participativa Revalorizadora'<sup>9</sup>, IPR).

Such an interpretation error may also cast new light over findings above about the prevalence of the PE key in sources, and the depth of understanding about why we should pursue PE in RRI. See section 2.1.5.5.2 Figure 8, and 2.1.5.5.2.4 for comparison.

A further type of interpretation error may be indicated in ID 75, USA, Bio-economy domain. The reviewer notes that the survey of US nano scientists' sense of social responsibility included too few women. This was said to be a limitation of the survey results. The reviewer entered this in the 'gender' part of the data entry form, but it has limited relevance to the RRI gender domain key, since it refers to the sampling method of a single piece of survey research.

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<sup>9</sup> This is defined by the reviewer as 'a methodology that consists in the generation of new knowledge in a participatory manner (between local actors and external researchers) linking, in addition, research processes with local development actions.'

## 2.1.6 DISCUSSION

This review was designed as a qualitative probe of the grey and white literature on RRI from different global perspectives. Because of this, it did not require statistical validity nor statistical completeness (see Objectives section). It may therefore be taken as a useful introduction to global RRI approaches, and as a jumping off point for more focused desk and field work under RRING WP3. Nevertheless, there are some limitations to the quality of the review which are described below in Section 2.1.6.2.1. These limitations represent learning points for future reviews where source coverage questions are more significant to the success of the review.

Below we discuss the most relevant findings from the pilot and main results Sections 2.1.4 and 2.1.5.

### 2.1.6.1 PILOT RESULTS

Pilot results are confined to the Dutch context but nevertheless yield findings of relevance to the main data. Firstly, P1, the EUR policy on building sustainability, aligns its efforts with broader social responsibility movements in the Netherlands. This is similar to other sources in the Main results which link their policies to social justice (ID 17, Brazil) or social responsibility (ID 60, Uruguay) concepts or policies. Secondly, P2, Unilever's gender policy, groups its policy under a broader banner of sustainability. This is similar to ID 44 (China and India, see 2.1.5.5.2.2 Gender) which groups (environmental) sustainability, gender and empowerment together as part of the UN Millennium Development Goals.

Pilot results also indicate one source-specific key which may be relevant to broadening RRING's RRI conception. This is P2's use of Shakti, 'an initiative to financially empower rural women and create livelihood opportunities for them'. This concept or policy also relates to similar 'empowerment' themes which are mentioned briefly by ID 44 (empowering women) and ID 68 (referring to the difficulty of 'engaging the public in discourse about risk, power and control' under an authoritarian political framing in China). Power and empowerment as a theme may be reflected in other Asian, African or Latin American RRI contexts (where Shakti is also said to be practised) and so possibly merits further study in RRING.

### 2.1.6.2 MAIN RESULTS

#### 2.1.6.2.1 Quality of the review

Quantitative results in sections 2.1.5.1 - 2.1.5.5 above give insights into the quality of the review conducted during the main data collection. Results show the coverage of countries, regions, domains and stakeholders of interest to RRING which was achieved. On the one hand, there are indicators of good quality. Firstly, there was some representation of RRING selection countries in 95% of sources. Secondly, just over half of sources referred to low GDP or GERD ranked countries, so being reasonably representative of RRI thinking in LMICs. Thirdly,

between the n=38 sources which referenced domains (see Section 2.1.5.4, Figure 6 a and b and Table 4), each of the four domains was evenly represented.

On the other hand, there are also some limitations in review quality. Firstly, the Arab World is markedly under-represented in the review, with only n=1 source covering that region, and only one country (Oman) represented within the region. Secondly, and as described above in Figure 4 (see 2.1.5.1), only Latin America was represented in sources for all four wealth/development rankings. This will have skewed the findings in the review and missed important insights from low GERD/GDP countries in Asia and Sub-Saharan Africa, and high GERD/GDP countries in N America and Europe. Thirdly, based on limitations in the way stakeholders were categorised, (and in how the review entry form was set up), it was difficult to assess reliably how sources applied to different types of stakeholder (see section 2.1.5.2). It was similarly difficult to assess the origin of sources by stakeholder reliably. This calls for better categorisation and shared understanding of the distinctions between stakeholder types in RRING. Fourthly, there were n=19 sources which did not reference the domains of interest to RRING (waste management, ICT, bio-economy and energy). Of these, n=4 also did not refer to any of the RRI keys. These n=19 may therefore be of limited use and may dilute the strength of conclusions which may be drawn from the dataset overall.

#### 2.1.6.2.2 Similarities to EU conceptions of RRI

The first main finding from this review is the suggestion that that the five or six key conception is present in many sources. Gender, public engagement and governance seem prominent keys. Some of these (such as gender) are shown to be evolving in maturity and depth consistently with EU policy (e.g. the move from gender to gender and diversity). However, it also appears that the prominence of other keys has sometimes been interpolated from sources, rather than being explicitly stated. One example of this is the very broad referencing of the governance key within sources. This referencing can mean anything from the act of governing or policy making, to ethical or responsible governance or decision-making in R&I. Another example is a possible error in interpreting sources which do not describe PE as part of a deliberate and sustained RRI strategy which institutionalizes PE, but rather as a type of participatory social scientific research method which is used in a discrete piece of research. RE and RI, open access and science education keys do not seem prominent in sources. Yet it is unclear whether this refers to a deficit of standards and processes in the RRING R&I domains of interest, or a limitation of this review's quality and reach. It is also the case that such keys are strongly represented (that is to say, convincingly argued for) in particular regions. For instance, there is strong representation of the open access key from Latin America in the ICT domain. Similarly, the conception of science education in the South African region (or country) is well-elaborated and covers both education and training for future scientists, and science awareness in society. This speaks to science education as a way to improve human social flourishing by increasing citizens' grasp of scientific enquiry.

Secondly, findings suggest that the process-based RRI conception is less common in the global RRI-related discourse. There is a lack of focus within the sources on the importance of anticipation, reflection, and inclusive deliberation processes (collectively known as the process-based conception) to RRI policy and practice. Only n=4 sources mention this, and the reviewer of one source (ID 49, published 2009) seems to interpolate this conception from the activities described. That is to say, the source itself does not recognise this conception, even though it may adhere to some of its core aspects. This lack of focus may be due to a number of factors. It may be that the process-based RRI conception is simply less convincing and does not explain current global RRI approaches. Additionally, it may be that it is harder to convey concrete policy from a process-based, as opposed to content- or principle-based, conception and rationale. Global policies have therefore preferred to talk about standards such as sustainability rather than processes. Finally, this review's methodology may not have adequately directed reviewers to look for the concept in the sources reviewed. Namely, the structure of the data entry form may have emphasised the five or six key conception (giving particular spaces in the form to talk about each key) to the exclusion of other conceptions (see Annex C). Because of such factors, it may not be possible to conclude much about use of this RRI conception from the results.

Thirdly, findings suggest a conception of EU RRI which stands apart from the five or six key, or process-based conception. Some sources regard RRI as a whole as instrumentally useful (see 2.1.5.5.1) in order to retain market competitiveness with the EU. This would be an efficiency-based understanding of RRI, largely omitting any ethical component. This might accord with sources which were identified as of questionable relevance to the review because they seem to focus only on economic impacts of R&I (see 2.1.5.7.5.1). Other sources have underlined the cooperative aspect of RRI between different countries and different types of stakeholder, particularly its efforts to unite the public, private and people (also known as the '4P' concept, see Section 2.1.5.5.4 for more details).

### 2.1.6.2.3 Differences from the EU RRI conception

Differences from the EU conception of RRI also referred to relevant RRI aspects not covered by EU frameworks currently. I.e., the two parts of the data entry form resulted in similar types of data being entered. Therefore, findings from the data have been grouped below.

Firstly, we list some alternative RRI keys arising from this review which may be of interest for follow-up research in RRING (see also Section 2.1.5.6.1). Not every alternative key or concept of RRI was region- or country-specific. Hence the heading used in the data entry form was altered in Section 2.1.5.6.1 to include source-specific keys. Concepts below are listed because they seem to be more than just phrases within sources. Rather they refer to concepts which are elaborated in more detail, or on which sources' arguments centrally depend:

- Innovation for social justice (ID 17): this concept explicitly harnesses innovation to resolve injustices in society

- Responsible innovation (P1, ID 76): in ID 76 this concept freights innovation (as part of the activities of a free market) with an individual and social conscience.
- Eco-industrialism, inclusive growth (ID 46). Eco-industrialism refers to sustainable economic growth (where ‘eco’ refers to prioritising eco-efficiency in industry). This may beneficially combine with the poverty alleviation embodied by the inclusive growth concept.
- Investigación Participativa Revalorizadora (ID 63): this concept is highly oriented towards bottom-up participatory approaches which combine sustainable development initiatives with R&I
- Power (P2, ID 44): this is a theme accompanying other environment or equality themes such as sustainability or gender. It highlights power disparities under certain political or government systems such as authoritarianism or neoliberalism. It suggests the bottom-up approaches found in some sources.

Secondly, we comment on some differences from the EU RRI conception highlighted by the sources in Section 2.1.5.6.2. Differences can be framed as ethical or economic trade-offs, or as reflecting different political and economic conditions in the countries or regions involved. For example, trade-offs often occur between factors like environmental sustainability or economic growth and social justice. Obvious differences observed between political systems (e.g. democratic versus autocratic) are insufficient to inform more fine-grained considerations even within democratic systems about the nature of the appropriate societal and individual contribution to R&I. It is also unclear how researcher freedoms or the demands of the free market may be balanced against competing claims of other stakeholders to drive the R&I agenda. In this respect, we are uncertain how to incorporate ID 74’s conceptual understanding of RRI into the review, especially since this policy on scientific freedom and responsibility was published in 1975. On the one hand, it is unlikely that an equivalent RRI policy today would be so focused on the concept of self-regulation of individual researchers and the ‘special rights’ of the scientist to professional freedoms. On the other hand, the recent march of neoliberalism in contemporary US society (among others) may mean it is important to think about whether stronger, rights-based claims of certain stakeholders to drive the RRI agenda are convincing. In this section, it is interesting to note how reviewers or source authors frame the differences observed. Sometimes source reviewers or authors seem critical of how the differences of approach do not meet EU standards (see ID 68 and 71 Japan and China examples). At other times, the reviewer or author defends the difference, and may suggest the difference is indicative of a superior approach. Particularly in the Latin American context, the message from reviewers and sources themselves is that the global North has much to learn from global southern approaches.

Thirdly, we highlight some relevant aspects which are not yet captured by EU RRI frameworks from Section 2.1.5.7’s findings. These indicate the importance of the following aspects to RRING’s deeper understanding of RRI in a global context: 1) sustainability and the environment; 2) bottom up, local and participatory aspects; and 3) cross-disciplinary or cross-stakeholder approaches. Synchronising responsible approaches to R&I with development and

sustainable development goals (MDGs and SDGs) is potentially important to Asian and African regions respectively. This section also suggests participatory approaches are valuable and their value related to the autonomy of groups or individuals. Finally, it is important to work across traditional dividing lines of discipline, stakeholder type, with associated implications for power dynamics.

#### 2.1.6.2.3.1 Differences from the EU RRI conception

With respect to Section 2.1.5.7.5 above, it is interesting to reflect on whether these sources are of questionable relevance or reflect the most profound differences between the EU and euro-centric conceptions of RRI, and the rest of the world. It may be that the examples in Section 2.1.5.7.5 are the most complete departures from the RRI conceptions currently understood at this stage of RRING's progress.

### 2.1.7 CONCLUSIONS AND LESSONS LEARNED

The review has mounted an initial quantitative and qualitative exploration of the white and grey literature relevant to the countries and geographic regions of interest in RRING. It has also given some illustration of the RRI discourse in the four domains of interest to RRING: waste management, information communication technology (ICT), bio-economy and energy.

A number of broad-brush conclusions may be made from this review. Firstly, the review indicates that EU RRI may be too socially tentative for countries built on socialist traditions and having (or aspiring to have) powerful grass roots and worker organisations. This suggests that participatory and societal aspects of the EU conception should be incorporated as more than token elements. By this we mean that if social acceptability and societal actors truly matter to the conception of and rationale for RRI, then policy and practice must reflect this fully. Secondly, the review indicates that while non-North American / Western European regions see the instrumental value of adopting EU RRI at a policy level, at a conceptual level adoption and understanding is less certain. The lack of a comprehensive adoption of all five or six keys in the eponymous conception of RRI by sources suggests this uncertainty. Because of this, even though the process-based conception may be harder to formulate at a policy level, it may prove a more effective way forward in RRING. This is because such a conception better accommodates varied understandings, standards or norms of what it means to do responsible R&I arising from different geopolitical and geocultural standpoints. Through this accommodation, such a process-based conception may also more effectively unify responsible R&I initiatives in later stages of RRING as global RRING participants and subcontractors are exposed to and learn from these variations. Thirdly, the review indicates that sustainability as it applies to RRI is under-determined conceptually. It may be a useful placeholder to relate to the environment, the economy or simply ongoing ('sustained') policies and practices (e.g., the example of circular economy from ID 46.) However, being such a placeholder permits

euphemism and a lack of clarity about how we should implement RRI practically and its meaningful impact.

There are also a number of lessons from this review for conducting further literature reviews in global RRI. The advantage of this review is that the criteria for source selection has been very broad and has maximised the breadth of the global discourse analysed which may be relevant to the RRI debate. However, future literature reviews may benefit from adding some constraints around the selection of sources, in order to develop the findings from this review further. To do this, future reviews could firstly focus on regions not well covered in this review (e.g. the Arab World). Secondly, they could be more directive about source selection (e.g. sources discussing ethical as opposed to efficient governance; and sources deploying participatory methods as a sustained R&I strategy rather than a single piece or programme of research). Being more directive might also include more constraints on how sources are chosen (e.g. stipulating a range of publication period, and also more specific search strategies to make sure RRI-related literature is prioritised).

## 2.2 PROJECT REVIEWS

### 2.2.1 INTRODUCTION

This section presents the results of Task 3.2.2.3 of the RRING project, a review of research projects that have promoted, developed or adopted RRI-related ideas and principles in five geographic regions of the world: Sub-Sahara Africa, Latin America and the Caribbean, Arab countries, Asia and Pacific, and Europe and North America. The review aims to contribute to an understanding of existing practices, knowledge and the state of the art of RRI in these global regions.

The reviews of the projects discussed in this section were conducted by seven RRING partners (UNESCO, the National Research Foundation [NRF] in South Africa, the Centre for the Promotion of Science [CPN] in Serbia, the Fraunhofer Society [FRAUN] in Germany, De Montfort University (DMU) in the UK, the Latin America Research and Documentation Centre [CEDLA] in Amsterdam, and two sub-contractors (Participatory Research in Asia [PRIA], and the American Association for the Advancement of Science [AAAS]). A total of 35 projects were reviewed. (Table 6 below provides an overview of the distribution of project reviews per geographical region).

The section describes the review process and presents and synthesizes key insights of the respective projects that they reviewed in the five regions. The data collected in T3.2.2.3 will be considered in tandem with results from T3.2.2.1 and T3.2.2.3 to identify the knowledge gaps that need to be filled in RRING. The structure of the section is as follows. Section 2.2.2 outlines the methodology and different components that were taken into consideration in the review process. It also discusses the limitations of the project review process and their implications for the ways in which data from this report can be used. Section 2.2.3 presents the main findings from the review for each of the five geographic regions. Findings for each region are organized along five overarching themes and corresponding sub-themes that emerged from the data. Section 2.2.4 concludes with a brief discussion of key differences and trends that could be observed within and between projects from the different geographic regions. Appendix I lists all projects and the abbreviations of project names that the report uses. Appendix IV contains all the 35 individual project reviews.

*Table 6: Distribution of project reviews per geographical region*

Geographical Region	Partner/Subcontractor	Projects Reviewed
Europe/ North America	CEDLA	NUCLEUS
	CEDLA	TRUST
	CPN	COMPASS
	CPN	NewHoRRIzon
	CPN	HEIRRI
	DMU	RRI Practice
	UNESCO	MORRI
	FRAUN	RESPONSIBILITY
	NRF	PRINTEGER
	NRF	RECODE
	AAAS	Gardenroots

	AAAS	Human Genome Project (HGP)
	AAAS	National Citizens' Technology Forum (NCTF)
	AAAS	PERVADE
<b>Latin America and Caribbean</b>	CEDLA	SciELO
	CEDLA	URSULA
	CEDLA	Natura
<b>Sub-Saharan Africa</b>	UNESCO	EVAMAB
	UNESCO	Community Briquette Project (CBP)
	UNESCO	SAGA
	NRF	AIMS
	NRF	TESSA
	NRF	TRUST
<b>Asia and Pacific</b>	Meiji	CAIP
	Meiji	CORTTA
	Meiji	GEST
	Meiji	PESTI
	Meiji	TPSRRIF
	PRIA	International Solar Alliance
	PRIA	5G Testbed Project
	PRIA	BLisC
	PRIA	CSE Waste
	PRIA	India Alliance
<b>Arab Countries</b>	UNESCO	IIWQ

## 2.2.2 METHODS

### 2.2.2.1 RRI WORKING DEFINITION

The general Work Package (WP3) methodology has provided a framework through which RRI discourse, policies and practices can be analysed. Because most of the existing conceptions of RRI have emerged in Europe, the RRING project has chosen to develop a working definition that highlights a series of core characteristics of RRI that inform the various RRI approaches, and that are relevant to innovation processes also in other world regions.

This definition is not carved in stone but is work in progress. It seeks to capture the core RRI ethos and to provide a sense of direction, while being sufficiently open to other (alternative) policies and strategies around the globe, that aim to make research and innovation more inclusive, sustainable and sensitive to societal expectations and concerns. Contributing to the development of a richer, more global working definition that is informed by the diverse local initiatives, practices and ideas that RRING explores in different world regions, is a central aim of our project. This leaves room for manoeuvre and flexibility, whilst embracing the core aspects of RRI. This has resulted in the following RRING-working definition.

1. RRI implies that societal actors (researchers, citizens, policy makers, business, non-governmental organisations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs, concerns and expectations of society.

2. RRI is not a dissemination or communication strategy, but an intrinsic component of the methodology of innovative research. In practice, it can be embedded in innovation projects as an integrated package that includes multi-actor and public engagement, enabling easier access to scientific results, the take up of gender inclusion and ethical considerations in the research and innovation content and process, and formal and informal science education.
3. RRI sees innovation as a complex, non-linear process of transition. In contrast to the traditional deficit model (in which a knowledge deficit is assumed for non-experts, and thus ‘explaining’ is the communicative model), the focus is on knowledge deficits of producers and experts of new knowledge and technologies, i.e. the difficulty of predicting whether and how techno-scientific innovations will work or be adopted in practice. The goal is not to predict, but to explore possible scenarios and to co-create the future via mutual learning exercises which function as discursive and imaginative laboratories.
4. RRI focuses not only on the techno-scientific ‘hardware’ of innovation, but also on the ‘software’ (mind-sets, values, interpretations, worldviews, in other words, so called ‘soft impacts’) and the ‘orgware’ (the institutional challenges on meso- and macro-levels of change; deep institutionalisation).

### 2.2.2.2 PROJECT SELECTION

Projects for this review had to fulfil three central inclusion criteria: First, they had to promote, develop or actively adopt RRI-related ideas and principles, as articulated in the working definition above. Second, projects had to operate in the following geographic regions of the world: Sub-Sahara Africa, Latin America and the Caribbean, Arab countries, Asia and Pacific, and Europe and North America. Third, they had to address or foster innovation processes in one (or several) of the following technology domains: digital (ICT), energy, bio-economy, and waste management. These criteria reflect the five geographies and four key domains the RRING project is focussing on.

Because RRI is a specifically European concept, relevant projects were identified by using a generic list of keywords that aimed to recognize RRI-related dimensions, also if these were not described as such.

### 2.2.2.3 COMPONENTS AND STRUCTURE OF THE PROJECT REVIEWS

In order to create uniformity in the review of the projects, RRING partners and the two contract research organizations followed the structure outlined below. These components were determined as part of a series of consultations with RRING partners involved in the task.

#### 1. Brief description of each project

This section aimed to provide a brief description of what each project is about, including its RRI or RRI-like characteristics. It also highlighted aspects related to the region that is covered by each project. It was agreed that it is acceptable if projects cross-cut across different regions, as long as this is highlighted.

## **2. Overview of stakeholders involved in each project**

This section provided an overview of stakeholders that were taking part and/or consulted in each of the reviewed projects. These could include, albeit were not limited to, the following: research performing organizations (RPOs), research funding organizations (RFOs), large industry organizations and multi-national corporations, small to medium size enterprises (SMEs), civil societal organizations and non-governmental organizations (NGOs), policy makers, national and international bodies, and researchers.

## **3. The sources on which basis projects were reviewed**

This section identified the types of sources they have used for the review of the projects. These could include any of the following: project outcomes, project documents like deliverables, published reports, scholarly literature such as journal articles, project guidelines, policies, other grey literature, webpages and blogs.

## **4. RRI-related methods and approaches that each project would employ**

This section described the methods and approaches through which RRI-related or similar ideas (e.g. activities related to gender, diversity and inclusion; engagement with civil societal organizations or different subsections of the public, etc.) were sought to be achieved or promoted in each project. In order to identify RRI-related dimensions, also if these were not defined as such, each reviewer used the inventory of keywords listed above.

## **5. An overview of the specific “RRI” dimensions that each project covers**

This section of each review aimed to highlight and summarize the key characteristics, activities and aims of each project, that can be classified as being related to RRI ideas and principles.

## **6. Innovation Domain**

This final section lists the innovation domain (or domains) for each of the reviewed projects.

### **2.2.2.4 ANALYSING THE PROJECT SUMMARIES**

A total of 35 project reviews were included in the analysis. We used a qualitative thematic analysis method to examine the review summaries that we obtained from our partners (the project summaries are compiled in Appendix IV). The analysis was structured around five overarching themes that emerged from the systematic reading of the summaries and an initial round of inductive coding. These themes were as follows:

- Aims, concepts and practices related to citizen participation and the promotion of democracy in science and technology

- Aims, concepts and practices related to gender, diversity and inclusion
- Aims, concepts and practices related to research ethics and research governance
- Aims, concepts and practices related to sustainability and the realization of sustainable development goals
- Aims, concepts and practices related to open science, science education

In a second analytical step we allocated data to these five themes and applied a further round of inductive coding to identify sub-themes (Table 2 below). This reflects an open analytical process that aimed to explore how projects in each geography defined and used RRI-related (or similar) concepts and frameworks. This is in line with the RRING concept of bottom-up learning in RRI, rather than applying a top-down approach or only using European understandings of RRI.

Table 7: Themes and Sub-Themes

<i>Citizen Participation &amp; Promotion of Democracy in S&amp;T</i>	Stimulate more inclusive public debate	Including citizens in STI decision making	Community-based research: empowerment and advocacy	Capacity building to facilitate public participation in future STI projects
<i>Gender, Diversity and Inclusion</i>	Gender equality	Improving access to education and research	Inclusive access to the benefits of innovation processes	Maximizing opportunities for researchers in an asymmetric world
<i>Research Ethics and Governance</i>	Risk management	Anticipation of potential futures	Understanding and responding to concerns among the public	Ethical capacity building for researchers and research projects
<i>Sustainability and Sustainable Development</i>	Mobilization of funds	Role of Technology	Stakeholder Collaboration	Societal engagement to realize sustainable development and inclusion.
<i>Open Science and S&amp;T education</i>	Open access	Education and training	Innovation and sustainable development set-ups	Education initiatives to facilitate sustainable innovation and development

### 2.2.2.5 METHODOLOGICAL LIMITATIONS

This review is characterized by several methodological limitations which have implications for the conclusions the report draws and the ways in which findings of the review can be used.

#### **Small number of projects and imbalance of projects from the five global regions**

A first limitation is that the number of projects in this review is relatively small. One reason for this is practical; limits of available time among partners and subcontractors to conduct the reviews, and one partner leaving the project. Another reason is that there are simply not that many projects that specifically address RRI-related (or similar) issues.

Moreover, significant differences exist at a global level. In some world regions, the number of projects that adopt or engage with RRI (or similar) ideas is much higher than in other regions. Part of the imbalance was due to difficulties in identifying projects in some regions, for example, the Arab region. Initially, Go-SPIN was agreed to be a source for projects, but this did not materialize as planned.

As a result, the number of projects from the five geographies is imbalanced. Projects from the EU and Northern-America (14 projects), for example, are over-represented compared to the Asia and Pacific region (10 projects), Sub-Saharan Africa (6 projects), Latin America and the Caribbean (3 projects), and the Arab region (1 project).

Most likely, the number of projects that adopt or promote ideas that correlate with US-European conceptions of RRI is much higher than the projects included in this review. For this reason, this report can only provide a snapshot of insights from the different global regions, and not a comprehensive overview.

### **Different levels of detail and quality in the summaries**

Another limitation is that the project reviews that we obtained from the different partners was of varying level of detail and quality. Some projects are described at a more depth than others. A key reason for this is, that the number of available sources (documents, websites, etc.) that partners and sub-contractors used to produce their summaries, varied widely between projects. But there were also some inconsistencies in how the project reviews were conducted and written despite the use of a standardized template for guidance. Moreover, not all partners and sub-contractors responded to feedback. This means that some of the requests for additional information that we sent out, remained unaddressed.

### **Extensive use of European RRI language in some summaries**

Some of the summaries make extensive use of European RRI concepts (as laid down in the RRI Keys, AREA, or the AIRR frameworks), to analyse RRI-related (or similar) ideas and practices in non-European projects. This prevents, at least in some cases, a more systematic engagement with the situated (or locally evolved) conceptions of “RRI”. This has, to some extent, influenced the inductive analysis of the project summaries. Some of the sub-codes that we identified in the summaries of non-European projects, reflect the ‘European’ RRI language, even though local framings may have been different.

### **Implications of these limitations**

Due to the small number of reviewed projects, any form of generalisation of the findings of this report beyond the reviewed projects is methodologically flawed and will be avoided. The conclusions and patterns that we identify here, relate merely to the projects reviewed. While some of these findings could potentially be indicative of broader trends within and/or between

the different geographies, further research would be required to confirm and explore these findings in greater depth. Another implication is that a systematic regional comparison of the different projects, or a systematic comparison between projects from different innovation domains, is not possible. The number of reviewed projects has been too small, and some of the global regions and innovation domains are insufficiently represented.

### 2.2.3 MAIN FINDINGS OF THE REVIEW

The following sections present the findings of the analysis of the 34 project reviews along the analytical themes and sub-themes summarized in Table 2 above.

#### 2.2.3.1 CITIZEN PARTICIPATION AND DEMOCRACY IN S&T

Ideas to facilitate public participation in decision making around STI and STI policies, that aim to make techno-scientific innovation more democratic and to connect innovation processes with the needs, demands and concerns of citizens have been an integral part of European and Northern American perspectives on RRI. However, in a globally diverse environment, that comprises different political systems and cultures, as well as significant inequalities in wealth and scientific capacities, the aspiration to “democratize” science and to promote public deliberation and the integration of citizens in STI decision making, is not unanimously shared.

Out of the 35 projects that RRING partners reviewed for this report, 25 in Sub-Saharan Africa, Asia, Europe and Northern America as well as Latin America and the Caribbean included or sought to facilitate processes of public participation, deliberation and dialogue. Unsurprisingly, a variety of perspectives and approaches could be observed. However, none of the 25 projects conceived of the interactions with citizens, citizen organizations and/or local communities merely as a top-down, one-way communication process. What could be observed instead, were a variety of approaches that included ideas of bottom-up learning, participatory research, empowerment and the integration of public views in STI decision making. Some projects, mostly from the EU and Japan, were inter-disciplinary social science initiatives, that aimed to facilitate public engagement in future innovation processes, others actively applied participatory approaches to emerging technology applications and research.

##### 2.2.3.1.1 Engagement to stimulate a more inclusive public debate

Some projects defined engagement with citizens and publics primarily as a form of science communicate, that served both, educational purposes and to stimulate a more include public debate around emerging innovations. The *Bangalore Life Science Cluster* (BLiCS), for example, an initiative to drive innovation in the biological sciences in India, established a science and society program that funded interdisciplinary research between scientists and humanities scholars, to stimulate a dialogue on broader societal implications of research in BLiCS and the life sciences at a more general level. This program also involved an educational

component, that aimed to provide research updates to the interested public, and to enhance the dialogue between BLiCS scholars and citizens in a more direct way.<sup>10</sup>

The IndiaAlliance (IA), a project funded by the Indian Department of Biotechnology and the UK Wellcome Trust, shares a similar agenda. Through collaboration with civil societal organizations, public lectures and a public engagement competition, the IA seeks to bring scientists and people from the public to share information, deliberate and debate on scientific and human health issues, that implicate society at large.<sup>11</sup>

Various other projects emphasized the importance of science communication and outreach, to stimulate public debate. The *Centre for Science and Environment* (CSE) in India, for example, a research institute with a designated focus on waste management, seeks to make scientific development around waste management accessible and understandable to lay people and local communities, through the educational materials, workshops, exhibitions and publications that include periodicals, films and other media such as e-news bulletins.<sup>12</sup>

### 2.2.3.1.2 Including citizens in STI decision making

Several of the reviewed projects aimed for a more extensive role of lay persons and different groups of the public. Instead of educating or stimulating public dialogue, these projects sought to actively integrate citizens of local communities in innovation-related decision making. The *Framework of Broad Public Engagement in STI Policy* (PESTI) in Japan, for example, worked towards the development of a participatory approach to engage subsections of the public in STI policy decision making in the country's energy sector. This project followed the nuclear disaster in Fukushima when public trust in the government's energy policy was low. Initiated by a group of academic researchers, and publicly funded, PESTI sought to ensure that a wide variety of voices would be heard in policy making, and that citizen needs and concerns regarding risks would be taken seriously.<sup>13</sup>

Another initiative that strives to include local stakeholder and communities in STI decision making is the *Economic Valuation of Ecosystem Services in Man and Biosphere Reserves* (EVAMAB) project. EVAMAB aims to contribute to the transition of a green economy in man biosphere reserves (MBR) in Benin, Ethiopia, Tanzania and Uganda. A central component of the EVAMAB project is the involvement of local community leaders, decision makers and end users, with the aim to inform policy decisions and to create a "critical mass" of informed stakeholders that can participate in management and governance decisions of MBR areas.<sup>14</sup>

The *National Citizens' Technology Forum* in the USA, a project that invited citizens, researchers and policy makers to an extended deliberation process on the topic of

<sup>10</sup> <https://www.ncbs.res.in/HistoryScienceSociety/>

<sup>11</sup> <https://www.indiaalliance.org/public-engagement>

<sup>12</sup> <https://www.cseindia.org>

<sup>13</sup> <https://www.jst.go.jp/ristex/stipolicy/en/project/project07.html>

<sup>14</sup> <http://www.biodiv.be/evamab/packages>

nanotechnology and human enhancement, is another example that included citizen participation in the shaping of STI policy decisions. The Forum's activities, and a corresponding congressional briefing, reportedly influenced a 2009 Senate bill on the reauthorization of the National Nanotechnology Initiative (NNI), by mandating that the NNI should involve ongoing "deliberative input in decision-making processes" (Sclove 2016).<sup>15</sup>

Still another project that relied on the use of inclusive, bottom-up participatory approaches is the Pervasive Data Ethics for Computational Research (PERVADE) project in the USA. PERVADE engaged different sub-groups of the public with the aim to understand public concerns about the use of big data sets in research as well as private sector and government applications. The project initiated a multi-stakeholder deliberation, through which big data researchers, platforms, regulators, and user communities should understand their ethical obligations and choices, in order to ensure the fairness and ethics of big data uses. Deliberation of citizens and sub-sections of the broader public was designed in order to facilitate responsiveness to identified concerns, at the level of policy, data collection practice, and the use of large data sets for research and commercial purposes.<sup>16</sup>

### 2.2.3.1.3 Community-based research: empowerment and advocacy

Another group of projects involved forms of community-based research, that were built around ideas of empowerment and advocacy. A sub-project of the above-mentioned IndiaAlliance, for example, is based on community research that involves participation of traditional and indigenous communities, with the aim to improve health in these communities and to enable access to new treatment options.

*Gardenroots*, a community-driven project in Arizona, USA, that aimed to identify soil pollution and to ensure the availability of unpolluted drinking water and vegetables in communities near a mining site, also relies on community research that aims to empower and facilitate policy advocacy. By employing ideas of co-design and co-creation, Gardenroots initiated a form of "citizen science" that enabled people in local communities to share concerns, co-develop a research agenda, and participate in the collection of soil, water and vegetable samples, with the aim to put pressure on mining companies and local government agencies.<sup>17</sup>

The project RRI-Practice, for example, aimed to understand the barriers and drivers for the successful implementation of RRI in both European several global contexts. A central objective of this project was to identify and support best practices for public engagement in diverse innovation contexts and cultures.<sup>18</sup> The NewHoRRizon project also aimed to further the

<sup>15</sup> Sclove, R. (2016). Reinventing Technology Assessment: A 21st Century Model, Science and Technology Innovation Program, DOI: 10.13140/RG.2.1.3402.5364.

<sup>16</sup> <https://pervade.umd.edu/about/>

<sup>17</sup> Nyenga, M., Karanja, N., Prain, G., Malii, J., Munyao, P., Gathuru, K., and B. Mwasi (2009). Community-based energy briquette production from urban organic waste at Kahawa Soweto Informal Settlement, Nairobi. Urban Harvest Working Paper Series, paper 5, October 2009. URL: <http://cipotato.org/wp-content/uploads/2014/08/005249.pdf>

<sup>18</sup> <https://www.rri-practice.eu/>

integration of RRI in research and innovation systems at national and the EU level. One aspect of NewHoRRizon was the development of a Social Labs approach, that aim to address social challenges related to RRI through the generation and appraisal of social experiments and by widening participation.<sup>19</sup> The COMPASS project, in turn, examined the state of RRI in industry and aimed to facilitate forms of engagement with and by industry stakeholders, including interaction between industry stakeholders, citizens and civil society.<sup>20</sup> A final example from this group of projects in the EU is the Monitoring the Evolution and Benefits of Responsible Research and Innovation (MoRRI) project. A key aim of MoRRI was to take stock and assess existing practices of citizen engagement and participation of societal actors in research and innovation, and to provide recommendations on how to adjust and implement these practices in future innovation contexts.<sup>21</sup>

Outside of the EU, only the project *Theoretical and Practical Study for new RRI Frameworks* (TPSRRIF) in Japan did actively adopt the “European” language of RRI, trying to understand how much RRI and related approaches are involved in Japanese research funding and innovation practices in regenerative medicine and other areas of the life sciences. Similar to the RRI-Practice project above, TPSRRIF aimed to identify the barriers to the adoption and improvement of these approaches, and to adjust them to the socio-cultural and institutional environment of Japan (Shineha et al. 2018a, 2018b).<sup>22</sup>

### 2.2.3.2 GENDER, DIVERSITY AND INCLUSION

A concern with equality issues, the embracing of human diversity and the creation of inclusive innovation practices, including fair and far-reaching access to the products and benefits of technoscientific innovation, is central to European and Northern American conceptions of RRI. Many of these concerns are shared in other global contexts. As this section shows, out of 35 reviewed projects 19 projects included a focus on the promotion of equality and inclusion.

#### 2.2.3.2.1 Gender equality

15 of the reviewed projects addressed issues related to gender and the promotion of gender equality. The above-mentioned MoRRI project in the EU, for example, examined the inclusion and representation of women in various research and innovation contexts, trying to identify new ways through which gender equality can be increased. Similar objectives were shared by

<sup>19</sup> <https://newhorizon.eu>

<sup>20</sup> <https://cordis.europa.eu/project/id/710543>

<sup>21</sup> <http://morri-project.eu/reports/2015-04-01-d2.1>

<sup>22</sup> Shineha, R., Inoue, Y., Ikka, T., Kishimoto, A., Yashiro, Y. (2018a) Science communication in regenerative medicine: Implications for the role of academic society and science policy. *Regenerative Therapy* 7, 89-97.

Shineha, R., Inoue, Y., Ikka, T., Kishimoto, A., Yashiro, Y. (2018b) Comparative Analysis of Attitudes on Communication toward Stem Cell Research and Regenerative Medicine between the Public and the Scientific Community. *Stem Cells Translational Medicine*, 7, 251-257.  
<https://stemcells.journals.onlinelibrary.wiley.com/doi/pdf/10.1002/sctm.17-0184>.

other projects. The *American Association for the Advancement of Science* in the USA, the *TPSRRIF* project in Japan (mentioned above), and in the EU the *RRI-Practice*, *New HoRRizon* and the *COMPASS* project (all three introduced above, and funded by the European Research Council), included work that aimed to identify gender inequalities in science and to promote reflection on gender and diversity as key aspects in the planning and management of innovation processes. The *COMPASS* project also conducted a survey on the adoption of RRI dimensions in European small to midsize enterprises. This study indicated that gender was the least considered dimension in these firms. Gender equality and the removal of barriers to the participation of women in science and innovation, were also promoted in the Sub-Saharan Africa projects. For example, the EVAMAB and CBP projects (introduced in Section 2.2.3 above) both included a concern with unequal participation of women. CBP, for instance, considered paying attention to gender needs as an integral part of the process to succeed in adapting briquette making technology to local conditions.

### 2.2.3.2.2 Gender and access to education

Other projects stressed the relation between gender and access to education, especially to higher education and research. The Teacher Education in Sub-Saharan Africa (TESSA) project, for example, includes work that aims to improve the learning outcomes of female pupils, especially in upper primary and lower secondary classes, which is a critical period that paves the way for access to higher education.<sup>23</sup> The STEM and Gender Advancement (SAGA) project, funded by UNESCO, also aimed to improve the situation of women and to reduce the gender gap in science, technology, engineering and mathematics (STEM) fields in the Sub-Saharan Africa region, and to maximize access to all levels of education and research. But the SAGA project also aimed to analyse how policies affect the gender balance in STEM, and to develop new and better indicators to provide tools for evidence-based policy-making, and to build capacity for data collection on gender in STEM and the advanced statistical analysis of these data.<sup>24</sup>

None of the Latin American and Caribbean projects addressed issues related to gender, gender equality or other diversity dimensions. However, considering the small number of projects reviewed from this region, no conclusion can be drawn from this.

### 2.2.3.2.3 Inclusive access to the benefits of innovation processes

The realization of inclusive access to the benefits of innovation processes was another theme that emerged from the data. Ideas of equal access to innovation products were present not only in the EU-funded *RRI-Practice*, *New HoRRizon* and *Morris* and *COMPASS* projects, but also in three Japanese projects. A key objective of the Centre for Advanced Intelligence Project (CAIP), for example, was to make sure that access to the benefits of AI were widely shared.

<sup>23</sup> <http://www.tessafrica.net>

<sup>24</sup> <https://en.unesco.org/saga>

The project also tried to anticipate what kind of inequalities could arise from AI applications, and how these would impact existing social divisions along the dimensions of class, age, ethnicity and other diversity dimensions.<sup>25</sup>

In a similar vein, the project Creating and Enhancing Trustworthy, Responsible and Equitable Partnerships in International Research (TRUST) focused on the identification of vulnerable populations in the context of research or international technology transfer. This intercontinental project (with partners in Africa, Asia and Europe) examined and created awareness of the possible effects of emerging technology systems on social groups that can easily be hurt, such as people with low or no steady income, disadvantaged minority groups, the sick and elderly, and groups affected by sexual or other forms of discrimination.<sup>26</sup>

The Japanese project Co-Creation and Communication for Real-Time Technology Assessment (CoRTTA) addressed a related equality dimension: inclusive participation of social groups in shaping the direction of research and innovation, in order to ensure that potential effects and concerns are fully understood, and that emerging projects correspond to public needs and interests.<sup>27</sup>

#### 2.2.3.2.4 Maximizing opportunities for researchers in an asymmetric world

Another equality dimension that surfaced especially in projects in low- or middle-income countries, was the aim to increase opportunities for researchers in a context of global asymmetries, where access to resources and scientific capabilities are limited and often dominated by stakeholders from high income countries. The IndiaAlliance project, for example, actively promoted forms of scientific capacity building and the building of a research ecosystem that would enable domestically driven innovation. These forms of capacity building also included training researchers for leadership roles and participation in the making of science and health policy.<sup>28</sup>

The 5G Testbed Project in India, also strives to empower local research communities. By building a pan-Indian multi-institutional team this project aimed to improve national capability in telecommunication technology, in order to develop indigenous intellectual property and to stimulate Indian telecom manufacturers.<sup>29</sup> These projects articulate ideas of responsibility and inclusion as a scientific and economic “catch-up” strategy, which aims to increase competitiveness in a context of global inequalities and established forms of hegemonic power.

<sup>25</sup> <https://www.riken.jp/en/research/labs/aip/>

<sup>26</sup> <https://cordis.europa.eu/project/id/664771>

<sup>27</sup> <https://www.jst.go.jp/ristex/hite/en/community/project000290.html>

<sup>28</sup> <https://www.indiaalliance.org>

<sup>29</sup> <https://ece.iisc.ac.in/~5G-Testbed/>

### 2.2.3.3 RESEARCH ETHICS AND GOVERNANCE

Research governance and ethics are central to the realization of “responsible” innovation processes, because they provide the rules and frameworks through which research is conducted and new ideas and inventions are translated into new applications, products or services. The ethics and governance of research-led innovation processes play a central role in improving research quality and safeguarding the public.

However, ideas about and approaches to the ethical governance of innovation vary widely, both across technology fields and between countries and global regions. Moreover, the implementation of ethical standards and regulations varies widely across societies, partly due to unequal availability of resources and regulatory infrastructures, and partly due to differences in values, ethical priorities and concerns that too much governance could prevent innovation rather than enable it (Sleeboom-Faulkner et al. 2016).<sup>30</sup> In our analysis of the project summaries, research ethics and governance emerged as a central area of concern in 22 out of 35 projects. Four principal sub-themes could be observed.

#### 2.2.3.3.1 Risk management

The first theme was a concern with the assessment and management of technology risks. The CAIP project in Japan (introduced in Section 2.2.3.2.3 above), for example, used a part of its resources for the consideration of risks that could arise from the deployment of AI, such as the disclosure of private information, the hacking of AI systems, or the misuse of AI by “bad actors”. The Global Ethics in Science and Technology (GEST) project, which explored the role of ethics in science and technology policy in China, India and the European Union, took a more reflective approach to the themes of risk. A key aim of this project was to show that conceptions of risks, benefits and risk-benefit ratios are often highly politicized in innovation discourse, and therefore often not trustworthy. A key conclusion of GEST was that, because representations of risks and benefits play such an important role in ethical considerations about emerging technologies, a critical concern with the ways in which these conceptions emerge needs to be given more prominence.<sup>31</sup>

The TRUST project (also introduced in Section 2.2.3.2.3) likewise explored the themes of risk and risk assessment from a more reflective perspective. Investigating ethical issues arising in the context of North-South research partnerships, the project focused on risks arising for vulnerable groups. Approaches that address risks and vulnerabilities, the TRUST project demonstrates, are typically designed as top-down processes and implemented under asymmetric relations. However, this ignores important risks and perspectives. Therefore, TRUST seeks to tackle these limitations through a set of participatory methodologies. TRUST’s activities indicated that the ways in which (and by whom) ethical issues are framed

<sup>30</sup> Sleeboom-Faulkner, M., Chekar, C. K., Faulkner, A., Heitmeyer, C., Marouda, M., Rosemann, A., ... & Patra, P. K. (2016). Comparing national home-keeping and the regulation of translational stem cell applications: an international perspective. *Social Science & Medicine*, 153, 240-249.

<sup>31</sup> [https://www.uclan.ac.uk/research/explore/projects/global\\_ethics\\_science\\_technology.php](https://www.uclan.ac.uk/research/explore/projects/global_ethics_science_technology.php)

and problematized, directly influence what types of risks are considered, assessed and managed. The inclusion of bottom-up perspectives in which ethical concerns and risks are framed according to the indigenous concerns and perceptions of vulnerable groups, forms for this reason an important component in the realization of responsible international partnerships, which is often neglected.

### 2.2.3.3.2 Anticipation of potential futures

The anticipation of the future transformative impact of emerging innovation on human societies and the natural environment, was another theme that emerged in relation to research ethics and governance. The Human Genome Project (HGP), a global effort to decode the human genome in the early 2000s, is a good example. In the USA and the EU, the HGP was one of the first projects that received substantial funding to explore the ethical, legal and social implications of genomics research, including a concern with the mid-to-long term future consequences of the increasing ability to access and analyse human genetic information.<sup>32</sup> Natura, a developer and manufacturer of cosmetics from Brazil, is another example. Natura's innovation model is based on a shared commitment to create both profits and social value to communities through development of a sustainable bio-economy model. To achieve this, the company finances research to assess the social and environmental impact of specific production pathways, using these insights to create more sustainable supply chains. For example, in 2014 the company helped to develop an agroforestry system to cultivate palm oil in order to overcome the socio ecological impacts of oil palm monoculture.<sup>33</sup> The Latin American University Social Responsibility Alliance (URSULA) is a project that is concerned with the ethical challenges of globalization as well as unsustainable development, production and consumption pathways. Anticipation is used as a tool to discuss the role of the university as a space to cultivate social responsibility and to help achieve more sustainable futures.<sup>34</sup>

### 2.2.3.3.3 Understanding and responding to ethical concerns among the public

The identification of ethical concerns among citizens and communities was another sub-theme that emerged from the data. While the examples below relate also to Section 2.2.3.1. (on Citizen Participation and Democracy in S&T) we have listed these here, because they are linked to the themes of research ethics and governance. The CoRRTA project in Japan, for example, involved the development of a discussion and co-creation platform (called NutShell) through which researchers could learn about the ethical concerns on AI and robotics innovation, among both inter-disciplinary experts and non-experts. These insights were reportedly used, to guide research processes into being socially beneficial rather than socially risky, and to provide early

<sup>32</sup> <https://ghr.nlm.nih.gov/primer/hgp/elsi>

<sup>33</sup> <http://blog.worldagroforestry.org/index.php/2014/04/07/evidence-mounts-for-oil-palm-under-agroforestry-in-brazil/>

<sup>34</sup> <http://unionursula.org>

identification of areas in which regulation will be essential to minimize negative consequences (Yoshizawa et al. 2018).<sup>35</sup> The CAIP project also explored public concerns and understandings of AI, in Japan and other societies in East Asia. One aim of this project was to realize innovation processes that contribute to the cultural and political ideal of “social harmony”, a Confucian-based concept in China and Japan that seeks to combine economic growth with the reduction of inequalities, more social justice and the prevention of social conflicts (Peng and Liu 2006).<sup>36</sup>

#### 2.2.3.3.4 Ethical Capacity Building for Researchers

The building of ethical capacity for researchers and research conducting organizations was another sub-theme that emerged in relation to research ethics and governance. Practices of ethical capacity building ranged from the development of ethics frameworks and best practice standards (as for example in BLiCS, PERVADE or the HGP), to the development of research ethics committees (MoRRI), the creation of ethics-related research tools (TRUST), the expansion of ethics education (HEIRRI), the implementation of ethics compliance frameworks (TRUST; RESPONSIBILITY), better integration of ethics in the research process (RESPONSIBILITY), the development of pathways to protect vulnerable groups and promote inclusiveness (TRUST), and the bridging of ethical practices in different world regions to facilitate international collaborations (SCIELO; TRUST).

#### 2.2.3.4 SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT

Sustainable development was at the core of many of the reviewed projects. Concerns that these projects addressed, ranged from overcoming societal challenges such as waste management, to the realization of health, education and the promotion of science with and for society. The following sub-themes emerged:

##### 2.2.3.4.1 Mobilization of funds

Most of the projects under review sought to incorporate sustainable practices in order to ensure the longevity and legacy of the projects. This is evident through mobilization of investment as seen in the case of the International Solar Alliance (ISA), the first international body to have its secretariat in India. Mobilization of funds ensures the continued existence of the project and the realization of its vision.

<sup>35</sup> Yoshizawa, G., van Est, R., Yoshinaga, D., Tanaka, M., Shineha, R., Konagaya, A. (2018) Responsible innovation in molecular robotics in Japan. *Chem-Bio Informatics Journal* 18, pp. 164-172. [https://www.jstage.jst.go.jp/article/cbij/18/0/18\\_164/\\_pdf/-char/en](https://www.jstage.jst.go.jp/article/cbij/18/0/18_164/_pdf/-char/en). Accessed 12th February 2019.

<sup>36</sup> PENG, F. Y., & LIU, L. Q. (2006). The ecological technology innovation and the construction of the harmonious society [J]. *Social Sciences in Ningxia*, 3.

### 2.2.3.4.2 Role of Technology

Technology plays a key role in the actualization of sustainability in many of the reviewed projects. This is evident from projects in India where technology plays a key role in local strategies for sustainable development. ISA for instance looks toward a green future and aims to develop available technologies further and adopt a mutual partnership model of not just advancing the technical research and resources but aim to shoulder responsibilities toward other countries who have not entirely explored the potentials and applications of solar energy. The 5 Testbed project for instance aims to develop telecommunication equipment locally rather than have it imported so that there is financial viability for the operators to provide broadband access in rural areas, which has been an important agenda of the Digital India program. In Africa for example, EVAWAB aims to develop tools for rapid assessment of ecosystem services and to perform evaluation of the economic value of ecosystem services in African biosphere reserves for a better appreciation of the potential for management and socio-economic integration.

COMPASS for instance has developed an interactive online platform aimed at providing RRI guidance and orientation tailored towards the needs of innovative enterprises with specific focus on SMEs. The RESPONSIBILITY project on the other hand developed an online Forum and a virtual Observatory to facilitate a network of stakeholders to adopt and diffuse a common understanding in RRI. The FORUM is supposed to provide knowledge-creation (participation and deliberation through the Forum) with regard to the notion of RRI while the Observatory provides the medium (electronic space for interaction) for storage of knowledge (the repository and monitoring function of the Observatory). The use of IT tools was also central to the PRINTEGER project particularly in the promotion of research integrity. Core to its focus, RECODE was also keen on a new technology platform to contribute to the reduction of CO2 emissions in the medium to long term. The Human Genome project also incorporates the use of technology to store information in databases, improve tools for data analysis and transfer related technologies to the private sector. Technical platforms were also used in the PERVADE project.

### 2.2.3.4.3 Stakeholder Collaboration

Collaboration efforts appear to be at the core of many of the projects that were under review. This includes the involvement of different societal stakeholders which not only can have societal buy-in but ensure longevity of the project as well. The aspect of collaboration with different stakeholders has the added element of trust in the project as the project is not only seen as a project for a few but for diverse members of a community. BLiCS cluster for instance hosts a wide variety of stakeholders for numerous collaborative enterprises. The cluster has created an atmosphere of openness and flexibility and is welcoming of collaborative efforts. NewHoRRizon for example has a wide-ranging group of R&I stakeholders co-creating tailor-made pilot actions to stimulate increased use and acceptance of RRI across H2020 and each of its parts. The RESPONSIBILITY project was also keen to inculcate co-creation/construction

with different stakeholders. As such, the online platforms were also intended to provide an avenue for the encounter and exchanges of different perspectives from different contexts around the world towards a co-construction mode of interaction. PRINTEGER was also another project which was keen on stakeholder engagement in order to maximize its impact. A wide range of initiatives, including the use of technical platforms, were employed in PERVADE to support stakeholder engagement on data ethics.

#### **2.2.3.4.4 Societal Engagement to achieve sustainable development and inclusion**

Societal engagement to realize sustainable development plays a key role in most of the reviewed projects. Brazil's Natura project for instance has social inclusion at its core business where its ethical concerns consist of adding shared value to communities surrounding its ecosystem, anticipating and reflecting on the need for long-term plans regarding a sustainable bioeconomy model. Development of a sustainable supply chain through production in agroforestry system has been a unique aspect of community and societal inclusiveness in Natura's business model.

The NUCLEUS project has been keen on advancement of public engagement. Its initiative has seen it take into account the contextual diversity and cultural adaptation through inclusion of different cultures which has included China and South Africa. Public engagement was also a central element to RECODE's project. Engagement of community members to evaluate environmental quality and the potential exposure to contaminants of concern near active or legacy resource extraction and hazardous waste sites was also at the heart of Gardenroots. This would clearly enable community buy-in of the project. Deliberative public input in decision-making processes appears to have been at the core of the National Citizens' Technology Forum with indications that deliberative public input influenced the 2009 Senate bill seeking to reauthorize the National Nanotechnology Initiative.

#### **2.2.3.5 OPEN SCIENCE AND SCIENCE EDUCATION**

Open science and science education are one of the central tenements of RRI as they allow the open sharing of knowledge with society. Open science is also intended to develop collaborative networks which can also allow for the continued development and sharing of knowledge. However, there is no clearly defined approach, at least not for the projects that were reviewed as they show different ways and processes that open science was affected within the projects. However, there were four streams of open science and science education that emerged under this sub-theme and these include open access; education and training; innovation and sustainable development set-ups; and education initiatives to facilitate sustainable innovation and development.

### 2.2.3.5.1 Open Access

BLiCS offered common instruments and equipment to anyone trained by the company representative in order to ensure there was no difficulty in having access to equipment for anyone needing it. The project's Science and Society' programme funds and hosts research beyond academia to the community. The CSE project uses their India Environment Portal, an Open-Source Platform which has a range of research reports and publications on various thematic categories of Environment and Sustainability to encourage open access. TESSA on the other hand, a Sub-Sahara network of educators, offers a bank of open educational resources (OER) which is linked to school curriculums. This is intended to support national curriculums as well as teachers and educators to plan lessons that engage, involve and inspire. The aspect of open access is further seen in SciELO (Scientific Electronic Library Online), a cooperative electronic publishing database and an advanced Latin American-designed model of open access journals, that offers full texts in open access without any restrictions. SciELO's initiative allows multidisciplinary and multilingual publications which are independently managed either by scientific societies or academic institutions, with the rare presence of commercial publishers. Open access continues to be evidence in projects such as URSULA, Natura, NUCLEUS as well as the TRUST projects.

Open access continues to be evident in the COMPASS project which is committed to participating in the European Open Data Management Pilot by ensuring that all project results are publicly available. All COMPASS project deliverables (reports, roadmaps, case studies, reviews, papers, strategies etc.) are open to the public. HEIRRI on the other hand contributes to the co-development of open access with specific instruments that stimulate the integration of RRI in everyday HEI. For instance, HEIRRI provides open access to its database contents. Through its open space, a virtual meeting place, the RESPONSIBILITY project encourages deliberation of RRI aspects. The open space allows participants to be able to open new topics and reply to each other's responses while the RECODE Project has planned for open access in its implementation processes and planning. According to GA provisions of RECODE (Art. 29.2), each beneficiary must ensure full open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its project results.

### 2.2.3.5.2 Education and Training

CSE helps to develop capacities of urban local bodies and government officials in different states of India. They look at different best practices in order to encourage other cities/communities to adopt and tailor them to their requirements. This suggests that CSE is open to learning and integrating new ways of learning that suit context and community. This also suggests a non-rigid top-down approach but one that is open and fluid to encourage knowledge sharing.

The HGP project supported projects to engage the public, educate multiple communities, and provide training. Further, the project supported development of resources and hosting events at public libraries, introducing high school teachers and students to bioinformatics, training

middle and secondary school science teachers to help students understand complex choices they may face as human genetics progress. The project also contributed to educating judges on the basics of genomics and genetics as well as contributing to the skills development of public-radio science reporters and producers thereby increasing the number and accuracy of science reports.

#### **2.2.3.5.3 Innovation and sustainable development set-ups**

The aspect of open science is evident in the URSULA project whose main aim is to promote open access as a strategy to enable sustainable innovation and development with focus on SDGS while Natura's contribution to science education is seen through its open access initiative which is promoted through the open innovation platform. Further, open science is made a possibility in the NUCLEUS project through participatory research and innovation which takes place through online co-production set-ups. Through its Fair Research Contracting Toolkit, the TRUST project has encouraged open access especially for vulnerable populations that allows them to participate in equitable research and innovation collaborations.

#### **2.2.3.5.4 Education initiatives to facilitate sustainable innovation and development**

BP adopted a Technical Training in Briquette Production and Marketing which introduced the concepts of environmental conservation and management and the need for recycling appropriate waste materials as sources of energy.

AIMS offers training to Africa's youth to shape the continent's future through Science, Technology, Engineering and Mathematics (STEM) education. Investing in the training of Africa's next generation of leaders has the potential to ensure sustainability and development in the area of STEM which is crucial for development and for competitive advantage in any economic advancement. The Natura project promotes co-production of knowledge and sustainable development through the Natura Campus.

### **2.2.4 CONCLUSION**

This section set out to review research projects that promote, develop and adopt RI and RRI-related ideas and principles in five geographic regions of the world, covering Sub-Saharan Africa, Latin America and the Caribbean, Arab countries, Asia and Pacific, and Europe and North America. During the analysis of the project summaries five central analytical themes emerged, that were specific to and/or associated with RRI and RRI-like practices in the regions under review. These were as follows: Citizen Participation and the Promotion of Democratic Practices in Science and Technology (S&T); Gender, Diversity and Inclusion; Research Ethics and Governance; Sustainability and Sustainable Development, as well as Open Science and S&T education. Although Sustainability and Sustainable Development is not a central concern

in the European RRI frameworks (such as RRI Keys or AREA), it is of central concern in many projects in other global regions. Moreover, recent debates on RRI in the EU have also increasingly embraced the idea of sustainable development and suggested that the realization of UN Sustainable Development Goals should be actively linked with RRI ideas (RRI EESC 2016; Gerber 2018).<sup>37</sup>

Each of these themes was investigated further by identifying relevant sub-themes, which allowed to examine different priorities and approaches in the reviewed projects, and how these vary across the geographies. However, as we mentioned above, due to methodological limitations (review of a relatively small number of projects, and imbalance of projects between the different regions), a systematic regional comparison that would allow to draw valid generalizations, was not possible in this review.

These limitations notwithstanding, in the remainder of this conclusion we will discuss a variety of possible patterns that indicate how the conception and use of “RRI”-related ideas is likely to differ between some of the included geographies. Each of these observations must be understood as a preliminary hypothesis that would need to be confirmed and investigated further in the context of future research.

A first observation is that most of the EU projects that we discussed in this review (RRI Practice; COMPASS; NewHoRRizon; HEIRRI; MORRI), were designed to specifically promote RRI ideas and to stimulate the implementation of RRI practices, including in the private sector. This reflects both, the fact that the conceptual origins of the RRI discourse lie primarily in the EU, and that EU funding bodies have provided money to inter-disciplinary projects that have sought to actively advance RRI ideas and to facilitate their integration in diverse innovation contexts. Among all reviewed projects, only one non-EU project pursued a similar goal: the TPSRRIF project in Japan.

In all other geographies, as we have shown, projects adopted a wide variety of different practices that in many respects were similar, but by no means identical, to European RRI frameworks. Furthermore, in contrast to the European RRI projects, of which only some involved scientific research (e.g. HGP), many projects in Sub-Saharan Africa, Latin America and the Caribbean, Arab countries and Northern America were actual S&T innovation projects. RRI-related aspects or activities accompanied and informed these innovation processes but were not a purpose in and of itself (e.g. CORTTA, PESTI, 5G Testbed, India Alliance, Natura, Gardenroots). Other projects, especially in Sub-Saharan Africa and Latin America, sought either to promote access to science education (e.g. AIMS, SAGA, URSULA, TESSA), or to create new economic and technological opportunities for local communities (e.g. EVAMAB, CBP, CSE).

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<sup>37</sup> Gerber, A. (2018). RRI: How to ‘mainstream’ the ‘upstream’ engagement. *Journal of Science Communication*, 17(3), C06. RRI EESC (2016). Conference Summary. URL: <https://www.eesc.europa.eu/sites/default/files/resources/docs/summary-from-the-conference-for-the-website-apres-relecture.pdf>

Another set of observations concern the type and nature of RRI aspects that projects in the different geographies employed. For example, projects in all regions included a concern with forms of public engagement. However, the purposes of engaging with citizens or different subgroups of the public varied. While some projects conceived of engagement with citizens and lay people primarily as a form of science communication, in order to “educate” people and to prevent public rejection (e.g. BLiCS, IA), others sought more far-reaching forms of participation that actively invited citizens to co-develop insights on how research and the development of new technology products or services could be tailored to societal needs, problems or aspirations (PESTI, EVAMAB, NCTF).

Another central RRI aspect, in many projects, was the theme of sustainability. For example, all projects in Sub-Saharan Africa and Latin America involved reflection or activities related to the realization of sustainable development. In these regions, this involved a combined focus on the actualization of economic growth and the generation of more sustainable forms of production that would correspond to the needs of local communities and ecosystems. In both geographies this also involved a concern with vulnerable population groups, such as indigenous or economically disenfranchised communities. Projects such as Natura and the TRUST project, for example, aimed simultaneously to improve the life circumstances for these groups, and to protect the natural environment on which these people depend. In high income countries such as the USA, Japan and the EU, on the other hand, a concern with vulnerable groups was less pronounced. Projects such as Gardenroots and NCTF, for instance, aimed instead to enable a transition towards more sustainable forms of both production and consumption, which would prevent environmental pollution and related effects on public health.

Another observation concerns the themes of research ethics and governance. While some projects involved a (more conventional) concern with the identification and prevention of technology risks, others focused specifically on ethical capacity building. In EU, North American and Japanese projects, ethical capacity building involved the development of regulation and safeguards for emerging technologies such as nanotechnology or genomics. In South America and Sub-Saharan Africa, on the other hand, processes of ethical capacity building focused more on the building of basic ethical infrastructures, such as the building of institutional review committees, ethics education and more effective integration of ethics into the research process.

More than half of all projects included a concern with gender, diversity and inclusion. The realization of gender equality, for example, was widely promoted in projects from Sub-Sahara Africa, Asia, Europe and Northern America, and in the Arab Country project. Interestingly, none of the projects from Latin America and Caribbean addressed issues related to gender equality or other diversity dimensions. However, considering the small number of projects from this region, no generalization can be drawn from this.

The actualization of more inclusive access to the benefits of innovation processes was another important theme, especially in projects from South America and Sub-Saharan Africa where intra-societal inequalities are more pronounced than in Japan or Europe. Another equality

dimension was the aim to maximize access to innovation opportunities for researchers in low- and middle-income countries. This concern was especially pronounced in Sub-Saharan Africa and Latin America, where access to financial and scientific resources is more limited than in high income countries.

### 3 STATE OF THE ART: BOTTOM-UP REVIEW OF THE OPERATION OF RESEARCHERS AND INNOVATORS WITHIN THE RRI ENVIRONMENT

This section of the report addresses the Work Package 3 (WP3) objective clarifying how Research Funding Organisations (RFOs) and Research Performing Organisations (RPOs) operated within region-specific research and innovation environments. It explored how they navigated the governance and regulatory frameworks for Responsible Research and Innovation (RRI), as well as offering their perspectives on the entities responsible for RRI-related policy and action in their locales.

This empirical research section addresses the following objectives:

No.	Objective
3	Clarify how RFOs and RPOs operate within this environment
4	Perform sampled key domain studies covering Digital (ICT), Energy, Bio-economy and Waste Management
5	Identify key RRI-related platforms, spaces and players
6	Explore the roles and interaction of the stakeholders included in the study (including societal actors)

#### 3.1 GLOBAL SURVEY RESEARCH: REGION OVERVIEW

##### 3.1.1 EXECUTIVE SUMMARY

The global survey data was designed to contextualise how RPOs and RFOs interacted within the research environment and with non-academic stakeholders. When asked to indicate how much time was spent interacting with different stakeholder groups, on average, the majority of respondents from all regions reported engaging with other RPOs and other academics more than with RFOs, industry, civil society, policy makers, and non-governmental organisations (NGOs).

Findings from the socio-demographic characteristics measures showed that the majority of respondents came from European and North American states. Overall, the observed respondent profile revealed a diverse professional background with pluralities working in social sciences (in Asian and Pacific states and European and North American states), natural sciences (in African states) engineering, manufacturing and construction (in Latin American and Caribbean states) and agricultural sciences (in Arab states).

To assess how an RRI approach can acknowledge potential societal expectations and implications, four key process dimensions of R&I systems were investigated. This included respondents noting any practical steps taken towards fulfilling these measures, which were used to identify key RRI-related platforms, spaces or players. Open-ended responses to questions about practical steps were diverse across regions and measures. However, a general reliance on top-down institutional processes (e.g., participation in relevant committees and compliance with rules, regulations, or legal obligations) was noticeable for some measures, namely, ensuring ethical principles are applied and work does not cause societal concerns. Finally, respondents provided their assumptions about and attitudes towards RRI and the United Nations' (UN) Sustainable Development Goals (SDGs).

The headline findings from the closed-ended survey items for each region regarding each process dimension of RRI are as follows:

### European and North American States

- ***‘Diverse and inclusive’***: Respondents were most attitudinally supportive of the importance of ensuring ethical principles were applied in R&I (92%), followed by diverse perspectives (88%), and gender equality (79%). Including ethnic minorities was the area which garnered the least attitudinal support (71%). Respondents took the most practical steps towards engaging with diverse perspectives (63%), and the least towards inclusion of ethnic minorities (24%).
- ***‘Anticipative and reflective’***: Respondents widely agreed (82%) with the importance of ensuring R&I work does not cause concerns for society, but only 37% confirmed they had taken practical steps to ensure this.
- ***‘Open and transparent’***: Vast majorities of respondents agreed on the importance of keeping R&I methods open and transparent (94%), with 65% also confirming they take practical steps to do this. An equally high number agreed on the importance of making the results of R&I work accessible to as wide a public as possible (94%), and 68% confirmed this through their reported actions. This indicated the smallest value-action gap of all RRI measures for respondents from European and North American countries. Attitudinal agreement on the importance of making data freely available to the public was lower (83%), as was the practical action aspect for this measure (45%).
- ***‘Responsive and adaptive to change’***: Most respondents agreed (89%) that it was important to ensure their work addresses societal needs, and 62% confirmed that they take practical steps towards this aim.

### Latin American and Caribbean States

- ***‘Diverse and inclusive’***: Respondents were most attitudinally supportive of the importance of gender equality in R&I (86%), followed by ensuring ethical principles are applied (85%), and diverse perspectives incorporated (83%). Including ethnic minorities was the area which garnered the least attitudinal support (77%). Respondents took the most practical steps towards ensuring ethical principles guide their work

(50%), and the least towards including ethnic minorities (25%), but the smallest value-action gap was found for gender equality.

- **‘Anticipative and reflective’**: Respondents agreed (79%) that it is important to ensure R&I work does not cause concerns for society, but only 29% confirmed they had taken practical steps to ensure this.
- **‘Open and transparent’**: The majority of respondents agreed on the importance of keeping R&I methods open and transparent (89%), with 45% indicating they had taken practical action. A majority also agreed on the importance of making the results of R&I work accessible to as wide a public as possible (88%), and 44% backed this up with practical action. Attitudinal agreement on the importance of making data freely available to the public was slightly lower (81%), as was the practical action aspect for this measure (35%).
- **‘Responsive and adaptive to change’**: Most respondents agreed (84%) that it was important to ensure their work addresses societal needs, and 49% confirmed that they take practical steps towards this aim.

### Asian and Pacific States

- **‘Diverse and inclusive’**: Respondents were most attitudinally supportive of the importance of ensuring ethical principles were applied in R&I (90%), followed by diverse perspectives (89%), and gender equality (86%). Including ethnic minorities was the area which garnered the least attitudinal support (76%). Respondents took the most practical steps towards engaging with diverse perspectives (65%), and the least towards including ethnic minorities (30%).
- **‘Anticipative and reflective’**: Respondents widely agreed (78%) with the importance of ensuring R&I work does not cause concerns for society, and 42% confirmed they had taken practical steps to ensure this.
- **‘Open and transparent’**: The majority of respondents agreed on the importance of keeping R&I methods open and transparent (91%), with 58% indicating they take practical steps to do this. A majority also agreed on the importance of making the results of R&I work accessible to as wide a public as possible (89%), and 64% backed this up with practical action. Attitudinal agreement on the importance of making data freely available to the public was lower (79%), as was the practical action aspect for this measure (40%).
- **‘Responsive and adaptive to change’**: Most respondents agreed (92%) that it was important to ensure their work addresses societal needs, and 69% confirmed that they take practical steps towards this aim. This was the RRI measure with the smallest value-action gap for respondents from the Asian and Pacific region.

### Arab States

- **‘Diverse and inclusive’**: Respondents were most attitudinally supportive of the importance of ensuring ethical principles were applied in R&I (93%), followed by

diverse perspectives (81%), and gender equality (85%). Including ethnic minorities was the area which garnered the least attitudinal support (74%). Respondents took the most practical steps towards engaging with diverse perspectives (66%), which equated to one of two equally small value-action gaps for respondents from Arab states, and the least practical steps towards inclusion of ethnic minorities (22%).

- **‘Anticipative and reflective’**: A high proportion of respondents (85%) agreed that it is important to ensure R&I work does not cause concerns for society. However, only 38% confirmed they had taken practical steps to ensure this.
- **‘Open and transparent’**: The majority of respondents agreed on the importance of keeping R&I methods open and transparent (89%), with 59% also confirming they take practical steps to do this. A majority also agreed on the importance of making the results of R&I work accessible to as wide a public as possible (90%), and 66% backed this up with practical action. Ensuring public accessibility of research results was the second of two measures with equally small value-action gaps. Attitudinal agreement on the importance of making data freely available to the public was much lower (78%), which also reflected the practical action aspect for this measure (49%).
- **‘Responsive and adaptive to change’**: Most respondents agreed (96%) that it was important to ensure their work addresses societal needs, and 68% confirmed that they take practical steps to achieve this.

### African States

- **‘Diverse and inclusive’**: Respondents were most attitudinally supportive of the importance of ensuring engagement with diverse perspectives and expertise in R&I (91%), followed by ensuring ethical principles are applied (90%), and gender equality (89%). Including ethnic minorities was the area which garnered the least attitudinal support (74%). Respondents took the most practical steps towards ensuring ethical principles guide their work (57%), and the least towards including ethnic minorities (32%).
- **‘Anticipative and reflective’**: The majority of respondents (85%) agreed that it is important to ensure R&I work does not cause concerns for society, with 59% confirming that they take practical steps to ensure this.
- **‘Open and transparent’**: A high proportion of respondents agreed on the importance of keeping R&I methods open and transparent (90%), with 54% also confirming they take practical steps to do this. A majority also agreed on the importance of making the results of R&I work accessible to as wide a public as possible (86%), and 56% backed this up with practical action. Attitudinal agreement on the importance of making data freely available to the public was significantly lower (73%), as was the practical action aspect for this measure (38%).
- **‘Responsive and adaptive to change’**: Respondents mostly agreed (92%) that it was important to ensure their work addresses societal needs, and 64% confirmed that they

take practical steps towards this aim. This was the RRI measure with the smallest value-action gap for respondents from African states.

### 3.1.2 INTRODUCTION

This global survey was commissioned to explore how people working in diverse sectors engage with RRI. Respondents' perceptions of the four RRI process dimensions and whether RRI practices and policies, commonly relating to these dimensions, were assessed. The project's research explored aspects in the context of the four RRING key domains of academic work originating from the EU's focus research areas. These areas are 'Digital (ICT)', 'Energy', 'Bio-economy' and 'Waste Management'.

More than 2,000 R&I stakeholders from diverse R&I fields were surveyed worldwide. The stakeholders were grouped into five major global regions, as defined by UNESCO.

These world regions are:

- African States (Section 3.2 and 3.3)
- Arab States (Section 3.4 and 3.5)
- Asian and Pacific States (Section 3.6 and 3.7)
- European and North American States (Section 3.8 and 3.2)
- Latin-American and Caribbean States (Section 3.10 and 3.10)

This report follows the UNESCO geographical grouping and regional results have been split accordingly.

### 3.1.3 RRI PROCESS DIMENSIONS

There are four RRI process dimensions, which are intended to acknowledge potential societal expectations and implications. They help emphasise how R&I systems can shape the future and impact society.

#### 3.1.3.1 RRI DIMENSION - DIVERSE AND INCLUSIVE

The RRI measures for this process dimension are '*Diverse Perspectives*', '*Gender Equality*', '*Ethnic Minorities*', and '*Ethics of Research*'. They refer to processes which encourage and enable the early involvement of a wide range of stakeholders. The intention is to broaden and acknowledge the diversity of expertise and enable benefits through a greater depth of knowledge from a wider range of personal and professional backgrounds.

Assessment was considered by gauging the importance of both involving a more diverse range of individuals or organisations and by ensuring equality. Attitudes were further interrogated to explore any practical steps respondents had taken in their work.

### 3.1.3.2 RRI DIMENSION - ANTICIPATIVE AND REFLECTIVE

The RRI measure for this process dimension is '*Societal Concerns*'. It refers to processes which promote and ensure continuous reflection and anticipatory action towards the underlying assumptions, values, and purposes of R&I work. The intention is to encourage valuable and timely insights, an openness to change and more responsible practices.

Assessment was considered by gauging the importance of ensuring work is conducted in such a way that it does not cause concerns for society. Attitudes were further interrogated to explore any practical steps respondents had taken in their work.

### 3.1.3.3 RRI DIMENSION - OPEN AND TRANSPARENT

The RRI measures for this process dimension are '*Transparency*', '*Public Accessibility*', and '*Open Data*'. They refer to processes which involve the communication and dissemination of methods, results, conclusions, and any implications from research. This must be directed towards a wide and appropriate range of stakeholders in a clear, balanced, and meaningful way. The intention is to boost visibility and understanding, allowing for public scrutiny and dialogue. They should lead to awareness of accountability and liability to ensure public trust in R&I.

Assessment was considered by gauging the importance of R&I work being open, transparent, and widely and freely available. Attitudes were further interrogated to explore any practical steps respondents had taken in their work.

### 3.1.3.4 RRI DIMENSION - RESPONSIVE AND ADAPTIVE TO CHANGE

The RRI measure for this process dimension is '*Societal Needs*'. It refers to processes which modify the approaches, behaviours and organisational structures following a change in circumstances, knowledge, views, and norms. It requires both acting on insights from the other process dimensions and ensuring actions align with societal needs.

Assessment was considered by gauging the importance of ensuring R&I work addresses societal needs. Attitudes were further interrogated to explore any practical steps respondents had taken in their work.

## 3.1.4 STAKEHOLDER CATEGORIES

There are six different categories of stakeholders with which R&I stakeholders can engage. They are:

### **3.1.4.1 1 - RESEARCH PERFORMING ORGANISATIONS / ACADEMICS / RESEARCHERS**

Research Performing Organisations (RPOs) usually belong in the public sector, but they could be private institutions. Universities are a good example of an RPO because they can belong to either sector. Members of these organisations tend to be research or administrative staff but can include independent researchers.

### **3.1.4.2 2 - RESEARCH FUNDING ORGANISATIONS**

Research Funding Organisations (RFOs) are usually public entities responsible for funding R&I activities. Members of RPOs and private organisations may apply to RFOs for funding.

### **3.1.4.3 3 - INDUSTRY / SMALL AND MEDIUM-SIZED ENTERPRISES**

Small and medium-sized enterprises (SMEs) are private businesses with a staff headcount and turnover which do not exceed set thresholds. They usually operate under different legal frameworks to large enterprises and are eligible for different types of funding schemes.

### **3.1.4.4 4 - CIVIL SOCIETY / CITIZENS**

This includes individual members of the wider public or public groups who are non-academic and not professionally involved in R&I activities.

### **3.1.4.5 5 - POLICY MAKERS**

As public representatives, policy makers are governmental executives who are responsible for drafting and implementing laws, regulations, and rules. In the context of R&I, policy makers are often required to make decisions prompted by R&I activities. They can implement policies which affect R&I stakeholders, the nature of their projects and the way they conduct their activities.

### **3.1.4.6 6 - NON-GOVERNMENTAL ORGANISATIONS**

Non-governmental organisations (NGOs) usually address issues of societal relevance through activism and cannot fully be attributed to the public, private or civil society sectors. These issues are frequently linked to R&I in different contexts.

## 3.1.5 METHODS

### 3.1.5.1 SAMPLING

The survey research approach used open snowball sampling to optimise the participant sample size. The global sample size of  $N = 2534$  included respondents who completed the survey to at least 70% ( $n = 2198$ ) and those under the threshold of 70% ( $n = 539$ ).

Table 8: Total number of complete responses across regions

Region	Total number of responses
African States	227
Arab States	206
Asia and the Pacific	321
Europe and North America	1728
Latin-America and the Caribbean	240

### 3.1.5.2 DATA COLLECTION

The survey was designed to capture both quantitative and qualitative data. Socio-demographic characteristics were collected as independent factors upon which to filter and analyse the other dependent variables using inferential statistics. Core survey questions covered the four RRI process dimensions, how policy and ethics shaped their work, stakeholder engagement and awareness and attitudes surrounding the SDGs. Two rounds of in-depth pilot testing and refinement with a global sample were used to develop the questions. The survey ran from 1 October to 20 December 2019 and took respondents an average of 33 minutes to complete.

The survey aimed to explore the degree to which R&I stakeholders engaged with other public, private, and civil society stakeholders. This was measured by asking participants to indicate how many hours they spent interacting with each stakeholder type in the context of their R&I work in the past seven days.

Respondents were asked a series of three questions regarding each individual RRI measure. They were first required to rate their agreement<sup>38</sup> with the importance of the measure. This was followed by indicating if, in the last 12 months<sup>39</sup>, they had taken any practical steps towards

<sup>38</sup> Response options to indicate their level of agreement for these survey questions were: 'strongly disagree', 'disagree', 'somewhat disagree', 'neutral', 'somewhat agree', 'agree', 'strongly agree', as well as 'not applicable/no opinion', and 'prefer not to say'.

<sup>39</sup> Response options to indicate whether they had taken any steps were: 'yes', 'no', 'unsure', as well as 'not applicable/no opinion', and 'prefer not to say'.

including the measure. Positive responses (i.e., ‘Yes’) were finally prompted to list these steps (see open-ended content analysis).

The survey structure allowed respondents to indicate practical steps taken regardless of their level of agreement with the measure. Please note, in this report, value-action gaps can arise when the proportion of respondents taking practical steps does not correspond with the same proportion expressing positive attitudinal agreement (‘*Somewhat Agree*’, ‘*Agree*’, and ‘*Strongly Agree*’).

Familiarity with the SDGs was covered through questions querying associations with the SDGs or ‘*responsible research and innovation*’. Respondents who indicated familiarity were asked about their associations with the SDGs as part of the open-ended content analysis. For a more detailed view, respondents’ perspectives were further explored by indicating their level of agreement with several related statements. Please refer to Appendix V for the full survey design.

### 3.1.5.3 QUANTITATIVE DATA ANALYSIS

The analysis of quantitative data mainly focused on ‘*Results by Dimension of Responsible Research and Innovation*’ and ‘*Results by Stakeholder Categories*’ to report descriptive statistics, i.e., frequencies, percentages and measures of central tendency. The levels of interaction with different stakeholders were expressed as medians<sup>40</sup>, as averages are sensitive to outliers, giving the potential for skewed results. Please note, in graphs throughout this report, percentage data will not always add up to 100% because of rounding.

### 3.1.5.4 OPEN-ENDED CONTENT ANALYSIS

Information about practical steps taken towards RRI measures was gathered using open-ended questions. These were analysed by coding and then categorising responses to cover the range of answers. This required an inductively designed coding guide based on the RRING bottom-up approach<sup>41</sup>. As there is no uniform method for implementing good R&I practices globally, coding categories were based on the content mentioned by respondents. This avoided assumptions biasing the analysis process, inadvertently reflecting a Eurocentric idea, and ensured a fair representation of activities and perspectives.

Coding included separating ‘*Non-specific, vague, platitude, or virtue signalling responses*’, ‘*general*’ responses and those stating specific steps. Responses were further coded to clarify how each RRI dimension was being practically integrated into the respondent’s work. Depending on the RRI measure, the coding categories were designed to compensate for the essential components of RRI methodology, rather than just reflecting conventional narratives.

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<sup>40</sup> Median: The most central data point - 50% of all values lie below the median and 50% lie above it.

<sup>41</sup> This research approach intends to follow the RRING project’s acknowledgement that each region in the world is advancing its own agenda on RRI.

### 3.1.5.5 CODING PROCESS

Coding was carried out by a team working in pairs. To ensure excellent intercoder reliability (ICR), multiple tests using Krippendorff's Alpha were completed throughout the coding process for each coder pair. Krippendorff's Alpha is widely regarded as one of the most reliable and sophisticated methods, as it accounts for both the raw agreement of the coders and their agreement by pure chance. Values of 0.8 or above are desired, values between 0.8 and 0.67 are only viable in some cases, and any values below 0.67 are unacceptable (Krippendorff, 2011). 10% of open-ended responses were therefore coded separately by each pair, and subsequently checked for the desired ICR of 0.8 or above. Any codes that did not achieve a sufficient ICR value were discussed to identify any differences in understanding that might account for the discrepancy. The codebook was then amended if necessary or additional coding categories included to account for this developed understanding. A secondary coding and ICR check were then carried out. This alignment process was repeated until all coding categories reported a sufficiently high ICR score.

The values for this ICR analysis were calculated using the Krippendorff's Alpha Python implementation '*fast-krippendorff*' (Pln-Fing-Udelar, 2019). As only the presence or absence of variables were coded, the nominal metric for Krippendorff's Alpha was used. As a result, the only values present in the dataset are 1 (presence of variable) and 0 (absence of variable).

### 3.1.6 RESULTS

#### 3.1.6.1 SOCIO-DEMOGRAPHICS OF THE GLOBAL SAMPLE OF R&I STAKEHOLDERS

This section describes the socio-demographic variables for the global sample of respondents. The region-specific results can be found in their individual sections.

The majority of respondents came from European and North American states ( $n = 1728$ , 63%) (Figure 9)<sup>42</sup>. Notably, the other geographic regions were represented less: Asian and Pacific states ( $n = 321$ , 12%), Latin American and Caribbean states ( $n = 240$ , 9%), African states ( $n = 227$ , 8%), and Arab states ( $n = 206$ , 8%). Comparisons between regions must be made with caution, due to the differences in region-specific sample sizes.

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<sup>42</sup> The total number of responses:  $N = 2722$

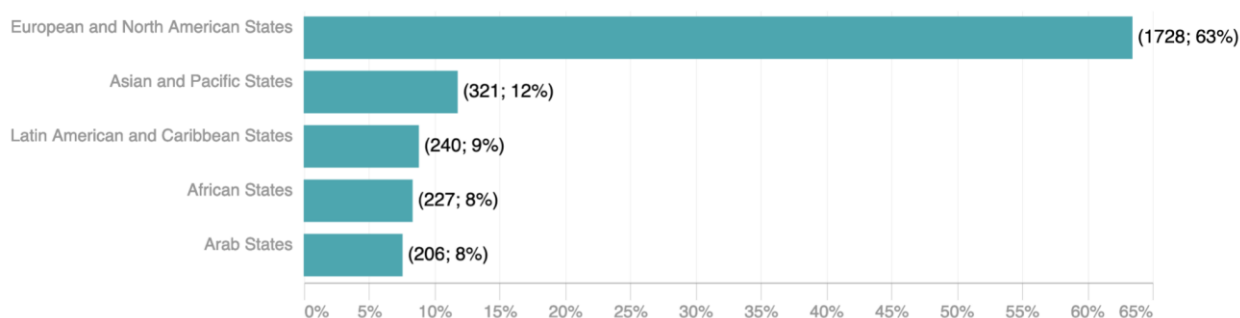


Figure 9: UNESCO Regions of the World.

Generally, all five regions exhibited a diverse representation of age groups, with 69+ being the least represented age category (Figure 10)<sup>43</sup>. The most reported age group for Latin American and Caribbean states was the 18 to 28 category ( $n = 97$ , 42%), followed by African states' 29 to 38 category ( $n = 80$ , 39%) and Arab States' 39 to 48 category ( $n = 84$ , 45%). The Asian and Pacific states and the European and North American states shared similar age distributions overall. Both regions had most respondents in the 39 to 48 category ( $n = 79$ , 29% for 'Asia and the Pacific',  $n = 470$ , 31% for 'Europe and North America').

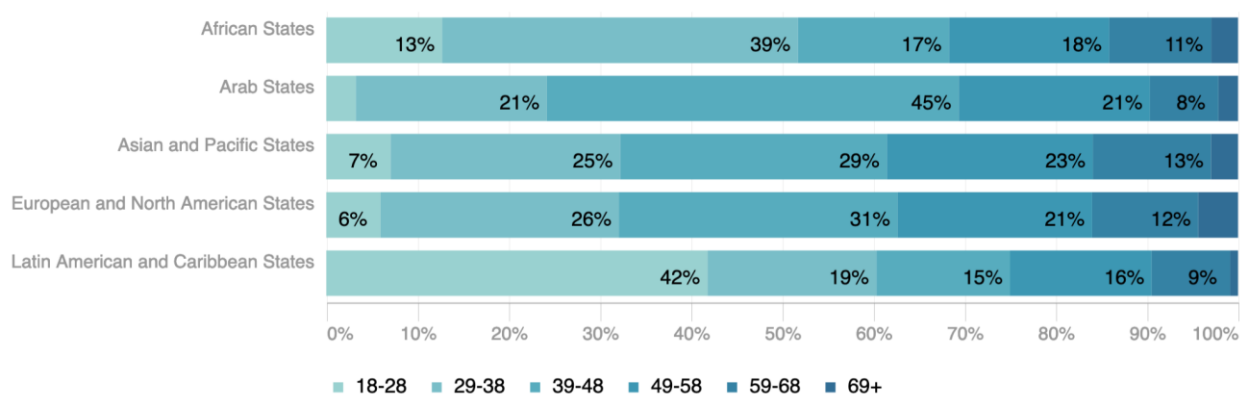


Figure 10: Distribution of age.

Overall, respondents were equally distributed between men ( $n = 1316$ , 49%) and women ( $n = 1307$ , 49%) (Figure 11)<sup>44</sup>. All regions, except for 'Europe and North America', exhibited a shift towards more men.

<sup>43</sup> The total number of responses:  $N = 2430$

<sup>44</sup> The total number of responses:  $N = 2684$

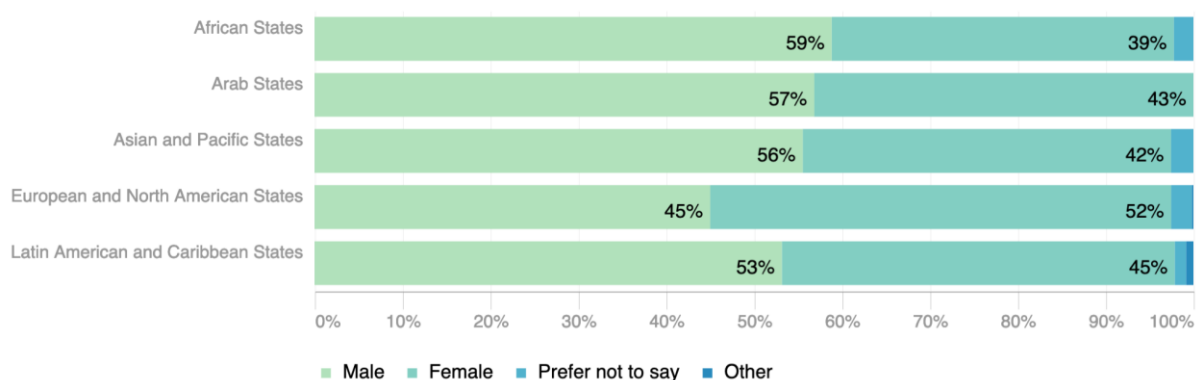


Figure 11: Distribution of gender.

All but one region had similarly low numbers of actively studying respondents (Figure 12)<sup>45</sup>. However, in the ‘*Latin America and the Caribbean*’ region, the majority was currently studying ( $n = 129$ , 55%).

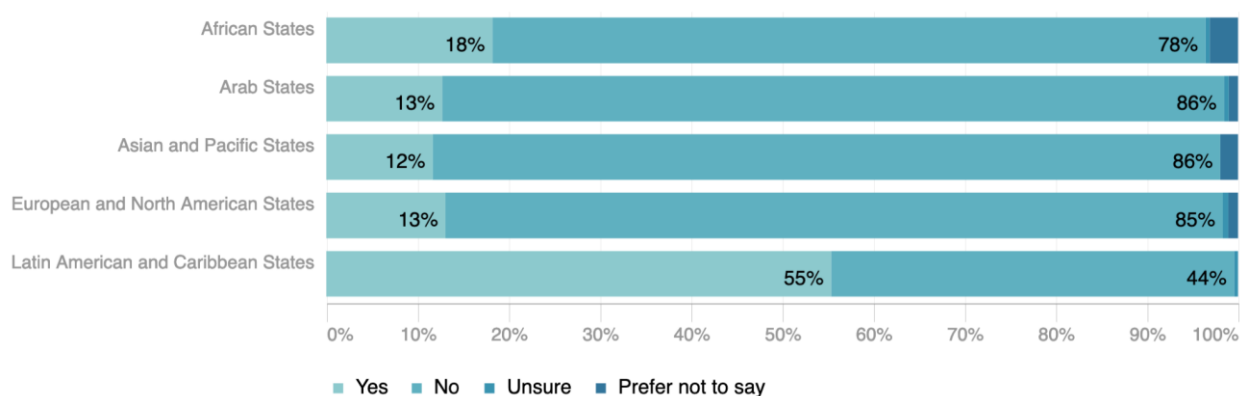


Figure 12: Currently studying at school, college or university.

Overall, the majority of respondents indicated high levels of education, holding ‘*Doctoral*’ ( $n = 1454$ , 55%) or ‘*Master’s*’ degrees ( $n = 692$ , 28%) (Figure 13)<sup>46</sup>. The highest levels of formal education, with most respondents holding a ‘*Doctoral*’ degree, was observed for ‘*Arab States*’ ( $n = 119$ , 60%), ‘*Asia and the Pacific*’ ( $n = 202$ , 66%), and ‘*Europe and North America*’ ( $n = 1028$ , 61%). ‘*Africa*’ ( $n = 51$ , 23%) and ‘*Latin America and the Caribbean*’ ( $n = 54$ , 23%) exhibited the lowest levels of formal education. Notably, these two regions have differing distributions with most holding ‘*Bachelor’s (or equivalent)*’ degrees. This could be explained by younger age profiles and the high number of respondents currently studying observed in ‘*Latin America and the Caribbean*’.

<sup>45</sup> The total number of responses:  $N = 2640$

<sup>46</sup> The total number of responses:  $N = 2637$

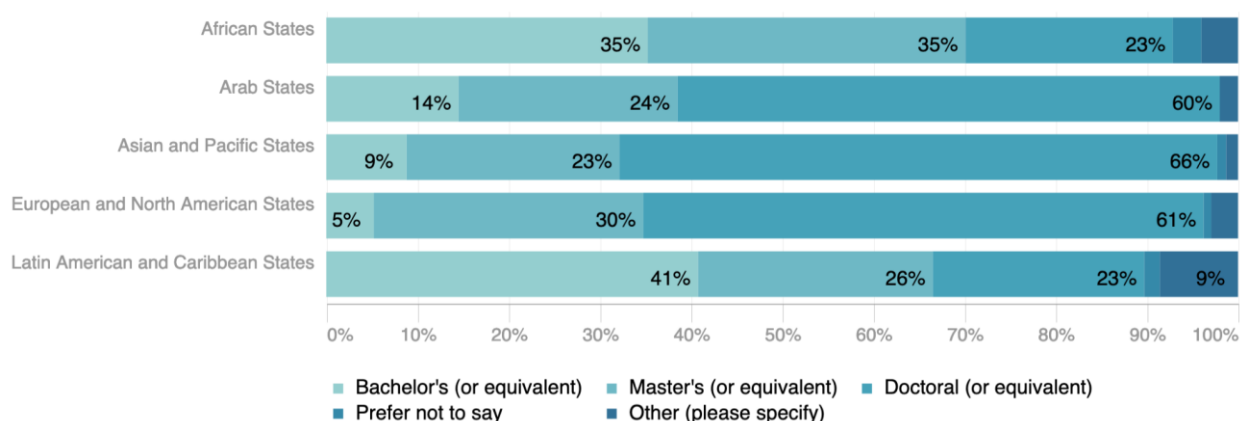


Figure 13: Highest level of formal education completed.

The observed respondent profile revealed diverse professional backgrounds (Figure 14)<sup>47</sup>. Most respondents had a degree in ‘*Natural sciences, mathematics and statistics*’ ( $n = 780$ , 22%), followed by ‘*Social sciences, journalism and information*’ ( $n = 538$ , 15%), ‘*Engineering, manufacturing and construction*’ ( $n = 399$ , 11%), ‘*Business, administration and law*’ ( $n = 364$ , 10%), and ‘*Arts and humanities*’ ( $n = 317$ , 9%). Less common degrees were ‘*Information and Communication Technologies (ICTs)*’ ( $n = 209$ , 6%), and ‘*Agriculture, forestry, fisheries and veterinary*’ ( $n = 188$ , 5%)

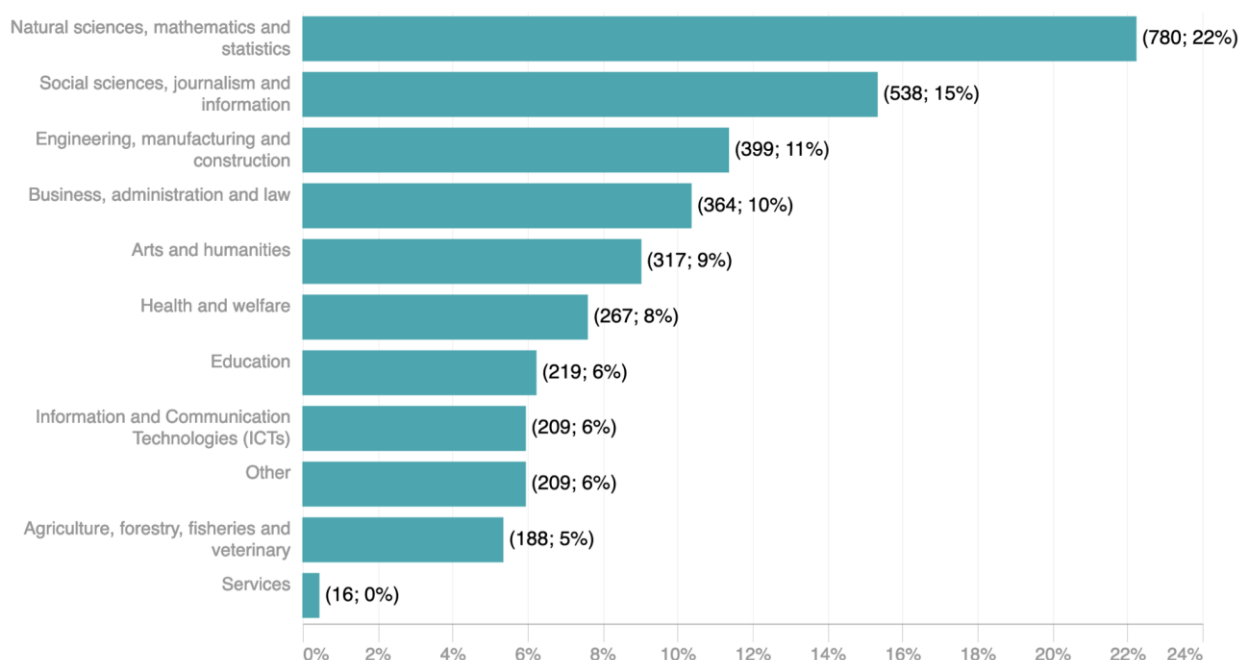


Figure 14: Distribution of degrees by subject area.

Overall, respondents had many years of professional experience, both in total ( $Mdn = 19$  years) and after completing their doctoral degree ( $Mdn = 12$  years) (Figure 15)<sup>48</sup>.

<sup>47</sup> The total number of responses:  $N = 3506$

<sup>48</sup> The total number of responses:  $N = 2071$

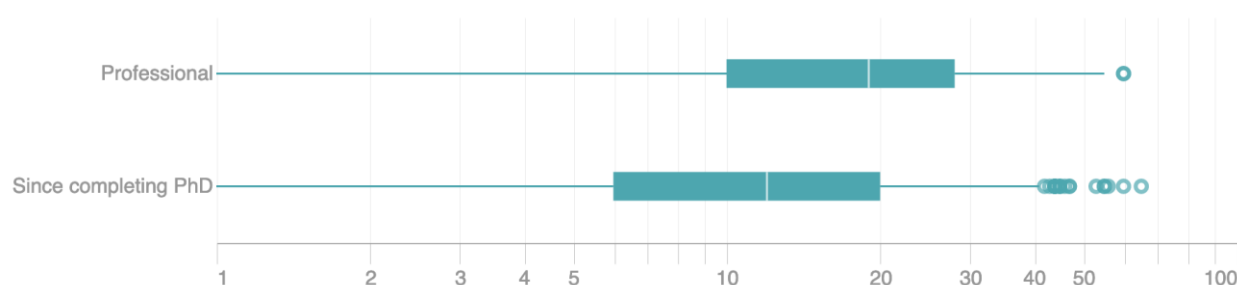


Figure 15: Years of experience as professional / since completing PhD (log scale).

Generally, professions were diverse (Figure 16)<sup>49</sup>. Most respondents worked in ‘*Natural sciences, mathematics and statistics*’ ( $n = 574$ , 20%), fewer in ‘*Engineering and technology*’ ( $n = 430$ , 17%) and ‘*Medical and health sciences*’ ( $n = 302$ , 12%) and only minor proportions chose ‘*Agricultural sciences*’ ( $n = 151$ , 6%) and ‘*Humanities*’ ( $n = 134$ , 5%).

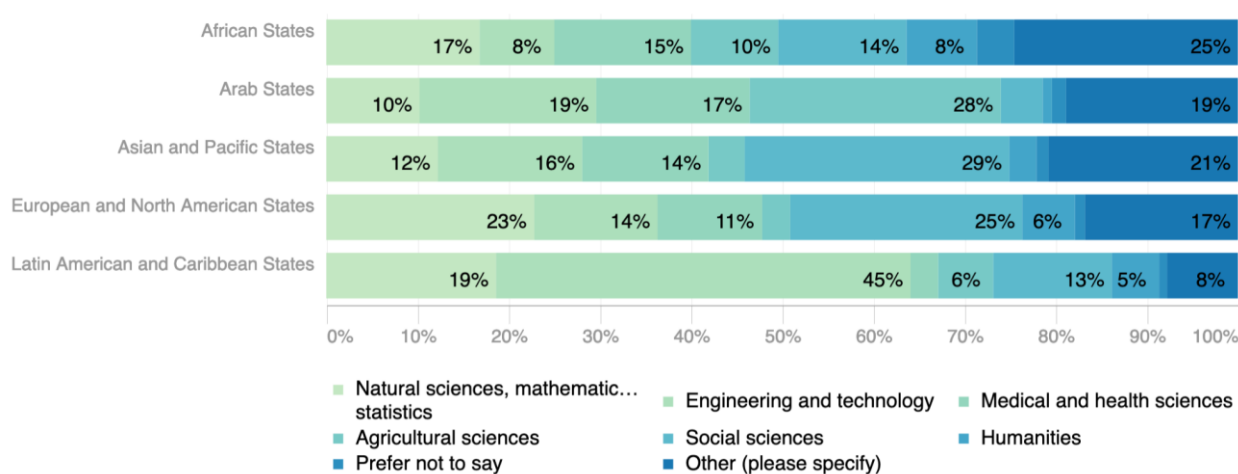


Figure 16: Fields or professions in which respondents work.

In all regions, the most reported sub-field of ‘*Medical and health sciences*’ was ‘*Health sciences*’ ( $n = 115$ , 40%) (Figure 17)<sup>50</sup>. ‘*Latin America and the Caribbean*’ is the least diverse, with a large portion involved in ‘*Basic medicine*’.

<sup>49</sup> The total number of responses:  $N = 2582$

<sup>50</sup> The total number of responses:  $N = 303$

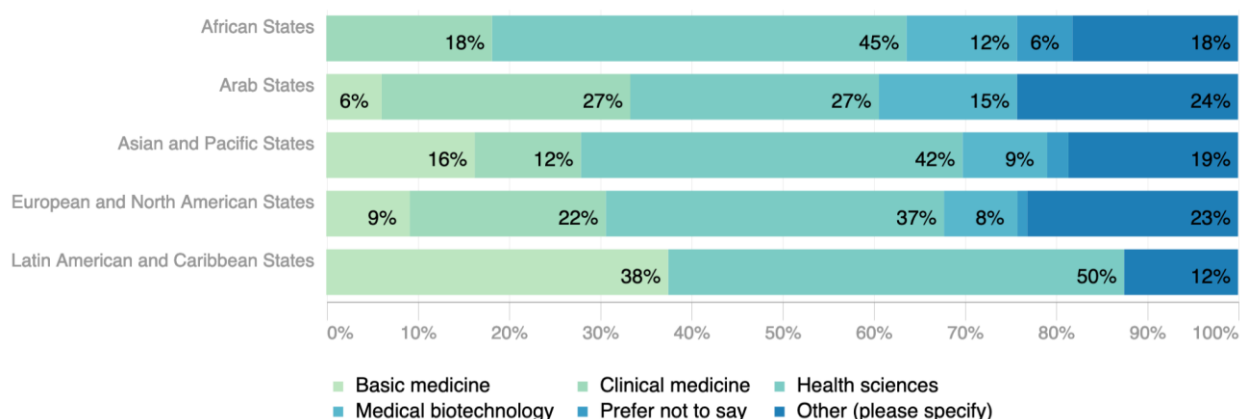


Figure 17: Sub-fields of medical and health sciences.

For ‘*Engineering and technology*’, most respondents worked in the ‘*Electrical/electronic/information engineering*’ sub-field ( $n = 127, 30\%$ ) (Figure 18)<sup>51</sup>. Notable portions of ‘*Latin America and the Caribbean*’ ( $n = 39, 37\%$ ) and ‘*Africa*’ ( $n = 5, 25\%$ ) reported working in ‘*Other*’ sub-fields, whereas a notable proportion of respondents from ‘*Arab States*’ ( $n = 10, 27\%$ ) worked in ‘*Environmental engineering*’.

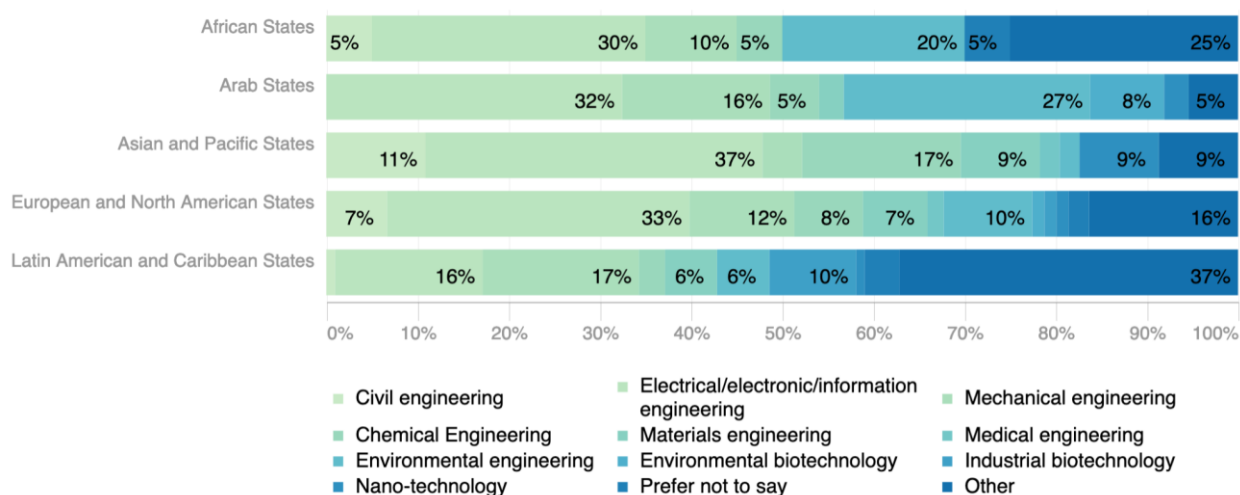


Figure 18: Sub-fields of engineering and technology.

The distribution among sub-fields of ‘*Natural sciences*’ was the most diverse across professional fields (Figure 19)<sup>52</sup>. On average, the most represented sub-field was ‘*Biological sciences*’ ( $n = 173, 36\%$ ). Notably, more respondents in this sub-field were from ‘*Arab States*’ ( $n = 12, 63\%$ ). Many also reported working in ‘*Earth and related environmental sciences*’ ( $n = 95, 18\%$ ).

<sup>51</sup> The total number of responses:  $N = 434$

<sup>52</sup> The total number of responses:  $N = 519$

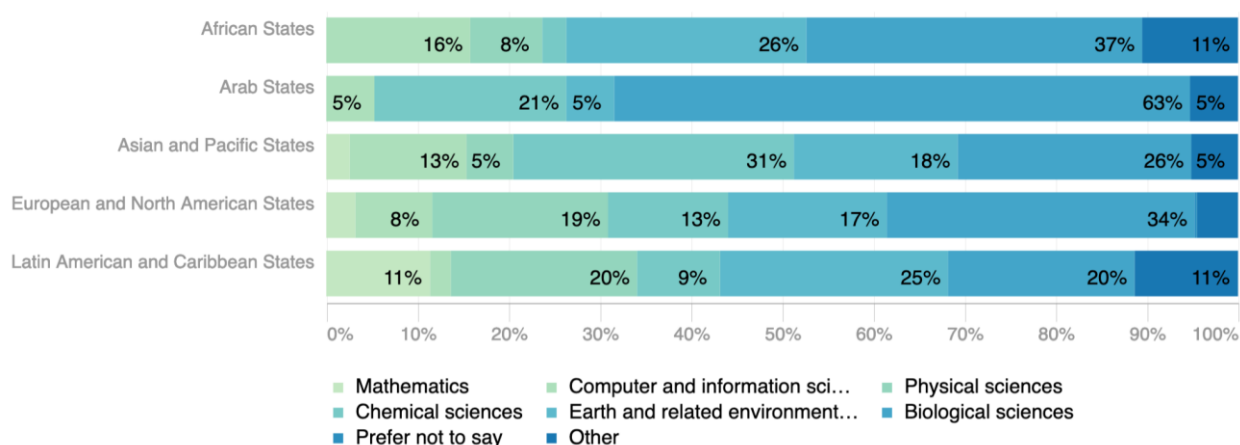


Figure 19: Sub-fields of natural sciences.

The most common sub-field of ‘Agricultural sciences’ was ‘Agriculture, forestry, and fisheries’ ( $n = 68$ , 47%) (Figure 20)<sup>53</sup>. This tendency was most pronounced in ‘Africa’ ( $n = 14$ , 67%), followed by ‘Latin America and the Caribbean’ ( $n = 8$ , 53%) and ‘Europe and North America’ ( $n = 23$ , 45%).

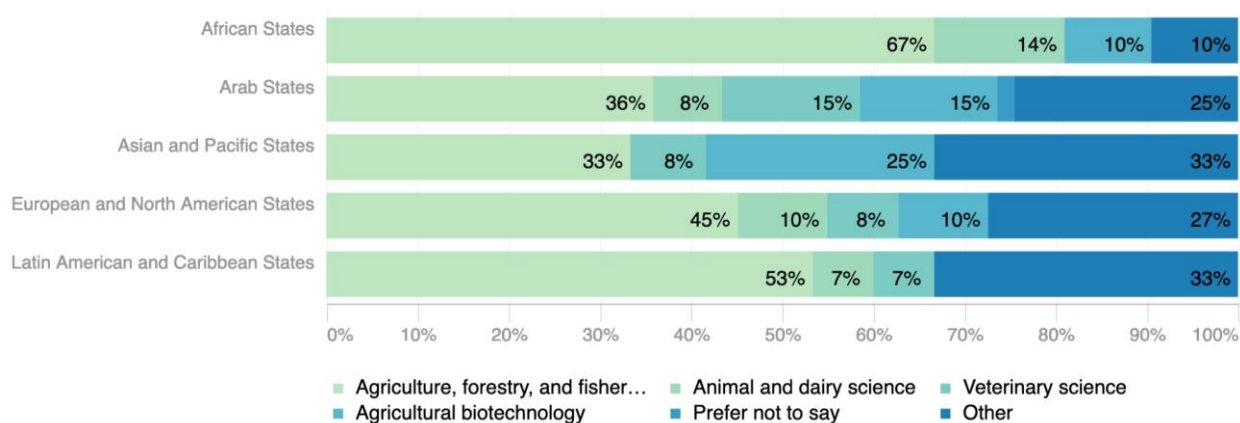


Figure 20: Sub-fields of agricultural sciences.

The most common sub-fields of ‘Social sciences’ were ‘Economics and business’ ( $n = 164$ , 34%) and ‘Educational sciences’ ( $n = 61$ , 15%) (Figure 21)<sup>54</sup>. The regions ‘Asia and the Pacific’, ‘Europe and North America’, and ‘Latin America and the Caribbean’ had the most diverse distribution, whereas ‘Africa’ had similar portions of respondents working in ‘Educational sciences’ ( $n = 10$ , 33%) and ‘Economics and business’ ( $n = 9$ , 30%). The least diverse distribution was present for the ‘Arab States’ sample, where the majority worked in ‘Economics and business’ ( $n = 6$ , 67%).

<sup>53</sup> The total number of responses:  $N = 152$

<sup>54</sup> The total number of responses:  $N = 581$

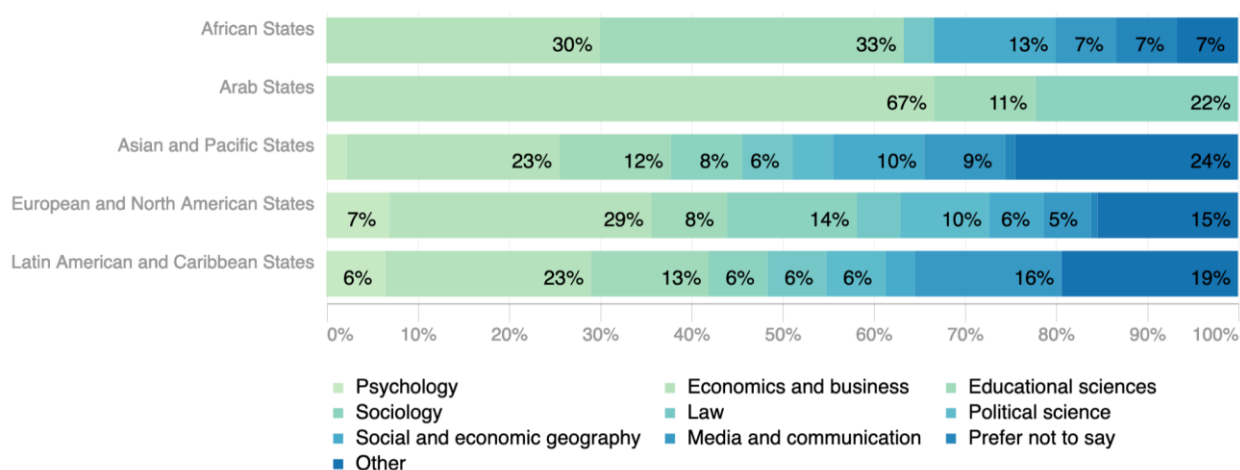


Figure 21: Sub fields of social sciences.

In all regions, most respondents did not identify with the predefined sub-fields of ‘*Humanities*’, as most selected ‘*Other*’ ( $n = 38, 42\%$ ) (Figure 22)<sup>55</sup>. The most diverse distribution was present for ‘*Europe and North America*’ and ‘*Africa*’. In ‘*Europe and North America*’, most respondents worked in ‘*Philosophy, ethics and religion*’ ( $n = 26, 27\%$ ), while large portions from ‘*Asian and Pacific*’ states also worked in this sub-field ( $n = 3, 33\%$ ). Only a few respondents from ‘*Arab States*’ worked in the field of ‘*Humanities*’ ( $n = 2, 100\%$ ). Of these, one worked in ‘*History and archaeology*’ ( $n = 1, 50\%$ ).

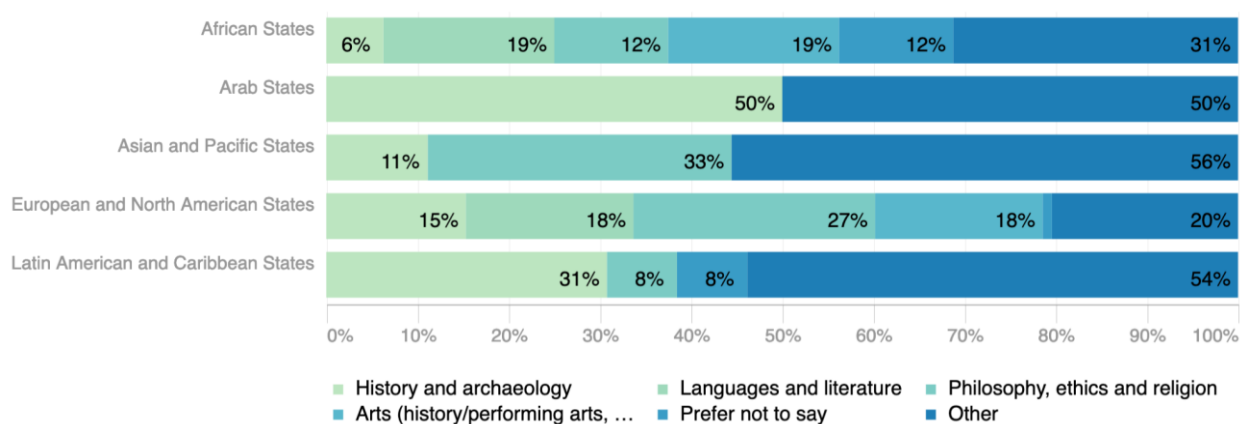


Figure 22: Sub-fields of humanities.

The sectors in which participants worked are almost similarly distributed when compared among regions (Figure 23)<sup>56</sup>. The majority of respondents indicated they worked at a ‘*University or similar research organisation*’ ( $n = 1560, 61\%$ ). The next most represented sector was ‘*National governmental organisation*’ ( $n = 349, 13\%$ ).

<sup>55</sup> The total number of responses:  $N = 138$

<sup>56</sup> The total number of responses:  $N = 2565$

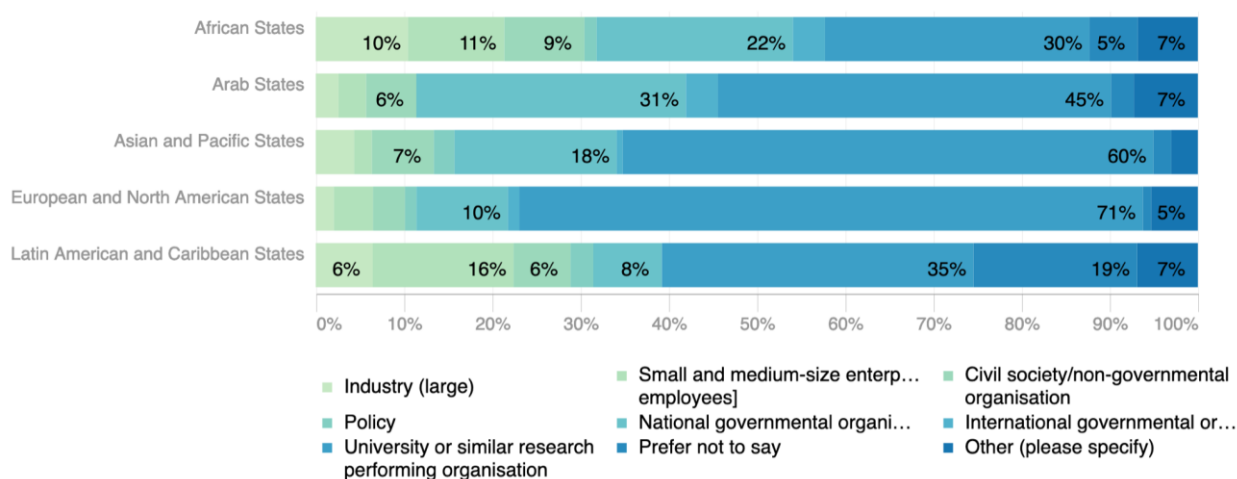


Figure 23: Sectors in which participants work[ed] in.

In general, most respondents were employed full-time ( $n = 1972$ , 74%) (Figure 24)<sup>57</sup>. Contrary to this global tendency, ‘Latin America and the Caribbean’ had large portions of ‘Student[s] only’ ( $n = 73$ , 31%) and full-time employed respondents ( $n = 92$ , 40%).

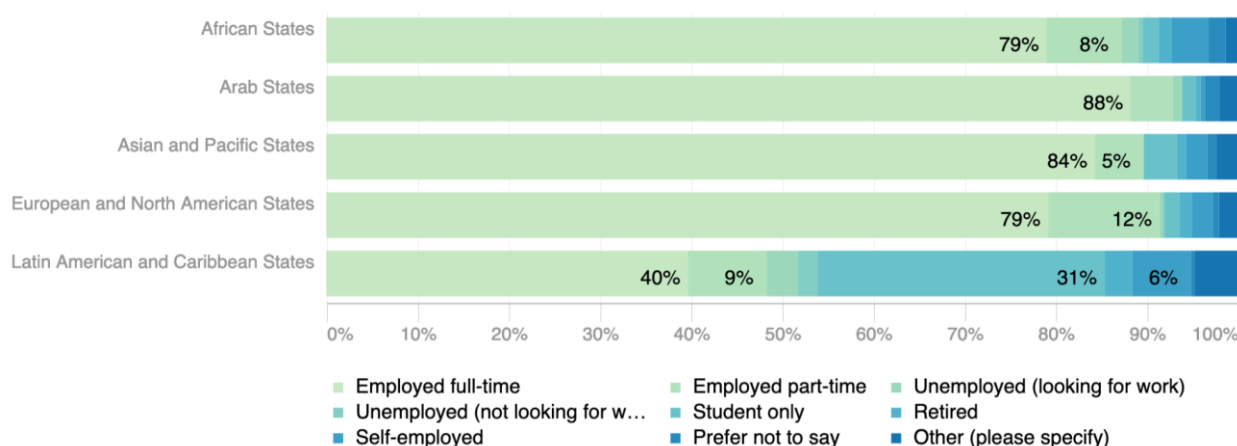


Figure 24: Participants' employment status.

In general, respondents tended to spend their working hours on a diverse range of tasks (Figure 25)<sup>58</sup>. For all regions, the most time was spent on ‘Research and innovation work’ ( $Mdn = 10$  h).

<sup>57</sup> The total number of responses:  $N = 2566$

<sup>58</sup> The total number of responses:  $N = 2423$

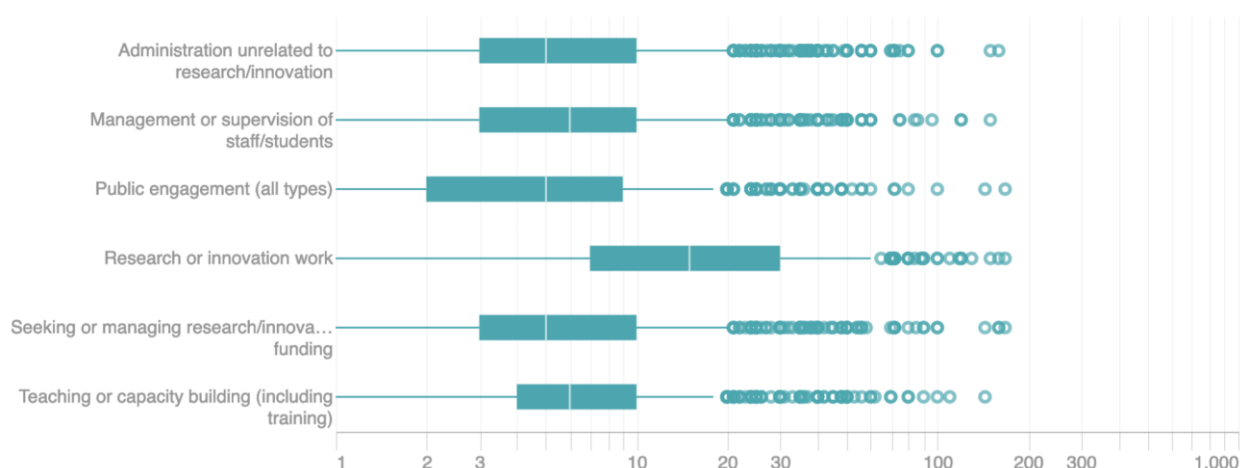


Figure 25: Hours spent on activities in the last 7 days (log scale).

The majority of respondents indicated their recent work was related to one of the four RRI key domains ( $n = 1527$ , 53%) (Figure 26)<sup>59</sup>. Most were connected to ‘*Digital (ICT)*’ ( $n = 660$ , 23%), followed by ‘*Energy*’ ( $n = 320$ , 11%), ‘*Bio-economy*’ ( $n = 308$ , 11%), and ‘*Waste Management*’ ( $n = 239$ , 8%). However, almost half of respondents indicated their recent work was not related to the four RRI key domains ( $n = 1285$ , 46%).

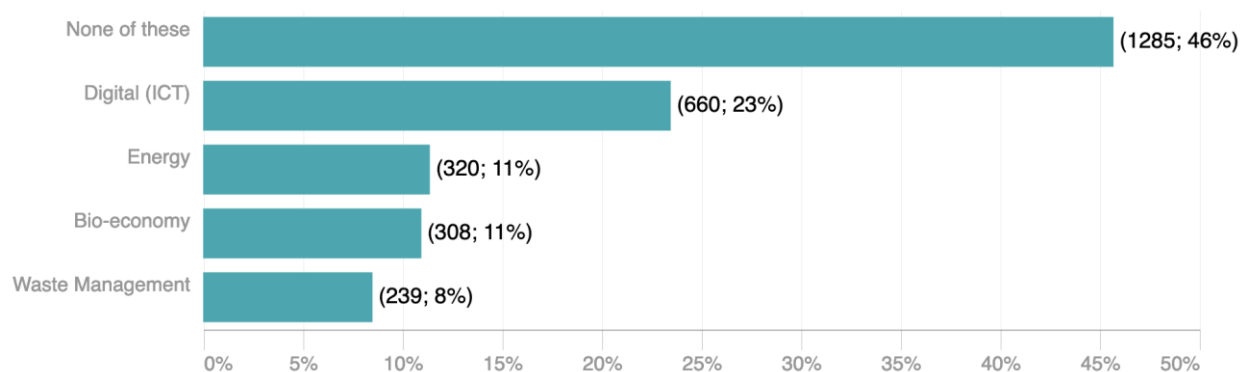


Figure 26: Domains relating to participants' recent work.

The median number of years respondents had worked as researchers and innovators was 10 years. Generally, respondents tended to have worked as a researcher and innovator longer than in their current role (Figure 27)<sup>60</sup>.

<sup>59</sup> The total number of responses:  $N = 2812$

<sup>60</sup> The total number of responses:  $N = 2425$

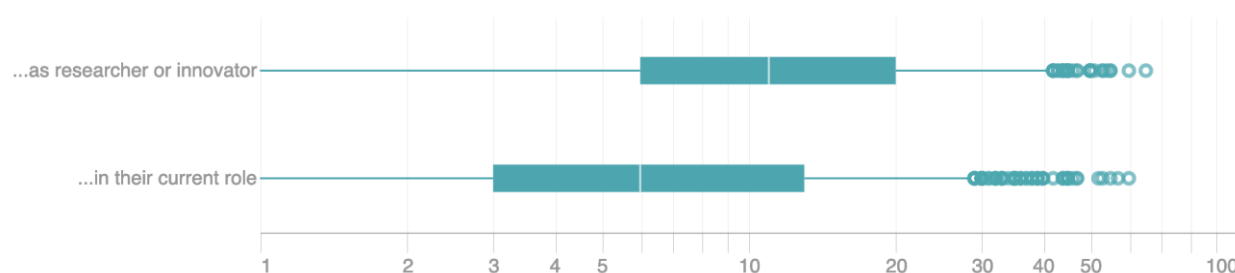


Figure 27: Years that respondents worked in their current role / as researcher or innovator (log scale).

### 3.1.7 CONCLUSION OF FINDINGS FROM ALL REGIONS

The samples from all regions were represented by dominant majorities of respondents from certain countries. Among these were South Africa, Egypt, Guatemala, Great Britain, and India. On a global scale, respondents were relatively equally distributed in terms of gender with a slight skew towards men. Europe and North America was the only region which received more responses from women than men. Across the different regions, most respondents were in the '29-38' (African states), and '39-48' (Arab, Asian and Pacific, and European and North American states) age categories. Respondents from Latin American and Caribbean states were the youngest on average among the regions, with their most dominant group being the '18-28' age category.

Regarding the categories of stakeholders with which respondents interacted, RPOs and other academics were those most engaged in all regions. This suggests a disproportionately higher internal engagement in comparison with non-academic stakeholders. In Latin American and Caribbean states, members of civil society were more often interacted with than in other regions.

The tendency to engage with other researchers and academics showed in the steps taken towards different RRI measures. For instance, as a pathway to transparency, respondents sought feedback from other academic stakeholders towards addressing societal concerns or sought feedback on research ideas and plans. Especially for societal concerns, respondents tended to rely on their own or other researchers' perspectives rather than engaging directly with the people most affected.

Results by RRI dimension showed overall agreement towards the importance of aspects of RRI on an attitudinal level. At a global level, the aspects most consistently highly valued were ensuring work addressed societal needs and that ethical principles were applied during research. However, there were value-action gaps for all measures (a discrepancy between the proportion of people expressing positive attitudes towards a particular measure and the proportion of people taking practical steps in line with that attitude). This suggests that while there is a general global attitudinal tendency towards RRI-related measures, they do not necessarily widely underlie governance structures, policies, and practices in R&I systems or, if they do, respondents are not always aware of them.

The inclusion of ethnic minorities was the least valued of all RRI measures and a trend found in all regions. This could mean that ethnic minorities are not part of the normative scientific discourse on research practices, that ethnic differences are not currently perceived as universal, cross-cutting aspects of all R&I work, or respondents do not see the importance of including them in their own work.

One of the most prevalent steps taken to ensure aspects of RRI, especially for gender equality, ethics, and ensuring work does not cause societal concerns, was engagement with and participation in relevant committees. For the latter two measures, compliance with rules, regulations and legal obligations were notable. This suggests many respondents relied on authoritative and monitoring processes to address aspects relevant to research and innovation processes.

When it comes to ensuring open data, results showed that openness and transparency were widely associated with open access publishing, academic exchange of results, or one-way dissemination (especially to audiences beyond academia). However, the idea of making the complete research process, including methods and data, open and transparent to academic and non-academic stakeholders seems to be less prevalent. Both attitudes and practical steps taken towards open data were the lowest for all regions, compared to other measures of openness and transparency. In the open-ended responses, respondents frequently indicated documenting and reporting research and decision-making processes as a step towards transparency. However, this measure did not differentiate the motives or intentions for doing so. Therefore, neither documenting or reporting processes were seen as part of the scientific method and were likely undertaken due to regulatory requirements or to facilitate the replicability and re-usability of research output and the accountability of research processes.

Although to differing extents, reaching out to non-academic and public stakeholders was mentioned in relation to diverse perspectives, and in relation to ethics through participatory methods. Research transparency is ensured through seeking upstream engagement on research ideas and plans, for public accessibility through outreach activities and participatory research approaches and meeting societal needs through participatory methods and communication activities. Overall, engagement activities were mentioned less frequently throughout the majority of RRI measures. This could suggest that researchers and innovators are not necessarily engaging in such activities themselves.

Globally, considerable proportions associate RRI with aligning research and innovation with societal benefits. While this generally suggests that researchers are amenable to this idea underlying RRI, there was an overall deficiency of practical application to ensure societal perceptions were included from the bottom up. This discrepancy could require further research to identify barriers towards transitioning RRI theory into R&I practice.

Global perspectives on the UN SDGs were highly positive and associated with diverse aspects in all regions. This underlines their potential in research and innovation fields to foster mutual global approaches to shared challenges. However, although the UN SDGs seem to be present in research, findings also suggest that research does not seem to be defined by ideas and

concepts of sustainable development. Notable proportions of respondents reported not being familiar with the UN SDGs, especially in Latin American and Caribbean states. Such gaps would need to be minimised to effectively use them as a global common denominator.

Generally, excluding highlighted differences, tendencies for RRI dimensions, including attitudes and action on RRI measures, were similar across all geographic regions. These findings do not support the assumption of Eurocentrism that is often associated with and scholarly discussed in relation to RRI. However, this might indicate that RRI approaches are not widely adopted in EU states to date.

## 3.2 GLOBAL INTERVIEW RESEARCH: AFRICAN STATES

### 3.2.1 EXECUTIVE SUMMARY

The aim was to investigate bottom-up perspectives and experiences of researchers and innovators in African States. The focus here is on collecting data through and from researchers and innovators themselves (i.e. ascertaining bottom-up views). We prioritise how and why research and innovation are supplied from those who are actually supplying it.

In delivering this, it was also important that these insights are provided for other parts of the RRING project, specifically regarding key RRI-related platforms, spaces and players operating in this region; interactions between different stakeholder types; domain-specific lessons related to Digital (ICT), Energy, Bioeconomy and Waste Management; as well as region-specific insights on what is shaping day-to-day research and innovation practice.

In attaining such insights and achieving this research aim, data from 21 structured interviews were analysed for African States, covering: Botswana (3 interviews); Malawi (8); South Africa (10). We undertook a Qualitative Content Analysis approach to analysing these interview data, which relied on utilising code counts to identify the most prevalent sub-themes for further deeper qualitative interrogation (and thus ultimately what was included in this report). The analysis was undertaken by a team of coders, with inter-coder reliability ensured through Inter-coder reliability was measured using Krippendorff's Alpha tests.

Our findings are structured around seven RRI-related themes, which were inspired by the EC pillars and AIRR dimensions, and indeed were core to structuring the interview sections of this report. Within each of these themes, a number of prevalent sub-themes (all of which are shaping how research and innovation professionals in African States are doing their work) also emerged:

- *Gender equality and inclusivity*: gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; and lack or uncertainty of policy.
- *Public engagement*: organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: evaluation; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.
- *Ethics*: positioning ethics – where does the responsibility lie?; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: accounting for local contexts; and conflicts and tensions.

Within each of these sub-themes, accounts are provided for each of RRING's four domains. Across these, we note the following:

- *Energy:*
  - Gender imbalance exists in energy-related engineering. Expectation that education could be a key driver in tackling gender issues.
  - Public engagement deemed helpful in dealing with community-relevant challenges (e.g. energy poverty).
  - Whilst legislation was in place to ensure information was released publicly, geological data (e.g. relating to petroleum) was protected.
  - Energy, alongside climate change and wider environment impact, were directly definitions of societal need.
  - Nuclear industry very active in science education.
  - Ethics of wider roll-out of energy technologies raised, in ways that were not considered by participants from other regions.
  - Politicised nature of local government undermining RRI development.
- *Waste management:*
  - Little insights available on gender and inclusivity, although it was noted that international political forces were calling for waste sector to increase diversity, given that it is a male dominated sector.
  - Little to no consideration of public engagement in this domain.
  - Little to no consideration of open science in this domain.
  - Waste management related societal concerns were raised in relation to economy and policy directions.
  - Little novelty in science education (e.g. open days, websites).
  - Little discussion of ethics, with one participant arguing that her work had no ethical concerns.
  - Little to no consideration of governance of RRI in this domain.
- *Information and Communications Technology (ICT):*
  - Gender imbalance was regarded as key characteristic of ICT domain. Some universities were applying female recruitment quotas in ICT. Recent improvements to gender imbalance may be attributable to foreign partners' presence in the country.
  - Assumptions exist that ICT advancements do not necessarily need any public engagement.
  - Release of data was commonly restricted on the grounds of government policy and ownership.
  - Little to no consideration of anticipative, reflective and responsiveness theme in this domain.
  - Hackathons used as part of innovative science education approaches.
  - Lack of policy arrangements on ethics attributed to lack of experience/development (of a country) in research and innovation.

- Tax or tariff arrangements were obstacles for advancing governance arrangements.
- *Bioeconomy*:
  - South Africa had diversity obligations affecting this domain. Social scientists were also said to be more likely female, whereas natural/technical scientists were said to be more likely male.
  - One-way communication, rather than two-way exchange, was discussed as a basis for public engagement.
  - Concerns existed on releasing data/findings, only for it to be misrepresented.
  - Country-specific issues occupied and drove research interests, e.g. animal welfare perceptions and vaccination conventions.
  - Evidence of science education involving local stakeholders, as part of the wider lifecycle of a research and innovation project.
  - Ethics committee approval was typical, with said committees have power of enforcement.
  - Governance of RRI involved institutional governance mechanisms aimed at controlling misreading and miscommunication of research.

Key platforms, spaces and players who were explicitly noted as being key to progress various aspects of RRI practice across African States included:

- *Gender equality and inclusivity*: no specific platforms and players were noted in this region. However, spaces included educational spaces (e.g. schools, universities) particularly with regard to STEM<sup>61</sup>, as well as international collaborators beyond the region.
- *Public engagement*: no specific platforms and players were noted in this region. However, the key spaces were noted as being either international, community, and indigenous on the one hand, and local and private space on the other.
- *Open Science*: no specific platforms and players were noted in this region. However, key spaces were public and private spaces, with the interests of the latter forming the guiding principle of competitiveness for deprioritising open access.
- *Anticipative, reflective and responsiveness*: Green Climate Fund; Global Environmental Facility.
- *Science education*: no specific platforms and players were noted in this region. The spaces were mostly community- and stakeholder-oriented.
- *Ethics*: South Africa's Council for Scientific and Industrial Research International (CSIR); Organisation for Standardisation.
- *Governance of RRI*: South Africa's Department of Science and Technology, and its Grassroots Innovation Programme. There was also emphasis on the large importance of local and community spaces.

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<sup>61</sup> Science, Technology, Engineering and Mathematics (STEM)

The lack of specific platforms and players is likely indicative of the lack of advancement of RRI practice in African States.

Key stakeholders interact within and across their research and innovation sectors in different ways, according to the RRI themes that structure our analysis and discussion:

- *Gender equality and inclusivity*: Research Funding Organisations have central roles to how the stakeholders relate to each other, primarily through their funding requirements.
- *Public engagement*: collaboration amongst stakeholders often did not involve a primary focus on identifying and aligning with societal needs, but there was evidence of some exchanges targeting those needs happening. The role of funders' expectation was also noted as key.
- *Open Science*: funding organisations were not prioritising open access over commercial interest or attaching open access conditions to funding.
- *Anticipative, reflective and responsiveness*: evidence of corporate stakeholders prescribing the type of production they would fund without taking on board what the community might have wanted.
- *Science education*: No relevant interview insights for this theme.
- *Ethics*: adherence to ethical standards was part of the contract drawn up between different stakeholders (e.g. in funding research and innovation).
- *Governance of RRI*: public engagement was stated as a priority, and the importance of involve new ideas and stakeholders (who have e.g. not yet been funded) was noted.

### 3.2.2 INTRODUCTION

This Chapter 3 presents findings from the RRING Work Package 3's Task 3.3 – specifically its global interview task – for African States. The aim of RRING's Task 3.3 interviews is to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data through and from researchers and innovators themselves, in African States.

This Chapter is structured as follows:

- We begin by giving headline details of methods adopted, including what country selection procedures, interview participant sampling targets, participant demographics, and analyses undertaken (Section 3.2.1). Note that in-depth information on the methodological approach undertaken for all Task 3.3's global interviews, across all the UNESCO regions we are reporting, can be found in the overarching report.
- The core of the report is then structured around our seven RRI-related themes, which are inspired by the EC pillars and AIRR dimension (Section 3.2.4 - 3.2.10). Within these sections, we begin each by briefly detailing the code counts for all codes deemed to be part of that respective theme, as part of setting the scene for the sub-themes that are subsequently discussed. Furthermore, following this discussion of the most

prevalent sub-themes, each theme-focused section then discusses what is unique for each domain (energy, waste management, bioeconomy, ICT) and for each stakeholder type (Research Performing Organisations, Research Funding Organisations, Industry and Business, Civil Society Organisations, Policy Bodies), in the specific African States. Each theme section finishes with a summary.

- The contents of these chapters feed into a dedicated conclusions section that summarises the key findings from the Task 3.3 interviews for African States (Section 3.2.11.1).

## 3.2.3 METHODS

### 3.2.3.1 DATA COLLECTION

Structured interviewing was selected as the method for RRING's Task 3.3 qualitative study of state-of-the-art research and innovation practices globally. Interviews were selected to provide in-depth perceptions, information and opinions of on-the-ground experiences concerning opportunities and bottlenecks in RRI in each of the five world-regions (Arab States; Asian and Pacific States; European and North American States; Latin-American and Caribbean States; African States). A structured approach was taken to ensure consistency in lines of questioning (including allowable follow-up questions) across the regions, which was deemed especially important given the range of interviewer experiences. The structured interviews ultimately provided more reliable, focused, and uniform data coverage across domains and stakeholder-types in each country and region.

The structured interview format consisted of questions on eight RRI themes and specific interview guidelines were provided to interviewers on how the interview was to be conducted. Interviews were conducted either face-to-face or through telephone/skype calls to facilitate participation. Further details of the data collection methods, guidelines and procedures used are provided in the overarching report.

In each region, country selection was done on a multi-based criterion. Four countries were to be studied from African States. One high and one low ranked country was to be selected based on GDP (per capita in USD) and GERD (Gross Expenditure on Research and Development). Only countries with a Travel Advisory Level of 1 & 2 were selected. In case no partner was available in the primary selected country, partner availability was determined for the alternate country from the list in each category, until coverage was established. Based on this criteria, the following three countries were selected:

1. Botswana: GDP= 6954.17; GERD= 0.50 (2013)
2. Malawi: GDP= 300.31; GERD= 0.03 (2018)
3. South Africa: GDP= 5280; GERD= 0.8 (2016)

In African States, UNESCO recommended excluding Central African Countries because of their political instability and lack of a consolidated R&D system. For the high GDP category,

the primary selection was for Gabon. However, since no partner was available in the country, this was later replaced with Botswana, where local contacts were available. No country was selected for the Low GERD category, since no partners were available in either the primary selection (Madagascar) or the alternative country (Sierra Leone).

### 3.2.3.2 SAMPLING

The selection of participants from each country was based on key selection considerations, including:

- Number of interviews: A minimum of five interviews were to be conducted per country.
- Gender: A 50-50 target split between males and females and/or other gender identities was recommended for interview participant selection, with an acceptable minimum of 40% representation of females and/or other gender identities.
- Domains: Interview participation of respondents from at least one of each domain category in the country sample was set as a target (ICT/digital; energy; waste management; bioeconomy).
- Stakeholder types: At least one of each stakeholder type was to be included in the interview sample (Research organisation; Research funding organisation; Industry and business; Civil society organisation; Policy body).
- Relevance of their professional work to the RRING project's RRI interests: Interview participants were to be selected based on their profiles indicating the presence of any publicly visible RRI-like activities undertaken to ensure that their work complemented the innovation/research approaches that RRING would find useful to investigate.

Interviews were designed and undertaken in accordance with ethical guidelines from the Global Sustainability Institute's (GSI) Departmental Research Ethics Panel, under the terms of Anglia Ruskin University's (ARU) Research Ethics Policy (Dated 8 September 2016, Version 1.7), as well as the Social Research Ethics Committee (SREC) under the terms of University College Cork. Once interviews were conducted, partners/sub-contractors were asked to submit audio-recordings, signed consent forms, transcripts (both in English, anonymised and non-anonymised, and local language), post-interview emails with transcriptions as attachments for participants to review, and proof of participants' background profiles demonstrating their suitability for participation and fieldnotes. Partners/sub-contractors were also requested to

provide a statement of performance against the selection criteria, with justifications if targets were not met across the sample.

Following the set criteria for interview participation and data collection, a total of 21 interviews were undertaken for African States, covering: Botswana (3 interviews); Malawi (8); South Africa (10). We undertook a Qualitative Content Analysis approach to analysing these interview data – details of the data and the specific African States sample are provided in Table 9.

Table 9: List of interview details and participant demographics for each country

African States	Interview code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT<sup>62</sup></i>	<i>Bioeconomy</i>	<i>RPO<sup>63</sup></i>	<i>RFO<sup>64</sup></i>	<i>Industry &amp; Business</i>	<i>CSO<sup>65</sup></i>	<i>Policy body</i>	Male	Female
Botswana	BW01	00:34:01			1		1			1		1	
	BW02	00:23:49	1	1	1	1	1	1				1	
	BW03	00:40:39	1	1	1		1					1	
Malawi	MW01	00:46:36			1	1	1			1		1	
	MW02	00:41:55			1				1			1	
	MW03	00:27:32	1				1		1			1	
	MW04	00:18:56			1		1						1
	MW05	00:22:27	1	1	1				1	1			1
	MW06	00:39:37				1	1					1	
	MW07	00:32:21			1		1	1					1
	MW09	00:38:46			1		1					1	

<sup>62</sup> Information and Communications Technology<sup>63</sup> Research Performing Organisation<sup>64</sup> Research Funding Organisation<sup>65</sup> Civil Society Organisation

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African States	Interview code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT<sup>62</sup></i>	<i>Bioeconomy</i>	<i>RPO<sup>63</sup></i>	<i>RFO<sup>64</sup></i>	<i>Industry &amp; Business</i>	<i>CSO<sup>65</sup></i>	<i>Policy body</i>	Male	Female
South Africa	ZA01	00:34:18	1				1		1			1	
	ZA02	00:35:58		1		1		1			1		1
	ZA03	01:45:05	1				1						1
	ZA04	00:15:10				1	1						1
	ZA05	00:44:40	1				1				1	1	
	ZA06	00:18:24			1		1					1	
	ZA07	00:18:24	1	1		1	1	1			1	1	
	ZA08	00:30:12		1			1	1					1
	ZA09	00:38:21	1				1					1	
	ZA10	01:14:02	1				1						1

### 3.2.3.3 DATA ANALYSIS

Qualitative Content Analysis was used as the primary data analysis method. This was achieved through coding and analysis of interviews in five phases:

1. In the first phase, 30 interviews (**26.5%** of the sample spanning all RRING regions) were inductively coded using NVivo 12 (a type of CAQDAS- Computer Aided Qualitative Data Analysis Software), with an inductive line-by-line open coding approach. The 30 interviews were selected to ensure a good distribution of countries (and UNESCO regions). Within each country, at least one interview from each gender was also included for this inductive coding phase. Following these country and gender considerations, selection was then based on distribution of domains and stakeholder types. Coding was done for the respondents' social construction of (responsible) research and innovation practices and accounted for both cross-cutting (i.e. across all the interview questions and all the geographies/domains/etc.) themes (e.g. enablers, constraints, conflicts, etc.), as well as context- and question section-specific subject matter based on the structured interview-based themes (e.g. public engagement, open access and open data, etc.). Various cycles of review and revision led to the development of a codebook containing 117 codes under 12 categories. This was used in the next phase for coder training.
2. The codebook was used by a team of coders to deductively code the remaining 94 interviews (again, this was for all of RRING's UNESCO regions). For this, the coders were provided extensive training in two practice rounds: (1) a full-day training workshop, in which the coders familiarised themselves with the codebook, practiced coding a pre-prepared transcript extract, and discussed their coding for greater inter-coder reliability; and (2) in the second practice round, each of the four coders was given a separate second practice transcript to be coded independently. Coding was then compared with the lead coder through dedicated virtual meetings with each coder, and inter-coder reliability was determined, and agreement reached. This process led to further revisions of the codebook based on mutual discussions and inter-coder agreements.
3. In the next stage, interview transcripts were distributed among the coders for coding deductively, using the revised codebook. During this stage, coders were expected to flag any critical new codes and reach a satisfactory inter-coder agreement. Coding for the interview section on 'Responsibility' was carried out inductively for all interviews, due to the degree of variance in responses and because of how it sat distinctly away from the RRI and AIRR structure of this report's themes. This was a result of the open-ended nature of the question on responsibility and how different participants understood responsibility very differently, based on their subjective interpretation of the term.
4. Inter-coder reliability was measured using Krippendorff's Alpha. On average, coders achieved a Krippendorff's Alpha value of 0.95, and a reliability of over 0.8 for 89% of variables.

5. Within each theme identified, as a first step code counting was done for each domain and stakeholder type in each region, as well separate counts for each country, to get a sense of what is in the data. After this, further in-depth qualitative interrogation of the coded data was then undertaken to interpret the patterns found in the selected codes (i.e. identified sub-themes).

The presentation of the qualitative data in this chapter uses example quotes for evidence and clarity. The quote blocks are often quite large to maintain the integrity of the original coding and to, critically, ensure richness and depth to the handover of data from this Task 3.3 to the rest of the RRING project, as well as be of use to other readers who may be interested to know more about our source data, and thus the claims we subsequently make based on these.

Our discussion in the following sections is based around seven themes: *gender equality and inclusivity*; *public engagement*; *open science: anticipative, reflective and responsiveness*; *science education*; *ethics*; and *governance of RRI*. Within each of these themes, we present two to four prevalent sub-themes, whereby a sub-theme is usually a single dominant code that cuts across a high proportion of the interview transcripts. There are a small number of sub-themes that represent a small number of codes, but which logically cluster together as part of us drawing out broader meanings from the interview data.

We now discuss the most prevalent codes (i.e. identified sub-themes) for each of our seven RRI themes, beginning with details on the code counting outcomes for each theme, which in turn lead to the sub-themes themselves that we present within the rest of this chapter.

### 3.2.4 GENDER EQUALITY AND INCLUSIVITY

As one of the six key RRI policy priorities highlighted by the European Commission, gender equality has been defined as being “about promoting gender balanced teams, ensuring gender balance in decision-making bodies, and considering always the gender dimension in R&I [research and innovation] to improve the quality and social relevance of the results”.<sup>66</sup>

Inclusivity is understood as promoting people in research and innovation people who are underrepresented (e.g. women, ethnicities, or economic minorities, etc.). Inclusivity deals with people who are included/excluded from the research and innovation process, whether intentionally or not.

There are also “process dimensions” to achieving these outcomes, whereby establishing a ‘diverse and inclusive’ process, requires that all actors and publics involved in and affected by research and innovation work together and are included early in research and innovation practice, deliberation, and decision-making, to yield more useful and higher quality knowledge.<sup>67</sup> “Voices across a diversity of communities should be involved in research, from

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<sup>66</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>67</sup> <https://www.rri-tools.eu/about-rri>

its beginnings to its commercialisation”, ensuring all points of view are accounted for, and generating higher quality science through different perspectives and expertise.<sup>68</sup>

The interviews and analyses were conducted with these definitions in mind. Of the 14 codes identified, four codes were seen most extensively: *gender and sexual diversity* [code 56]; *organisational norms and practices* [code 55]; *discrimination and lack of diversity* [code 65]; *lack or uncertainty of policy* [code 66].

Codes	African States			
	Botswana	Malawi	South Africa	Total
<b>53: Gender equality and inclusivity</b>				
54: Contextual understanding of diversity and inclusion-societal and cultural norms	3	0	1	4
55: Organisational norms and practices	6	4	8	18
56: Gender-Sexual diversity	11	9	19	39
57: Ethnic and religious diversity	3	1	11	15
58: Country-based representation	1	0	0	1
59: Disability	0	1	0	1
60: Academic diversity	2	1	2	5
61: Age diversity	3	3	3	9
62: Socio-economic diversity and inclusion	1	1	2	4
63: Motives-Benefits of diversity and inclusion	1	2	3	6
64: Risks-Disadvantages associated with diversity and inclusion	0	3	1	4
65: Discrimination and lack of diversity	4	1	3	8
66: Lack or uncertainty of policy	2	6	8	16
67: Discrimination- a non-issue	3	3	6	12

The following sections provide details regarding these four codes and descriptions of the findings.

In the summary section, the findings relating to the theme *gender equality and inclusivity* are brought together.

<sup>68</sup><https://www.rri-tools.eu/documents/10184/16301/RRI+Tools.+A+practical+guide+to+Responsible+Research+and+Innovation.+Key+Lessons+from+RRI+Tools>

### 3.2.4.1 GENDER EQUALITY AND FEMALE PARTICIPATION IN THE R&I WORKPLACE

In the framework of this report, *gender equality* encompasses any references to gender diversity and inclusion in R&I workplace.

This includes references to the need or methods employed for improving gender equality, inclusion, reducing the gender gap (such as a gap in salary, recruitment, promotion, participation, scientific and research domains, etc.) and providing relevant support structures. The results for each country are discussed in this chapter.

While negative responses to gender equality are included in the ‘Discrimination and lack of diversity’ code, some ambiguous comments, that indicate an openness to including women but do not support inventions, are coded here.

While there is acceptance of the rights of women to be part of research and innovation and the workplace, there is divergence over how this gender inclusion is framed, the means to increase the presence of women, and whether to intervene at all. Besides gender equality, other forms of inclusivity and diversity are largely absent. Certain participants, particularly in South Africa, acknowledge increased female participation rates in education. However, participants reproduce a meritocratic framing of gender-equal participation that largely delegitimises sincere forms of intervention.

Across the region, there is a tendency to discuss gender equality in reference to female participation, which stands in contrast to more progressive interpretations of equality that are in line with the EU and process dimension definitions. Reducing equality to mere participation overlooks the content of these definitions, such as gender equality in decision-making, of which the following is a rare mention that points to the lack thereof:

*“...Botswana is a very patriarchal system. It's run by men, with women, having some senior roles, but primarily the senior roles in government in the administration, the university and researchers are mostly men. So I think that's just a cultural issue. It's not to say that women aren't good researchers. We've got some very good women researchers here... Women haven't been given the opportunities that men have.”* [Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>69</sup>]

More progressive understandings recognise the presence of women and LGBTQ+ partners throughout the process and how greater gender inclusivity can broaden the research and industry perspectives. There is an absence of commentary on sexual diversity. While partially a product of interviewers tending to concentrate on gender, gender equality held higher salience and priority over other forms of inclusivity. One participant notes the following:

*“...Government policies nowadays are leaning towards gender mainstreaming. Almost all the policies they will encourage involving women. Maybe the other*

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<sup>69</sup> BW02

*minority groups are not talked about that much... ” [Male; Malawi; RPO, Industry & Business; Energy<sup>70</sup>]*

While LGBTQ+ is not addressed, two participants recognise how greater inclusivity can widen perspectives and improve impact:

*“...we tend to only focus on the what is mainstream, therefore, it is very important for any section or part of the society that is not represented, it should be included.” [Male; Botswana; RPO; ICT<sup>71</sup>]*

The gender imbalance in engineering is identified by a participant who carries out research in energy, waste, and ICT, as originating from misconceptions about the content of particular fields of engineering. For example, mechanical engineering may have certain masculine or physical associations:

*“...if you look at engineering global, you almost always going to be getting men with very few exceptions.” [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>72</sup>]*

According to this participant, these associations were not as strong for other engineering disciplines, such as electrical engineering:

*“But if you go to the relatively soft engineering fields, what I'm saying you if you look at electrical engineer, you will get a proportionately more women even sometimes civil but when you go to computer and related ICT...” [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>73</sup>]*

In the same vein, this participant considers gender imbalance is seen as a key characteristic of the ICT domain:

*“...if you just consider IT and technology as a profession you find that you only meet a third of women professionals in the industry...” [Male; Malawi; Industry & Business; ICT<sup>74</sup>]*

The same participant says there are improvements in the field, but the actual increased female presence is located within their foreign partners rather than the country per se:

*“In ICT... There is male dominance in that one. But in Botswana it's improving... it's nowhere close to where we should be. But they seem to be attract[ing] females...” [Male; Botswana; RPO; ICT<sup>75</sup>]*

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<sup>70</sup> MW03

<sup>71</sup> BW01

<sup>72</sup> BW03

<sup>73</sup> BW03

<sup>74</sup> MW02

<sup>75</sup> BW01

This male participant in the bioeconomy domain contrasts male and female participation in STEM and social science disciplines, and points out that women dominate the field of social science and men dominate STEM:

*“...what is actually interesting when you are talking about sciences you are going to realise that it is male-dominated. We need a lot of females. And when it comes to the social sciences, actually you will be shocked to realise that it’s a lot of females that dominate in that field. And yes, we need males in that field. So, we need to a kind of create a balance in terms of gender...”* [Male; Botswana; RPO; Bioeconomy<sup>76</sup>]

The same participant locates the origins of the imbalance in biases:

*“...the belief that science is a male dominated field as well as the same belief that social sciences are basically a female dominated field. Those are beliefs and biases but then they are not regulations but then there are other things that we were raised up to.”* [Male; Botswana; RPO; Bioeconomy<sup>77</sup>]

Perceptions differed support measures that should be implementation with strong interventive approaches, such as quotas, receiving little or no consideration or support in discussions. Increasing female participation in education is one of the main concerns:

*“...when we do career expos, when we do all these other things we always specifically try to engage more female members, female students, trying to create that sort of interest into the nuclear industry...”* [Male; South Africa; RPO, Industry & Business; Energy<sup>78</sup>]

In South Africa, this female participant comments on how female participation in education has increased:

*“...in terms of students, we always have a very high number of [female] students, which is fantastic for the waste sector, because it’s always been a very male-dominated sector...”* [Female; South Africa; RPO, RFO; Waste Management<sup>79</sup>]

This female participant shares a similar sentiment:

*“So even in my field of hydrology we graduate more women than men in universities...”* [Female; South Africa; RPO; Energy<sup>80</sup>]

Narrowing the focus on gender equality and inclusivity to participation is the focus from which participants' support for non-intervention gained expression. Many participants reduced them to non-issues on the basis that women (and minorities) are not prevented from participating.

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<sup>76</sup> MW06

<sup>77</sup> MW06

<sup>78</sup> ZA01

<sup>79</sup> ZA08

<sup>80</sup> ZA03

This is often supported - by male participants - with the reasoning that meritocratic forms of participation ensure that discrimination is prevented:

*“In our organisation we promote information from any individual not considering the gender, race, whatever other factors that may be considered for us important thing is that I listened all that information if the information is relevant, and it tells us what we want to hear, or what we are looking for, then that information to us is viable. But if the information is not viable, it is not based on any discrimination.”*  
[Male; South Africa; RPO, Policy body; Energy<sup>81</sup>]

Another male participant from Botswana agrees:

*“...when we appoint researchers, we appoint on merit without a point on gender... we say, who's the best person for the job. And if it's a man then the man gets the job, if it's a woman, the woman gets the job.”* [Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>82</sup>]

Faith in meritocracy remains, although participants are aware of systemic and subtle gender biases. The participant mentioned above maintained his meritocratic position despite referring to the existence of a historical and cultural bias in favour of men in their country. He is also dismissive of gender equality policies on account of the biases of individuals:

*“...Because of the biases of people on employment panels, I mean, you can have all the policies that you like, but people will have their own personal biases.”*  
[Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>83</sup>]

Meritocratic perceptions of fairness often delegitimise interventive measures, like quotas, which deviates from the appointment through merit. In fact, intervention can accompany this narrative in the guise of being a threat to the participation of men, according to this participant:

*“...But this generation is going to suffer the same disparities now where there's going to be women dominating and less boys involved.”* [Male; South Africa; RPO; Energy<sup>84</sup>]

Another perceived threat from interventions out of line with meritocracy is to the quality of the research/work:

*“Sometimes you pick people who are not capable and one who is supposed to be that position because of their gender. Yeah, so to me, it has to be neutral, whether female or male.”* [Male; Malawi; RPO; ICT<sup>85</sup>]

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<sup>81</sup> ZA05

<sup>82</sup> BW02

<sup>83</sup> BW02

<sup>84</sup> ZA09

<sup>85</sup> MW09

### 3.2.4.2 INTERVENTIONS AND POLICIES IN PLACE

This section covers any explicit or implicit mention of policies, formal/informal rules, norms, codes, guidelines, values, procedures, and specific models or frameworks used for diversity and inclusion within the participants' organisation(s).

Uncertainty shown by participants about what such norms and practices might be or how they might play a role in diversity and inclusion are also included.

How the organisational norms and practices of this region are discussed in the interviews, demonstrated little recognition that gender and diversity is something that organisations should monitor or of quotas as concrete organisational policy. Organisational inclusivity of ethnic minorities and especially class or persons of socioeconomically disadvantaged backgrounds are absent. The vagueness of many participants' knowledge of their own organisation's take on diversity and inclusion and a lack of any institutional measures suggests inclusivity and equality are a low priority.

Additionally, some organisations that do not factor in gender and diversity are framed as progressive and there are examples of a natural or matter-of-fact acceptance of bias within the organisation, as though some essential quality of the people who make up the organisation.

Many interview participants offer singular or even throwaway comments on their organisation's practices and policies, which are lacking in further elaboration or specifics:

*"...in every work, in every activity but also in terms of departmental policies they have tried as much as possible to include the different groups of people."* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>86</sup>]

More explicit pronouncements, like the following, emphasise a high level of disconnect between researchers and their organisation's policies on diversity and inclusivity:

*"...I just know that there are certain benefits if you are a lady and you are pregnant, you are given maternity leave and that common across many organisations. But I am yet to see if we have a gender policy in the organisation."* [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>87</sup>]

The comment suggests low existence or weak enforcement of diversity practices by the organisation. It also indicates a certain amount of delegation of responsibility to the organisation.

Participants based in Malawi and Botswana have little to say, which suggests little to no existence of inclusivity policies and practices in their organisation. One participant expresses explicit support for quota-type measures:

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<sup>86</sup> MW05

<sup>87</sup> MW01

*“I don't think there is that policy, but I would prefer if they had specified that maybe for these positions, you need to have my five females or diversified in that manner.”* [Male; Botswana; RPO; ICT<sup>88</sup>]

Two participants from South Africa are aware of inclusive policies. One participant's organisation aims to enhance gender and racial balance:

*“There's a target for supporting previously disadvantaged individuals and research teams have to have a particular makeup from a gender and racial perspective.”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>89</sup>]

The other participant's organisation provides assistance for and promotes the ‘disadvantaged’:

*“...our institution promotes people that were previously disadvantaged, in order to give them a say, and a view and also be allowed to pitch in, in in whatever is being done...”* [Male; South Africa; RPO, Policy body; Energy<sup>90</sup>]

While racial and gender-based exclusion is listed as covered by these policies, the participants make no reference to the LGBTQ+ community specifically.

According to this participant, girls at school level should be exposed to the engineering profession:

*“...try as much as possible to try and interest young girls at school, not university... asking the school to begin to consider it as a professional route and beginning to show more women [who] have graduated...”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>91</sup>]

This participant is aware of measures in place to increase the proportion of women in the ICT domain, with some universities applying quotas:

*“That is why some universities are putting up deliberate policies to accept students. For example, they will say as a deliberate policy we will take 30% female students... to make sure that at least they are promoting the participation of other groups...”* [Male; Malawi; Industry & Business; ICT<sup>92</sup>]

As part of a RFO, this participant says their organisation makes use of calls for proposals to engender greater inclusivity:

*“...as a general rule, one of the requirements of the calls that are put out is the need to make sure there's meaningful participation of black-owned technology*

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<sup>88</sup> BW01

<sup>89</sup> ZA02

<sup>90</sup> ZA05

<sup>91</sup> BW03

<sup>92</sup> MW02

*businesses, of wom[e]n, of young people...*” [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>93</sup>]

The same participant recognises that conditions are needed in funding programmes:

*“...if you want to change... the gender and the racial and special makeup of who we benefit from our program[me], then you have to put deliberate conditions in place to make sure that happens...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>94</sup>]

The concept of capacity building is found in the comments of one CSO participant:

*“I think the only way we saw it as a need was to incorporate some of the left-out groups, like the women you are talking about but also the youth into the project through the capacity building... So, that’s our only way that maybe I could say we addressed gender and maybe diversity.”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>95</sup>]

Funding organisations have central roles in how stakeholders relate to each other, primarily through funding requirements:

*“There’s a target for supporting previously disadvantaged individuals and research teams have to have a particular makeup from a gender and racial perspective...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>96</sup>]

In the next section, discrimination and lack of diversity in relation to gender equality and inclusion is discussed.

### 3.2.4.3 DISCRIMINATION AND LACK OF DIVERSITY

*Discrimination and lack of diversity* refers to any diversity and inclusion within the organisation that leads to discrimination and includes commentary where ethnic or age diversity, female inclusivity, and acknowledgement of disability, are lacking. This section includes references to specific organisational norms and practices that lead to a lack of diversity and inclusion.

There is a general recognition that organisations hire more men than women, however, the rarer mentions of ethnic, LGBTQ+, and class participation suggests signs of weaker agenda positioning and deeper marginalisation. For example, the following type of statement occasionally emerges:

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<sup>93</sup> ZA02

<sup>94</sup> ZA02

<sup>95</sup> MW05

<sup>96</sup> ZA02

*“Maybe the other minority groups are not talked about that much otherwise it encourages participation of women.” [Male; Malawi; RPO, Industry & Business; Energy<sup>97</sup>]*

The meritocratic theme reappears as a legitimization of organisational policies not to support gender-inclusive measures:

*“...it's not a regulation or a policy in our institution. But it's just that, when they were hiring... they just said they hired the best guy. But the other candidates that were females, were they worse off? No, I don't think so.” [Male; Botswana; RPO; ICT<sup>98</sup>]*

The experiential accumulation that comes with seniority and the temporal lag of the organisation is a reason for the dominance of particular groups.

*“I think that on the more senior academic and research aside, it's still very, but it's still more male, white dominated, but that's where, you know, these are people that have got 20, 30 years of experience in academia in this particular topic, and that's going to take time to change... So given time, we expect to see that those that are applying for research projects that are applying for grants, will take on more of the broader, kind of South Africa[n], representation...” [Female; South Africa; RPO, RFO; Waste Management<sup>99</sup>]*

The temporal solution offered at the end of this quote can be interpreted as delegitimising interventions, like the meritocratic position demonstrated throughout African States.

#### 3.2.4.4 LACK OF UNCERTAINTY OF POLICY

The *lack or uncertainty of policy* sub-theme includes any reference to uncertainty about government and supra-institutional policy beyond their organisation, or a lack of such policy on diversity and inclusion.

Uncertainty about relevant government policies, as well as uncertain beliefs that none exist at all, are present. However, across African States, there are contradictory beliefs about the existence of such policies. The disconnect described in *organisational norms and practices* between participants' own knowledge of inclusivity measures and their organisation's policy and practice, is repeated here between participants and the stance of their governments.

There are only two mentions of supra-institutional or government inclusivity and equality policies from the participants in Botswana. This participant says such policies do not exist:

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<sup>97</sup> MW03

<sup>98</sup> BW01

<sup>99</sup> ZA08

*“There is none, they don't have those where you will say maybe 50% of your workforce should be female.” [Male; Botswana; RPO; ICT<sup>100</sup>]*

The other participant from Botswana says it is on the government's agenda, but no effective measures are in place:

*“Well, government always talks about employment, gender equality, poverty eradication, and so but there's nothing to stop those things happening...” [Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>101</sup>]*

According to this participant from Malawi, there is uncertainty:

*“On that one I am not sure on those policies I should be frank.” [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>102</sup>]*

In contradiction, two participants from Malawi state that government policies are in place to encourage female participation (MW03; MW09). MW09 also expresses the opinion that selecting on the basis of gender could negatively affect the quality of research, by not choosing people on the basis of their existing knowledge.

The South African participants also express contradictory opinions. Some express uncertainty and point out that the government has it on the agenda, but there are no concrete policies:

*“Other than just recognising that there is a need for that in the country, I can't think of any.” [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>103</sup>]*

Furthermore:

*“...there are no policies that promote diversity except strategies, which is what we call ministerial guidelines which is a strategy that promotes diversity.” [Male; South Africa; RPO; ICT<sup>104</sup>]*

In contrast, two other participants from South Africa – including the only women quoted in this sub-theme – say policies exist and refer to BBBEE (Broad-based Black Economic Empowerment), which is a country-specific framework of legislation presented as an attempt to counteract the legacies of Apartheid. Whilst supportive of the legislation, one participant says it is deficient in its implementation:

*“...the policies of government they [are] talking about that support [BB]BEE there, they did it in the statute, that there, the problem is the implementation thereof.” [Female; South Africa; RPO; Energy<sup>105</sup>]*

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<sup>100</sup> BW01

<sup>101</sup> BW02

<sup>102</sup> MW01

<sup>103</sup> ZA02

<sup>104</sup> ZA06

<sup>105</sup> ZA10

They are hopeful of future government action. However, this hopefulness is tempered by uncertainty of that future:

*“...we've got beautiful policies, but they're not being actually executed... the president saying that he's going to be entering into the performance contract with the ministers... Hopefully, there will be consequences this time around.”* [Female; South Africa; RPO; Energy<sup>106</sup>]

The other participant, who is unsure what the policy framework is called, mirror the concerns of MW09, regarding how insisting on more diverse forms of participation, rather than adhering solely to ‘merit’, is hampering the quality of output:

*“I think it's BBBEE a lot of time people do not get the job until they match a certain criteria and the quota system is dragging progress.*

*We don't have anything holding us back as an institution the problem is in the government due to the quota system and it's simply autocratic there is no appointment by merit.”* [Female; South Africa; RPO; Bioeconomy<sup>107</sup>]

In the following section, a summary of the gender equality and inclusivity chapter is provided.

### 3.2.4.5 SUMMARY OF GENDER EQUALITY AND INCLUSIVITY

The responses that have most support for *gender equality and inclusivity* centre around weak or light approaches (for example awareness-raising or education). Alternatively, a meritocratic understanding of who should participate is resistant to any interventions, while at the same time is framed as progressive and anti-discriminatory. In this light, attempts to intervene to improve the balance of participation is detrimental to the quality of the knowledge being applied and produced, as opposed to enriching research by broadening perspectives.

There is more to discern about the RRI in the region based on what is absent rather than what is present. Gender equality and inclusivity considerations are absent or sparse in interviews, implying low-status, under-developed or non-progressive interpretations of these issues in African States. In the interest of being comprehensive, it is necessary to note that other types of diversity and inclusivity, such as racial, sexual and economic, are not comprehensively discussed by the participants in this sample. Further research would be required to ascertain the views and current situation of participants in R&I in this region.

There is little elaboration on other aspects of gender equality and inclusivity as laid out in the EC and process dimension definitions, such as the role of gender in decision-making. There is little consideration of how social relevance of research results might be affected by greater gender equality. Processes of inclusion are overlooked. There are mentions of how the quality

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<sup>106</sup> ZA10

<sup>107</sup> ZA04

of the knowledge might be improved through the inclusion of different perspectives and expertise that can hail from different backgrounds.

There are no direct references to the need to include publics that are involved in and affected by the research. There is no reference to when such groups should be included and how the process of inclusion should appear in practice, deliberation, and in decision-making.

Where the quality of the knowledge is raised, it is usually out of concern that selecting participation based on equality and inclusivity might reduce the actual quality of the research.

Uncertainty about relevant government policies, as well as uncertain beliefs that none exist at all, are present. However, across the regional sample, there are contradictory beliefs held about the existence of such policies.

### 3.2.5 PUBLIC ENGAGEMENT

*Public engagement* is one of the key policy agendas that should be furthered by RRI practices. There are three key dimensions according to the European Commission's (EC) definition of public engagement. It is (1) collaborative, (2) multi-actor, and should (3) align with societal values, needs, and expectations. This means RRI should foster collaborative and multi-actor research and innovation processes where “all societal actors work together during the whole process in order to align its outcomes to the values, needs and expectations of society”.<sup>108</sup>

It is within this framework that interviews, and subsequent analyses, were conducted.

Of the 42 codes identified for this theme, four were seen most extensively: *organisational norms and practices* [code 2]; *motives-benefits of public engagement and collaboration* [code 4]; *building support networks and strategic alliances* [code 112]; *integration of different domains and stakeholders* [code 114].

Codes	African States			
	Botswana	Malawi	South Africa	Total
1: Public engagement				
2: Organisational norms and practices	3	11	10	24
3: Lack or uncertainty of public engagement policy	2	5	8	15
4: Motives-Benefits of public engagement and collaboration	1	11	11	23
5: Risks-Disadvantages associated with public engagement and collaboration	1	1	2	4
6: Types of stakeholders for engagement	23	33	82	138

<sup>108</sup> <https://www.rri-tools.eu/about-rri>

7: Government bodies, municipalities, and regulatory authorities	6	8	26	40
8: Professional bodies	0	4	7	11
9: Research Funding organisations	2	0	8	10
10: Scientific community	2	5	15	22
11: Specialists-Experts	1	2	3	6
12: Civil society organisations	4	3	5	12
13: Industry and Business	4	2	16	22
14: Marketing and communication agencies- Public Relations Industry	1	0	2	3
15: Celebrities	0	0	0	0
16: Citizens or the general public	3	9	11	23
17: Others	0	3	2	5
26: Consultation tools	4	5	4	13
27: Surveys	0	1	0	1
28: Public-citizen consultations	4	2	2	8
29: Feasibility studies- working groups	0	2	2	4
30: Involvement tools	2	2	4	8
31: Open public calls and funding initiatives, etc.	0	0	3	3
32: Focus groups and discussions	0	2	1	3
33: Competitions and awards	0	0	0	0
35: Collaboration tools	0	0	1	1
36: Social networks	0	0	0	0
37: University-based start-ups	0	0	0	0
38: Applied research laboratories	0	0	0	0
39: R&I matchmaking	0	0	1	1
40: Empowerment tools	0	0	0	0
41: Participatory management-approaches	0	0	0	0
42: Campaigning-Lobbying	0	0	0	0
43: Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0
107: Lack of (perceived) interest of general public	0	2	4	6
44: Other	0	0	0	0
111: Collaboration	5	3	27	35
112: Building support networks and strategic alliances	2	2	7	11

113: Actor mapping	0	0	4	4
114: Integration of different domains and stakeholders	1	0	10	11
115: RRI frameworks for new cross-disciplinary research	0	0	0	0
116: Difficulties in collaboration and engagement	2	1	6	9
106: Financial constraints and considerations	4	4	11	19

The following sections provide details regarding these codes and descriptions of the findings. The sections provide information about organisational norms and practices, the motivations for and benefits of public engagement, the need to build support networks and strategic alliances as well as the integration of different domains and stakeholders. In the summary section, the findings relating to the theme *public engagement* are brought together.

### 3.2.5.1 ORGANISATIONAL NORMS AND PRACTICES

*Organisational norms and practices* encompass findings that describe organisational norms and practices or formal/informal rules and procedures within the organisation for public engagement. Any uncertainty displayed by the participants about what such norms and practices might be or how they might play a role in public engagement are also included in this section. Government and supra-institutional level policy are included in other sub-themes.

The vague and distantly-related information provided by the participants on organisational norms and practices to do with public engagement suggest that it is not fully understood. The practices, norms, or rules they discuss are tenuously related to engagement outcomes and rarely align with needs, expectations or values. Two-way co-producing styles of engagement are not part of the process.

One participant says that while there are no formal restrictions, the practices are affected by a lack of resources:

*“Even in my institution in the answer will be the same to the previous so we[re] still lacking now, there's nothing that limits your ability to work with people around, rather, you do not have much support, because and support could be varied, from skills to personnel to funds and so on...”* [Male; Botswana; RPO; ICT<sup>109</sup>]

The role of resources makes it easier to see how the collaborative relationship between an RPO and NGO in Malawi can be influenced by the interests of donors:

*“...being an NGO, we are funded by some donors. So, most of the times... when you are engaging into a project, the donor has specific objectives.”* [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>110</sup>]

<sup>109</sup> BW01

<sup>110</sup> MW01

According to participants, there is not much engagement outside of the shared domain and institutional spaces, which might help explain some of the confusion in the following:

*“...Most of the people we work with are within the ICT field. But so far, we haven’t worked much with others who are outside...”* [Female; Malawi; RPO; ICT<sup>111</sup>]

Another participant from Malawi speaks about the need for public engagement and aligning with communities in the ICT domain:

*“...whatever services IT is providing, as the IT society we have to make sure that it doesn’t cause harm to the communities around...”* [Male; Botswana; Industry & Business; ICT<sup>112</sup>]

Organisational norms concerning collaborative measures with the public - rather than private, government, and CSO stakeholders - are in the minority, according to participants. Mostly, where they are considered, it is more in the case of outreach – or “mentoring” (MW04) – and one-way forms of communication, such as the “information sharing” of results:

*“...we only involve those that we share our results with... the public or the stakeholders that are outside our circle we only involve them in terms of information sharing, like when we produce the results we share with everyone through different channels for them to be aware and make informed decisions...”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>113</sup>]

In this example, the public is dealt with at the end of the research and innovation process:

*“We normally engage the final stakeholders or the general public after all the results have been fine-tuned.”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>114</sup>]

According to this participant, mentoring school pupils is part of their public engagement activities:

*“...we are developing technical solutions for the education sector, specifically higher learning institutions. That’s the scope, that’s our main focus. Unless it is just mentoring may be because we usually have a week where we engage secondary school students so that they appreciate what we are doing... but beyond that, no...”* [Female; Malawi; RPO; ICT<sup>115</sup>]

While this South African example appeared to allow for a more regular interaction with the public, it is a case of one-way communication (i.e. reporting):

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<sup>111</sup> MW04

<sup>112</sup> MW02

<sup>113</sup> MW05

<sup>114</sup> MW05

<sup>115</sup> MW04

*“Look, our organisation has to report to the public, has to always inform the public... That is rule number one where the CEO together with the management we report to the public every quarter as to what is happening around with regard to safety...”* [Male; South Africa; RPO, Industry & Business; Energy<sup>116</sup>]

Some organisations are more open to public engagement. The following participant acknowledges that public knowledge, including indigenous knowledge, has value:

*“Public engagement is something that has to be done, we really value information, and we value the views of people within the surrounding areas with scientific knowledge, whether it's an indigenous knowledge, whatever knowledge the public has to offer, we really appreciate and value it...”* [Male; South Africa; RPO, Policy body; Energy<sup>117</sup>]

In the following section, motivations for and benefits of public engagement are discussed.

### 3.2.5.2 MOTIVATIONS FOR AND BENEFITS OF PUBLIC ENGAGEMENT

This section includes references to the motivation behind and benefits derived from public engagement and collaboration, according to the participants in this sample.

These include increased understanding, developing trust and alleviating public concerns, increasing awareness, developing credibility and legitimacy, and improving R&I outcomes.

The *motives-benefits of public engagement and collaboration* are discussed in a positive tone and talked about as having advantages. Although engagement is occasionally framed as a two-way collaborative process, it is also framed as a one-way, top-down relationship with benefits for the target stakeholders defined by the organisation, rather than derived through a shared process of engagement. Often the benefits mentioned are accrued to the participant's organisation, rather than to the other stakeholders. Still, there are some comments on the benefits of engagement and aligning with the needs and expectations of others.

Participants describe benefits and motivations to collaborative activities, such as the benefits of improving the skills of their own members:

*“So, we normally are also engaging other organisations in terms of training and coaching... to build up the skills.”* [Male; Malawi; Industry & Business; ICT<sup>118</sup>]

And access to information and assistance with distribution:

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<sup>116</sup> ZA01

<sup>117</sup> ZA05

<sup>118</sup> MW02

*“Usually, it’s to get information from them as stakeholders, maybe key informants as well. For the others, it’s to help us to get us to distribute the products that we have.” [Male; Malawi; RPO, Industry & Business; Energy<sup>119</sup>]*

Collaboration also offers the potential for improved dissemination of results, through providing a platform:

*“...you maybe use the media if I would consider them as another institution or as another partner organisation, so it is mostly creating that platform to communicate the result findings.” [Male; Malawi; RPO; Bioeconomy<sup>120</sup>]*

Collaboration improves how the organisation’s message is packaged and communicated, according to this participant:

*“Over the years we have found that when we speak to stakeholders outside we find that we are helping each other. This has educated us to say how best we can deliver the new information in such a way that is easily understandable.” [Male; South Africa; RPO, Industry & Business; Energy<sup>121</sup>]*

Considering how outside stakeholders understood the message, the main emphasis is delivering the organisation’s message, rather than gaining insights from others as to their needs and everyday realities, which can aid in aligning with the values, expectations and needs of society.

The impressions suggest organisations are more concerned with communicating the science or communicating the organisational message, rather than two-way engagement processes aimed at establishing advantages for society and achieving alignment:

*“...we have these different types of our multi-faceted approach to educate the people... We are trying to make it as simple as possible to someone who doesn’t understand the industry.” [Male; South Africa; RPO, Industry & Business; Energy<sup>122</sup>]*

Even where benefits are demonstrated for all stakeholders, it has the appearance of one-way communication rather than engagement:

*“...we have to make sure that the participants of the study because they are part of communities that are comfortable and not afraid of what we are trying to do and we not here to destroy their animals and we have to make sure that we show they are going to benefit and also how we are going to benefit.” [Female; South Africa; RPO; Bioeconomy<sup>123</sup>]*

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<sup>119</sup> MW03

<sup>120</sup> MW06

<sup>121</sup> ZA01

<sup>122</sup> ZA01

<sup>123</sup> ZA04

Another example from a South African participant, highlights this emphasis on one-way communication of the benefits with no acknowledgement of two-way engagement:

*“...we have been involving the public in terms of getting the information through [to] them and telling them and explaining what type of projects and what are the benefits. And also in that doing, encouraging the public the general public to pursue careers that could be used in in this process, since it's sort of a technical process...”* [Male; South Africa; RPO, Policy body; Energy<sup>124</sup>]

There are some exceptions though, for which there is a sense of the practical value of obtaining information from other stakeholders as to their needs, to improve the process of alignment. The interview participant speaks about working with the communities and providing solutions to their problems:

*“I think most of the institutions either by design help in the sense that when you get a product out there will be a lot of people that are either appreciative or critical of it. And so that also helps us refine our processes and the products that we put out.”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>125</sup>]

According to this participant, working with groups outside the organisation provides greater understanding of projects and their long-running implications:

*“...it is really important to engage partners outside the organisation to understand the importance of the projects that we are implementing in Malawi, their implications for Malawi in the long run...”* [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>126</sup>]

Similarly, “regular” engagement offers benefits of familiarity, which assists in arriving at an understanding of the needs and concerns of those involved:

*“I think it's to understand the needs that are there. Before the project was initiated there was a study that was done... we tried as much as possible to engage almost every stakeholder that is involved and to understand what their needs are...”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>127</sup>]

In the next section, building support networks and strategic alliances is discussed.

### 3.2.5.3 BUILDING SUPPORT NETWORK AND STRATEGIC ALLIANCES

This section covers references to opportunities for finding common ground, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.

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<sup>124</sup> ZA05

<sup>125</sup> BW03

<sup>126</sup> MW01

<sup>127</sup> MW05

In addition, references to building relationships and making connections to facilitate useful outcomes for research and innovation are covered. However, simple exchange/transfer of knowledge are not included.

There is little in the interviews that suggests the development of support networks and strategic alliances aimed towards the alignment part of the definition of public engagement. From the following two examples, strategic alliance building establishes access to specialised knowledge.

Networks are usefully applied to problem-solving and accessing resources, as in the case of the following where, depending on the project, the organisation engages other institutions for relevant specialisations and expertise that they lack. In this case, there is a problem-specific dimension to building networks that perhaps suggests their temporary arrangement:

*“...it all depends on the project we are working on... some projects could be joint research and development and others could be sponsored, in terms of an outside party, has an interest in something and they sponsor the research for it... could be we lack a particular specialisation or expertise and then we'll engage with another institution to work with, so it varies across spectrum.”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>128</sup>]

According to this participant involved in research funding, collaboration is encouraged and often favoured:

*“I very much encourage, you know, researchers to work in a collaborative way across projects, and we tend to favour funding projects that are collaborative...”* [Female; South Africa; RPO, RFO; Waste Management<sup>129</sup>]

Another example suggests how support networks are required to ensure access to specialised expertise. This is especially the case where there are complex areas of technological development, which is a recurring aspect of climate mitigation technologies and energy transitions:

*“The part that we 'are not familiar with is the [in]jection part, which is on the ground. So we got companies that are advising us on the capture site locally...”* [Male; South Africa; RPO; Energy<sup>130</sup>]

According to this participant, her job is to ensure greater integration in research and innovation in the public and private sectors:

*“...my job is to play this facilitation role between research academia, and the public and private sector...”* [Female; South Africa; RPO, RFO; Waste Management<sup>131</sup>]

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<sup>128</sup> BW03

<sup>129</sup> ZA08

<sup>130</sup> ZA09

<sup>131</sup> ZA08

This participant from Malawi says multi-actor engagement happens at every level, to ensure all stakeholders are aware of developments and decisions:

*“...at every stage there are some meetings, for instance I will have meetings at the ministry level where they call other stakeholders and then we’re able to explain the steps where we are, and what we have done, and what we’re expecting to do again...”* [Male; Malawi; RPO; ICT<sup>132</sup>]

In the following section, the integration of different domains and stakeholders is discussed.

### 3.2.5.4 INTEGRATION OF DIFFERENT DOMAINS AND STAKEHOLDERS

Any reference to the need for better integration and collaboration between different domains and stakeholders (both cross-disciplinary or otherwise) or involvement/participation at different phases of research and innovation are included under the *integration of different domains and stakeholders* sub-theme.

Interviews show recognition of the need for inter-domain, interdisciplinary, and multi-stakeholder integration, to comprehend and respond to some of the world’s increasingly complex problems such as healthcare, sustainability, and climate change.

A Botswanan participant recognises how the complexity of modern systems (such as healthcare) requires multi-disciplinary teams spanning ICT, health, management, and NGOs:

*“Some organisations, obviously the healthcare needs a multi-disciplinary team. So you need people from your IT division, you need health professionals, you need management, you need NGOs, you need donors... everybody has a role to play which is very important...”* [Male; Botswana; RPO; ICT<sup>133</sup>]

Public engagement activities in the energy domain are based on recognising how public engagement can be of benefit to both NGOs and RPOs dealing with energy poverty and local water issues:

*“...you work with communities to say, “Well, what solutions could we develop that could be deployed to reduce, you know, that problem?” That’s how we engage with some of our projects.”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>134</sup>]

The inter-domain and multi-actor quality of a collaboration on sustainability and green energy is also apparent in the transdisciplinary nature of the collaboration, according to this participant:

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<sup>132</sup> MW09

<sup>133</sup> BW01

<sup>134</sup> BW03

*“I am also in strong collaboration with my former [university]... specifically on sustainability, transdisciplinary and green energy...” [Female; South Africa; RPO; Energy<sup>135</sup>]*

Furthermore, the complexity and large undertakings required for climate mitigation research and innovation requires political backing. For this participant, that means engaging with all levels of government to achieve integrated political support:

*“...I’m focusing on raising awareness on the technologies that actually mitigate against climate change, in particular, the carbon capture and storage... because it is a flagship project of the government, and it’s a fairly new technology, I have to engage across the board, starting from parliament, the cabinet, the national government, the provincial government, the local government, even before I can go to the communities, because there has to be a buy-in.” [Female; South Africa; RPO; Energy<sup>136</sup>]*

Obtaining integrated political buy-in across all these levels of government is necessary before going to the communities and engaging them on carbon capture and storage research. The community being located last in this stakeholder engagement process suggests misalignment with the process dimension definitions of public engagement - i.e. it is the case that “all societal actors work[ed] together during the whole process in order to align its outcomes to the values, needs and expectations of society”.

The multi-domain nature of such climate mitigating technologies, which has legacy issues related to South Africa’s geography and history, is visible in the multiple departments referred to by the same participant:

*“We are working with the Department of Environmental Affairs, because at this flagship project of carbon capture and storage... We work very closely with the Department of Water Affairs... We work very closely with the municipalities... we work very closely with Department of Transport... we are working very closely with PetroSA...” [Female; South Africa; RPO; Energy<sup>137</sup>]*

In the following section, a summary of this chapter is provided.

### 3.2.5.5 SUMMARY OF PUBLIC ENGAGEMENT

The vague and often distantly related information provided by the participants in this section suggests that public engagement is not fully understood. The practices, norms, or rules they discuss are tenuously related to engagement outcomes and rarely align with societal needs, expectations, or values. Although engagement is occasionally framed as a two-way collaborative process, much is framed as a one-way, top-down relationship with the benefits

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<sup>135</sup> ZA03

<sup>136</sup> ZA10

<sup>137</sup> ZA10

for the target stakeholders often defined from the viewpoint of the participant's organisation, rather than through a shared process of engagement.

Some of the benefits and motivations that interview participants attribute to collaborative activities includes improving the skills of their own members and accessing information to aid product distribution; improving dissemination of results through providing a platform; accessing specialised knowledge; and improving how the organisation's message is packaged and communicated.

While discussion of stakeholder interactions is about collaborating on research and innovation activities without a primary focus on identifying and aligning with societal needs, several examples are presented where engagement is used in working towards aligning with the needs and expectations of others. Where processes of alignment between R&I and societal needs are apparent, is in the spaces of community and local. The stakeholders seeking some form of alignment are most active in these spaces.

The interviews show recognition of the need for inter-domain, interdisciplinary, and multi-stakeholder integration, to comprehend and respond to some of the world's increasingly complex problems, such as healthcare, sustainability, and climate change. Some of these problems require international mobilisation as well as sharing of specialised forms of knowledge across countries.

### 3.2.6 OPEN SCIENCE

*Open science* includes both the EU 'open access' pillar and 'open and transparent' process dimension. The open access pillar definition incorporates the FAIR principle (Findable, Accessible, Interoperable, Reusable).

According to this principle, the attributes of open access are (1) the easy accessibility and (2) findability of data, and (3) that data can be shared and (4) reused without difficulty. Open access is intended to encourage collaboration, to catalyse innovation, to prevent costly access to scientific research, to facilitate productive dialogue with civil society, and to improve the quality of research.<sup>138</sup>

The 'open and transparent' process dimension involves the inclusivity of all actors in the process of R&I through transparency, openness, and the provision of meaningful information at all stages of the process.

All actors, including the public, should be encouraged and enabled to engage with, discuss and scrutinise science and technology, and be empowered to make informed decisions.

Openness and transparency should develop multi-way dialogue with all relevant parties, foster accountability and public trust, and meaningfully involve people not normally part of science and technology systems, in the research and innovation process.

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<sup>138</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

It is within this framework that interviews, and subsequent analyses, were conducted. Of the 10 codes identified for this theme, four were seen most extensively: *levels and limits of open access* [code 46]; *lack or uncertainty of policy* [code 50]; *risks-disadvantages associated with open data access* [code 51]; *motives-benefits of open access and data* [code 52].

Codes	African States			
	Botswana	Malawi	South Africa	Total
45: Open Science				
46: Levels and limits of open access	3	10	11	24
47: Data protection	0	1	6	7
48: Data accessibility	0	3	7	10
49: Organisational norms and practices	2	6	5	13
50: Lack or uncertainty of policy	3	6	4	13
51: Risks-Disadvantages associated with open data-access	2	12	7	21
52: Motives-Benefits of open access and data	1	9	9	19
76: Transparency	2	1	13	16
77: Accountability	3	1	5	9
106: Financial constraints and considerations	4	4	11	19

For this region, the code count of 16 for *transparency* places it as fourth. However, to ensure comparability *lack or uncertainty of policy*, with a count of 13, is included instead.

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *open science* are brought together.

### 3.2.6.1 LEVELS AND LIMITS OF OPEN ACCESS

Included in this section are references to limits on open access or different rules, procedures or criteria for open access/data needed at different levels of the organisation (or beyond). References to sharing only particular forms of data and not others are included (e.g. sharing results and outcomes, not data or vice versa; sharing policy-driven research, not market-driven research, sharing with key stakeholders and not the general public, etc.).

The main limits to the release of data are commercial and competition-based, legislative restrictions, the public sensitivity of the data, and data ownership. A few examples also hinted at the importance of open access for more robust and informed outcomes and public trust and inclusivity.

Across the African States region, commercialisation and intellectual property rights are prioritised over open access:

*“...if there are no commercial implications for the research, then we're fine to have it as an open basis. But the primary rule is that if there are commercialisation aspect[s]... commercialised first and publish the second...”* [Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>139</sup>]

Another participant from Botswana shares the same sentiment:

*“With us it's a mixed bag... certainly you want to derive value economically but out of the intellectual property... that doesn't talk to open access to the research... there are certain divisions... where the outcomes are publicly accessible...”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>140</sup>]

The following participant says their organisation's focus is commercialisation:

*“Public universities, I'm sure, we may have to get to a point where government with the institution must decide what particular data might be might have to be public. But with ourselves, we are a research and development institution with a view to actual commercial products that we have so it doesn't comply in our case...”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>141</sup>]

Furthermore, another participant says open access could jeopardise their competitive advantage:

*“I would leave it up to the academics... I wouldn't want them to disclose anything that's going to jeopardise any competitive advantage they might be having in terms of technology development, or intellectual property...”* [Female; South Africa; RPO, RFO; Waste Management<sup>142</sup>]

The restrictive role of the commercial ownership of data is present in the role of subscription and its cost, which are obstacles for accessing databases, according to this participant from South Africa:

*“...majority of our information databases... were forcing people to subscribe. It means that people who can't access to those [data]bases must belong to an institution that has subscribed to those databases the question is that is the institution able to subscribe to these databases some institutions cannot afford to subscribe to those databases...”* [Female; South Africa; RPO; Energy<sup>143</sup>]

State legislation, policy and state ownership are described as playing a role in whether data gets released, according to this participant:

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<sup>139</sup> BW02

<sup>140</sup> BW03

<sup>141</sup> BW03

<sup>142</sup> ZA08

<sup>143</sup> ZA03

*“...I always encourage people to make the information available, open. However, there are laws and regulations that limits how that information gets shared...”*

[Male; South Africa; RPO; Energy<sup>144</sup>]

Legislation is in place to ensure information is released, but if it is of a geological nature related to petroleum industry, there are laws in place to prevent certain data from being released:

*“...Public Access to Information Act. We are governed by law to share information available... So these are sort of regulations and policies that are in place that are hiding our work.”* [Male; South Africa; RPO; Energy<sup>145</sup>]

In the case of the following participant, they are restricted by government policy and ownership of the data they work with:

*“...we have to abide by the Malawi National Health Information System Policy... So, you cannot make a decision... to interact with partners, share with them data or make decisions, or making changes to the system without the consent of the Ministry of Health.”* [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>146</sup>]

The same participant elaborates:

*“...the Government says that the data belongs to them so if anyone wants to access the data, they have to go to them... So, there are a number of things that we cannot easily implement because of those policies.”* [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>147</sup>]

International trade agreements and stakeholder benefits are presented by one policy body member as a reason not to release information:

*“...if, for example, somebody specifically asks you not to share publicly a particular research project because it affects international trade agreement negotiations or those sorts of things, then you do need to respect that as well...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>148</sup>]

Other reasons or framings, besides intellectual property, state ownership and legislation, are regarding the limited release of data or releasing data under certain circumstances. The need for endorsement from funders is required, according to this participant from a CSO:

*“...in terms of our organisation we always make sure that we get endorsement before we share our information...”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>149</sup>]

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<sup>144</sup> ZA09

<sup>145</sup> ZA09

<sup>146</sup> MW01

<sup>147</sup> MW01

<sup>148</sup> ZA02

<sup>149</sup> MW05

This participant puts information sensitivity forward as a reason not to allow open access:

*“It is, depending on how sensitive that information is. So whether the information is released or not depends on the sensitivity of that information and how, what the company aims to achieve with the information that it has.”* [Male; South Africa; RPO, Policy body; Energy<sup>150</sup>]

Another participant from Malawi is concerned about sensitive patient information:

*“I would propose that there must be some sort of control to make sure that what we would call free access should be validated. For instance, if it is coming from the health sector, it means that professionals from the health sector must scrutinise the information or the data... That way we know the information cannot cause any harm to the society...”* [Male; Malawi; Industry & Business; ICT<sup>151</sup>]

This following participant touches on the concern over open data restrictions and the sensitivity of the research:

*“...Due to the nature of this study, it’s a bit sensitive for us to be going to the wider public but there have been other studies where we have had to reach out to the wider public...”* [Male; Malawi; RPO; Bioeconomy<sup>152</sup>]

The same participant refers to making the information understandable for the wider public, and the role of journalists for that task, once the release of the information has been approved by the organisation:

*“So, findings have come out, they [the public] have to be told these are the findings. If there will be any scientific issues they will have to be addressed. But then for them [the journalists] as well, they have to simplify the scientific issues to the wider public...”* [Male; Malawi; RPO; Bioeconomy<sup>153</sup>]

*In the next section, lack or uncertainty of policy is discussed.*

### 3.2.6.2 LACK OR UNCERTAINTY OF POLICY

This section includes references to participants' uncertainty about government and supra-institutional policy beyond their organisation, or a lack of such policy on open access and open data. As this is concerned only with policy beyond the organisation, any discussion on organisational norms and practices (both formal and informal) are not included in this section.

Uncertainty about relevant government policies, as well as beliefs that none exist at all, are present in the interviews. While only one participant considers open data policy from the

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<sup>150</sup> ZA05

<sup>151</sup> MW02

<sup>152</sup> MW06

<sup>153</sup> MW06

perspective of business use of that data, many participants think open access and open data policy is non-existent:

*“There is none. We don't have here in Botswana at the moment...”* [Male; Botswana; RPO; ICT<sup>154</sup>]

Another participant from Botswana agrees:

*“...I don't think there's any policies or regulations around that. It's all around what institutional policies and what institutional things happen here...”* [Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>155</sup>]

This participant from Malawi says government policy is absent, although this may change in future:

*“We are not there yet, but at least things have started to come up...”* [Male; Malawi; Industry & Business; ICT<sup>156</sup>]

This participant says there are no policies in place that prevent public access:

*“I haven't come across any that says you really can't do open access...”* [Male; Malawi; RPO; Bioeconomy<sup>157</sup>]

One participant from South Africa is aware of an Intellectual Property Rights (IPR) Act, which covers public access for publicly funded research:

*“...because all of our work is publicly funded, it falls under the IPR Act... with respect to open access...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>158</sup>]

However, this participant is uncertain of the consequences of breaching the Act.

Another researcher from South Africa is unsure of the regulations and suggests that key decision-making responsibilities are delegated to collaborative partners:

*“...I think it also comes down to institutions themselves and the companies that you publish with, there are lots of publications you have to pay, sign up for... you need a certain licence...”* [Female; South Africa; RPO; Bioeconomy<sup>159</sup>]

Furthermore, there is a lack of clarity in how businesses are regulated regarding open data, according to this South African participant:

*“It's good to have open data, provided that data would be used for driving social impact. Unfortunately, at the moment, regulations are not clear about how private*

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<sup>154</sup> BW01

<sup>155</sup> BW02

<sup>156</sup> MW02

<sup>157</sup> MW06

<sup>158</sup> ZA02

<sup>159</sup> ZA04

*companies can use open data to drive their own processes, so that becomes a bit of a problem...*” [Male; South Africa; RPO, RFO, Policy body; Energy, Waste Management, Bioeconomy<sup>160</sup>]

Across all the interviews, it is clear there is a lack of centralised policies or even informal guidance for how to prioritise, define, and/or deliver *open science* in African States.

### 3.2.6.3 RISKS-DISADVANTAGES ASSOCIATED WITH OPEN DATA ACCESS

This section includes references to the negative consequences and disadvantages of open access to data. This may relate to, but is not limited to IP rights, patents, commercially sensitive data, competitive advantage, data distortion, financial concerns, data overload, misuse or shortcomings and negative perceptions attached to open-access journals.

Given that this section includes more about the risks and disadvantages of open access in African States, than the advantages, the tone of this section is negative. Specifically, participants’ concerns with open access are about competitiveness and ownership rights and the misrepresentation of primary data.

One of the risks expressed in this region is about loss of commercial opportunities, intellectual property, and competitiveness:

*“...because you are expected to commercialise our research certainly when you are commercialising it cannot be open access...”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>161</sup>]

One participant from South Africa says:

*“...we present work either through a conference, or a workshop, and all these other different platforms so we are making it easy to share the knowledge and work in terms of what we currently do, of course without hindering the issues of proprietary, intellectual property...”* [Male; South Africa; RPO, Industry & Business; Energy<sup>162</sup>]

Another participant from South Africa says it is difficult to balance open access and a competitive advantage:

*“...it is a conflict you have to manage in this particular environment, because you are talking about dealing with the private sector, and it is research that is meant to improve their competitiveness. Which is generally would be a bit of a contradiction to the notion of open access and open innovation...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>163</sup>]

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<sup>160</sup> ZA07

<sup>161</sup> BW03

<sup>162</sup> ZA01

<sup>163</sup> ZA02

Furthermore, another concern, noted by the Malawian participants, is the risk of data being misrepresented. This participant is especially concerned about the misrepresentation of primary data:

*“We can publish, we can have free access but at least we should have some controls in terms of how the data should be accessed, or who accesses it and for what reason... we have had instances where people accessed data without the knowledge of the Ministry of Health, they have published it but then the results misrepresented the facts on the ground.”* [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>164</sup>]

Another participant shares a similar sentiment:

*“...if these publications can be made freely accessible to anybody... there might be mismanagement, or they might abuse the use of the publications... But anyway, if they have been published it means they have gone through all the necessary precautions...”* [Female; Malawi; RPO, RFO; ICT<sup>165</sup>]

In keeping with the dangers of misrepresentation, this participant suggests that data be validated before release:

*“...free access means everyone has got the freedom to have access to the information, before we declare that this information or data is available for everyone to see, I would propose that there should be a way of filtering that information or data out...”* [Male; Malawi; Industry & Business; ICT<sup>166</sup>]

According to this participant, sharing primary data is risky:

*“I would be uncomfortable especially with the primary research data. I would present the findings but the primary research data I would be uncomfortable sharing that with the wider public, unless somebody has got a specific interest.”* [Male; Malawi; RPO; Bioeconomy<sup>167</sup>]

However, the participant does not elaborate on the reasons for their statement.

This participant expresses concern about whether open access could be taken advantage of:

*“...my point of view is that it [open access to data] must be properly regulated to make sure that people don't take advantage and start using it on a wrong way...”* [Male; Malawi; Industry & Business; ICT<sup>168</sup>]

Again, the participant does not provide a reason for their concern.

The cost associated with open access are deemed as too high for the institutions in developing countries, according to this participant from Botswana:

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<sup>164</sup> MW01

<sup>165</sup> MW07

<sup>166</sup> MW02

<sup>167</sup> MW06

<sup>168</sup> MW02

*“...open access is not open, unless you pay the subscription fees to the publishers who provide open access... there is no institution in Botswana that can afford to pay 600,000 US dollars every year for open access... I think it's a rip-off.”* [Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>169</sup>]

The cost of open access is a common thread throughout the interviews. This participant says open access is not financially rewarding the effort required to deliver on open access ambitions:

*“...I would feel it's very unfair for people who spent a considerable amount of time researching on a particular topic and at the end of the day that work can just be made open...”* [Female; Malawi; RPO; ICT<sup>170</sup>]

Another participant from Malawi raises the issue of prestige in publishing. They say public access journals are less attractive to publish in:

*“...if you publish in a journal with open access people will start to look at it as if it's less prestigious... it's the prestige that we attach to non-open access versus open access...”* [Male; Malawi; RPO; Bioeconomy<sup>171</sup>]

It is clear that the participants from African States are aware of the risks and disadvantages of open access. In the next section, the motives for and benefits of open access are discussed.

### 3.2.6.4 MOTIVES FOR AND BENEFITS OF OPEN ACCESS AND DATA

Any reference to the benefits or motivations of open access, such as influencing public opinion, furthering research and policy, improved visibility, allowing corrective measures, etc. are covered in this section.

This section is structured around three main motives-benefits in African States: (1) reducing costs, and the exclusionary effects thereof, is a recurring thread throughout the interviews, which researchers consider particular to the Global South – the Malawian participants voiced these especially, (2) the broadening of access to wider communities is also mentioned along with (3) the prevention of duplication. Other minor benefits are also listed in this section.

Overcoming the exclusionary aspects of paid access is a key benefit-motive, according to this participant:

*“...So when it is open access, I think that it helps the study results to be disseminated so quickly and it gives chance to a lot of people to read whatever study was done as quickly as possible. Rather than people buying whatever, that limits a lot of people...”* [Male; Malawi; RPO; ICT<sup>172</sup>]

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<sup>169</sup> BW02

<sup>170</sup> MW04

<sup>171</sup> MW06

<sup>172</sup> MW09

Another researcher based in Malawi also mentions reduced cost as a means to promote open access:

*“...some of the publications you know you have to buy an article to read the information- so if they can be made free access to everyone that will work to the advantage to people because they will have an access to information easily, freely and at any time...”* [Female; Malawi; RPO, RFO; ICT<sup>173</sup>]

According to the same participant, open access will benefit students by granting them access to information:

*“...if they [data] are made free then it will work to the advantage of most of the researchers, most of the people, including students- it means they will access to information that they require...”* [Female; Malawi; RPO, RFO; ICT<sup>174</sup>]

This participant lists a series of benefits from increased open access. Firstly, open access will open the research up to participants and will be beneficial for the wider community:

*“...it been said that academics communicate with each other, they don’t communicate with the wider public... I like to think that with an open access policy then it will be more beneficial for the wider community.”* [Male; Malawi; RPO; Bioeconomy<sup>175</sup>]

Secondly, it also will prevent a situation where policymakers must pay for access to reports and articles that contain policy recommendations:

*“...I mean it hardly makes sense that somebody should have, say a recommendation on policy, and for me if I am a policy implementor, to get that recommendation in policy then should pay to access that article.”* [Male; Malawi; RPO; Bioeconomy<sup>176</sup>]

Thirdly, for the Global South, open access reduces the unfair advantage of the Global North by allowing access to journals the Global South is less likely to pay subscription for:

*“...when it comes to open access actually it has got an opportunity not just to share the findings with the wider public but also to develop research from the context of the Global South... I would say I am up for the open access other than the kind of restricted access that a lot of highly valued journals do go for...”* [Male; Malawi; RPO; Bioeconomy<sup>177</sup>]

One researcher highlights the need of making access ‘meaningful’, which is an important part of the theme definition in this chapter. Given how people have trouble reading and

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<sup>173</sup> MW07

<sup>174</sup> MW07

<sup>175</sup> MW06

<sup>176</sup> MW06

<sup>177</sup> MW06

understanding such data, there is a need to commit to deeper public engagement in the execution of open access:

*“...Most of our participants can’t read academic articles in the way they are written. So, it moves beyond open access. It comes to community engagement- how do you engage with the community that is about the participants. But in terms of open access it’s about sharing knowledge actually...”* [Male; Malawi; RPO; Bioeconomy<sup>178</sup>]

Benefiting wider communities is a benefit mentioned by this researcher from South Africa. She argues that open access can inform the wider community of improved approaches (in this case, agricultural production), which are necessary due to climate change:

*“This is actually very important to us because our studies are done via the general public we want them to understand what is going on... with climate change there is need for information to be shared with the community at large. Open access and free access to research I feel is of paramount importance...”* [Female; South Africa; RPO; Bioeconomy<sup>179</sup>]

In addition, open access has the potential to spread the benefits of research to various organisations. Data sharing provides the foundations for benefit sharing, according to this participant:

*“I believe it’s very important to have open access to information in order to allow any other organisations that have an interest in that information to be able to get that information... the information you get, might not just only benefit your organisation, it could benefit hundreds of other organisations...”* [Male; South Africa; RPO, Policy body; Energy<sup>180</sup>]

In terms of research visibility, open access enhances both research projects and the profiles of the researchers:

*“Free access not only increases visibility of a research [project] but people also know the domain they are working under...”* [Female; South Africa; RPO; Energy<sup>181</sup>]

The same participant says open access reduces the duplication of efforts, increases access to information, and contributes to the advancement of R&I agendas:

*“You can imagine Indians, Chinese and Nigerians working on research, Nigeria has about 150 million people and India has millions of people doing research the*

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<sup>178</sup> MW06

<sup>179</sup> ZA04

<sup>180</sup> ZA05

<sup>181</sup> ZA03

*chance of duplication is high... open access allows people from [the] developing world to have access to information...*” [Female; South Africa; RPO; Energy<sup>182</sup>]

The following participant agrees open access is vital for knowledge advancement – especially for Africa, where access is more difficult – and for preventing redundancies:

*“...So you cannot get access to... by various institutions they are not accessible, and therefore leads to redundancies or lack of references for things that already exist. That is very important that we get all that information accessible to all to advance the domain of the knowledge that we're trying to create... for our own profession, as a nation and as a continent...”* [Male; Botswana; RPO; ICT<sup>183</sup>]

This participant says data should be made available to benefit all levels of society through education:

*“...because of the purpose to educate and if we are going to make education more expensive than it already is then why are we doing the research? ...are we helping the rich? are we helping the middle class? what about the poor?... so I think it's a brilliant idea to make our research available...”* [Female; South Africa; RPO; Bioeconomy<sup>184</sup>]

Inequality is a common thread across this sub-theme, in that the benefits of open access actively respond to a current system, organised in a way that inhibits longer-term research and innovation advancements.

In the next section, a summary of this chapter is provided.

### 3.2.6.5 SUMMARY OF OPEN SCIENCE

For African States, responses to *open science* are mixed and certain participants appear uncertain about the relevant government policies, and whether any exist at all. The risks and disadvantages referred to are mainly about competitiveness and ownership rights, as well as the misrepresentation of primary data. They are also the main limits to the release of data, along with legislative restrictions and the sensitivity of the data.

One of the three main motives-benefits in the interviews is reducing costs, and the exclusionary effects thereof, which is suggested as key problem for the Global South - especially in Malawi. The broadening of access to wider communities is also present along with the prevention of duplication.

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<sup>182</sup> ZA03

<sup>183</sup> BW01

<sup>184</sup> ZA04

### 3.2.7 ANTICIPATIVE, REFLECTIVE AND RESPONSIVE RRI

*Anticipative, reflective and responsive RRI* includes both the ‘anticipative and reflective’ and ‘responsive and adaptive’ process dimension definitions. For R&I to be responsible, it requires the actors involved to engage in a process of anticipating and reflecting on the future they want to create with their R&I, how that future can be achieved, and what possible impacts and unintended consequences may arise.

Responsible actors should reflect on why that future is desirable, and on the assumptions, values and purposes that underlie the tasks and objectives of trying to achieve that future. The insights generated from such anticipation and reflection guide more responsible action.

R&I must also be ‘responsive and adaptive to change’, which means that actors must include, in their process, a responsiveness to the views of the public and other stakeholders with an ability to adapt and change goals and methods, if necessary.<sup>185</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. Of the 17 codes identified for this theme, four were seen most extensively: *evaluation* [code 100]; *demand-driven research and innovation* [code 81]; *targeting critical societal challenges* [code 82]; *furthering research-developing policy or standards* [code 84].

Note that *meeting societal needs* [code 80] is an aggregation of seven of the codes listed here and therefore overcounted. *Demand-driven R&I* is an aggregation of three codes, including code 82 and code 84. As *demand-driven R&I* is reflected in the two combined codes, as well as containing its own additional coding, the three codes are treated as one section.

Codes	African States			
	Botswana	Malawi	South Africa	Total
<b>88: Anticipative, reflective and responsive RRI</b>				
89: Future societal needs and challenges	0	3	3	6
90: Environmental sustainability	0	6	10	16
91: Responsive approach	5	4	6	15
92: Organisational norms and practices	1	3	5	9
93: Lack or uncertainty of anticipation policy and framework	2	2	2	6
100: Evaluation	2	1	13	16
101: Importance of feedback	5	0	1	6
103: Participation in upstream R&I	0	1	13	14
80: Meeting societal needs	12	22	46	80
81: Demand-driven research and innovation	11	19	39	69

<sup>185</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

82: Targeting critical societal challenges	7	14	32	53
83: Benefiting specific groups	2	2	5	9
84: Furthering research-developing policy or standards	1	4	4	9
85: Organisational norms and practices	0	1	1	2
86: Lack of consideration of societal benefits	0	0	0	0
87: Lack or uncertainty of policy for meeting societal needs	1	3	2	6
105: Time frames and time constraints	0	2	7	9

The following sections provide details about the two codes and descriptions of what is to be found in the analysed data. In the summary section, the findings relating to the theme *anticipative, reflective and responsive RRI* are brought together.

An important point about the interview participants is that many displayed difficulties with grasping an RRI conceptualisation of anticipation. With ‘anticipation’ conceived as framing future implications of their research and work, the interviewers substituted “future implications” for “anticipation” as it was felt to be clearer. However, “future implications” appear to have been too abstract for people to understand with participants failing to connect with the anticipatory concept it referred to. Consequently, it appears that the whole idea of “anticipation” is too difficult an idea, or is too rarely considered, for it to be articulated and elaborated upon. In the end, the data coded for this theme contains little future perspective. It was more concerned about the state of the present particularly through a frame of quality assurance.

### 3.2.7.1 EVALUATION

The *evaluation* sub-theme references the evaluation process to conducting research and innovation. This can include formative evaluation (such as assessing risk, feasibility, forecasting, etc.); implementation evaluation (such as assessing/ensuring applicability, implementation, etc.); and impact evaluation. Evaluation here is understood in terms of the formal procedures and established methods used, for example quality testing, forecasting, risk assessment, impact assessment, etc., and includes references to evaluation for any stage of the research and innovation process. Therefore, this sub-theme is not reduced to including anticipatory or future-oriented processes only. However, the evidence provided in this section is selected based on their relevance and insightfulness to the overall theme of this chapter.

Participants discussed evaluation, which we can think of as a process to ensure they evaluated the present to plan for the future accordingly. However, the relevant interview material mainly refers to standard evaluation instruments or procedures in place. Sometimes impact assessments are also referred to:

*“...where we do our work, or maybe we are deploying, we would normally do an assessment in terms of possible impact. And you know, and then we develop a*

*mitigation processes and we will involve the community even when we deploy... You make sure that those that may get in contact with that are aware of the dangers and how to handle it...” [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>186</sup>]*

Other examples of evaluative procedures, include the ongoing use of oversight from a research funding body:

*“...we receive regular reports on all the research projects, and then we assess whether there's any commercialisation aspects to it, whether there's any ethical issues with it, whether there's any funding, irregularities, whatever. So there's, there's always an oversight of the research programmes...” [Male; Botswana; RPO, RFO; Energy, Waste Management, ICT, Bioeconomy<sup>187</sup>]*

A participant from South Africa mentions risk analysis as a means of evaluation:

*“...In terms of risking you know that if this thing is done what are the risks, what are the implications and all that. So, risk metric and to analyse the risk implications.” [Male; South Africa; RPO, Industry & Business; Energy<sup>188</sup>]*

There are potential situations where the interests of certain stakeholders take priority. Corporate stakeholders prescribe the production they will fund without taking into account what the community needs. Such a situation could obstruct the necessary openness of researchers, according to this participant:

*“They wanted to plough back into the community in terms of corporate responsibility so they wanted to find out what this community could require in terms of small-scale enterprises... but the only problem was that it was prescribed they wanted to fund poultry production...” [Female; South Africa; RPO; Energy<sup>189</sup>]*

This participant says policy bodies' evaluation and targeted futures are framed by existing policies:

*“Government outcomes, ministerial outcomes, they are looking at the outcomes of government, whether we are meeting societal needs, monitoring and evaluation of the national development plan which talks to the number of people, contributing to statistics South Africa in terms of the quarterly labour surveys so that measures what we are doing...” [Male; South Africa; RPO, RFO, Policy body; Energy, Waste Management, Bioeconomy<sup>190</sup>]*

In addition, the use of roadmaps is part of the evaluation process. In this case, the roadmap involves developing a ten-year plan with stakeholders:

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<sup>186</sup> BW03

<sup>187</sup> BW02

<sup>188</sup> ZA01

<sup>189</sup> ZA03

<sup>190</sup> ZA07

*“...our work plans every year are based on the 10-year roadmap... scoped with stakeholders. So there's a very clear strategy and direction of where we want to go in terms of achieving the overall objectives...”* [Female; South Africa; RPO, RFO; Waste Management<sup>191</sup>]

In the following section, demand-driven research and innovation is discussed.

### 3.2.7.2 DEMAND-DRIVEN RESEARCH AND INNOVATION

This section includes mentions of specific solutions to specific societal problems when they occur as part of setting the goals and agenda for R&I. This can include references to meeting societal needs through focus on UN SDGs, local development, developing the right types of products that are needed on ground, etc. In coding terms, it is the parent node for *targeting critical societal challenges* and *furthering research/ developing policy/standards*, which are also included in this section.

*Targeting critical societal challenges* codes any reference to existing or imminent critical challenges research and innovation focuses on (can be around the UN SDGs). This can include issues of health and wellbeing, waste management, access to resources and infrastructure, and environmental protection.

*Furthering research-developing policy or standards* codes references to local policy development or support in development of regulations/standards. Both codes are about meeting societal needs and have little reference to future-oriented thinking.

While much of the findings presented under this sub-theme overlook the elements of *anticipative, reflective and responsiveness*, particularly coherent comments on future-oriented thinking, there are insights into how ‘societal needs’ are defined by organisations. Where ‘societal needs’ are referenced in relation to the objectives of research and innovation, offers some insight into the kind of future organisations seek to create and why that future is desirable. There is data on how the first steps of responsiveness, which are receiving the views of others, are aided by closer interaction with communities.

In this region, societal needs are framed by how the domain, geography, and country intersect, as in this case regarding energy:

*“At a global level, is to say if you look at society is generally the ones that produce technology... the biggest challenge for most developing countries in Africa is energy. So if we can find alternative energy sources... you begin to address the energy poverty.”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>192</sup>]

Another energy researcher’s orientation towards societal needs is steered by domain and the direct environmental consequences experienced by South Africa:

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<sup>191</sup> ZA08

<sup>192</sup> BW03

*“I also work on rainwater harvesting... the idea is about the research domain and community engagement domain. This one is driven by community needs...”*  
[Female; South Africa; RPO; Energy<sup>193</sup>]

The same participant considers her work beneficial to society:

*“This [work on rainwater harvesting] is affecting the lifestyle of downstream communities. I work on real societal problems...”* [Female; South Africa; RPO; Energy<sup>194</sup>]

These grand societal challenges are shaped by government interests and the private sector, according to this participant:

*“...we've continued to engage with the public and private sector to say, are they particularly issues are they particularly concerns problems that you need to address through R&D?... So we rely on the public and private sector to help us craft these kind of societal challenges and the issues they face...”* [Female; South Africa; RPO, RFO; Waste Management<sup>195</sup>]

The same participant has societal concerns around waste issues, particularly in relation to the South African economy and policy:

*“...So what we're saying is, if we look at waste as a resource, how do we unlock the opportunity that that provides for South Africa? ... that's what we keep in mind every time we evaluate a proposal, every time we put out a grant call, is will this particular research project achieve those overall objectives?”* [Female; South Africa; RPO, RFO; Waste Management<sup>196</sup>]

There is also evidence of participatory approaches to evaluation, whereby stakeholders are invited to evaluate projects. This is especially important if the funding is awarded with ambitions of driving societal impact, according to this participant:

*“We also bring stakeholders in to evaluate projects... because we want to make sure that the research that we're funding is impact driven...”* [Female; South Africa; RPO, RFO; Waste Management<sup>197</sup>]

There is also a common thread throughout the interviews that reflection and responsiveness can be informed by collaborating with communities:

*“...a community water supply scheme which are starting at our rural home because it was community driven, engineered and labour force, community provided the funds, community offered to maintain...”* [Female; South Africa; RPO; Energy<sup>198</sup>]

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<sup>193</sup> ZA03

<sup>194</sup> ZA03

<sup>195</sup> ZA08

<sup>196</sup> ZA08

<sup>197</sup> ZA08

<sup>198</sup> ZA03

Another participant describes a similar approach to collaborating with communities in Malawi:

*“For us it’s starting from involving the community advisory groups. So, when are involving the community advisory groups we are also understanding what are the needs of the community...”* [Male; Malawi; RPO; Bioeconomy<sup>199</sup>]

The idea of sustainable development is at play in deciding attitudes to societal needs and desirable futures, according to this participant:

*“...because society needs come first, what we do need to benefit the society and not just now we are looking at sustainable society, global society, we’re looking at things that are going to create sustainable livelihoods through the sciences, as well, not just immediate needs...”* [Male; South Africa; RPO, Policy body; Energy<sup>200</sup>]

Similarly, this researcher in the bioeconomy domain, says country-specific issues drive their research interests:

*“...with the work we do because it involves indigenous species you are going to have to work with local farmers... When we do our studies, we give back information to them... we actually take that information to relay it in a way they will understand, and they will know how to use it...”* [Female; South Africa; RPO; Bioeconomy<sup>201</sup>]

Climate change, as an issue with ramifications across all parts of society, frames societal needs in the energy domain, according to this participant:

*“The work that we do is addressing climate change issues ... and it’s affecting our society globally.”* [Male; South Africa; RPO; Energy<sup>202</sup>]

However, climate mitigation is not considered a societal need by the public in Malawi. According to this participant, climate change as a research subject, is driven by funding and government interest:

*“We [are] a country that gets affected by climate change and people are looking at adaptation as an immediate need. But when we talk about mitigation, it is a long-term solution where you are trying to contribute to reduction in emissions ... but it terms of the public or the citizens, they really don’t see the benefit...”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>203</sup>]

According to the same participant, government prioritises climate change research:

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<sup>199</sup> MW06

<sup>200</sup> ZA05

<sup>201</sup> ZA04

<sup>202</sup> ZA09

<sup>203</sup> MW05

*“...as a nation, we can say that the project is addressing a need that the government has prioritised...”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>204</sup>]

The interviews demonstrate that evaluation is not done in a vacuum, whereby the lessons are fed back into future planning. According to this participant, evaluation and implementation are intertwined:

*“...if you did an evaluation, implementation, evaluation or impact evaluation of your programme, you'd look at the recommendations that come out of that, you'd also look at the lessons you would have learned through implementing a programme over time, and factor that into the design of something going forward.”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>205</sup>]

In the next section, a summary of this chapter is provided.

### 3.2.7.3 SUMMARY OF ANTICIPATIVE, REFLECTIVE, AND RESPONSIVENESS

In this region, climate change and environmental destruction are part of the framing of societal needs and implied future objectives. Some of these are additionally framed by policy and the private sector, although international environmental funding sources play a significant role.

Societal needs are framed by how the domain, geography, and country intersect. Responsiveness is based on close collaboration with communities, according to certain participants. However, participants fail to provide sufficient information, suggesting difficulties in the ability to discuss the nuances associated with being anticipative, reflective and/or responsive.

### 3.2.8 SCIENCE EDUCATION

According to the European Commission pillar definition, *science education* involves developing processes to spread scientific knowledge, understanding, insight and critical capacity to citizens to better equip them with the necessary skills to be part of R&I discussions. A second component of the pillar, which aims to enhance access to R&I for citizens, is to increase the number of scientific researchers and promote science as a vocation.<sup>206</sup>

Additional components of the science education pillar include the 'promotion of innovative problem-solving and critical thinking'; 'embedding social, economic and ethical principles'; 'promoting engagement and an entrepreneurial mindset'; 'empowering citizens to participate in

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<sup>204</sup> MW05

<sup>205</sup> ZA02

<sup>206</sup> <https://www.rri-tools.eu/about-rri>

science policy making'; 'sharing responsibility while solving social challenges'; 'facilitating a strong interdisciplinary approach, and stakeholders' involvement'.<sup>207</sup>

Codes	African States			
	Botswana	Malawi	South Africa	Total
<b>Science education</b>				
18: Tools for engagement	6	7	12	25
19: Information-based tools	0	1	2	3
20: Training and workshops	1	2	6	9
21: Conferences, symposiums, talks and exhibitions	3	2	9	14
22: Research publications and policy reports	1	3	0	4
23: Information centres	0	0	2	2
24: University open days	0	0	1	1
25: Media	0	5	1	6
34: Tie-ups with local schools	2	0	0	2
102: R&I Capacity Building	0	2	3	5

The codes (sub-themes) used for this science education for this theme are selected because of their relevance to the concept of science education. The first sub-theme deals with *the tools of science education* [codes 18-25, 34] and the second concerns *R&I Capacity Building* [code 102].

The following sections provide details regarding these two codes and descriptions of the findings. In the summary section, the findings relating to the theme *science education* are brought together.

### 3.2.8.1 THE TOOLS OF SCIENCE EDUCATION

*The tools of science education* sub-theme combine seven categories, which were originally separate codes, before being brought together in this overarching sub-theme. The categories are as follows: information-based tools; conferences, symposiums, talks and exhibitions; training and workshops; research publications and policy reports; information centres; university open days; and media

*Information-based tools* covers references to tools that provide information for understanding R&I in the organisation as well as its norms, procedures, and practices. This includes only one-

<sup>207</sup> <https://www.rri-tools.eu/science-education>

way communication strategies and not two-way communication or engagement. There was nothing to note for this region, in this regard.

*Conferences, symposiums, talks and exhibitions* includes any reference to providing information through different presentation-focused events.

Participants refer to these tools being employed for myriad science education reasons. The following is a list of quotes providing an indication as to how they are used, which are community- and public-focused:

- “*We go to schools, do motivational talk, we host seminars...*” [Male; Botswana; RPO; ICT<sup>208</sup>]
- “*...guest lectures and seminars for our students...*” [Male; Botswana; RPO; ICT<sup>209</sup>]
- “*...we present work either through a conference, or a workshop, and all these other different platforms so we are making it easy to share the knowledge and work in terms of what we currently do...*” [Male; South Africa; RPO, Industry & Business; Energy<sup>210</sup>]
- “*...annual open day the community comes to us we interact with them they get to understand what we do; we go to shows, we go to exhibitions, engage and show our, our products and our services. So that we can engage and be known and share what we do, why we do what we do, and get feedback from people...*” [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>211</sup>]
- “*...we do some of the engagement where exhibitions to the public to talk about... other nuclear industry applications...*” [Male; South Africa; RPO, Industry & Business; Energy<sup>212</sup>]

*Training and workshops* refers to training sessions and/or workshops, where the aim is skills development and capacity building (as opposed to simple information sharing, as in the previous two sections).

The training referred to by this participant is aimed at stakeholders:

*“...our work basically involves collecting data, sitting on the desk, and putting it into the software but also inviting the relevant stakeholders, build their capacity, they should help in the collection of the data but also training them to enter the*

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<sup>208</sup> BW01

<sup>209</sup> BW01

<sup>210</sup> ZA01

<sup>211</sup> BW03

<sup>212</sup> ZA01

*data in the appropriate software... ” [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>213</sup>]*

According to this participant, the ICT sector offers innovative and novel forms of science education dissemination:

*“And we also run a hackathon, where we get private companies to come and present problems, for our students to also engage...” [Male; Botswana; RPO; ICT<sup>214</sup>]*

*Research publications and policy reports* provides a list of tools referred to by participants for providing information such as research journals, publication, online research repositories, digital research platforms, and public databases, and policy reports.

One participant mentions one-way communication, in the form of research publications shared with stakeholders:

*“...the public or the stakeholders that are outside our circle... we only involve them in terms of information sharing, like when we produce the results we share with everyone through different channels for them to be aware and make informed decisions about different interventions...” [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>215</sup>]*

This approach was not in keeping with various RRI components of science education such as “promoting engagement and an entrepreneurial mindset”; “empowering citizens to participate in science policy making”; and “facilitating a strong interdisciplinary approach, and stakeholders' involvement”.

*Information centres* covers any reference to providing information through information centres, such as visitor centres. One participant from South Africa reports the use of an information centre:

*“...the Necsa [South African Nuclear Energy Corporation] Visitor Centre where they explain things such as: what is nuclear energy, what applications are there and what does Necsa do within the nuclear science and technology space?” [Male; South Africa; RPO, Industry & Business; Energy<sup>216</sup>]*

It was implied that personnel involved in the centre are experts, ensuring the quality of communication:

*“That is why when you get to the visitor centre you will find people dedicated to the visitor centre. You have got educationalists there... everyday they host people,*

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<sup>213</sup> MW05

<sup>214</sup> BW01

<sup>215</sup> MW05

<sup>216</sup> ZA01

*they tell them and educate them about this nuclear industry...*” [Male; South Africa; RPO, Industry & Business; Energy<sup>217</sup>]

*University open days* includes any reference to communication/providing information through university open days. There was nothing to note for this region, in this regard.

*Media* covers references to communication through different media, including print media, broadcast media, and online media. Examples include newspapers, brochures, films, radio, TV, websites, blogs, and social media. Participants provide a list of media types that are employed:

- *“We have been focusing much on updating on our website...”* [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>218</sup>]
- *“...engagement through public media...”* [Male; Malawi; RPO; Bioeconomy<sup>219</sup>]
- *“I have been on the radio, on television talking about my other studies...”* [Male; Malawi; RPO; Bioeconomy<sup>220</sup>]
- *“...Television...”* [Male; Malawi; RPO; Bioeconomy<sup>221</sup>]
- *“We make all of the deliverables available on the roadmap website...”* [Female; South Africa; RPO, RFO; Waste Management<sup>222</sup>]

In the next section, research and innovation capacity building is discussed.

### 3.2.8.2 RESEARCH AND INNOVATION (R&I) CAPACITY BUILDING

*Research and innovation (R&I) capacity building* provides a list of references to building capacity for research and innovation as a means of improving responsibility. This can be in terms of local development, contextual development, etc.

Capacity building is mentioned by this participant in relation to inclusivity and how it brings left-out groups into a project:

*“I think the only way we saw it as a need was to incorporate some of the left-out groups, like the women you are talking about but also the youth into the project through the capacity building.”* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>223</sup>]

One participant from South Africa mentions that capacity building occurs at various levels:

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<sup>217</sup> ZA01

<sup>218</sup> MW01

<sup>219</sup> MW06

<sup>220</sup> MW06

<sup>221</sup> MW06

<sup>222</sup> ZA08

<sup>223</sup> MW05

*“...the human capacity development strategy, the human resource strategy and the national development plan, those are the national level. Then you find institutional strategies like building you own capacity kind of strategies; those are just maybe institutional...”* [Male; South Africa; RPO; ICT<sup>224</sup>]

Another South African participant speaks about capacity building through their networks:

*“...we try to build capacity, we try to put knowledge out there into our networks, and together with other influences, know hopefully achieve the kind of objectives overall that we want...”* [Female; South Africa; RPO, RFO; Waste Management<sup>225</sup>]

In this case, and in the former, however, capacity was not sufficiently defined.

A summary of this chapter is provided in the next section.

### 3.2.8.3 SUMMARY OF SCIENCE EDUCATION

The interviews are sparse in detail and richness regarding *science education*, as per the EU pillar definition. From the information provided, participants indicate that science education in African States is community- and public-oriented.

Capacity building is rarely mentioned and, where it was, it related to a single CSO, while much of the rest was relatively vague and does not represent the two-way qualities of science education put forward by RRI advocates – such as “promoting engagement and an entrepreneurial mindset”; “empowering citizens to participate in science policy making”; and “facilitating a strong interdisciplinary approach, and stakeholders' involvement”.

### 3.2.9 ETHICS

As part of the European Commission's RRI agenda, ethics focuses on (1) preventing research and research practices that lack integrity, and on (2) the relationship between science and society, to ensure scientific and technological developments are ethically acceptable.

For policymakers, this definition requires that R&I policy consciously meets the ethical demands of society. For the research community, scientific processes and outcomes are to meet the demands of research integrity and moral deliberation for both individuals and institutions. Within business and industry related research, "social actors should work together from the beginning to embed ethical considerations in their R&I processes". Finally, the ethics of RRI

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<sup>224</sup> ZA06

<sup>225</sup> ZA08

require citizens' involvement to realise R&I that is ethically acceptable and "aligned with society's values and demands, while minimising risks and maximising benefits".<sup>226 227</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. Of the nine codes, four were seen most extensively: *Positioning ethics – where does the responsibility lie?* [code 69]; *Organisational norms and practices* [code 72]; *Lack or uncertainty of ethical standards and policies* [code 78]; *Protection of rights* [code 79].

Codes	African States			
	Botswana	Malawi	South Africa	Total
<b>68: Ethics</b>				
69: Positioning ethics- where does the responsibility lie	3	3	5	11
70: Disidentification with ethical responsibility	1	1	2	4
71: Personal responsibility and morality	1	2	3	6
72: Organisational norms and practices	10	1	15	26
73: Safety and security	2	4	6	12
74: Justice and fair dealing	0	1	4	5
75: Quality assurance and testing	1	4	1	6
78: Lack or uncertainty of ethical standards and policies	3	4	2	9
79: Protection of rights	1	8	11	20

For comparability with the other region-specific reports, these codes have been selected based on the total count. However, with a count of 12, *safety and security* [code 73] had the fourth highest count, putting *lack or uncertainty of ethical standards and policies* into fifth highest place with its count of 9.

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *ethics* are brought together.

### 3.2.9.1 POSITIONING ETHICS – WHERE DOES THE RESPONSIBILITY LIE?

This section includes stated or implied perceptions of where ethical responsibilities are located, such as whether they are defined by or found in existing rules/standards/policies, within or beyond the organisation, at the individual, institutional, national, or international level.

Identifiable patterns from the interviews include how the participants have difficulty positioning ethics. Consequently, with no clear sense of ethical standards, there is a tendency towards ethics becoming an issue of personal responsibility and morality. Certain participants

<sup>226</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>227</sup> <https://www.rri-tools.eu/ethics>

speak as though disidentifying with ethics, as if it is of little or no relevance to them and their work.

Discussion on the responsibility of managing ethical concerns in the interviews involves vague and distant comments from the participants, offering little insight into the ethical positionality of R&I.

A key thread emerging from the interviews is individualised ethical responsibility, as this example from South Africa demonstrates:

*“...I'm a scientist at heart. And I make sure that everything that we do is, is within the means I always try and put myself in someone else's shoes... And then whatever policies or plans in a draft crafted with that in mind...”* [Male; South Africa; RPO; Energy<sup>228</sup>]

According to this participant, there is personalised reasoning on where ethics lies in relation to their research:

*“Normally my work centres around people interacting with technology. So there's not much sensitivity there. Because I'm focusing most of the time on perceptions, perceptions, attitude, so I don't think there's too much effect that derived from that.”* [Male; Botswana; RPO; ICT<sup>229</sup>]

This participant from Botswana says there is a gap between national and university levels that is filled by individual reasoning:

*“...at national level there are laws... but we also have to deduce from those institutions specific guidelines and policies and values that guide us and our employees on a day-to-day basis.”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>230</sup>]

This participant from Malawi also considers ethics as an individual responsibility:

*“...if I'm sent by an organisation outside whatever, I have to again conform to my principles, my moral principles...”* [Male; Malawi; RPO; ICT<sup>231</sup>]

This participant derives legitimacy for ethical concerns based on maintaining the university's reputation:

*“...whatever I'm doing, I have to know that there's a university behind me, so... I don't have to bring it into disrepute.”* [Male; Malawi; RPO; ICT<sup>232</sup>]

What might bring the institution into disrepute is not clear. Being dependent on this form of validity could: potentially reinforce ethical standards, if the institution had clear policies in

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<sup>228</sup> ZA09

<sup>229</sup> BW01

<sup>230</sup> BW03

<sup>231</sup> MW09

<sup>232</sup> MW09

place; or possibly weaken their application should the institution's grounds for disrepute, or the individual's interpretation thereof, conflict with associating with marginalised groups.

The ethics standards for one RPO member from Botswana are dependent on external organisations:

*"...the ethics processes that normally you have to go through because of the sensitivity of the work we do is one thing that I think when you work with external organisation, particularly from outside the country, and those tends to slow the process down, although it is a good thing, but it's a bit of a nuisance."* [Male; Botswana; RPO; ICT<sup>233</sup>]

One energy-based researcher located ethical considerations outside their laboratory:

*"...in my field that doesn't arise much it will only arise if you are experimenting something on a river or the effects of a given contaminant a river to research the water quality but if you want to experiment you bring it to the lab and experiment... I think it depends on the domain."* [Female; South Africa; RPO; Energy<sup>234</sup>]

This participant from South Africa locates their research outside the bounds of ethical considerations because they view their research for the greater good of the environment:

*"I think the benefit for society for the environment for the South African economy is very clear. So I can't see how anything that we would fund any of the research that would be undertaken by researchers in South Africa, would in any way negatively impact."* [Female; South Africa; RPO, RFO; Waste Management<sup>235</sup>]

In the following section, examples of the application of ethics within participants' organisations are discussed.

### 3.2.9.2 ORGANISATIONAL NORMS AND PRACTICES

This section refers to the formal and informal existence and treatment of ethics within the organisation's structure and operations. Furthermore, this section covers if participants show uncertainty about what such norms and practices might be and their own role in the organisation's approach to ethics.

This section demonstrates the extent to which participants are uncertain about the ethical norms or practices in their organisation. There are no clear elaborations on moral deliberation and research integrity, and it remains unclear as to how such are (and would be) established. Throughout the interviews, the composition of ethical research and innovation is elusive.

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<sup>233</sup> BW01

<sup>234</sup> ZA03

<sup>235</sup> ZA08

According to this participant from a RPO in Botswana, ethics committees are responsible for approving projects:

*“...there is an ethics committee, both in the university... in the ministry where I do most of my work... you be applying for ethic twice... to ensure that you do not present any harm or take advantage of being vulnerable sections of the society... so I think they are sufficient for now.”* [Male; Botswana; RPO; ICT<sup>236</sup>]

In contrast with his previous comment, there are no in-house standards regarding ethical research, at this organisation. This participant blames a lack of resources:

*“...there is absolutely no regulations on research... From research, the whole division has about five people... we need to grow much.”* [Male; Botswana; RPO; ICT<sup>237</sup>]

Another participant from Botswana says their organisation subscribes to the standards of external organisations:

*“...we observe certain standards whether it’s our ISO [International Organisation for Standardisation] or the Botswana Bureau of Standards so if it’s safe for our own employees...”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>238</sup>]

The reference to ISO is suggestive of how organisational ethics is equated with product and process quality.

The same participant says their organisation has rules in place that employees must abide by:

*“...as institution we have also we have our own values that we expect every single employee to abide by...”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>239</sup>]

In South Africa, ethical standards are derived from government obligations for policy body members:

*“...as the government department, you are bound to ensuring that you, you do things in a way that meets government’s objectives that is constitutional...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>240</sup>]

The policy body does not have ethical standards in place, apart from government obligations, according to the same participant:

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<sup>236</sup> BW01

<sup>237</sup> BW01

<sup>238</sup> BW03

<sup>239</sup> BW03

<sup>240</sup> ZA02

*“There aren't any specific protocols... just trying to make sure that it meets the objectives of the program[me] and the objectives of government...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>241</sup>]

Furthermore, the same participant says the Council for Scientific and Industrial Research (CSIR) requires ethical approval:

*“...one of the conditions, if it does arise will be that you need to meet the ethics requirements of the institution that is doing the research project... it will have to get the ethics approval from the ethics body that exists in the CSIR or in the universities or wherever...”* [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>242</sup>]

Two other participants from South Africa also mention the role of ethics committees:

*“...we always plan out proposals and submit it to an ethic committee... and the ethics committee decides whether or not our proposal isn't breaching any codes of conduct in constitutional laws... We have to ensure that everything is by the book...”* [Female; South Africa; RPO; Bioeconomy<sup>243</sup>]

And:

*“...our work undergoes ethical clearance almost all the time. It is guided by the framework of the ethical committee. But as a researcher as well you know what can affect or what needs consent from other parties.”* [Male; South Africa; RPO, RFO, Policy body; Energy, Waste Management, Bioeconomy<sup>244</sup>]

Obtaining the ethics committee's consent is reduced to fulfilling formalities and staying within the law, according to this participant:

*“We just follow the signed document by the book, and we have scientific backing behind we have the law behind it, so we are not breaking any rules...”* [Male; South Africa; RPO; ICT<sup>245</sup>]

Furthermore, ethical adherence is necessary where live test subjects are involved, according to this participant:

*“...we are always a bit more careful on how we tackle our research because we don't want to cause unnecessary trauma to animals... Our concern is that are we doing things by the book.”* [Male; South Africa; RPO; ICT<sup>246</sup>]

In the following section, lack or uncertainty of ethical standards and policies are discussed.

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<sup>241</sup> ZA02

<sup>242</sup> ZA02

<sup>243</sup> ZA04

<sup>244</sup> ZA07

<sup>245</sup> ZA06

<sup>246</sup> ZA06

### 3.2.9.3 LACK OR UNCERTAINTY OF ETHICAL STANDARDS AND POLICIES

Participants' uncertainty about, or a lack of, government or institutional policy regarding ethics are included in this sub-theme. This includes policy beyond the organisation and does not include any discussion on organisational norms and practices, which is covered in the previous section.

From the interviews, certain participants attribute a lack of policy to their country's relatively recent entrance into research and innovation. There is also an example of departmentalisation of ethical responsibility.

Two participants from Malawi point to a lack of existing policies:

*"Interviewer: What Government policies or regulations affect how you address ethics in your work? Any formal policy?"*

*Interviewee: No..."* [Female; Malawi; Industry & Business, CSO; Energy, Waste Management, ICT<sup>247</sup>]

Another participant shares a similar sentiment:

*"In terms of dissemination I haven't come across such policies. I haven't come across such ethical regulations..."* [Male; Malawi; RPO; Bioeconomy<sup>248</sup>]

A researcher from Botswana attributed the lack of policy on research ethics to the country's recent entry into the research and innovation field:

*"Botswana, in our country, things are a bit at the start in understanding the research processes and style, so there's no, they don't have that sort of lea[r]ning at the moment, but they are trying to conform to the, to the international standards."* [Male; Botswana; RPO; ICT<sup>249</sup>]

The same reasoning is applied by a business and industry member in Malawi, who implies that ethics is a responsibility located elsewhere (e.g. with the originators of the technology):

*"...I don't think I have been affected in any way with the policies that are available. Because we are just borrowing as a country in terms of technology, so we are still in the young stages. So, I don't think like on my part government policies have affected my work or my engagement in any way..."* [Female; Malawi; RPO; ICT<sup>250</sup>]

Also in Malawi, a researcher described the contradictory and confusing policy arrangement, occurring under the country's process of decentralisation:

*"...the Ministry of Health in the National Health Information System Policy says that the approval should be made by CMED [Central Monitoring and Evaluation Division]. So, there are those conflicting guidelines that at times we don't know*

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<sup>247</sup> MW05

<sup>248</sup> MW06

<sup>249</sup> BW01

<sup>250</sup> MW04

*what to do because the government is contradicting itself.*” [Male; Malawi; RPO, CSO; ICT, Bioeconomy<sup>251</sup>]

The following expression of uncertainty from the South African sample refers to a departmentalisation of ethics:

*“...there is a different department that deals specifically with the policies and ethics in which the company is supposed to work. And I am unable to give them to you clearly and in the way that you would want them because it is basically not something I work with.”* [Male; South Africa; RPO, Policy body; Energy<sup>252</sup>]

In the following section, the protection of rights is discussed.

### 3.2.9.4 PROTECTION OF RIGHTS

The *protection of rights* section includes references to protecting the rights of all stakeholders such as through ensuring consent, confidentiality, ownership and intellectual rights, preventing copyright infringement, plagiarism and fraud, protection from liabilities, and avoiding conflicts of interest.

Ensuring consent and ownership are the main concerns for participants in the African States region. The practicalities of ensuring and protecting these rights frame these lines of discussions in the interviews.

This participant from Botswana expresses a level of uncertainty about data protection:

*“...I am not aware of anything that is limiting... the only thing I can think of, is the sensitivity of some of the data that you might get from the hospital, which needs to be reclassified. So be identifiable, removing, identification of patient records, their names and so on...”* [Male; Botswana; RPO; ICT<sup>253</sup>]

This participant from Malawi deals with confidentiality, including, for example, confidentiality agreements:

*“I think that’s the only binding document that we have. So, we sign that one, we call it confidentiality agreement...”* [Female; Malawi; RPO; ICT<sup>254</sup>]

The same participant discusses the practicalities of obtaining informed consent from participants in research projects:

*“...even before you get the information from those particular participants or your population you really need to seek for their consent. First of all you give them proper information, all the information that they need to understand, or they need*

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<sup>251</sup> MW01

<sup>252</sup> ZA05

<sup>253</sup> BW01

<sup>254</sup> MW04

*to know about your project or your research so that whenever they agree to participate in the research they should be well aware of what is going to be involved.” [Female; Malawi; RPO, RFO; ICT<sup>255</sup>]*

Another participant from Malawi mentions the need to avoid public harm and liability:

*“...first of all I have to analyse... to make sure that whatever I’m going to do in the community or the society, doesn’t bring harm to the members...” [Male; Malawi; RPO; ICT<sup>256</sup>]*

According to this participant from South Africa, there are formal expectations to obtain informed consent from study participants:

*“The formal expectation will be before any person does... particular research... if it includes individuals you need to be able to tell them about the consent forms and all that...” [Male; South Africa; RPO, RFO, Policy body; Energy, Waste Management, Bioeconomy<sup>257</sup>]*

Detail and nuance are missing from participants' explanations on the protection of rights, further supporting the previous sub-theme on *lack or uncertainty of ethical standards and policies*. In the next section, a summary of the chapter is provided.

### 3.2.9.5 SUMMARY OF ETHICS

Throughout this chapter, participants have difficulty positioning ethics and articulating what ethics entail. Many participants are not sure about the ethical norms or practices in their organisation.

It is clear from the views expressed in this chapter that participants have different views about where ethical responsibilities lie. As a result, there is a tendency towards ethics becoming an issue of personal responsibility and morality.

The protection of rights is mainly about the importance of informed consent and the ethical considerations when working with live subjects.

On a few occasions, interview participants attributed a lack of policy to their country’s relatively recent entrance into research and innovation.

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<sup>255</sup> MW07

<sup>256</sup> MW09

<sup>257</sup> ZA07

### 3.2.10 GOVERNANCE OF RESPONSIBLE RESEARCH AND INNOVATION (RRI)

Governance of RRI is defined by the European Commission as "arrangements that lead to acceptable and desirable futures"<sup>258</sup>. To lead to successful RRI futures, such arrangements must be "robust and adaptable" to unpredictable R&I development; "familiar enough to align with existing practices in R&I"; shares "responsibility and accountability among all actors" and "provide[s] governance instruments to actually foster this shared responsibility".<sup>259</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. The parent nodes from which the codes are derived are *accounting for local contexts* [codes 95, 96, 97, 98, 99]; and *conflicts and tensions* [code 109, 110]. The constituent codes for the former include:

- 96: Importance of customisation
- 97: Contextualising technology and innovation
- 98: Importance of politics
- 99: Accounting for geographic scale

*Conflicts and tensions* codes are:

- 109: Conflicts between theory and practice
- 110: Conflicts and tensions in R&I expectations

Codes	African States			
	Botswana	Malawi	South Africa	Total
Governance of RRI in African States				
94: Enablers	4	8	45	57
95: Accounting for local contexts	2	4	16	22
96: Importance of customisation	0	2	1	3
97: Contextualising technology and innovation	0	0	0	0
98: Importance of politics	1	1	2	4
99: Accounting for geographic scale	1	0	12	13
109: Conflicts between theory and practice	2	3	9	14
110: Conflicts and tensions in R&I expectations	2	3	7	12
105: Time frames and time constraints	0	2	7	9
108: Lack of (perceived) applicability of RRI	0	0	0	0

<sup>258</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>259</sup> <https://www.rri-tools.eu/about-rri#why>

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *governance of RRI* are brought together.

### 3.2.10.1 ACCOUNTING FOR LOCAL CONTEXTS

This *accounting for local contexts* sub-theme includes any reference to the role of context in determining and/or undertaking RRI practices. In coding terms, it is the aggregated parent node for the subcategory codes in this section, which are: importance of customisation; contextualising technology and innovation; importance of politics; and accounting for geographic scale.

*Importance of customisation* includes any reference to the importance of a custom-tailored approach for research and innovation in all/varying aspects of responsibility (e.g. communication and engagement, ethics, etc.).

The only customisation of governance of RRI relates to communication. According to this participant from Malawi, public communication is routed through institutional governance mechanisms, aimed at controlling the misreading and miscommunication of research:

*“...if there are findings and you want to share with wider and non-academic what has to be done is there has to be liaison with what is called the science communication department... because at the end of the day we want to communicate information that is easily understood, but also, we don’t want to communicate something that would contradict the findings...”* [Male; Malawi; RPO; Bioeconomy<sup>260</sup>]

Other communicative strategies employed by this participant's organisation include giving results back to communities, through community advisory groups:

*“...in terms of addressing the societal needs then it’s the question of the community advisory groups... informing you this is what will be appropriate, these are the challenges in our communities. And then you give back the results to the communities through the same community advisory groups...”* [Male; Malawi; RPO; Bioeconomy<sup>261</sup>]

*Contextualising technology and innovation* encompasses comments that do not simply focus on technology development, but also providing space for experimentation and dissemination in context for maximising positive impact.

This participant describes pilot programmes deployed by one RFO in South Africa, to broaden innovation opportunities beyond academia:

*“...there's something called the grassroots innovation program[me], that is, at least in theory, trying to assist those sorts of outside people in the national system*

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<sup>260</sup> MW06

<sup>261</sup> MW06

*of innovation. So the people who don't work at universities who don't work at a science council, but who have a clear idea.” [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>262</sup>]*

The same participant says expanding the remit (in terms of governance) of policy body organisations, towards greater inclusivity of non-university types, is important:

*“...with the interventions that enable innovation, for example, you want to make sure that you not just supporting stuff in Cape Town or in Stellenbosch, all that what you're supporting has meaningful impact in Khayelitsha, or, you know, that sort of thing. So you put in place conditions that make sure that those interventions would reach out to those areas as well...” [Female; South Africa; RFO, Policy body; Waste Management, Bioeconomy<sup>263</sup>]*

*Importance of politics* includes how local/international politics or internal politics within the organisation influence (R)RI practices. There are three identifiable governance points from the participants in this region: tax exemptions; politicised nature of local government services; and the role of community leaders.

Tax exemptions are offered by the Malawian government to encourage global research and innovation collaboration, according to this participant in business and industry:

*“...when you want to import let's say equipment or IT services, you don't pay any tax... we feel that exemptions like these promote our engagement with organisations from outside our firm...” [Male; Malawi; Industry & Business; ICT<sup>264</sup>]*

The politicised nature of local government services in South Africa undermines RRI development, according to this participant in the energy domain:

*“...government departments have institutionalised politics in governance to such an extent... this has stagnated the growth of municipalities in Africa but much it has slowed down the growth specifically in areas that require knowledge.” [Female; South Africa; RPO; Energy<sup>265</sup>]*

The same participant provides more details:

*“...because of political power people have not been able to separate politics and government functions...” [Female; South Africa; RPO; Energy<sup>266</sup>]*

Finally, the role of community leaders is central to certain research activities in South Africa:

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<sup>262</sup> ZA02

<sup>263</sup> ZA02

<sup>264</sup> MW02

<sup>265</sup> ZA03

<sup>266</sup> ZA03

*“Usually when we are dealing with communities, we can't just go into them we need permission from the chief or the leader in that community... when we go there, we are expecting to give back and be mindful of our project and if they are going to listen to us. That does not usually work out because they are not always willing to engage with us...”* [Female; South Africa; RPO; Bioeconomy<sup>267</sup>]

*Accounting for geographic scale* includes references to differences in or accounting for geographical scales to highlight how local/area-specific policies might influence/apply to technologies or products that are, in fact, for global use or how local policies are applied to/influenced by larger national, international, or global standards/policies. This can include any implications on the difference in scale of policies. It can also include interactions or comparisons between different contexts like the Global North and South.

There is little discussion of such issues in the African States region. One exception is how the absence of Botswanan bioeconomy laws and policies is a potential hindrance to international collaboration:

*“...let's take the example of South Africa has laws and process in terms of working with bio. You know, GMO [genetic modified organisms], you can come to the context of Botswana, we don't have clear cut laws or policies so if you are to work in that space will difficult because you are at two different levels...”* [Male; Botswana; RPO; Energy, Waste Management, ICT<sup>268</sup>]

According to this participant, the absence of laws in Botswana is made apparent, given that its neighbour – South Africa – has laws in place.

In the next section, conflicts and tensions in the governance of RRI are discussed.

### 3.2.10.2 CONFLICTS AND TENSIONS

*Conflicts between theory and practice* [code 109] is the aggregated parent node for *conflicts/tensions in R&I expectations* [code 110]. It includes references to conflicts between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as any tensions between what is 'wanted' and what is 'needed'. The conflicts can be because of different normative frames or different research priorities and end-goals.

Recruitment practices and the legacy of South Africa's reliance on foreign researchers and lecturers who are returning to their countries, is of concern for one researcher who considers it a problem for the future of research in the country:

*“...the university contradiction of government policy when it comes to foreign scholars and foreign lecturers, they implement the opposite and that bothers me... the reason why it was that was countries that were experiencing wars in Africa*

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<sup>267</sup> ZA04

<sup>268</sup> BW03

*majority of them have become stable so foreign skills that had come to SA are now going back and when they are going the areas occupied cannot be filled.*” [Female; South Africa; RPO; Energy<sup>269</sup>]

In Malawi, the government's importation and possibly tax or tariff arrangements is an obstacle for organisations to access up-to-date technologies:

*“...Malawi as a country does not normally manufacture IT equipment. Our industrialisation is still at a very low level and we find that most of the things that we use are imported from other countries... It normally hinders you from being innovative because you are restricted...”* [Male; Malawi; Industry & Business; ICT<sup>270</sup>]

In the following section, a summary of this chapter is provided.

### 3.2.10.3 SUMMARY OF GOVERNANCE OF RESPONSIBLE RESEARCH AND INNOVATION (RRI)

In *accounting for local contexts* (as a sub-theme), the *importance of customisation* highlights the role of public communications through institutional governmental mechanism, with the aim for minimising and mitigating the misinterpretation and miscommunication of research findings. The need for involving communities, be it through community advisory groups or through the involvement of gatekeepers (such as local chiefs) is clear.

The interviews provide limited insights regarding *contextualising technology and innovation*. One participant from South Africa mentions providing space for experimentation and dissemination in context for maximising positive impact and to broaden innovation opportunities beyond academia.

The importance of politics is clear through three identifiable governance issues: tax exemptions; politicised nature of local government services; and the role of community leaders.

Whilst there is little discussion relevant to *accounting for geographic scale*, there is some discussion regarding comparisons between different countries' governance approaches. Specifically, Botswana does not have laws in places, whereas its neighbouring South Africa does. South Africa is a frontrunner for the region and is thus typically the reference point for comparisons (governance related or otherwise) made throughout the interviews.

The *conflicts and tensions* that shape the governance of RRI further builds on this point, in that the internationalisation of research and innovation endeavours means that collaborating organisations have different procedures in place for doing their work.

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<sup>269</sup> ZA03

<sup>270</sup> MW02

### 3.2.11 CONCLUSION

This section provides a conclusion of the findings in the African States region.

As mentioned in the introduction, the RRING project acknowledges that each region of the world is advancing its own agenda on RRI.

RRING adopts an open approach to gain an understanding how each geography approaches RRI concepts and approaches. This in line with the RRING concept of bottom-up learning in RRI, rather than top-down approach or only using a European model understanding of RRI.

#### 3.2.11.1 SUMMARY OF FINDINGS FOR THE REGION

Findings are structured around seven RRI-related themes, which are inspired by the European Commission (EC) pillars and AIRR dimensions. In this report, the following key themes were investigated: *gender equality and inclusivity*, *public engagement*, *open science*, *anticipative, reflective and responsive RRI*, *science education*, *ethics*, and the *governance of RRI*, within the following four domains: energy, waste management, information and communications technology (ICT) and bioeconomy.

The aim of the structured interviews with participants was to investigate their perspectives and experiences, in line with the RRING concept of bottom-up learning in RRI, rather than top-down approach or only using European model understanding of RRI.

In the chapter about *gender equality and inclusivity*, the responses that have most support for gender equality centre around weak or light approaches (for example awareness-raising or education). Alternatively, a meritocratic understanding of who should participate is resistant to any interventions, while at the same time is framed as progressive and anti-discriminatory. In this light, attempts to intervene to improve the balance of participation is detrimental to the quality of the knowledge being applied and produced, as opposed to enriching research by broadening perspectives. There is more to discern about the RRI in the region based on what is absent rather than what is present. Gender equality and inclusivity considerations are absent or sparse in interviews, implying low-status, under-developed or non-progressive interpretations of these issues in African States. In the interest of being comprehensive, it is necessary to note that other types of diversity and inclusivity, such as racial, sexual and economic, are not comprehensively discussed by the participants in this sample. Further research would be required to ascertain the views and current situation of participants in R&I in this region. There is little elaboration on other aspects of gender equality and inclusivity as laid out in the EC and process dimension definitions, such as the role of gender in decision-making. There is little consideration of how social relevance of research results might be affected by greater gender equality. Processes of inclusion are overlooked. There are mentions of how the quality of the knowledge might be improved through the inclusion of different perspectives and expertise that can hail from different backgrounds. There are no direct references to the need to include publics that are involved in and affected by the research. There

is no reference to when such groups should be included and how the process of inclusion should appear in practice, deliberation, and in decision-making. Where the quality of the knowledge is raised, it is usually out of concern that selecting participation based on equality and inclusivity might reduce the actual quality of the research. Uncertainty about relevant government policies, as well as uncertain beliefs that none exist at all, are present. However, across the regional sample, there are contradictory beliefs held about the existence of such policies.

In the following chapter on *public engagement*, the vague and distantly related information provided by the participants suggests that public engagement is not fully understood. The practices, norms, or rules they discuss are tenuously related to engagement outcomes and rarely align with societal needs, expectations, or values. Although engagement is occasionally framed as a two-way collaborative process, much is framed as a one-way, top-down relationship with the benefits for the target stakeholders often defined from the viewpoint of the participant's organisation, rather than through a shared process of engagement. Some of the benefits and motivations that interview participants attribute to collaborative activities includes improving the skills of their own members and accessing information to aid product distribution; improving dissemination of results through providing a platform; accessing specialised knowledge; and improving how the organisation's message is packaged and communicated. While discussion of stakeholder interactions is about collaborating on research and innovation activities without a primary focus on identifying and aligning with societal needs, several examples are presented where engagement is used in working towards aligning with the needs and expectations of others. Where processes of alignment between R&I and societal needs are apparent, is in the spaces of community and local. The stakeholders seeking some forms of alignment are most active in these spaces. The interviews show recognition of the need for inter-domain, interdisciplinary, and multi-stakeholder integration, to comprehend and respond to some of the world's increasingly complex problems, such as healthcare, sustainability, and climate change. Some of these problems require international mobilisation as well as sharing of specialised forms of knowledge across countries.

In the third chapter, findings relating to *open science* are presented. For African States, responses to open access to data are mixed and certain participants appear uncertain about the relevant government policies, and whether any exist at all. The risks and disadvantages referred to are mainly about competitiveness and ownership rights, as well as the misrepresentation of primary data. They are also the main limits to the release of data, along with legislative restrictions and the sensitivity of the data. One of the three main motives-benefits in the interviews is reducing costs, and the exclusionary effects thereof, which is suggested as key problem for the Global South - especially in Malawi. The broadening of access to wider communities is also present along with the prevention of duplication.

In the chapter about *anticipative, reflective and responsive RRI*, climate change and environmental destruction are part of the framing of societal needs and future objectives. Some of these are additionally framed by policy and the private sector, although international environmental funding sources play a significant role. Societal needs are framed by how the

domain, geography, and country intersect. Responsiveness is based on close collaboration with communities, according to certain participants. However, participants fail to provide sufficient information, suggesting difficulties in the ability to discuss the nuances associated with being anticipative, reflective and/or responsive.

In the fifth chapter, about *science education*, participants discuss the need for science education and the tools used to engage with their audiences. The interviews are sparse in detail and richness regarding science education, as per the EU pillar definition. From the information provided, participants indicate that science education in African States is community- and public-oriented. Capacity building is rarely mentioned and, where it was, it related to a single CSO, while much of the rest was relatively vague and does not represent the two-way qualities of science education put forward by RRI advocates.

In the chapter about *ethics*, participants comment on where ethical responsibility lies, as well as the protection of rights. Participants have difficulty positioning ethics and articulating what ethics entail. It is clear from the views expressed in this chapter that participants have different views about where ethical responsibilities lie. As a result, there is a tendency towards ethics becoming an issue of personal responsibility and morality. The protection of rights is mainly about the importance of informed consent and the ethical considerations when working with live subjects. On a few occasions, interview participants attributed a lack of policy to their country's relatively recent entrance into research and innovation.

Finally, in the chapter about *governance of RRI*, participants share their experiences relating to the influence of politics, the impact of policies and regulation, as well as conflicts and tensions in RRI governance. In *accounting for local contexts* (as a sub-theme), the *importance of customisation* highlights the role of public communications through institutional governmental mechanism, with the aim for minimising and mitigating the misinterpretation and miscommunication of research findings. The need for involving communities, be it through community advisory groups or through the involvement of gatekeepers (such as local chiefs) is clear. The interviews provide limited insights regarding *contextualising technology and innovation*. One participant from South Africa mentions providing space for experimentation and dissemination in context for maximising positive impact and to broaden innovation opportunities beyond academia. The importance of politics is clear through three identifiable governance issues: tax exemptions; politicised nature of local government services; and the role of community leaders. Whilst there is little discussion relevant to *accounting for geographic scale*, there is some discussion regarding comparisons between different countries' governance approaches. Specifically, Botswana does not have laws in places, whereas its neighbouring South Africa does. South Africa is a frontrunner for the region and is thus typically the reference point for comparisons (governance related or otherwise) made throughout the interviews. The *conflicts and tensions* that shape the governance of RRI further builds on this point, in that the internationalisation of research and innovation endeavours means that collaborating organisations have different procedures in place for doing their work.

### 3.2.11.2 INTERVIEW FINDINGS

Chapter 3 presents findings from the RRING Work Package 3's Task 3.3 – specifically its global interview task – for African States. The aim of RRING's Task 3.3 interviews is to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data through and from researchers and innovators themselves, in African States.

In total, 21 interviews were undertaken for African States, covering: Botswana (3 interviews); Malawi (8); South Africa (10). We undertook a Qualitative Content Analysis approach to analysing these interview data.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions, and indeed are core to structuring the interview sections of this report. Within each of these themes, a number of prevalent sub-themes (all of which are shaping how research and innovation professionals in African States are doing their work) also emerged:

- *Gender equality and inclusivity*: gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; and lack or uncertainty of policy.
- *Public engagement*: organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: evaluation; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.
- *Ethics*: positioning ethics – where does the responsibility lie?; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: accounting for local contexts; and conflicts and tensions.

Taking each of these themes in turn, we now briefly reiterate salient findings that have been generated through our analysis:

#### 1. Gender equality and inclusivity (Section 3.2.4)

The responses that have most support for *gender equality and inclusivity* tends to be centred around weak or light approaches (e.g. awareness-raising or education). Alternatively, a meritocratic understanding of who should participate is resistant to any interventions, while at the same time is often framed as progressive and anti-discriminatory. In this light, any attempts to intervene to improve the balance of participation is seen as detrimental to the quality of the

knowledge being applied and produced, as opposed to enriching research by broadening perspectives.

There was perhaps a lot more to discern about the RRI in the region based on what was absent than what was present. Quite a lot of the gender equality and inclusivity considerations are absent or sparse in interviews, implying low-status, under-developed or non-progressive interpretations of these issues in African States. While female participation in research is generally approved of, other forms of inclusivity and diversity are largely absent, with LGBTQ+ completely overlooked. There is little elaboration on other aspects of gender equality and inclusivity as laid out in the EC and process dimension definitions, such as the role of gender in decision-making. There is also little consideration of how social relevance of research results might be affected by greater gender equality. Processes of inclusion are greatly overlooked. There are few mentions of how the quality of the knowledge might be improved through the inclusion of different perspectives and expertise that can hail from different backgrounds.

There are no direct references to the need to include publics that are involved in and affected by the research. There is no reference to when such groups should be included and how the process of inclusion should appear in practice, deliberation, and in decision-making.

Ironically, where the quality of the knowledge is raised, it is out of concern that selecting participation based on equality and inclusivity might reduce the quality of the research.

Uncertainty about relevant government policies, as well as uncertain beliefs that none exist at all, are present. However, across the regional sample there are contradictory beliefs held about the existence of such policies.

## **2. Public engagement (Section 3.2.5)**

The vague and distantly related information provided by the participants for this section suggests that public engagement is not fully understood by most participants. The practices, norms, or rules they discuss are tenuously related to engagement outcomes and rarely align with societal needs, expectations or values. Although engagement is occasionally framed as a two-way collaborative process, it is also framed as a one-way, top-down relationship with the benefits for the target stakeholders often defined from the viewpoint of the participant's organisation, rather than through a shared process of engagement.

Some of the benefits and motivations that participants attribute to collaborative activities include improving the skills of their own members and accessing information to aid product distribution; improving dissemination of results through providing a platform; accessing specialised knowledge; and improving how the organisation's message is packaged and communicated.

While discussion of stakeholder interactions is more about collaborating on research and innovation activities, without a primary focus on identifying and aligning with societal needs, several examples are presented where engagement is used in working towards aligning with

the needs and expectations of others. Where processes of alignment between R&I and societal needs are most apparent, is in the spaces of community and local. The stakeholders seeking some form of alignment are the most active in these spaces.

The interviews also show recognition of the need for inter-domain, interdisciplinary, and multi-stakeholder integration, in order to comprehend and respond to some of the world's increasingly complex problems, such as healthcare, sustainability, and climate change. Some of these problems require international mobilisation as well as sharing specialised forms of knowledge across countries.

### **3. Open Science (Section 3.2.6)**

For African States, responses to *open science* are mixed and participants appear uncertain about the relevant government policies, and whether any exist at all. The risks and disadvantages referred to are about competitiveness and ownership rights and the danger of misrepresenting primary data. They are also the main limits to the release of data, along with legislative restrictions and the public sensitivity of data.

One of the three main motives-benefits in the interviews is reducing costs, and the exclusionary effects thereof, which is suggested as key problem for the Global South - especially in Malawi. The broadening of access to wider communities is also present, along with the prevention of duplication.

### **4. Anticipative, reflective and responsiveness (Section 3.2.7)**

In this region, climate change and environmental destruction are part of the framing of societal needs and implied future objectives. Some of these are framed by policy and the private sector, although international environmental funding sources play a part.

Societal needs are framed by how the domain, geography, and country intersect. Responsiveness is based on close collaboration with communities; however, certain participants fail to provide sufficient information, suggesting difficulties in the ability to discuss the nuances associated with being anticipative, reflective and/or responsive.

### **5. Science education (Section 3.2.8)**

The interviews are sparse in detail and richness with regard to *science education*. Participants indicated that science education in African States is community- and public-oriented. Capacity building is mentioned rarely and, where it is, it relates to a single CSO, while the rest is vague and does not represent the two-way qualities of science education put forward by RRI advocates – such as “promoting engagement and an entrepreneurial mindset”; “empowering citizens to participate in science policy making”; and “facilitating a strong interdisciplinary approach, and stakeholders' involvement”.

## **6. Ethics (Section 3.2.9)**

Throughout the ethics' sub-theme, participants have difficulty positioning ethics and articulating what it entails. Many participants are unsure about what ethics norms or practices exist in their organisation.

There is a tendency towards ethics becoming an issue of personal responsibility and morality, and some participants speak of disidentifying with ethics as if it were of little or no relevance to them and their work.

There are no clear elaborations on moral deliberation and research integrity, and it remains unclear how these would be established.

One participant attributes the lack of policy to their country's relatively recent entrance into research and innovation.

## **7. Governance of RRI (Section 3.2.10)**

In *accounting for local contexts* (as a sub-theme), the *importance of customisation* highlights the role of public communications through institutional governmental mechanism, with the aim of minimising and mitigating the misinterpretation and miscommunication of research findings. The need for involving local communities, be it through community advisory groups or through the involvement of gatekeepers (such as local chiefs), is clear.

One participant provides insights regarding *contextualising technology and innovation*, by providing space for experimentation and dissemination in context for maximising positive impact and to broaden innovation opportunities beyond academia.

The *importance of politics* is clear through three identifiable governance issues: tax exemptions; politicised nature of local government services; and the role of community leaders.

Whilst there is little discussion relevant to *accounting for geographic scale*, there is some discussion regarding comparisons between different countries' governance approaches. Specifically, that Botswana does not have laws in places, whereas neighbouring South Africa does. South Africa is a frontrunner for the region and is thus typically the reference point for comparisons (governance related or otherwise) made throughout the interviews.

The *conflicts and tensions* that shape the governance of RRI further builds on this point, in that the internationalisation of research and innovation endeavours means that collaborating organisations have different procedures in place for doing their work.

## 3.3 GLOBAL SURVEY RESEARCH: AFRICAN STATES

### 3.3.1 INTRODUCTION

The sample size from African states ( $n = 227$ ) represented only a small part of the complete global participant pool and were largely dominated by respondents from South Africa and Malawi. The socio-demographic measures showed the dominant age group as 29 to 38, and the gender distribution was slightly skewed toward men. Over half of the respondents indicated working in one of the four key RRING domains. Most of the respondents worked in a university or similar RPO, with the most dominant professional fields relating to natural sciences and health sciences.

RPOs and other academics were by far those most engaged, suggesting a disproportionately higher internal engagement in comparison with non-academic stakeholders. This is most likely due to academic collaborations and joint research projects. RRI was mostly associated with the ethical aspects of R&I, and dominant associations with the SDGs were for economic aspects of sustainable development.

There was an overall agreement on the importance of diverse and inclusive RRI dimensions, and results suggested that engaging other researchers and academics was a typical part of research processes. Outside academia, respondents most frequently reached out to policy bodies. Gender equality was ensured internally by creating equal research teams and promoting female researchers but lacked widely adopted measures to integrate gender equality on a more substantive level. This also applied to ethnic minorities, as their promotion was not as highly valued as the other diverse and inclusive RRI measures.

Respondents expressed a broad consensus of agreement towards the anticipative and reflective dimension of RRI, which translated into various practical steps. These mostly referred to rules, regulations, and legal obligations, but also aspects relating to the treatment of human research participants and the impact on the environment.

Transparency of research at all levels of R&I work was broadly ensured through one-way dissemination, presumably as it was considered a viable pathway towards open and transparent methods and processes. Researchers and innovators also shared their work both within the academic field, and with public and non-academic stakeholders. However, making research findings and data openly available to the public was widely confused with open access.

The attitudinal agreement for societal needs was the highest in comparison with other RRI dimensions. In practice, rather than empowering relevant groups of people to shape the R&I process, there seemed to be a dominant and less responsive top-down approach when selecting research topics.

### 3.3.2 OVERVIEW

This section focuses on the sample of respondents from African states. It was represented by a dominant majority of respondents from South Africa ( $n = 90$ , 40%) and Malawi ( $n = 87$ , 39%). The sample size for African states was  $n = 227$  (completed surveys), making up 8% of the global sample.

#### 3.3.2.1 SOCIO-DEMOGRAPHICS OF AFRICAN STATES

The dominant age group was 29 to 38 ( $n = 80$ , 37%) (Figure 28)<sup>271</sup>, and the gender distribution was slightly skewed towards men ( $n = 133$ , 59%) rather than women ( $n = 88$ , 39%) (Figure 29)<sup>272</sup>.

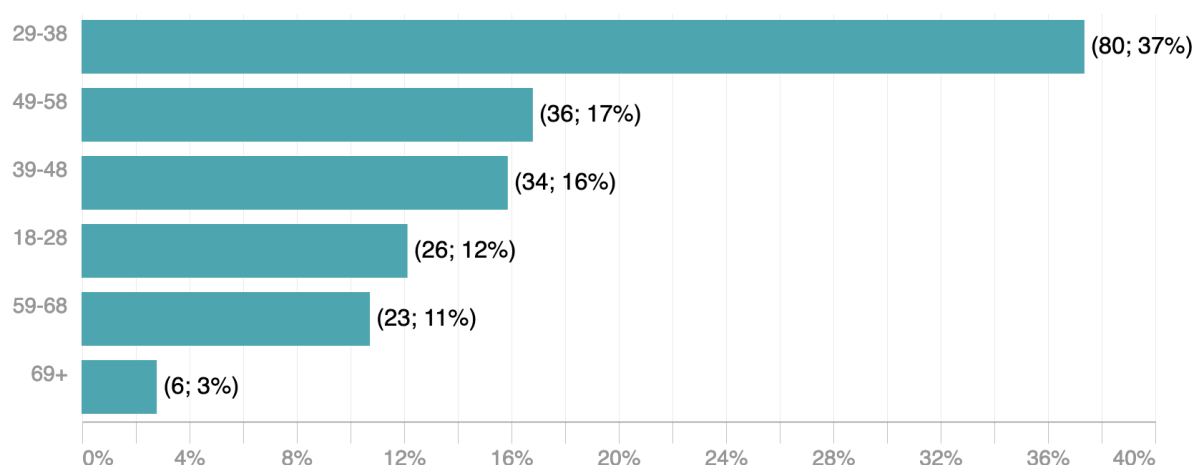


Figure 28: African States - Distribution of age.

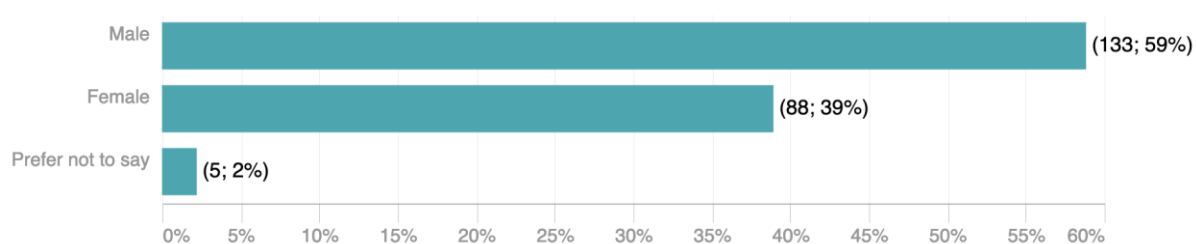


Figure 29: African States - Distribution of gender.

Most participants indicated that they are not currently participating in an educational programme ( $n = 176$ , 78%) (Figure 30)<sup>273</sup>. The overall level of formal education was high. Most held a Bachelor's ( $n = 79$ , 35%) or Master's degree ( $n = 78$ , 35%), while fewer people reported completing a Doctoral degree ( $n = 51$ , 23%) (Figure 31)<sup>274</sup>.

<sup>271</sup> The total number of responses:  $N = 205$

<sup>272</sup> The total number of responses:  $N = 226$

<sup>273</sup> The total number of responses:  $N = 225$

<sup>274</sup> The total number of responses:  $N = 224$

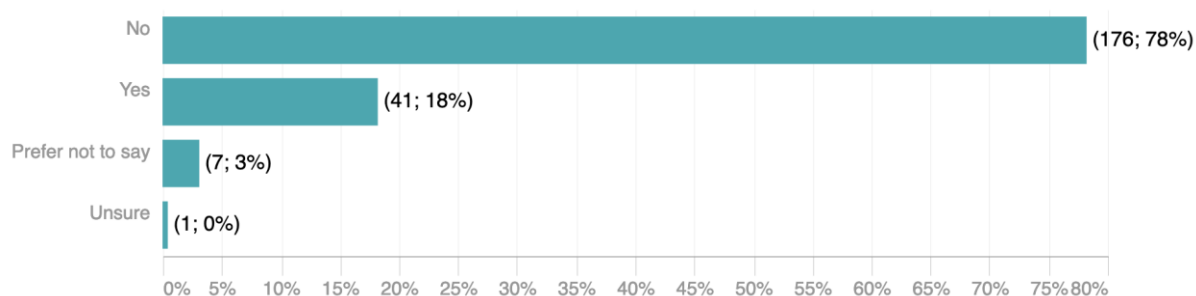


Figure 30: African States - Currently studying at school, college or university.

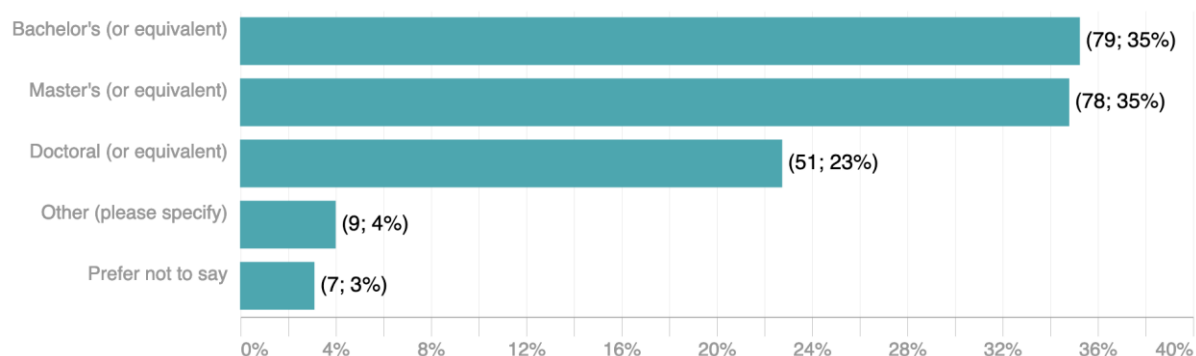


Figure 31: African States - Highest level of formal education completed.

In general, the subject areas of respondents' degrees were diverse (Figure 32)<sup>275</sup>. Among the degree subject areas, '*Natural sciences, mathematics and statistics*' ( $n = 60$ , 20%) represented the largest group, followed by '*Business, administration and law*' ( $n = 37$ , 12%), '*Social sciences, journalism and information*' ( $n = 35$ , 11%), '*Information and communication Technology*' ( $n = 31$ , 10%), '*Education*' ( $n = 29$ , 9%), '*Arts and humanities*' ( $n = 29$ , 9%), '*Health and welfare*' ( $n = 29$ , 9%), '*Agriculture, forestry, fisheries and veterinary*' ( $n = 24$ , 8%), '*Other*' ( $n = 16$ , 5%), '*Engineering, manufacturing and construction*' ( $n = 13$ , 4%), and '*Services*' ( $n = 3$ , 1%).

<sup>275</sup> The total number of responses:  $N = 306$

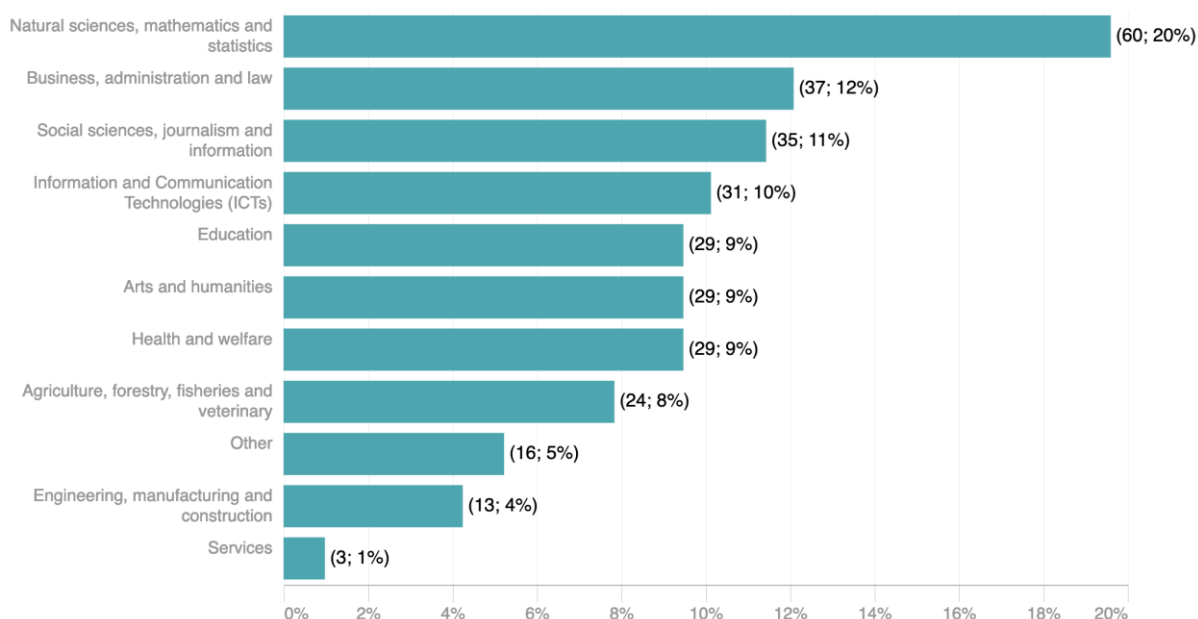


Figure 32: African States - Distribution of degrees by subject area (multiple choice).

Respondents tended to have many years of professional experience, both in total ( $Mdn = 12$  years) and after completing their doctoral degree ( $Mdn = 14$  years) (Figure 33)<sup>276</sup>.

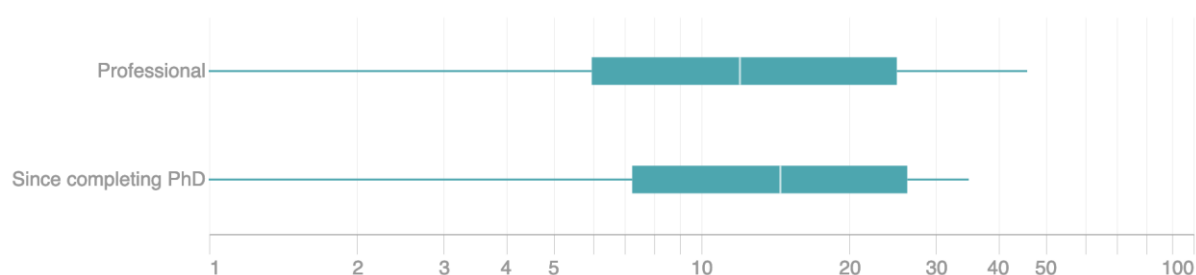


Figure 33: African States - Years of experience as professional / since completing PhD (log scale).

In terms of respondents' academic fields of work, the most dominant were 'Natural sciences, mathematics and statistics' ( $n = 37$ , 17%) and 'Medical and health sciences' ( $n = 33$ , 15%) (Figure 34)<sup>277</sup>.

<sup>276</sup> The total number of responses for 'Professional'  $N = 167$ , 'Since completing PhD'  $N = 42$

<sup>277</sup> The total number of responses:  $N = 220$

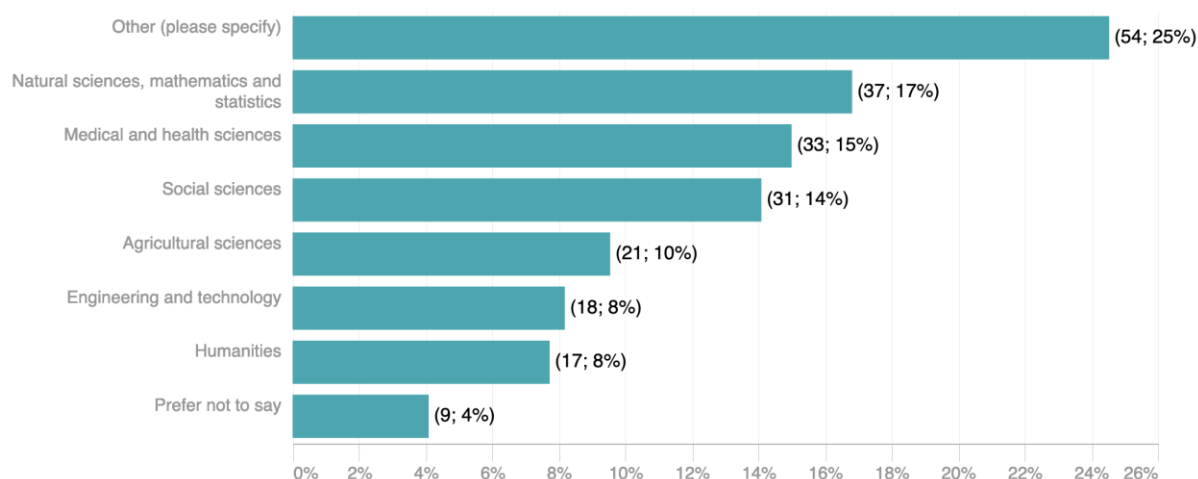


Figure 34: African States - Fields or professions in which respondents work.

The most commonly reported sub-fields within these categories were '*Biological sciences*' ( $n = 14, 37\%$ ) (Figure 35)<sup>278</sup> and '*Health sciences*' ( $n = 15, 45\%$ ) respectively (Figure 36)<sup>279</sup>.

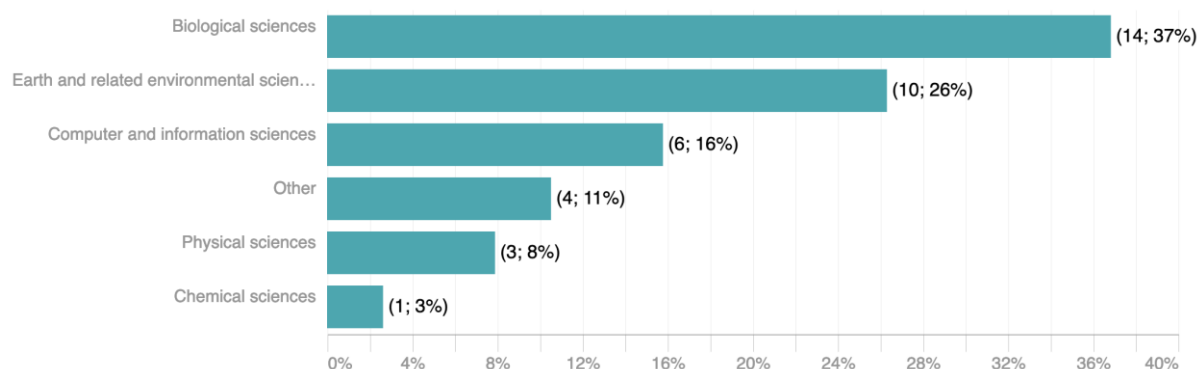


Figure 35: African States - Sub-fields of natural sciences.

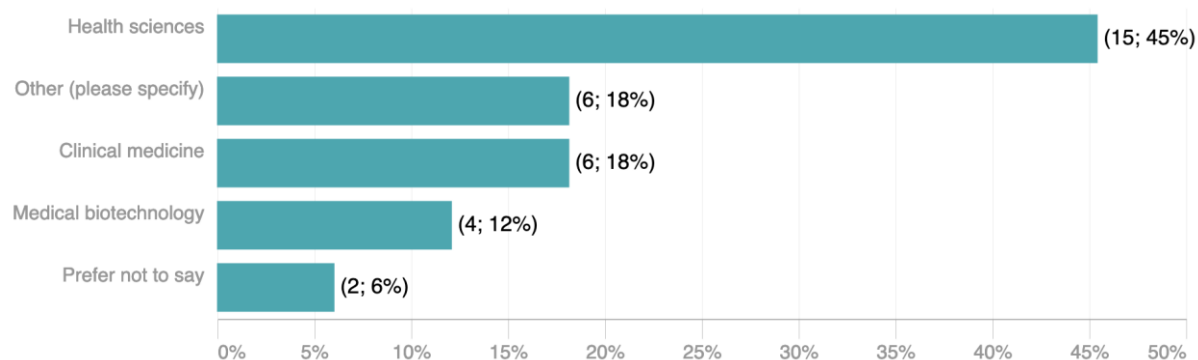


Figure 36: African States - Sub-fields of medical and health sciences.

<sup>278</sup> The total number of responses:  $N = 38$

<sup>279</sup> The total number of responses:  $N = 33$

Other sub-fields were ‘*Electrical/electronic/information engineering*’ ( $n = 6$ , 30%) within ‘*Engineering and technology*’ (Figure 37)<sup>280</sup>, and ‘*Agriculture, forestry, and fisheries*’ ( $n = 14$ , 67%) within ‘*Agricultural sciences*’ (Figure 38)<sup>281</sup>.

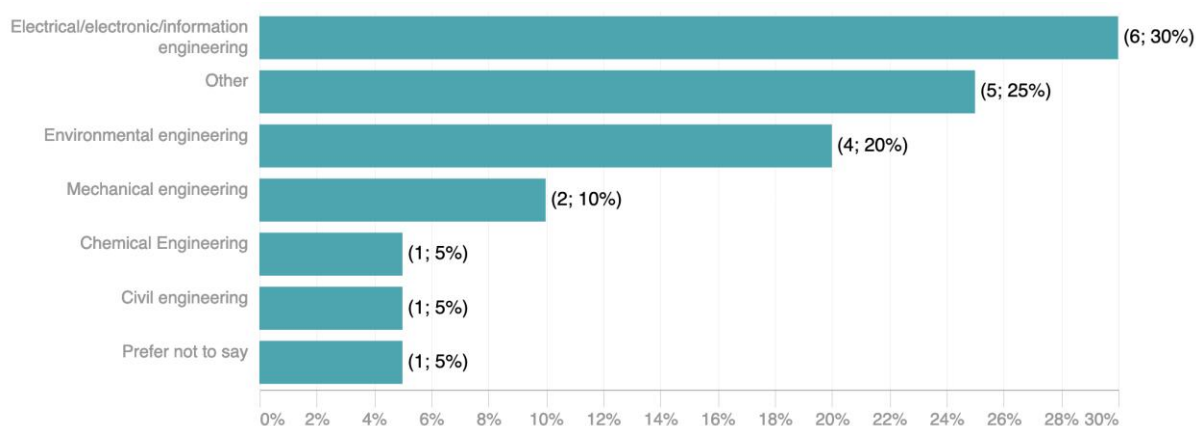


Figure 37: African States - Sub-fields of engineering and technology.

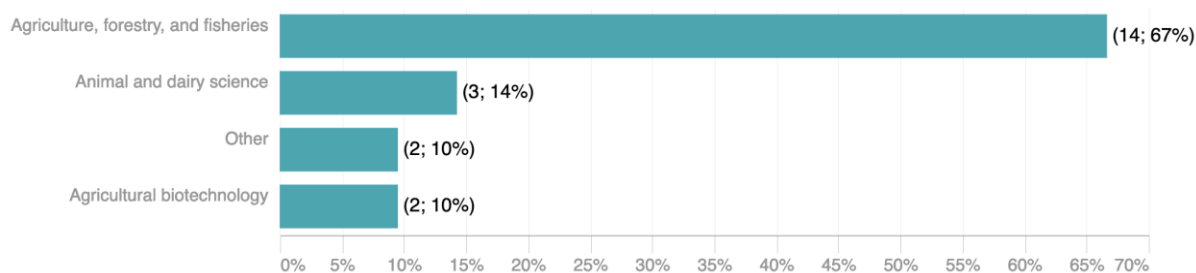


Figure 38: African States - Sub-fields of agricultural sciences.

The most common sub-fields of ‘*Social sciences*’ were ‘*Educational sciences*’ ( $n = 10$ , 33%), and ‘*Economics and business*’ ( $n = 9$ , 30%) (Figure 39)<sup>282</sup>. For ‘*Humanities*’, these were ‘*Languages and literature*’ ( $n = 3$ , 19%), and ‘*Arts (history/performing arts, music)*’ ( $n = 3$ , 19%) (Figure 40)<sup>283</sup>.

<sup>280</sup> The total number of responses:  $N = 38$

<sup>281</sup> The total number of responses:  $N = 21$

<sup>282</sup> The total number of responses:  $N = 30$

<sup>283</sup> The total number of responses:  $N = 16$

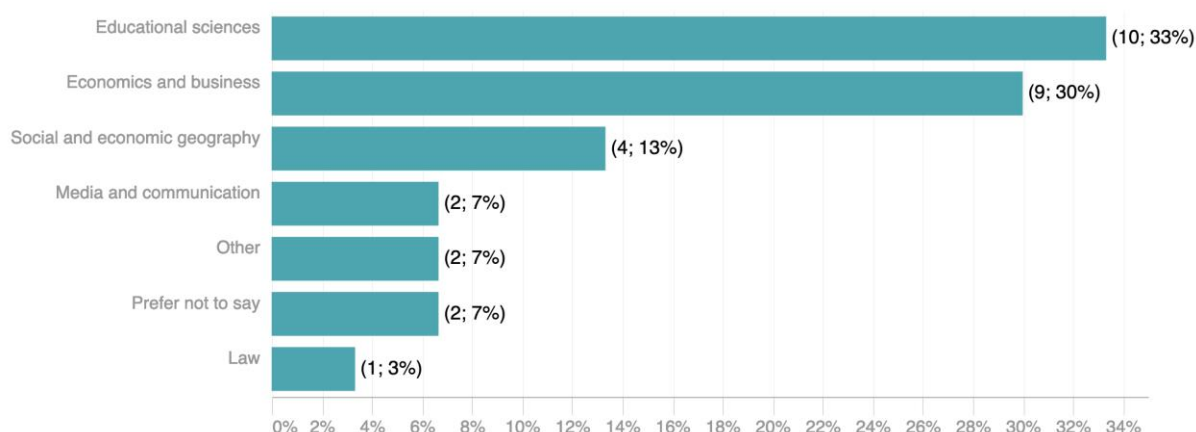


Figure 39: African States - Sub-fields of social sciences.

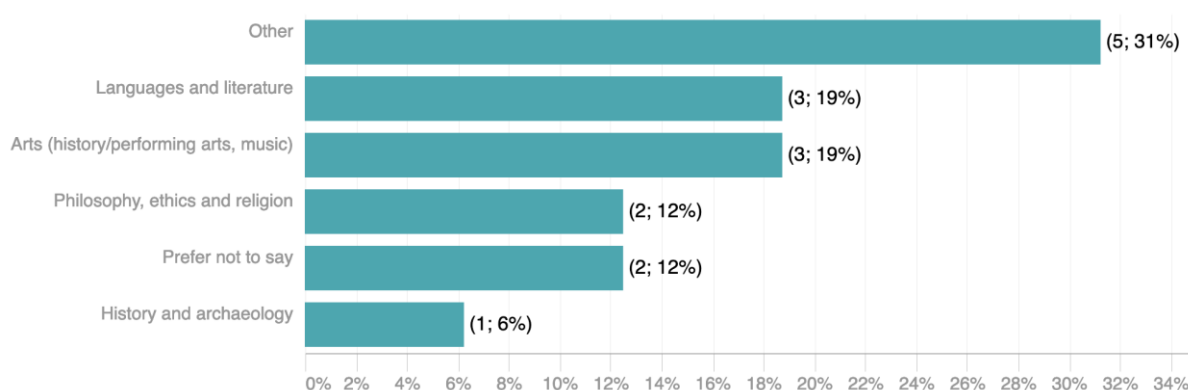
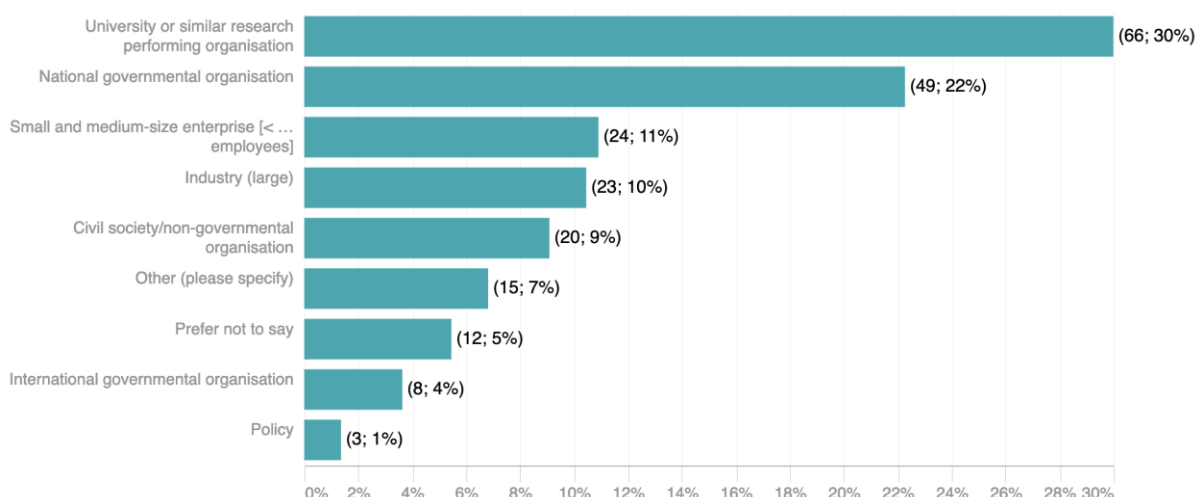


Figure 40: African States - Sub-fields of humanities.

Most respondents worked full-time ( $n = 173$ , 79%) (Figure 42)<sup>284</sup> in ‘Universit[ies] or similar research performing organisation[s]’ ( $n = 66$ , 30%), ‘National governmental organisation[s]’ ( $n = 49$ , 22%), or ‘Small and medium-sized enterprise[s]’ ( $n = 24$ , 11%) (Figure 41)<sup>285</sup>.



<sup>284</sup> The total number of responses:  $N = 219$

<sup>285</sup> The total number of responses:  $N = 220$

Figure 41: African States - Sectors in which participants work[ed].

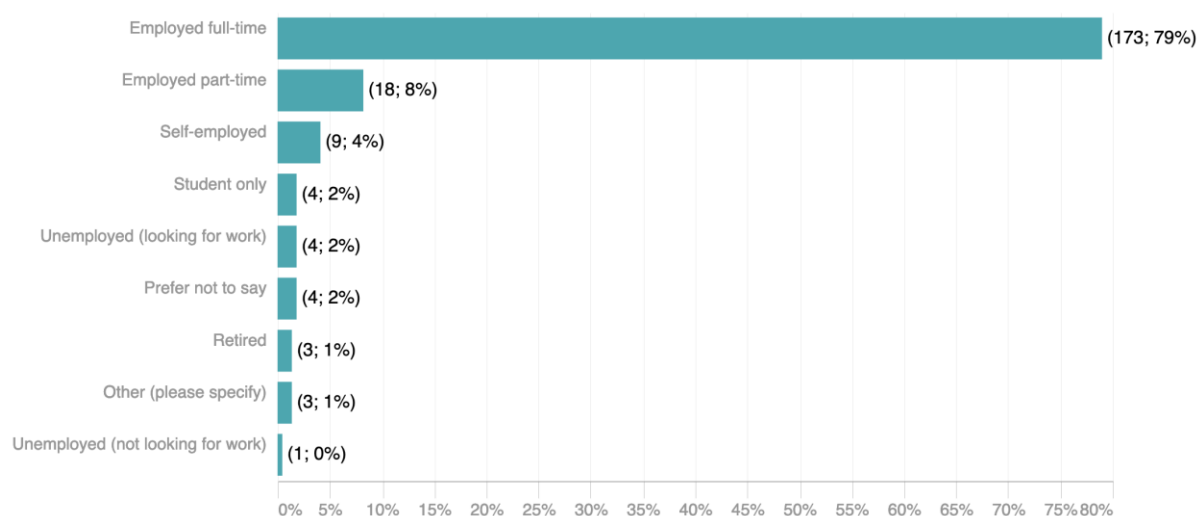


Figure 42: African States - Participants' employment status.

In general, respondents spent their working hours on a range of tasks. The most time was spent on 'Research and innovation work' ( $Mdn = 6$  hours)<sup>286</sup> and 'Administration unrelated to research/innovation' ( $Mdn = 5$  hours) (Figure 43)<sup>287</sup>.

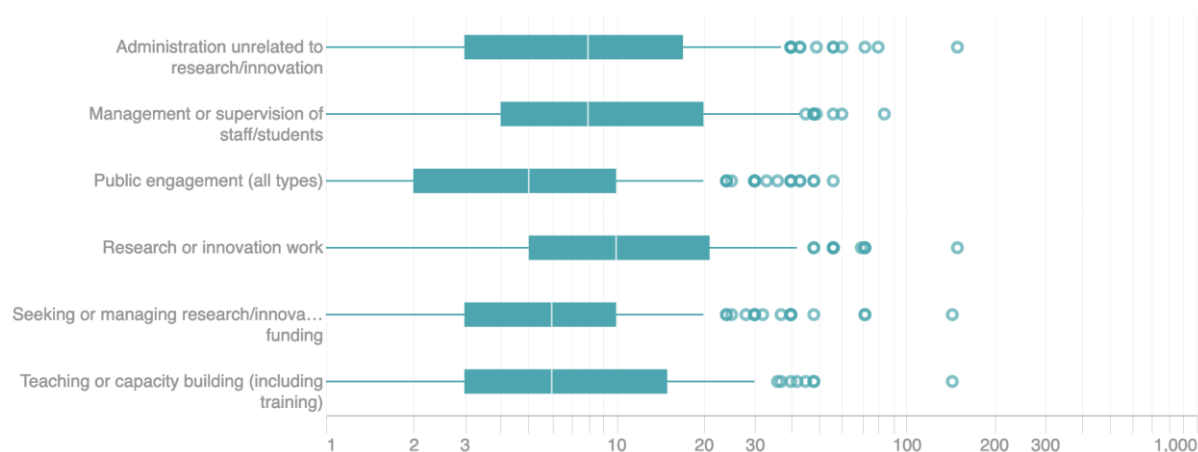


Figure 43: African States - Hours spent on activities in the last 7 days (log scale).

The median number of years that respondents had worked as researchers and innovators was 5 years<sup>288</sup>. In terms of their current positions, the median number of years of respondents' work experience was also 5 years (Figure 44)<sup>289</sup>. Generally, respondents tended to have worked longer as a researcher and innovator than in their current role.

<sup>286</sup> The total number of responses:  $N = 169$

<sup>287</sup> The total number of responses:  $N = 154$

<sup>288</sup> The total number of responses:  $N = 166$

<sup>289</sup> The total number of responses:  $N = 168$

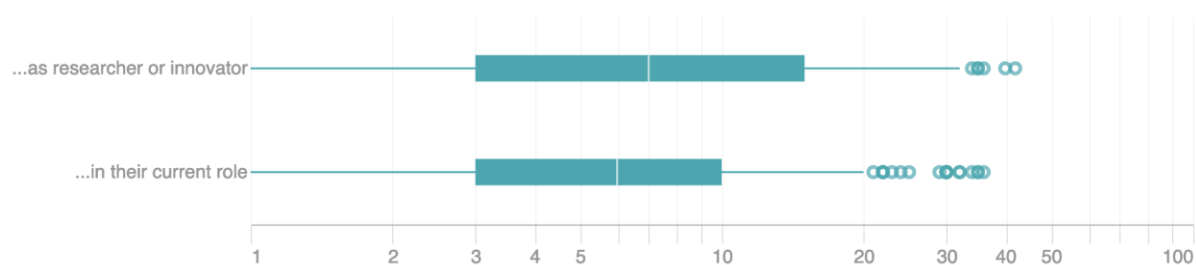


Figure 44: African States - Years that respondents worked in their current role / as researcher or innovator (log scale).

From the four key RRING domains, respondents most frequently indicated working in ‘Digital (ICT)’ ( $n = 70$ , 30%). Less common were ‘Bio-economy’ ( $n = 33$ , 14%), ‘Waste Management’ ( $n = 22$ , 10%) and ‘Energy’ ( $n = 18$ , 8%) (Figure 45)<sup>290</sup>.

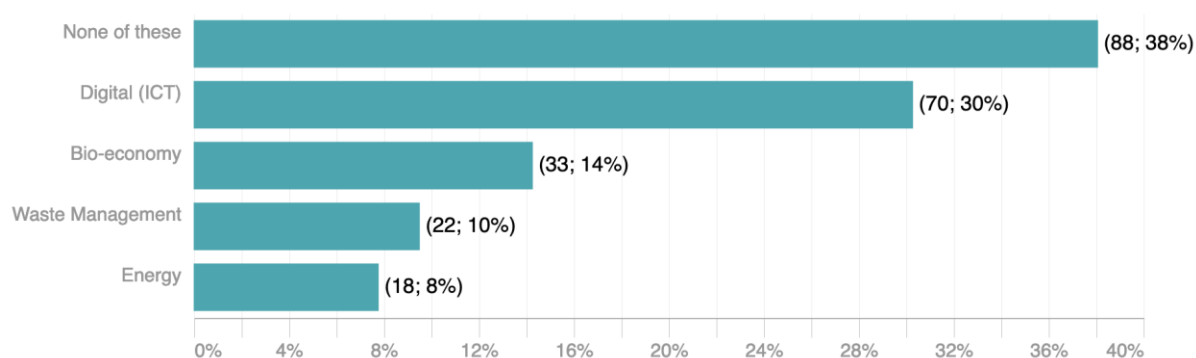


Figure 45: African States - Domains relating to participants' recent work.

### 3.3.3 RESULTS BY DIMENSION OF RESPONSIBLE RESEARCH & INNOVATION

This section describes the level of engagement with the four RRI process dimensions, both on an attitudinal and practical level.

#### 3.3.3.1 RRI DIMENSION – DIVERSE AND INCLUSIVE

While there was overall agreement on an attitudinal level, there were value-action gaps for each measure. This was most apparent for the inclusion of ethnic minorities as attitude and reporting practical steps did not align. This measure also had the lowest level of total attitudinal agreement (79%, compared to 89% for gender equality, 90% for ethics, and 91% for diverse perspectives and expertise).

<sup>290</sup> The total number of responses:  $N = 231$

### 3.3.3.1.1 Diverse and Inclusive – Diverse Perspectives

The majority of respondents agreed, but with differing levels of strength, that it is important to involve diverse stakeholders ( $n = 178$ , 91%) (Figure 46)<sup>291</sup>. A notable portion expressed the strongest level of agreement ( $n = 81$ , 41%), whereas only minor proportions disagreed ( $n = 9$ , 5%) or responded neutrally ( $n = 10$ , 5%).

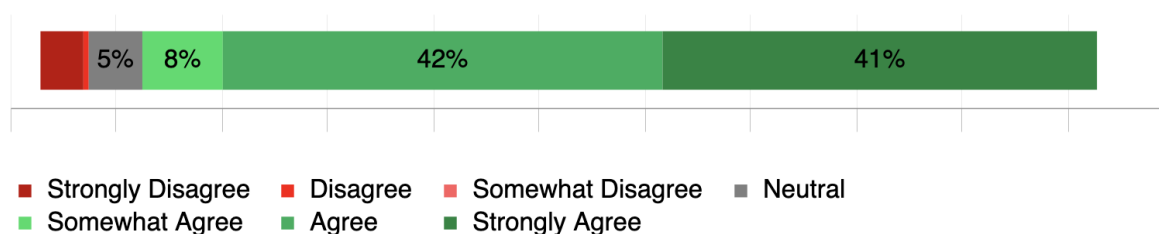


Figure 46: African States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work'.

Just over half ( $n = 109$ , 53%) reported taking practical steps to involve diverse stakeholders (Figure 47)<sup>292</sup>. This represents 61% of those who indicated a positive attitude towards involving diverse perspectives. There were many ( $n = 69$ , 39%) whose attitudinal agreement had not translated into practical action or did not answer the question. A notable portion explicitly reported taking no steps ( $n = 49$ , 24%) or thought taking action did not apply to them or had no opinion ( $n = 28$ , 14%).

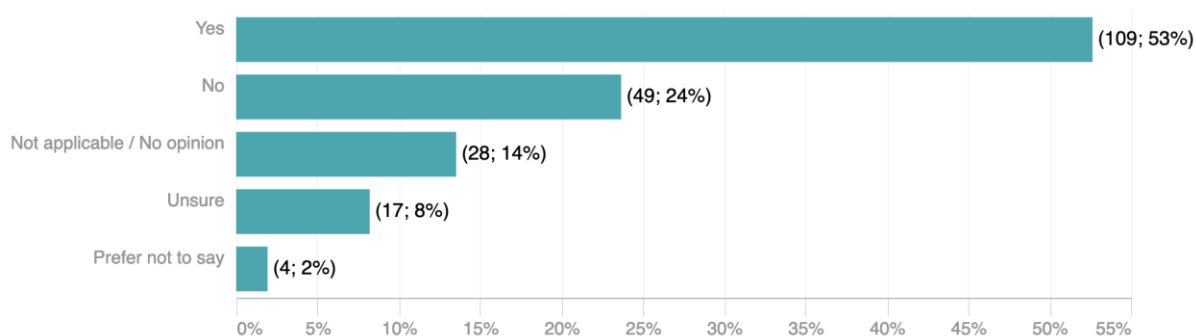


Figure 47: African States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.

Respondents involved different sectors in their R&I process (Figure 48)<sup>293</sup>. Most frequently 'Universit[ies] or college[s]' ( $n = 67$ , 18%) were specified, followed by 'Government agenc[ies]' ( $n = 60$ , 16%), 'Research organisation[s]' ( $n = 51$ , 14%), and the 'General public' ( $n = 40$ , 11%).

<sup>291</sup> The total number of responses:  $N = 197$

<sup>292</sup> The total number of responses:  $N = 207$

<sup>293</sup> The total number of responses:  $N = 366$

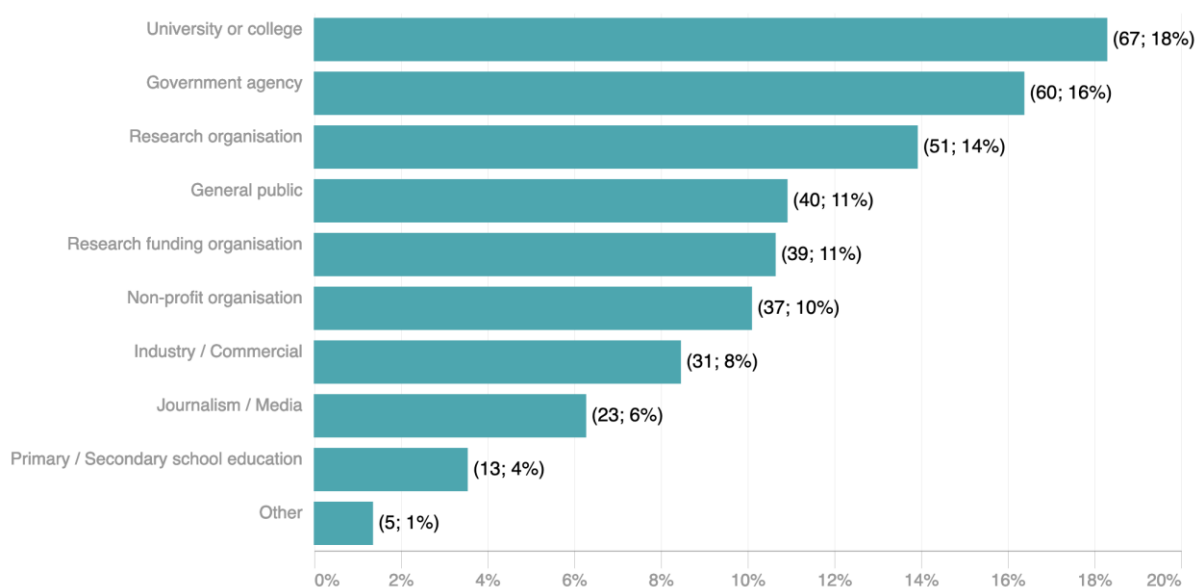


Figure 48: African States - Sectors participants involved in research and innovation practice.

In general, respondents reported similar proportions of involved stakeholders for R&I practice and dissemination (Figure 49)<sup>294</sup>. Again, sectors most frequently involved were ‘*Universit[ies] or college[s]*’ ( $n = 66$ , 18%) and ‘*Government agenc[ies]*’ ( $n = 56$ , 15%). However, ‘*General public*’ ( $n = 51$ , 14%) was mentioned more frequently for dissemination than ‘*Research organisation[s]*’ ( $n = 18$ , 13%). Additionally, ‘*Industry / Commercial*’ ( $n = 27$ , 7%) was mentioned less often, while ‘*Journalism / Media*’ ( $n = 27$ , 7%) was involved more often.

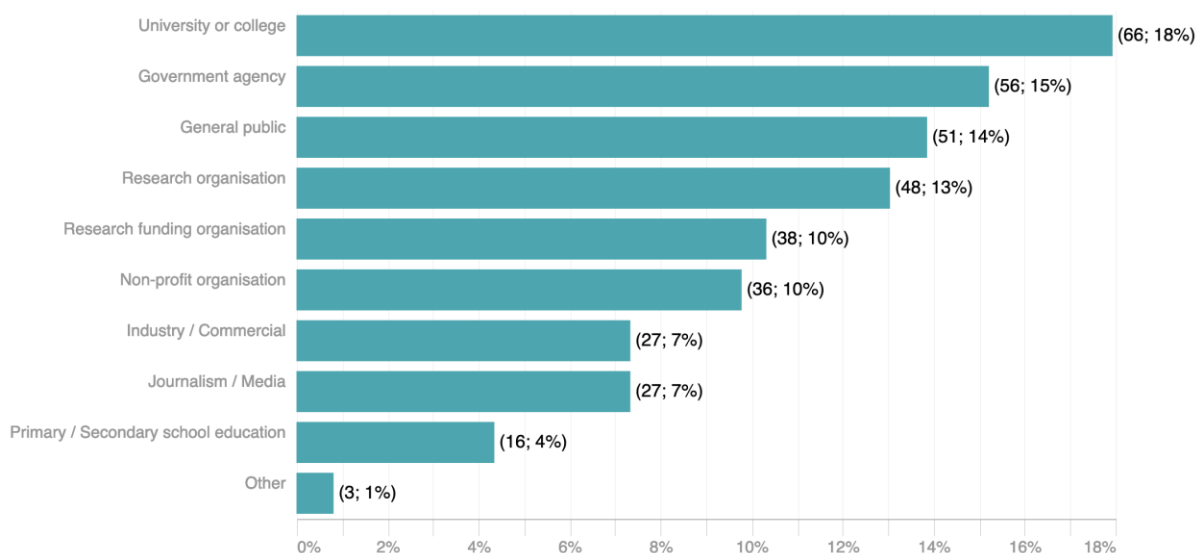


Figure 49: African States - Sectors participants involved in research and innovation dissemination.

<sup>294</sup> The total number of responses:  $N = 368$

### 3.3.3.1.2 Diverse and Inclusive – Gender Equality

There was a broad consensus of agreement with the importance of promoting gender equality in R&I work (Figure 50)<sup>295</sup>. The majority of respondents ( $n = 173$ , 89%) responded positively, with almost half ( $n = 94$ , 48%) expressing the strongest level of agreement. A minority ( $n = 21$ , 11%) responded neutrally or disagreed that promoting gender equality was important in their work.

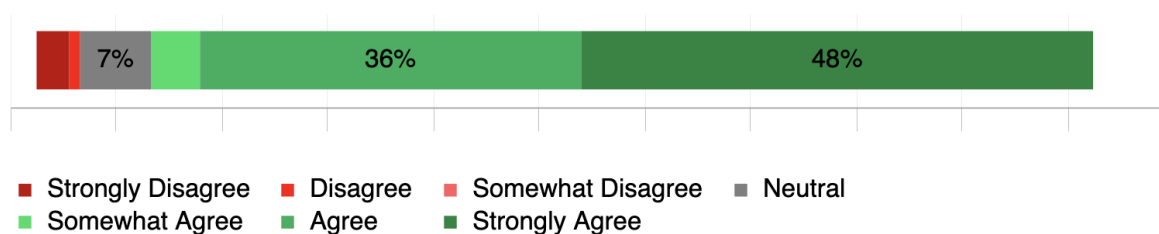


Figure 50: African States - 'It is important to promote gender equality in my research and innovation work'.

More than half of the respondents ( $n = 104$ , 51%) had taken steps to promote gender equality in their work over the past 12 months (Figure 51)<sup>296</sup>. This represents 60% of those respondents who indicated a positive attitude towards gender equality. There was a proportion of those who thought it was attitudinally important ( $n = 69$ , 40%), but had not explicitly confirmed any actions.

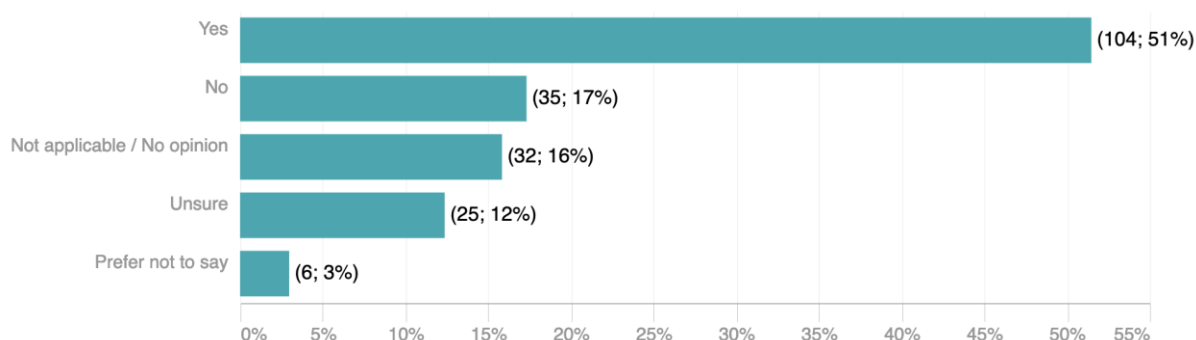


Figure 51: African States - Promoted gender equality in research and innovation work in the past 12 months.

### 3.3.3.1.3 Diverse and Inclusive – Ethnic Minorities

The majority of respondents ( $n = 149$ , 79%) agreed it was important to include ethnic minorities in R&I work (Figure 52)<sup>297</sup>, however this was to a lower degree than for diverse perspectives and gender equality measures. Fewer respondents agreed at the strongest level ( $n = 68$ , 36%) when compared to the same level of agreement for the gender equality measure

<sup>295</sup> The total number of responses:  $N = 194$

<sup>296</sup> The total number of responses:  $N = 202$

<sup>297</sup> The total number of responses:  $N = 190$

(48%). Disagreement was expressed by a considerable proportion ( $n = 17$ , 9%), especially when compared to other diversity and inclusivity measures.

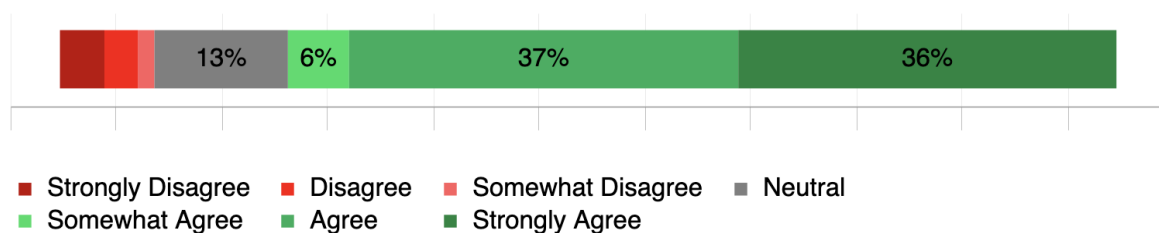


Figure 52: African States - 'It is important to include ethnic minorities in my research and innovation work'.

Few respondents explicitly confirmed they had acted on including ethnic minorities ( $n = 64$ , 32%) (Figure 53)<sup>298</sup>. This represents 43% of those respondents who indicated a positive attitude towards including ethnic minorities. This was the lowest indication of practical steps in comparison with the other measures of this dimension. More than half of the respondents ( $n = 85$ , 57%) thought including ethnic minorities was important, but had not explicitly taken steps to ensure this or had not answered the question.

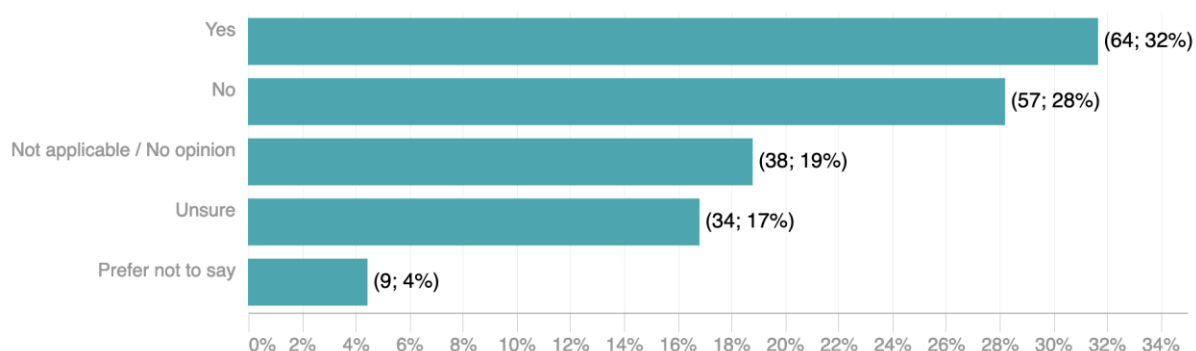


Figure 53: African States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.

### 3.3.3.1.4 Diverse and Inclusive – Ethics

There was a broad consensus of agreement amongst respondents regarding the importance of ethics (Figure 54)<sup>299</sup>. The majority ( $n = 167$ , 90%) responded positively and almost half ( $n = 91$ , 49%) expressed the strongest level of agreement. A small portion of respondents ( $n = 7$ , 4%) explicitly disagreed that ensuring ethical guidelines was important in their work.

<sup>298</sup> The total number of responses:  $N = 202$

<sup>299</sup> The total number of responses:  $N = 186$

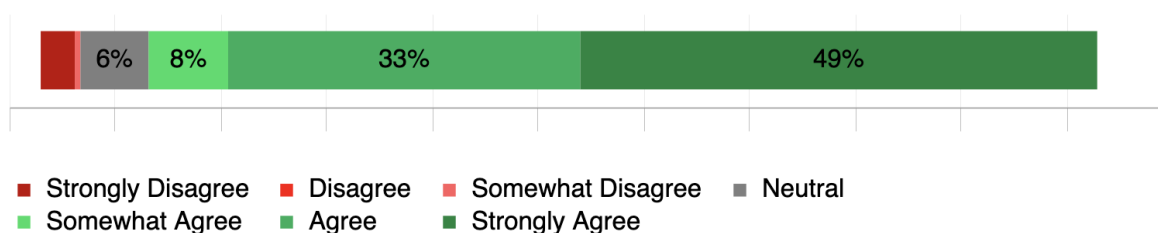


Figure 54: African States - 'Ethical principles guide my research and innovation work'.

The majority of respondents ( $n = 110$ , 57%) had taken steps to be guided by ethical principles (Figure 55)<sup>300</sup>. This represents 59% of respondents who considered it important. A notable proportion thought ethics were important ( $n = 76$ , 41%), but had not explicitly taken steps to ensure this or had not answered the question.

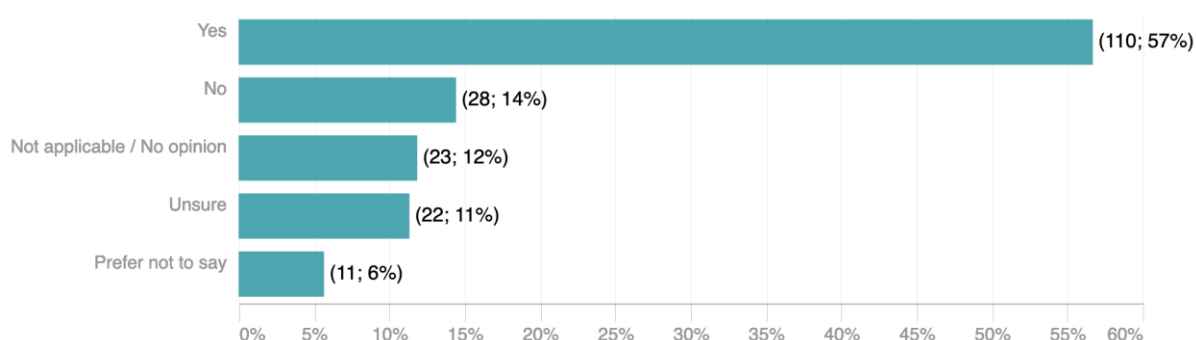


Figure 55: African States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.

### 3.3.3.1.5 Further Diverse and Inclusive Agreement Statements

The previous findings on RRI measures are further explored through results on the levels of agreement towards the following statements regarding detailed perspectives on the UN SDGs (Figure 56).

Most respondents agreed that 'It is important to maintain an equal number of men and women in research and innovation teams' ( $n = 112$ , 70%)<sup>301</sup> and thought that 'It is important to take gender into account when developing [their] research and innovation work' ( $n = 129$ , 83%)<sup>302</sup>. The majority disagreed that 'Gender is irrelevant in [their] work' ( $n = 104$ , 67%)<sup>303</sup>.

<sup>300</sup> The total number of responses:  $N = 202$

<sup>301</sup> The total number of responses:  $N = 158$

<sup>302</sup> The total number of responses:  $N = 156$

<sup>303</sup> The total number of responses:  $N = 157$

The majority of respondents agreed that *'It is important to take ethnic diversity into account when developing [their] research and innovation work.'* ( $n = 134$ , 86%)<sup>304</sup>, while some disagreed that *'Ethnic differences are irrelevant in [their] work.'* ( $n = 108$ , 69%)<sup>305</sup>.

Similar portions of respondents disagreed ( $n = 78$ , 49%) and agreed ( $n = 67$ , 42%) that *'The best time to talk to public audiences about [their] research and innovation work is at the very end of the process after all the work has been completed'* <sup>306</sup>. Most agreed they *'feel a professional responsibility to communicate findings from [their] research or innovation work to public audiences'* ( $n = 138$ , 88%)<sup>307</sup>.

Concerning the communication of findings to the public, the majority agreed that *'[their] organisation encourages [them] to communicate findings from [their] research or innovation work to public audiences'* ( $n = 116$ , 77%)<sup>308</sup>. Most also disagreed that *'[their] organisation [...] discourages [them] from communicating the results of my research or innovation work to public audiences'* ( $n = 108$ , 80%)<sup>309</sup>.

Respondents were split on whether *'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals'* as similar proportions agreed ( $n = 65$ , 41%) and disagreed ( $n = 76$ , 48%).

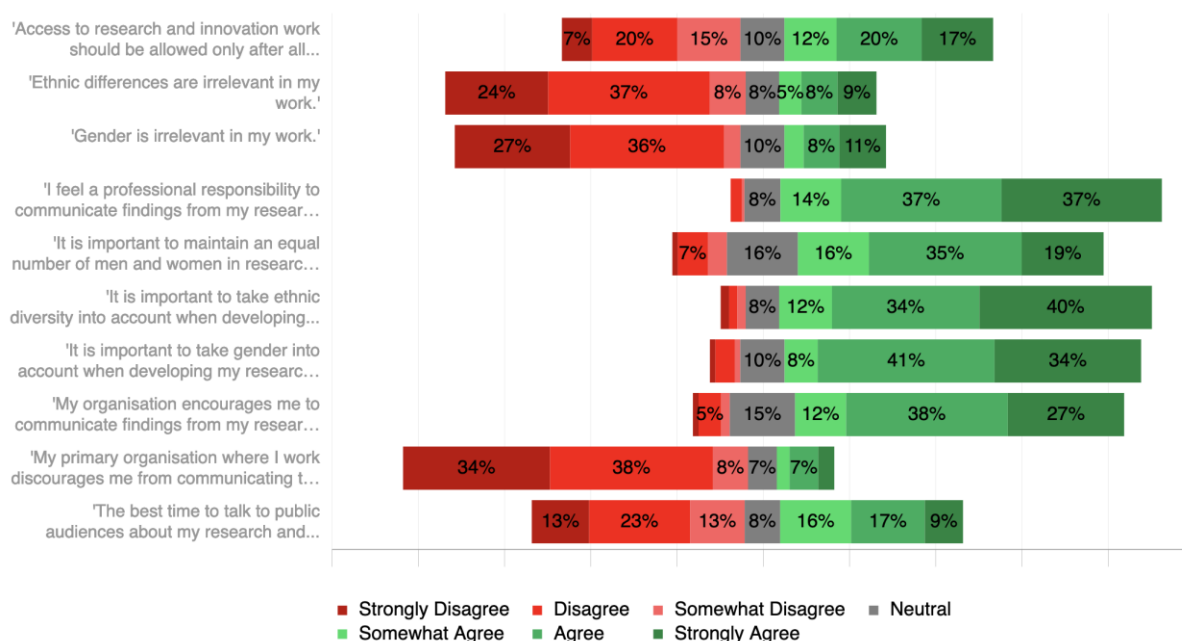


Figure 56: African States - Statements related to working in research and innovation.

<sup>304</sup> The total number of responses:  $N = 155$

<sup>305</sup> The total number of responses:  $N = 155$

<sup>306</sup> The total number of responses:  $N = 158$

<sup>307</sup> The total number of responses:  $N = 156$

<sup>308</sup> The total number of responses:  $N = 152$

<sup>309</sup> The total number of responses:  $N = 135$

### 3.3.3.2 RRI DIMENSION – ANTICIPATIVE AND REFLECTIVE

Overall, there was broad agreement that R&I work should recognise societal concerns. This was noticeable on a moderately high attitudinal level regarding practical action. This resulted in a smaller value-action gap than for other RRI measures.

#### 3.3.3.2.1 Anticipative and Reflective – Societal Concerns

The majority of respondents agreed it was important their work did not cause concerns for society ( $n = 169$ , 85%) (Figure 57)<sup>310</sup>. Almost half of respondents strongly agreed with this statement ( $n = 84$ , 42%). A small but considerable portion ( $n = 19$ , 10%) explicitly disagreed, with a few neutral responses ( $n = 10$ , 5%).

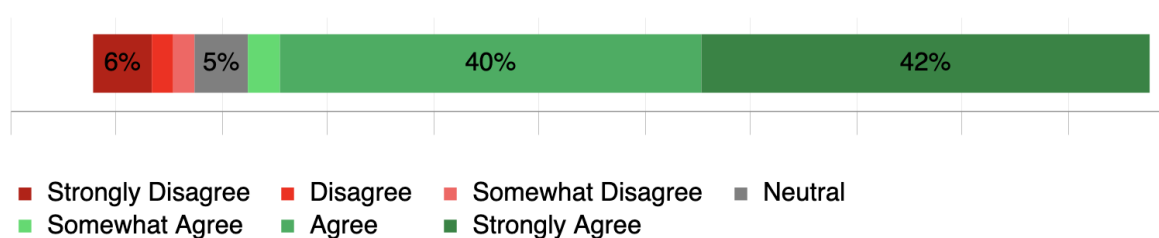


Figure 57: African States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society'.

Most respondents confirmed they had taken steps to ensure their work did not cause concerns for society ( $n = 120$ , 59%) (Figure 58)<sup>311</sup>. This represents 71% of those respondents who indicated a positive attitude towards societal concerns. The next highest categories were almost equally 'Unsure' ( $n = 27$ , 13%) and 'Not applicable / No opinion' ( $n = 28$ , 14%), followed by explicitly negative responses ( $n = 23$ , 11%). This indicates that ensuring R&I work does not cause concerns for society is surrounded by ambiguity, particularly regarding practical steps.

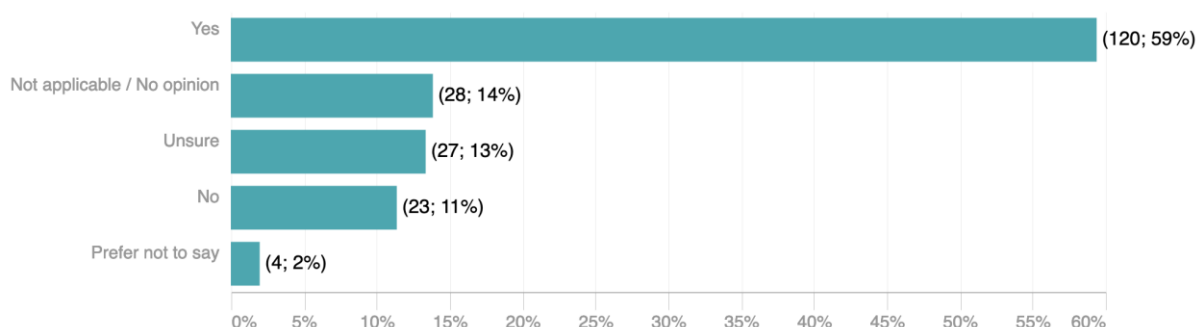


Figure 58: African States - Ensured work does not cause concerns for society in the past 12 months.

<sup>310</sup> The total number of responses:  $N = 198$

<sup>311</sup> The total number of responses:  $N = 202$

### 3.3.3.3 RRI DIMENSION – OPEN AND TRANSPARENT

Overall, there was a level of support towards openness and transparency and public accessibility of results, although the level of accessibility was debated.

#### 3.3.3.3.1 Open and Transparent – Open and Transparent Methods and Processes

The majority of respondents ( $n = 174$ , 90%,) agreed on the importance of ensuring methods and processes were open and transparent (Figure 59)<sup>312</sup>. Almost half of the respondents were in strong agreement ( $n = 89$ , 46%). A small portion disagreed ( $n = 15$ , 8%), with ‘*Strongly disagree*’ being the most frequent category ( $n = 9$ , 5%).

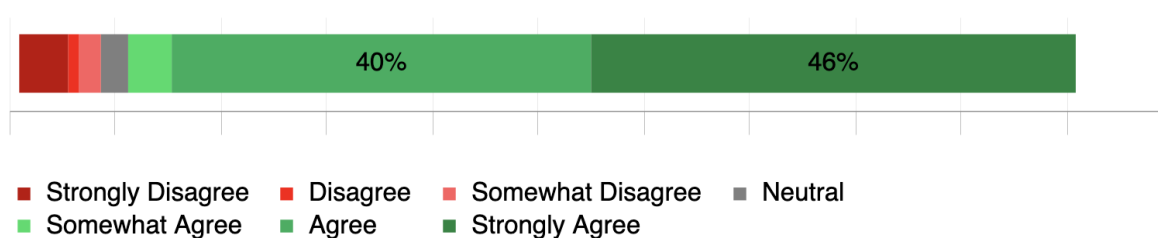


Figure 59: African States - 'It is important to make my research and innovation methods/processes open and transparent'.

The majority of respondents ( $n = 110$ , 54%) reported taking practical steps to ensure R&I methods/processes are open and transparent (Figure 60)<sup>313</sup>. This represents 63% of those respondents who indicated a positive attitude towards openness and transparency. A notable but small portion were ‘*Unsure*’ ( $n = 31$ , 15%), followed by explicitly negative responses ( $n = 29$ , 14%).

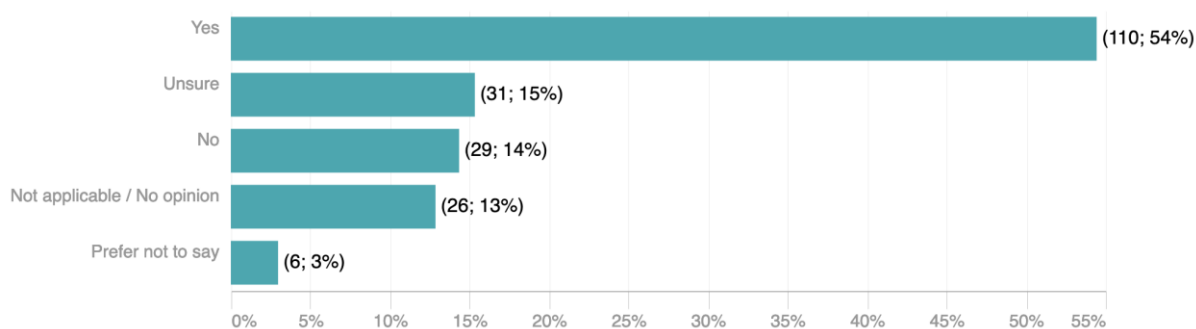


Figure 60: African States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.

<sup>312</sup> The total number of responses:  $N = 194$

<sup>313</sup> The total number of responses:  $N = 202$

### 3.3.3.3.2 Open and Transparent – Public Accessibility

The majority of respondents agreed that wide public accessibility of results was important (Figure 61)<sup>314</sup>. However, while the majority agreed ( $n = 166$ , 86%), overall disagreement was notable ( $n = 21$ , 11%).

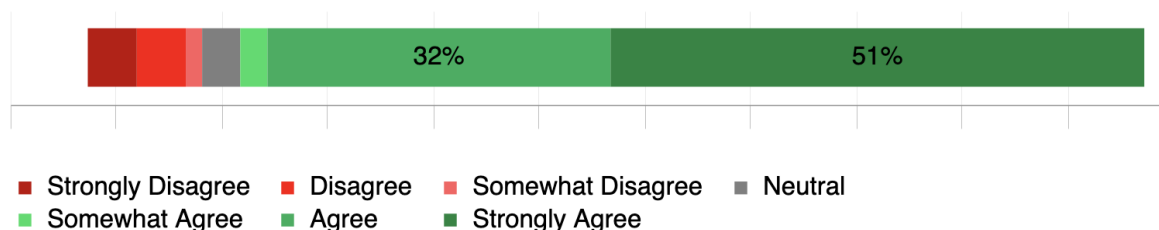


Figure 61: African States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.

More than half of all respondents reported taking practical steps to make their work publicly accessible ( $n = 112$ , 56%). This represents 68% who indicated a positive attitude towards public accessibility (Figure 62)<sup>315</sup>. However, almost a quarter of respondents indicated taking no steps ( $n = 41$ , 21%).

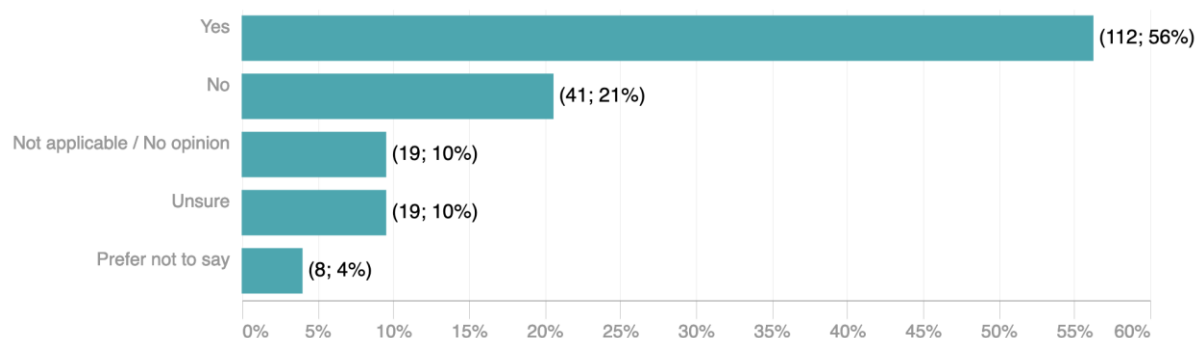


Figure 62: African States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.

### 3.3.3.3.3 Open and Transparent – Open Data

The majority of respondents agreed on the importance of ensuring their research data was freely and publicly available ( $n = 139$ , 73%) (Figure 63)<sup>316</sup>. However, this was the lowest level of general agreement for an RRI measure. Almost a quarter of respondents explicitly disagreed ( $n = 41$ , 22%), indicating this is a prominent point of contention.

<sup>314</sup> The total number of responses:  $N = 194$

<sup>315</sup> The total number of responses:  $N = 199$

<sup>316</sup> The total number of responses:  $N = 189$

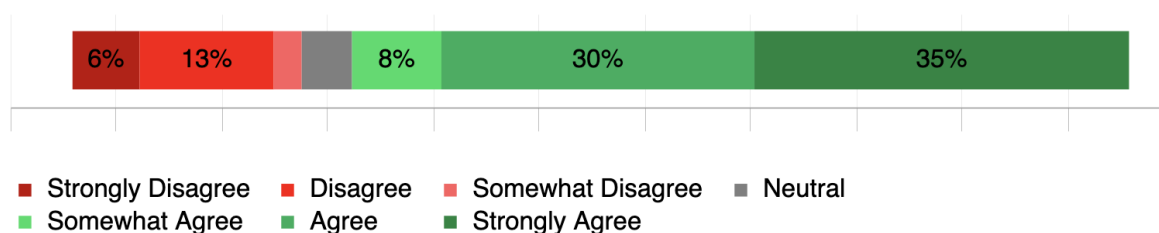


Figure 63: African States - 'It is important to make data from my research and innovation activities freely available to the public'.

There was an almost equal response rate between 'No' ( $n = 75$ , 38%) and 'Yes' ( $n = 72$ , 36%) towards taking practical steps to make data from R&I activities freely available to the public (Figure 64)<sup>317</sup>. This indicates that there are diverging practices and no clear overall trend regarding taking practical steps toward making data freely and publicly available.

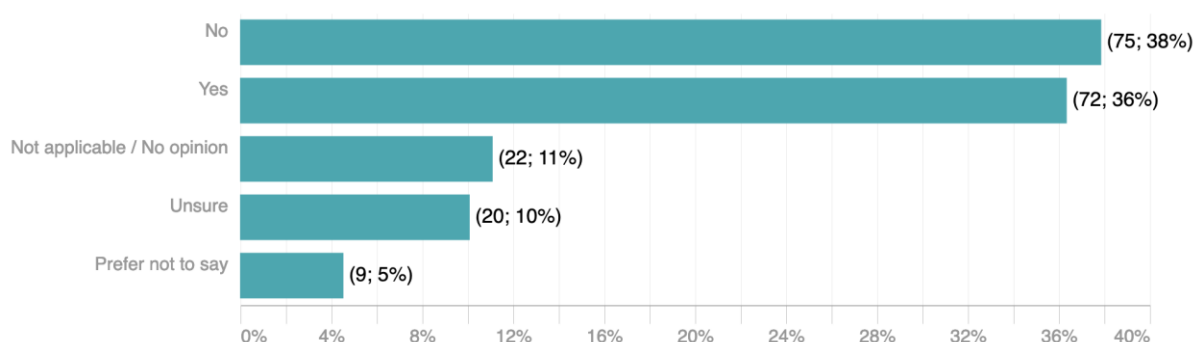


Figure 64: African States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.

### 3.3.3.4 RRI DIMENSION – RESPONSIVE AND ADAPTIVE TO CHANGE

There was broad agreement regarding being responsive to societal needs. This was the case on both an attitudinal and practical level. Importantly, this measure showed the smallest value-action gap compared to the other RRI measures. This indicates that in African states, there are implementable steps within the R&I systems to ensure their work addresses societal needs.

#### 3.3.3.4.1 Responsive and Adaptive to Change – Societal Needs

The overwhelming majority of respondents agreed that it is important to ensure their work addressed societal needs ( $n = 180$ , 92%). Over half of respondents agreed at the strongest level ( $n = 104$ , 53%), few explicitly disagreed ( $n = 10$ , 5%), and even fewer responded neutrally ( $n = 5$ , 3%) (Figure 65)<sup>318</sup>.

<sup>317</sup> The total number of responses:  $N = 198$

<sup>318</sup> The total number of responses:  $N = 195$

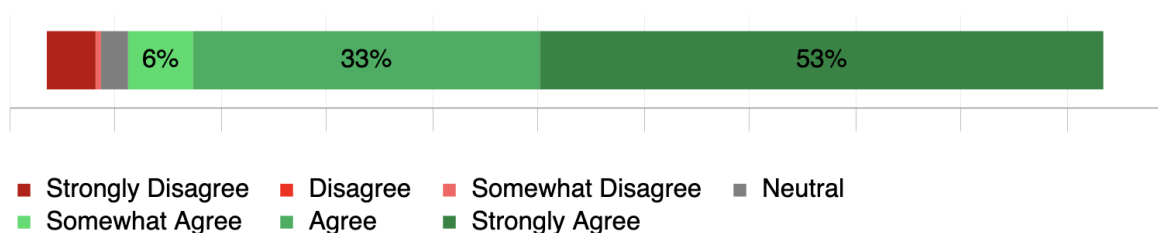


Figure 65: African States - 'Research and innovation should address societal needs'.

This agreement clearly translated into practical action for the majority who confirmed taking practical steps ensuring their work addressed societal needs ( $n = 129$ , 64%) (Figure 66)<sup>319</sup>. This accounted for 72% of respondents who agreed it was important and indicated the smallest value-action gap of all RRI measures. A minority stated they had not taken any steps ( $n = 28$ , 14%), or were 'Unsure' ( $n = 25$ , 12%).

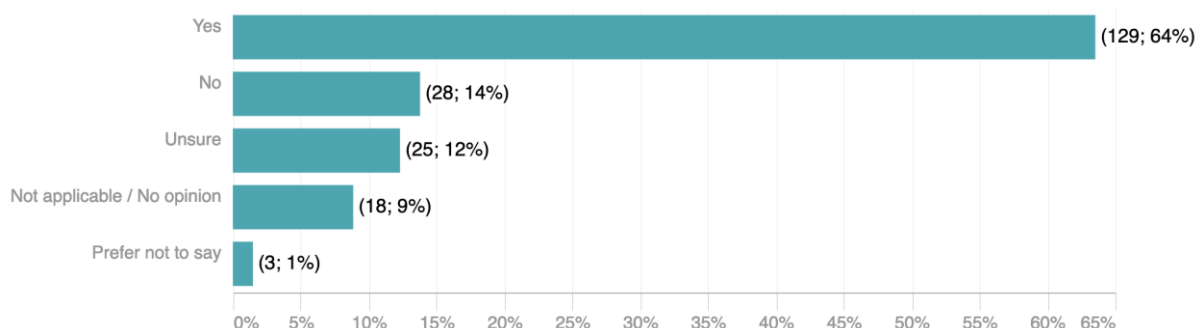


Figure 66: African States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.

### 3.3.3.4.2 Regulatory Frameworks Relevant to Social Responsibility

Most respondents indicated their work was 'Rarely' ( $n = 38$ , 23%) guided by regulatory frameworks covering relevant aspects of social responsibility (Figure 67)<sup>320</sup>. This was followed by 'Usually' ( $n = 25$ , 15%), 'Always' ( $n = 23$ , 14%), 'Sometimes' ( $n = 22$ , 13%), 'Frequently' ( $n = 21$ , 13%), and 'Occasionally' ( $n = 15$ , 9%).

<sup>319</sup> The total number of responses:  $N = 203$

<sup>320</sup> The total number of responses:  $N = 166$

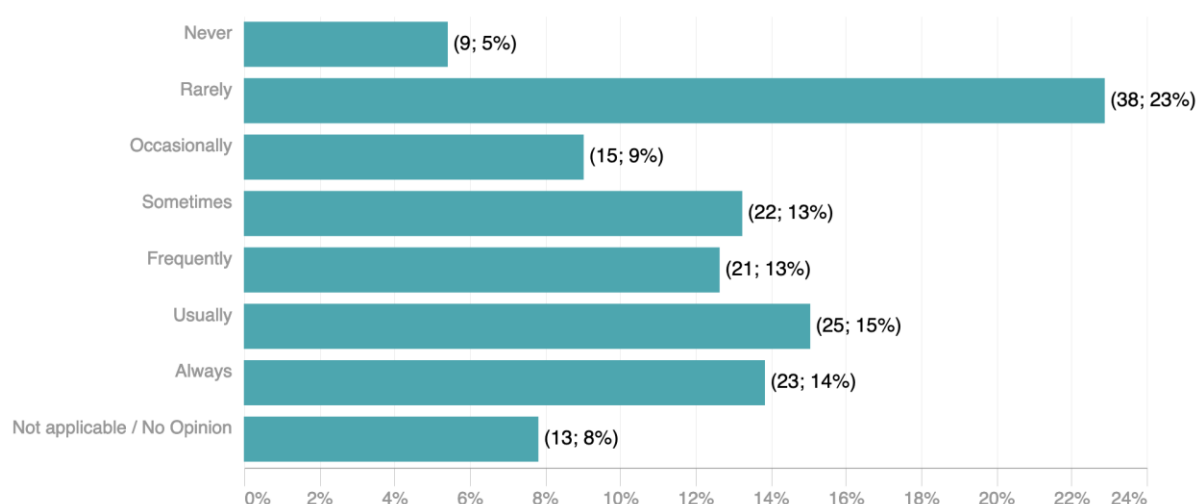


Figure 67: African States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.

### 3.3.3.4.3 Crosscutting Findings

Overall, there were positive attitudes towards all RRI dimensions, although responses to one particular variable turned out to be comparatively negative. Disagreement with the importance of research data being publicly and freely accessible was considerably higher, and the majority of respondents explicitly indicated they had not taken any steps to ensure accessibility. For all other questions regarding application of the attitudinal measures, most participants indicated that steps had been taken.

Within each RRI dimension, there were considerable discrepancies between supportive attitudes and their translation into action. This was most notable for the ‘*diverse and inclusive*’ and ‘*open and transparent*’ dimensions. In contrast, the smallest discrepancy was found for the ‘*responsive and adaptive to change*’ dimension.

## 3.3.4 RESULTS BY STAKEHOLDER CATEGORIES

### 3.3.4.1 STAKEHOLDER CATEGORY 1 – RESEARCH PERFORMING ORGANISATIONS / ACADEMICS / RESEARCHERS

Respondents indicated a substantial level of engagement with this category compared to others ( $Mdn = 5$  h/w) (Figure 68)<sup>321</sup>. This was also the stakeholder type most engaged with for over ten hours in the last seven days ( $n = 51$ , 26%).

<sup>321</sup> The total number of responses:  $N = 149$

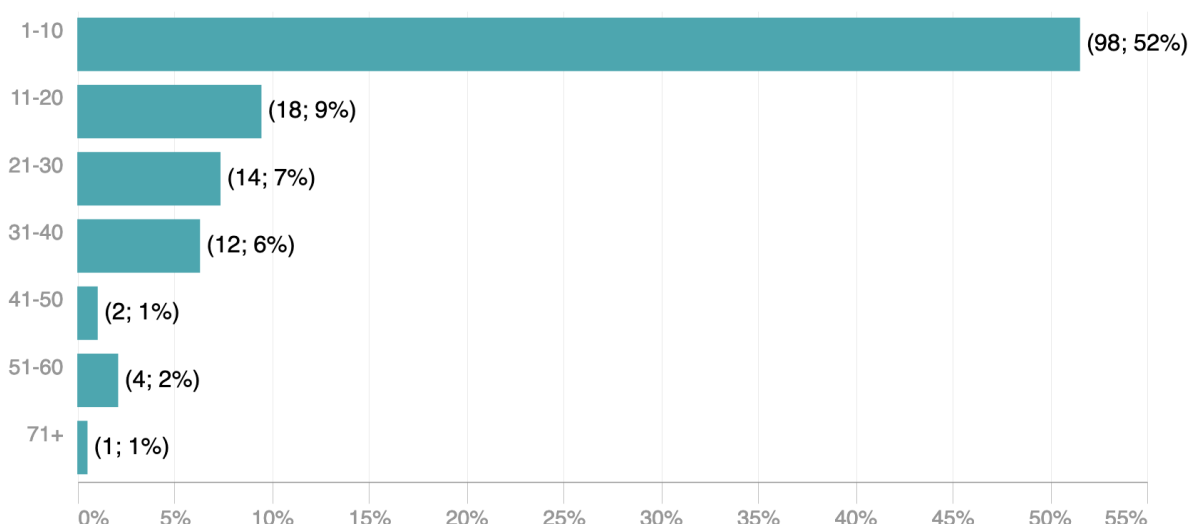


Figure 68: African States - Hours interacting with research performing organisations/academics/researchers in the last 7 days.

### 3.3.4.2 STAKEHOLDER CATEGORY 2 – RESEARCH FUNDING ORGANISATIONS

On average, engagement with RFOs was the lowest among all categories ( $Mdn = 0$  h/w) (Figure 69)<sup>322</sup>. A handful of respondents ( $n = 6$ , 4%) indicated high levels of interaction (i.e., over 40 hours in the last week). This could mean that activities, such as writing proposals for funding applications, did not fall under most respondents' duties. However, RFOs were the stakeholder type with the most '71+ hours' interaction responses ( $n = 3$ , 2%) compared to other stakeholder categories.

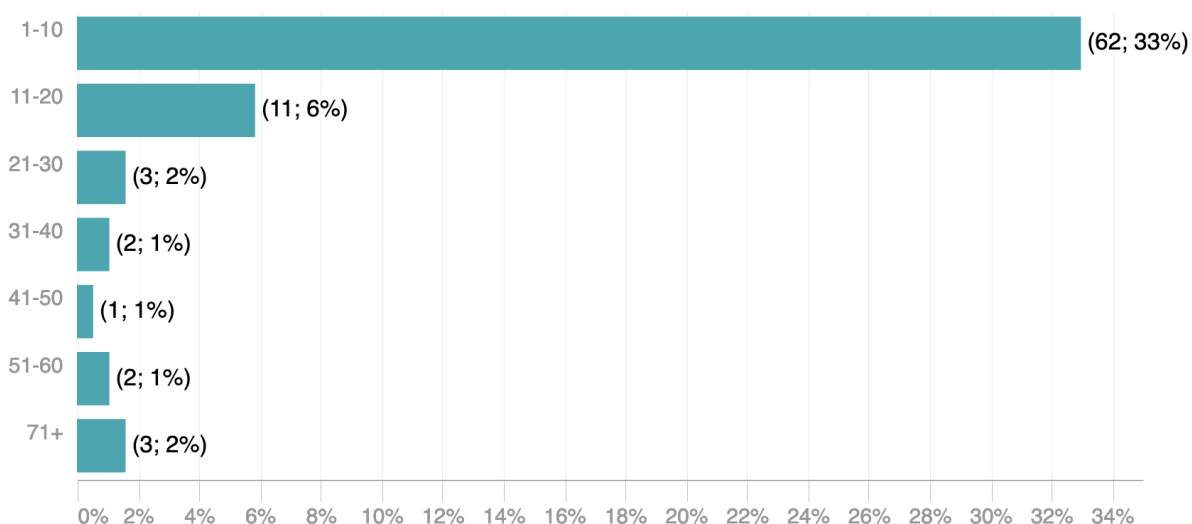


Figure 69: African States - Hours interacting with research funding organisations in the last 7 days.

<sup>322</sup> The total number of responses:  $N = 84$

### 3.3.4.3 STAKEHOLDER CATEGORY 3 – INDUSTRY / SMALL- AND MEDIUM-SIZED ENTERPRISES

Similar to engagement levels with RFOs, respondents tended to spend a small amount of time interacting with this category ( $Mdn = 1$  h/w) (Figure 70)<sup>323</sup>. A few respondents ( $n = 20$ , 10%) indicated a medium to high level of engagement (i.e., between 11 and 40 hours in the last week), and only one respondent ( $n = 1$ , 1%) indicated a high level of interaction (i.e., over 40 hours in the last week).

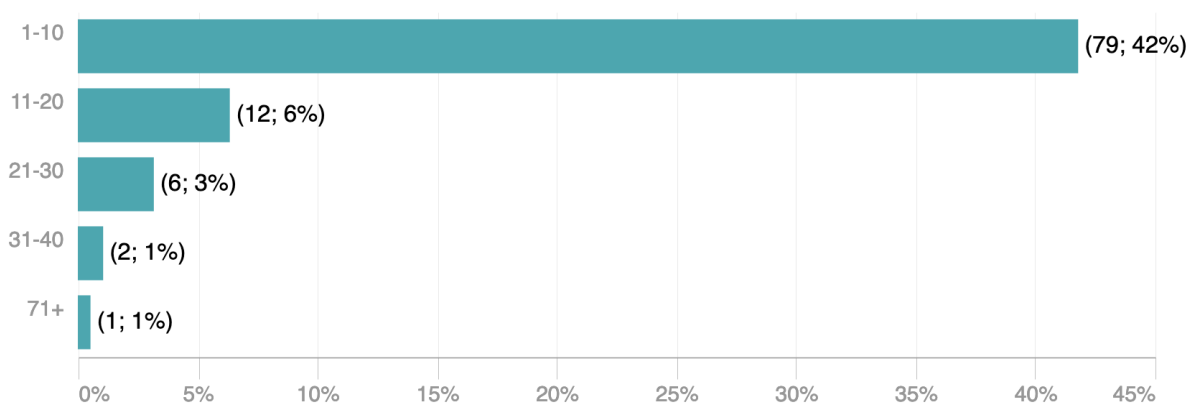


Figure 70: African States - Hours interacting with industry / small and medium-sized enterprises in the last 7 days.

### 3.3.4.4 STAKEHOLDER CATEGORY 4 – CIVIL SOCIETY / CITIZENS

There was a high level of engagement with this category and the second highest level relative to other categories (Figure 71)<sup>324</sup>. Most respondents ( $n = 112$ , 60%) spent little time engaging with this category ( $Mdn = 2$  h/w). A notable proportion indicated medium to high levels of interaction time (i.e., between 11 and 40 hours in the last week) ( $n = 29$ , 15%). Many respondents indicated engaging for less than ten hours in the last week ( $n = 78$ , 41%).

<sup>323</sup> The total number of responses.  $N = 100$

<sup>324</sup> The total number of responses:  $N = 112$

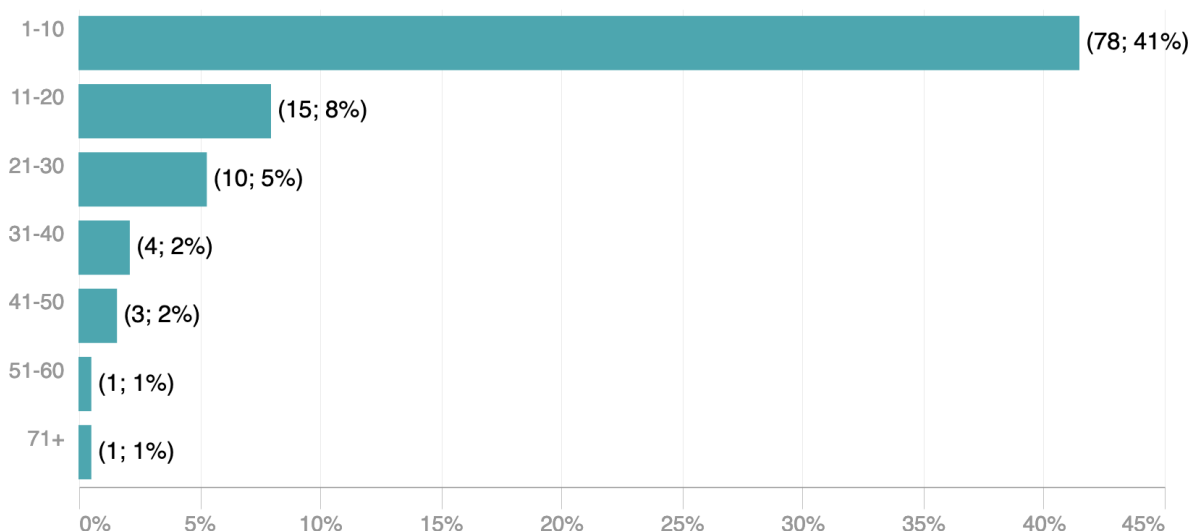


Figure 71: African States - Hours interacting with civil society/citizens in the last 7 days.

### 3.3.4.5 STAKEHOLDER CATEGORY 5 – POLICY MAKERS

Policy makers was the stakeholder category which respondents tended to engage with the least ( $Mdn = 1$  h/w) (Figure 72)<sup>325</sup>. When there was time spent, many respondents ( $n = 81$ , 43%) indicated the least amount of time (i.e., between 1 and 10 hours in the last week). Few respondents had medium to high levels of engagement (i.e., between 11 and 40 in the last week) ( $n = 16$ , 9%) and none spent more than 50 hours interacting with policy makers.

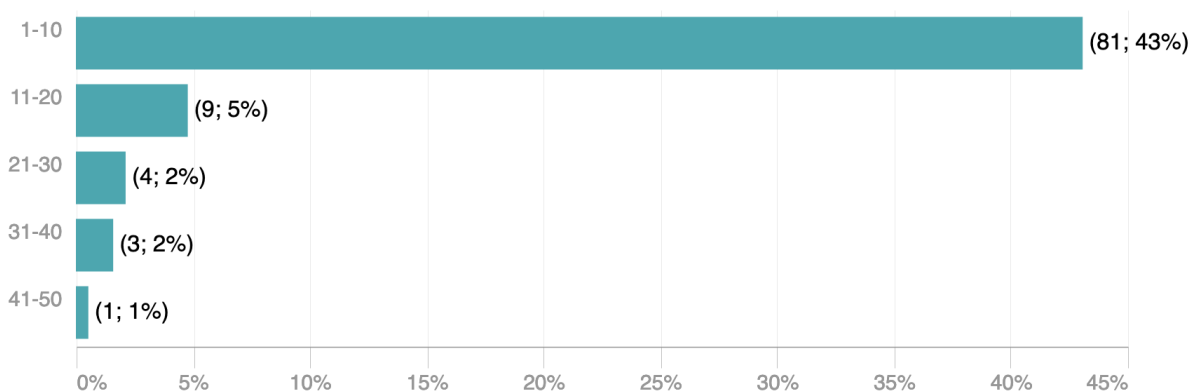


Figure 72: African States - Hours interacting with policy makers in the last 7 days.

<sup>325</sup> The total number of responses.  $N = 98$

### 3.3.4.6 STAKEHOLDER CATEGORY 6 – NON-GOVERNMENTAL ORGANISATIONS

Engagement with this category tended to be low ( $Mdn = 1$  h/w) (Figure 73)<sup>326</sup>. The results somewhat mirror those of the SME category. Few respondents ( $n = 20$ , 10%) indicated a medium level of engagement (i.e., between 11 and 40 hours in the last week), and notably less ( $n = 2$ , 2%) indicated a high level (i.e., over 40 hours in the last week). This indicates there are similar levels of interaction with NGOs and SMEs categories.

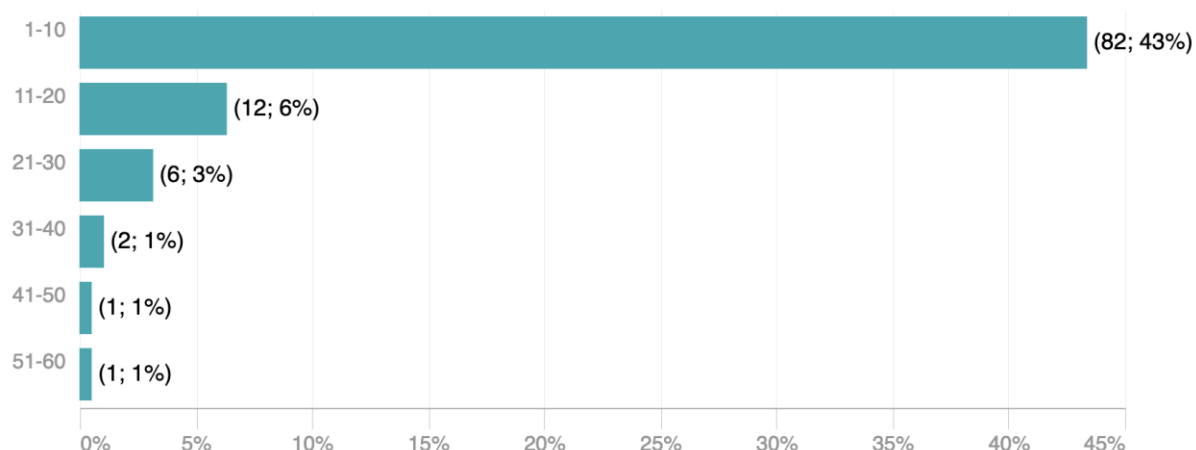


Figure 73: African States - Hours interacting with NGOs/international organisations in the last 7 days.

### 3.3.4.7 OVERVIEW AND COMPARISON OF FINDINGS ACROSS STAKEHOLDER CATEGORIES

Participants engaged disproportionately more frequently with *RPOs*, *academics* and *researchers* ( $Mdn = 5$  h/w) (Figure 74)<sup>327</sup>. Engagement with all other categories was low, as the median weekly interaction hours was close to zero. Across all categories respondents interacted most often with members of civil society ( $Mdn = 2$  h/w).

<sup>326</sup> The total number of responses:  $N = 103$

<sup>327</sup> The total number of responses:  $N = 190$

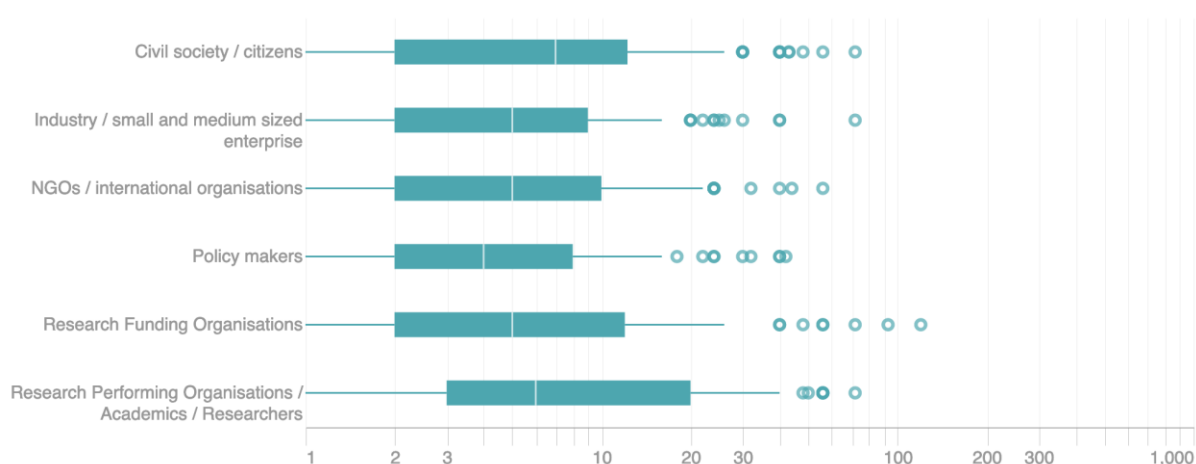


Figure 74: African States - Hours interacting with different stakeholders in the last 7 days (log scale).

### 3.3.5 RESULTS SPECIFIC TO THE UN SUSTAINABLE DEVELOPMENT GOALS

This section explores respondents' level of exposure, attitudes towards, and detailed perspectives about the UN SDGs.

The majority of respondents indicated they are familiar with the SDGs ( $n = 163$ , 86%) (Figure 75)<sup>328</sup>. Respondents expressed being '*Moderately Familiar*' ( $n = 59$ , 31%), while there was less self-reported slight familiarity ( $n = 49$ , 26%). Fewer respondents indicated being '*Extremely Familiar*' ( $n = 32$ , 17%), '*Not at all Familiar*' ( $n = 26$ , 14%), and '*Somewhat Familiar*' ( $n = 23$ , 12%).

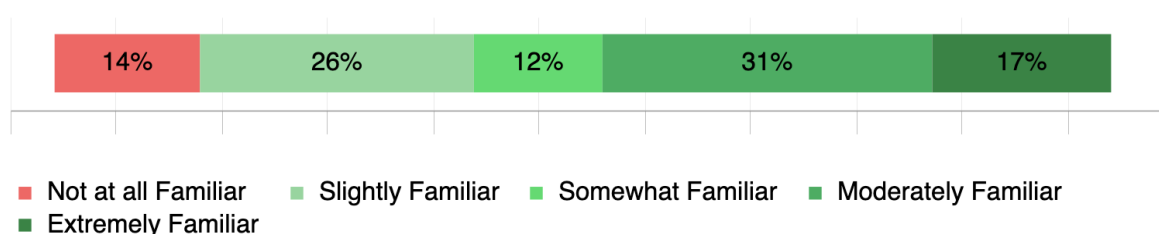


Figure 75: African States - Participants' familiarity with the UN SDGs.

The majority of respondents ( $n = 132$ , 81%) heard or read about the SDGs in the last month (Figure 76)<sup>329</sup>. Among the frequencies, '*2-3 times*' ( $n = 40$ , 25%) represented the largest group, followed by '*Once*' ( $n = 33$ , 20%), '*Not at all*' ( $n = 25$ , 15%), '*Once per week*' ( $n = 23$ , 14%), '*Daily*' ( $n = 17$ , 10%), '*2-3 times a week*' ( $n = 16$ , 10%), '*Unsure*' ( $n = 6$ , 4%), and '*4-6 times per week*' ( $n = 3$ , 2%).

<sup>328</sup> The total number of responses:  $N = 189$

<sup>329</sup> The total number of responses:  $N = 163$

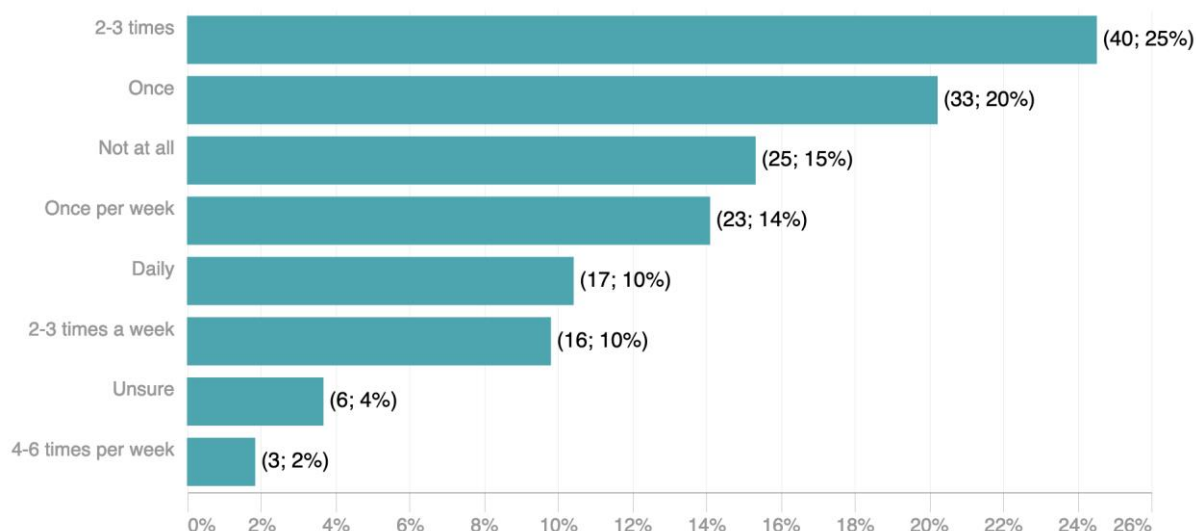


Figure 76: African States - Heard or read about the UN Sustainable Development Goals in the last 30 days.

The majority of respondents ( $n = 130$ , 78%) thought about the SDGs in the last month (Figure 77)<sup>330</sup>. Among the frequencies, 'Once' ( $n = 37$ , 23%) represented the largest group, followed by 'Not at all' ( $n = 28$ , 17%), '2-3 times' ( $n = 27$ , 17%), 'Daily' ( $n = 26$ , 16%), '2-3 times a week' ( $n = 19$ , 12%), 'Once per week' ( $n = 15$ , 9%), '4-6 times per week' ( $n = 6$ , 4%), and 'Unsure' ( $n = 5$ , 3%).

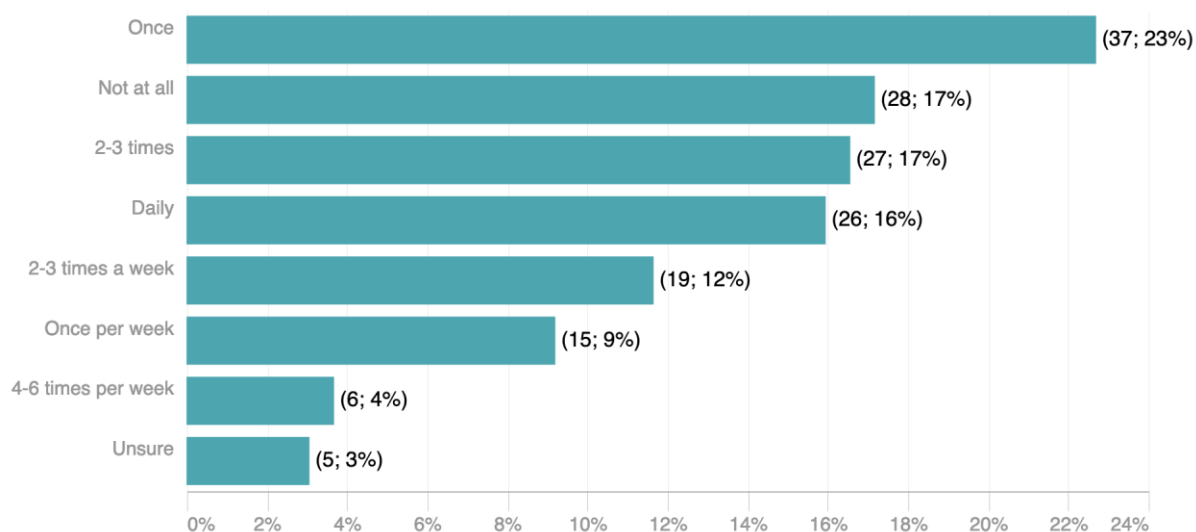


Figure 77: African States - Thought about the UN Sustainable Development Goals in the last 30 days.

Respondents held mostly positive attitudes about the UN SDGs (Figure 78). Respondents most frequently perceived them as 'Beneficial' ( $n = 151$ , 93%)<sup>331</sup>, 'Valuable' ( $n = 150$ , 92%)<sup>332</sup>,

<sup>330</sup> The total number of responses:  $N = 163$

<sup>331</sup> The total number of responses:  $N = 161$

<sup>332</sup> The total number of responses:  $N = 161$

‘Relevant’ ( $n = 148$ , 92%)<sup>333</sup>, ‘Important’ ( $n = 148$ , 90%)<sup>334</sup>, ‘Useful’ ( $n = 139$ , 86%)<sup>335</sup>, ‘Essential’ ( $n = 144$ , 89%)<sup>336</sup>. However, some respondents perceived UN SDGs as ‘Useless’ ( $n = 13$ , 8%), ‘Unnecessary’ ( $n = 11$ , 7%), and ‘Unimportant’ ( $n = 11$ , 7%).

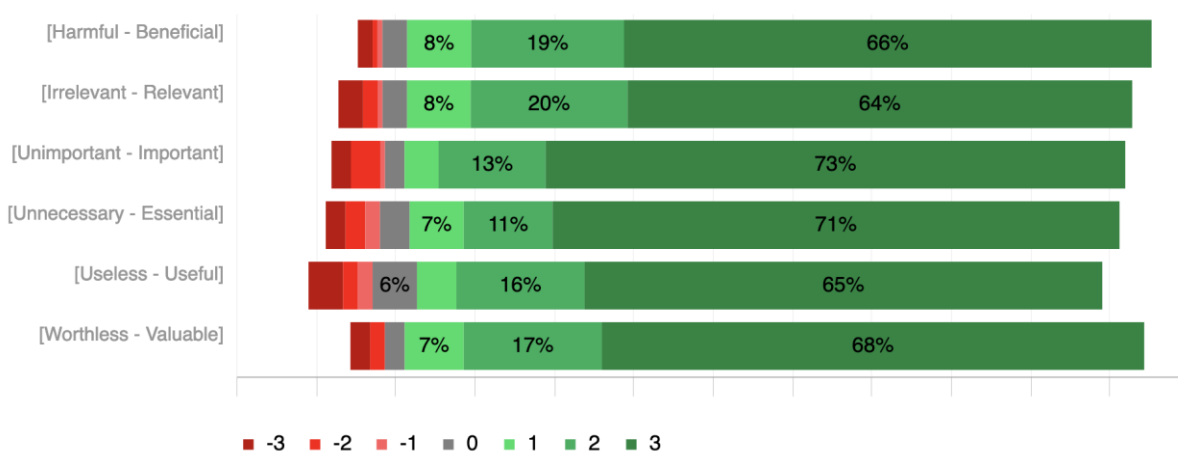


Figure 78: African States - Semantic differentials on thoughts about the UN Sustainable Development Goals.

Similarly, respondents held mostly positive attitudes about the UN SDGs related to their work (Figure 79). Respondents most frequently perceived the UN SDGs as ‘Important’ ( $n = 153$ , 95%)<sup>337</sup>, ‘Beneficial’ ( $n = 151$ , 94%)<sup>338</sup>, ‘Essential’ ( $n = 150$ , 92%)<sup>339</sup>, ‘Valuable’ ( $n = 147$ , 91%)<sup>340</sup>, ‘Useful’ ( $n = 148$ , 91%)<sup>341</sup>, and ‘Relevant’ ( $n = 141$ , 87%)<sup>342</sup>. However, some respondents perceived the UN SDGs as ‘Irrelevant’ ( $n = 13$ , 8%).

<sup>333</sup> The total number of responses:  $N = 162$

<sup>334</sup> The total number of responses:  $N = 163$

<sup>335</sup> The total number of responses:  $N = 161$

<sup>336</sup> The total number of responses:  $N = 161$

<sup>337</sup> The total number of responses:  $N = 162$

<sup>338</sup> The total number of responses:  $N = 161$

<sup>339</sup> The total number of responses:  $N = 162$

<sup>340</sup> The total number of responses:  $N = 162$

<sup>341</sup> The total number of responses:  $N = 162$

<sup>342</sup> The total number of responses:  $N = 162$

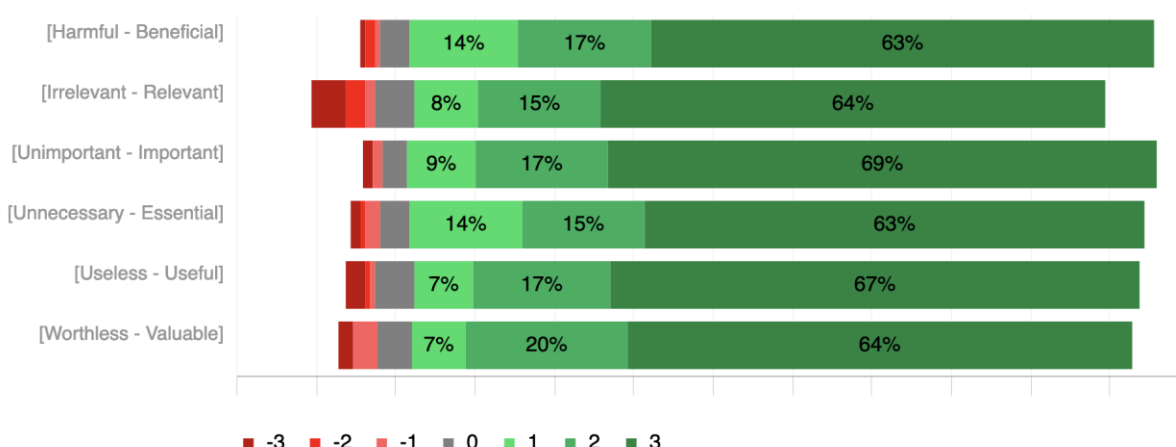


Figure 79: African States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

Most respondents held positive perceptions on the UN SDGs (Figure 80). Most agreed with the statement ‘*The UN Sustainable Development Goals should be a priority for my professional field.*’ ( $n = 125, 77\%$ )<sup>343</sup>, followed by ‘*The UN Sustainable Development Goals are a priority for me.*’ ( $n = 117, 73\%$ )<sup>344</sup>. Results were varied, but still positive, for ‘*I follow stories in the news about the UN Sustainable Development Goals.*’ ( $n = 101, 64\%$ )<sup>345</sup> and ‘*The UN Sustainable Development Goals represent legally binding international treaties to protect the environment.*’ ( $n = 101, 63\%$ )<sup>346</sup>, although they are not actually legally binding. A large portion disagreed with the statement ‘*The UN Sustainable Development Goals are focussed only on long-term financial development.*’ ( $n = 58, 37\%$ )<sup>347</sup>.

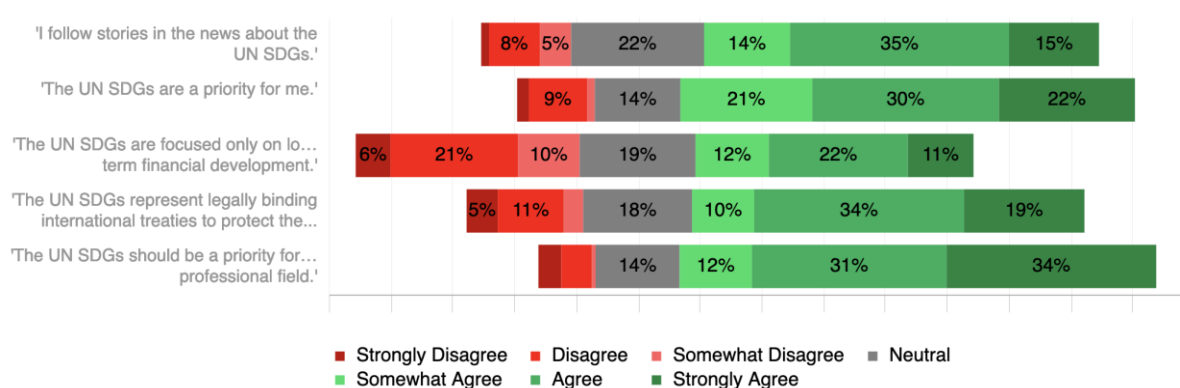


Figure 80: African States - Detailed perspective on UN SDGs.

<sup>343</sup> The total number of responses:  $N = 162$

<sup>344</sup> The total number of responses:  $N = 159$

<sup>345</sup> The total number of responses:  $N = 158$

<sup>346</sup> The total number of responses:  $N = 159$

<sup>347</sup> The total number of responses:  $N = 160$

### 3.3.6 OPEN-ENDED CONTENT ANALYSIS RESULTS

This section sets out results of the content analysis conducted on the qualitative data obtained through the RRING Research and Innovation Global Survey.

#### 3.3.6.1 DIVERSE PERSPECTIVES

This section explores the range of responses given to the question *‘Please list the steps you have taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning your research and innovation work.’*

A moderate portion of respondents indicated they had reached out to diverse stakeholders ( $n = 27$ , 35%), with more indicating this engagement in a *‘general’* way ( $n = 20$ , 26%). Only a few respondents specified the steps they had actually taken ( $n = 8$ , 10%) (Figure 81)<sup>348</sup>. Respondents referred to engaging policy bodies and policy makers ( $n = 10$ , 13%), and industry and businesses ( $n = 8$ , 10%) most commonly. Civil society organisations (CSOs) were mentioned less often ( $n = 3$ , 4%). This category included entities separated either from the state or the market that have a declared social mandate, such as NGOs.

A large proportion of respondents indicated involvement in *‘Meetings, workshops, focus groups and ‘Consultations’* ( $n = 28$ , 36%). Another notable proportion indicated contributing *‘In-reach to other disciplines, researchers, academics, experts or students’* ( $n = 20$ , 26%), which meant respondents included diverse perspectives from within their academic or professional environment.

Smaller proportions of respondents indicated taking *‘Steps for building collaboration/teams/consortia with no connection to diversity per se’* ( $n = 8$ , 10%), or referred to *‘General dissemination/broadcasting/dissemination of information about the research/innovation work’* ( $n = 3$ , 4%). This category was assigned when respondents indicated one-way dissemination, rather than including external views.

A notable proportion ( $n = 18$ , 23%) responded with *‘Non-specific, vague, platitude or virtue signalling response’*.

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<sup>348</sup> The total number of responses:  $N = 168$

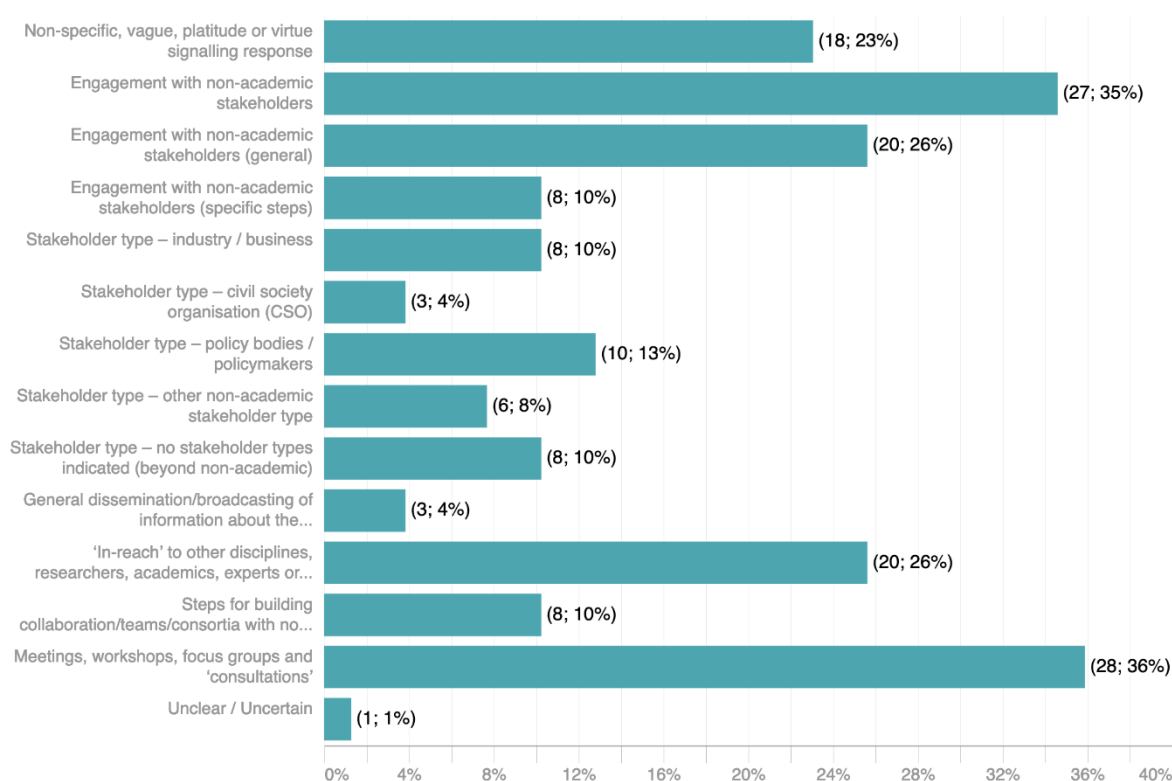


Figure 81: African States - Steps taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning research and innovation work.

### 3.3.6.2 GENDER EQUALITY

This section explored the range of responses given to the question *'Please list the steps you have taken to promote gender equality in your research and innovation work.'*

A majority of respondents ( $n = 66$ , 75%) indicated they had promoted gender equality. More respondents referred to taking *'specific steps'* ( $n = 39$ , 44%), over a smaller proportion promoting gender equality in a *'general'* way ( $n = 27$ , 31%) (Figure 82)<sup>349</sup>.

The most common steps were *'Fostering gender equality in research/innovation teams/workforce'* ( $n = 12$ , 14%), *'Ensuring gender equality in process of recruitment and selection of R&I staff'* ( $n = 11$ , 12%), and *'Promotion/mentorship of female researchers'* ( $n = 10$ , 11%). Few respondents ( $n = 2$ , 2% each) indicated *'Promoting gender equality through delivering or attending training'*, or *'Supporting female researchers' publications, co-authorship, academic citations'*. Almost none of the respondents ( $n = 1$ , 1%) mentioned *'Participation in or engagement with equality committees'*. Many respondents indicated steps that could not be easily categorised ( $n = 21$ , 24%).

<sup>349</sup> The total number of responses:  $N = 239$

A considerable proportion of respondents gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 22$ , 25%). This indicated they had promoted or supported gender equality without mentioning the steps they had taken.

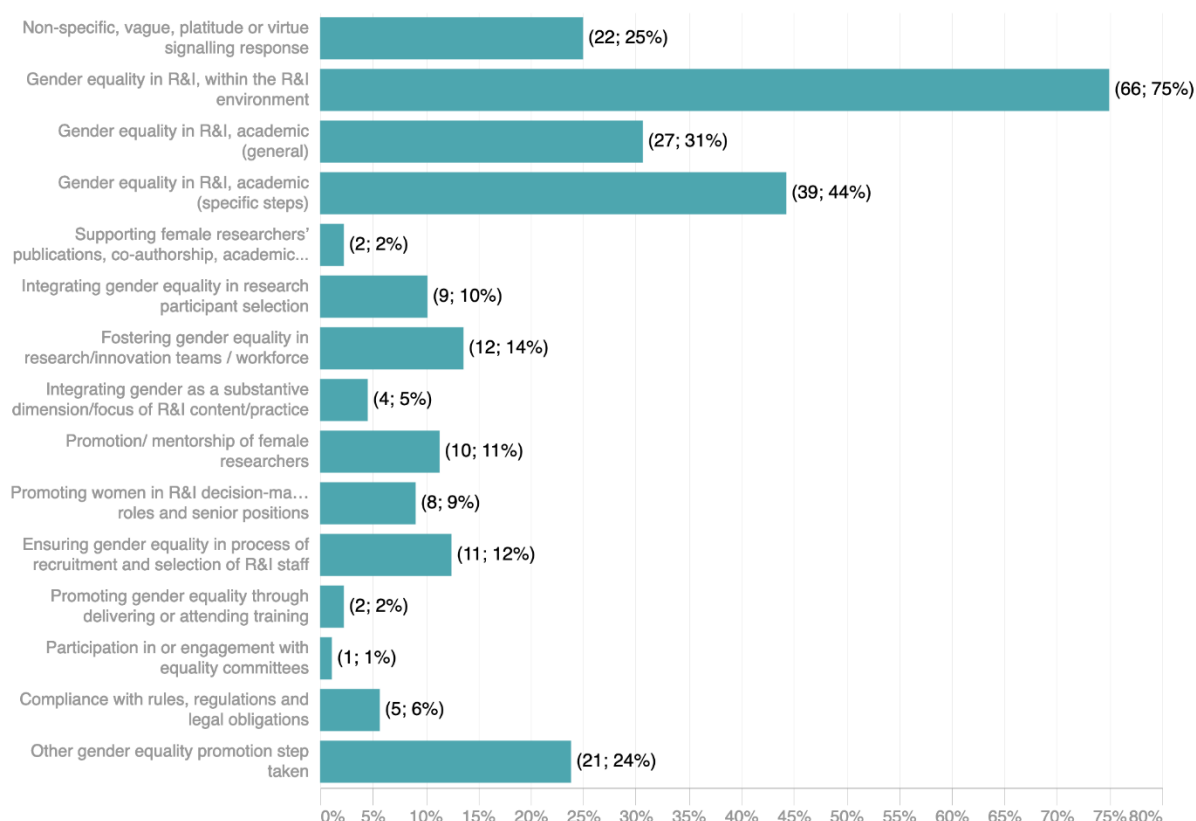


Figure 82: African States - Steps taken to promote gender equality in research and innovation work.

### 3.3.6.3 ETHNIC MINORITIES

This section explored the range of responses given to the question ‘*Please list the steps you have taken to include ethnic minorities in your research and innovation work.*’.

The majority of respondents ( $n = 40$ , 82%) indicated they had promoted diversity of ethnic minorities, with more indicating ‘*general*’ views ( $n = 24$ , 49%), over ‘*specific steps*’ ( $n = 16$ , 33%) (Figure 83)<sup>350</sup>. The most common steps were ‘*Promotion/mentorship of ethnic minority researchers/innovators*’ ( $n = 9$ , 18%), ‘*Integrating racial/ethnic equality in research participant selection*’ ( $n = 7$ , 14%), ‘*Fostering racial/ethnic equality in research/innovation teams/workforce*’ ( $n = 6$ , 12%), and ‘*Integrating race/ethnicity as a substantive dimension/focus of R&I content/practice*’ ( $n = 5$ , 10%). A notable proportion indicated ‘*Other racial/ethnic equality promotion step[s] taken*’ ( $n = 12$ , 24%), while few indicated ‘*Downplaying, minimising and excusing ethnic diversity issues in R&I*’ ( $n = 1$ , 2%).

<sup>350</sup> The total number of responses:  $N = 136$

A minority ( $n = 8$ , 16%) provided ‘*Non-specific, vague, platitude or virtue signalling response[s]*’, indicating they generally supported equality of ethnic minorities without listing practical steps.

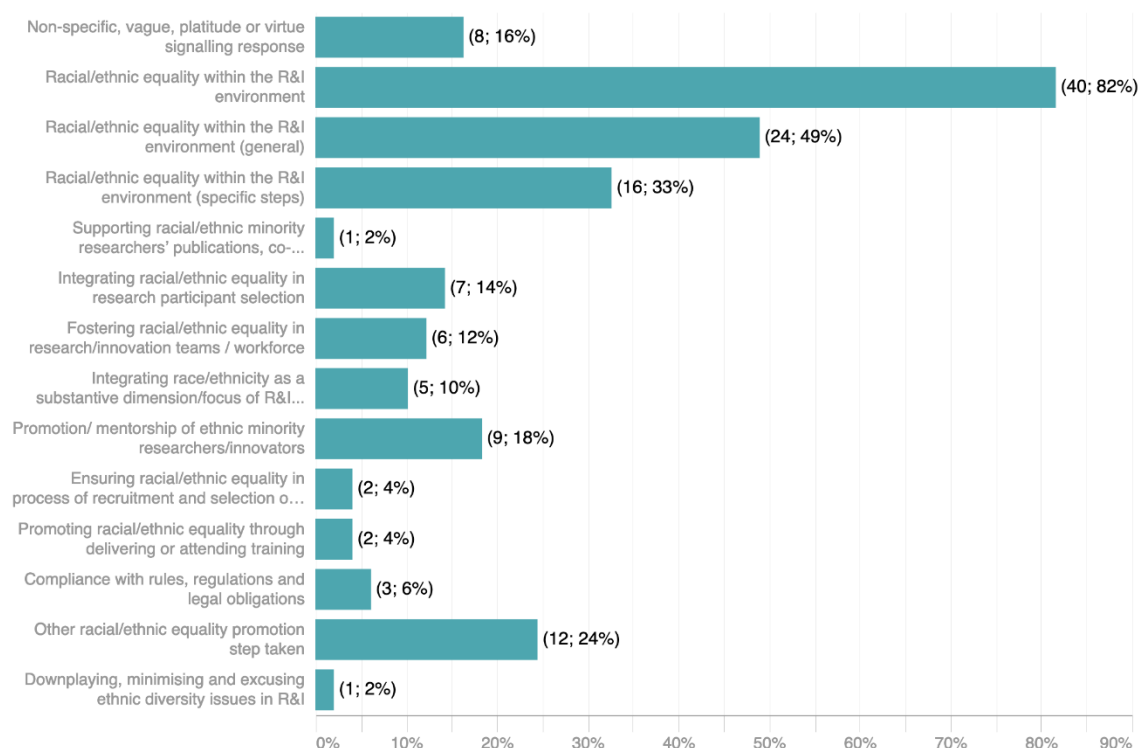


Figure 83: African States - Steps taken to include ethnic minorities in research and innovation work.

### 3.3.6.4 ETHICS OF RESEARCH

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to ensure ethical principles guide your research and innovation work?*’.

Many respondents ( $n = 65$ , 71%) indicated they ‘*Integrat[ed] ethics in [their] R&I work*’, although most provided ‘*general*’ responses ( $n = 42$ , 46%) rather than ‘*specific steps*’ ( $n = 23$ , 25%) (Figure 84)<sup>351</sup>.

The most common ways respondents ensured ethical working practices were through ‘*Participation in or engagement with ethics committees*’ ( $n = 15$ , 16%) and ‘*Compliance with rules, regulations, and legal obligations*’ ( $n = 15$ , 16%). This indicated respondents either contributed to or sought advice from ethical committees, while complying with internal rules and legal obligations. Other steps focussed on the treatment of research participants, such as ‘*Ensuring informed consent with participants*’ ( $n = 13$ , 14%), and ‘*Ensuring participant anonymisation or confidentiality*’ ( $n = 11$ , 12%). The least common steps were ‘*Ensuring open*

<sup>351</sup> The total number of responses:  $N = 240$

access to research methods and outputs’, ‘Ensuring that R&I outputs are used to deliver positive societal impact’, and ‘Reporting of unethical conduct’ ( $n = 1$ , 1% for all).

A considerable proportion of respondents ( $n = 27$ , 29%) indicated a commitment to ethical principles but did not mention any steps, providing a ‘Non-specific, vague, platitude or virtue signalling response’.

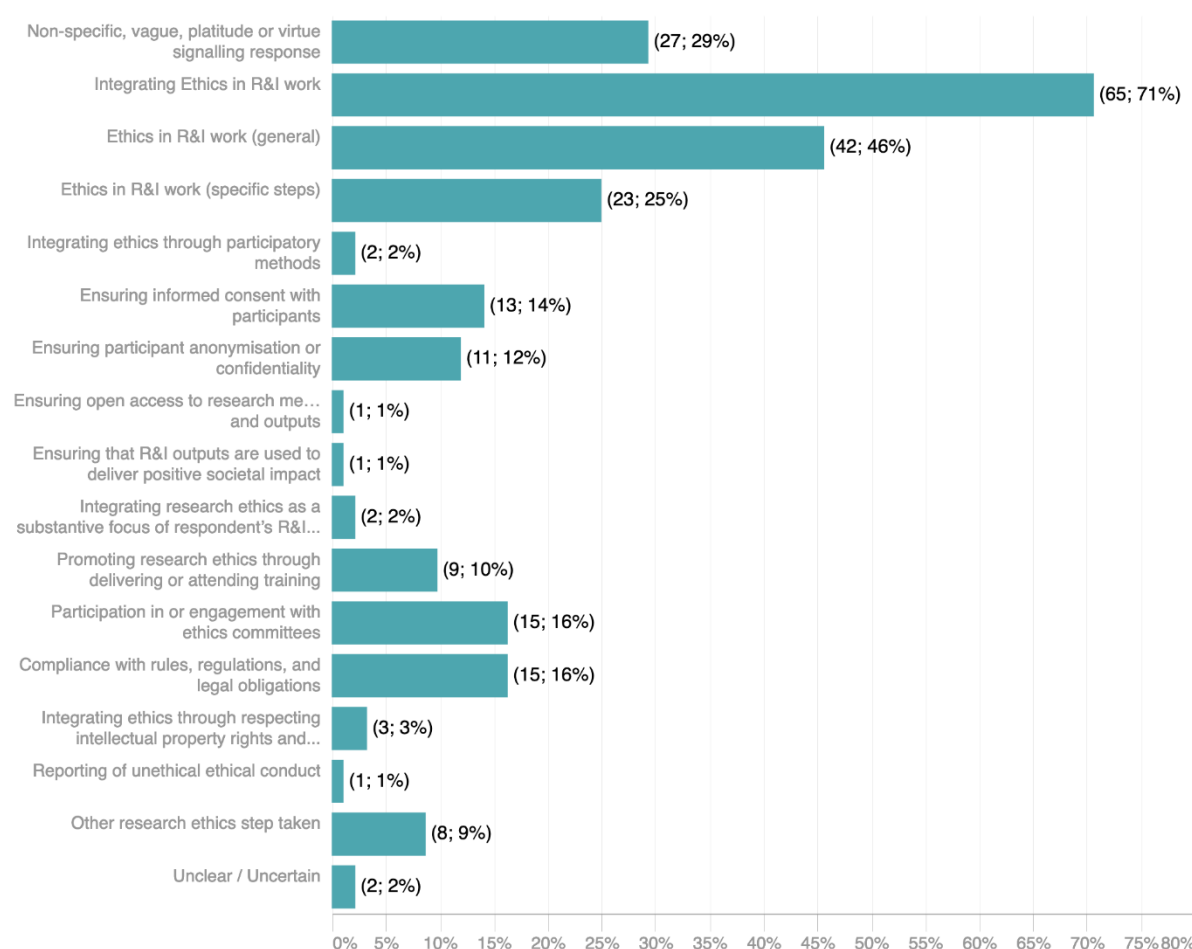


Figure 84: African States - Steps taken to ensure that ethical principles guide research and innovation work.

### 3.3.6.5 TRANSPARENCY

This section explored the range of responses given to the question ‘What steps have you taken to ensure your research and innovation methods/processes are open and transparent?’.

Many respondents indicated they carried out ‘One way dissemination with no reference to research methods/processes’ ( $n = 38$ , 43%) without specifying how they ensured transparency (Figure 85)<sup>352</sup>. A similar portion of respondents ( $n = 46$ , 52%) indicated having taken ‘Pathways to open and transparent R&I methods and outputs’. Fewer respondents provided

<sup>352</sup> The total number of responses:  $N = 205$

‘general’ steps ( $n = 22$ , 25%), in comparison with those who indicated having taken ‘specific steps’ ( $n = 24$ , 27%).

In terms of practical steps, most ‘*Document[ed]/report[ed] research and decision-making processes*’ ( $n = 17$ , 19%) in at least a semi-public form that allowed for scrutiny of methods and decision-making. Another common step was ‘*Seeking upstream feedback on research ideas/plans from non-academics/non-researchers*’ ( $n = 13$ , 15%), which ensured their research was informed by non-academic stakeholders. Few respondents specified having used ‘*Open access publication[s]*’ ( $n = 9$ , 10%), while ‘*Participation in or engagement with relevant committees*’ ( $n = 2$ , 2%) was the least frequently taken step.

Only a few respondents provided answers coded as a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 10$ , 11%).

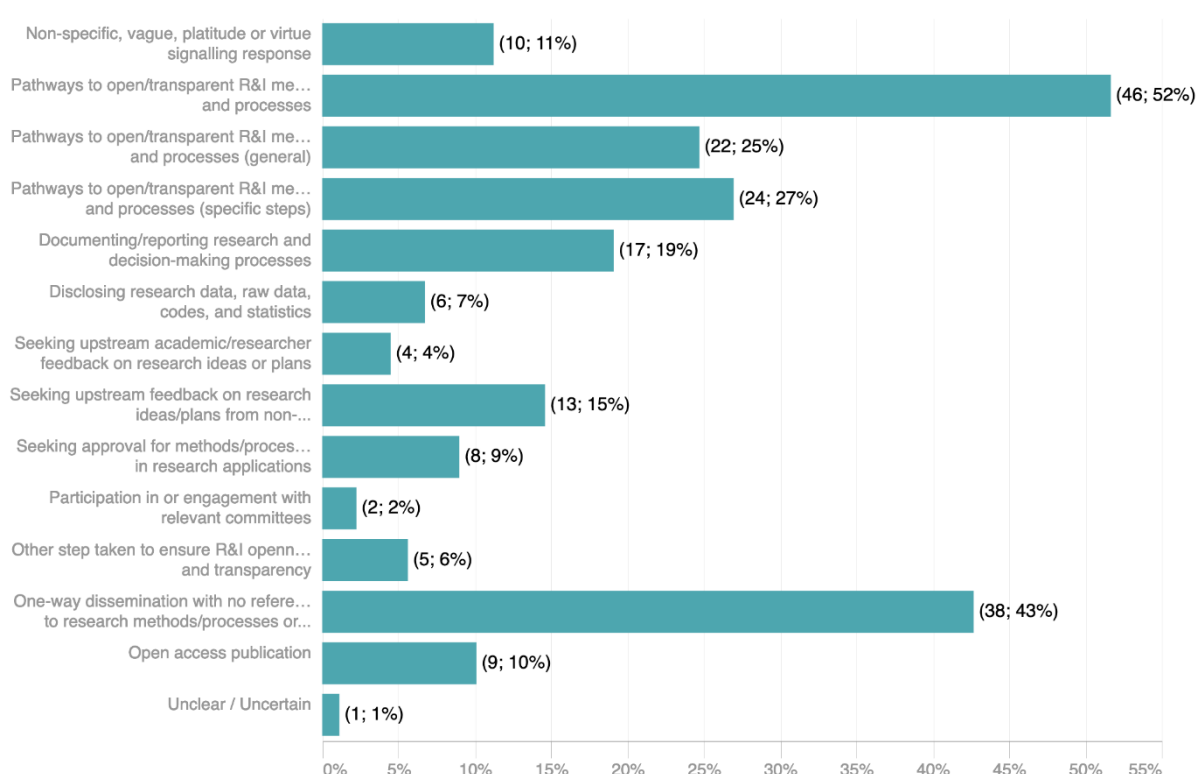


Figure 85: African States - Steps taken to ensure research and innovation methods/processes are open and transparent.

### 3.3.6.6 PUBLIC ACCESSIBILITY

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to make the results of your research and innovation work accessible to as wide a public as possible?*’.

A considerable proportion of respondents described steps on ‘*Sharing R&I work within professional R&I stakeholder environments*’ ( $n = 52$ , 52%). This indicated they had not made their research results available to the general, non-academic public (Figure 86)<sup>353</sup>.

However, most respondents ( $n = 59$ , 59%) indicated they had shared their findings with the public. More respondents ( $n = 54$ , 54%) reported taking ‘*specific steps*’ towards public accessibility of R&I results, compared to only a small proportion who referred to a ‘*general*’ compliance ( $n = 5$ , 5%).

The most common steps were ‘*Promoting R&I results in the media*’ ( $n = 20$ , 8%), and ‘*Engaging with non-academic/public stakeholders through outreach activities after research is completed*’ ( $n = 17$ , 17%). This was followed by ‘*Personally publishing/disseminating R&I outputs to the public outside of scholarly publishing*’ ( $n = 13$ , 13%). The least common steps were ‘*Efforts to facilitate public understanding of R&I results*’ ( $n = 2$ , 2%) and ‘*Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research*’ ( $n = 2$ , 2%).

A few respondents provided answers which were coded as a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 9$ , 9%).

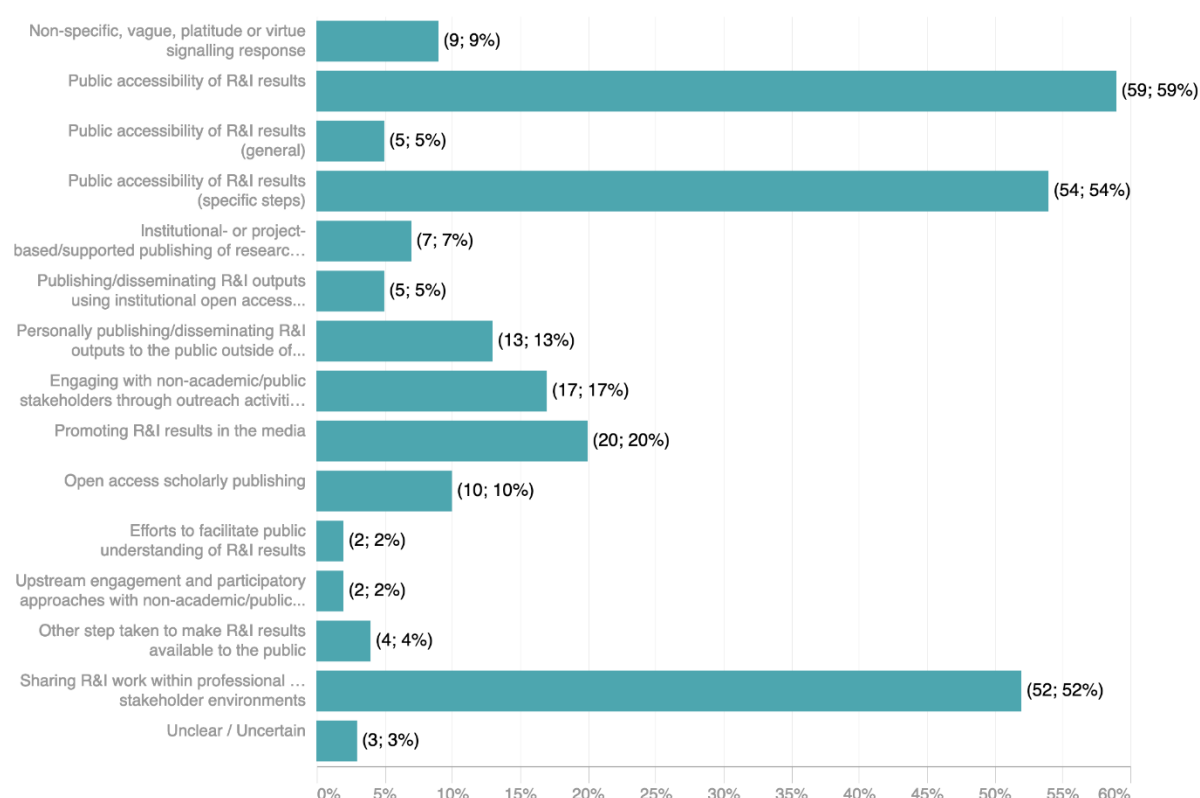


Figure 86: African States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.

<sup>353</sup> The total number of responses:  $N = 262$

### 3.3.6.7 OPEN DATA

This section explores the range of responses given to the question *‘What steps, if any, have you taken to make the data from your research and innovation activities freely available to the public?’*.

Relative to the other categories, most respondents were *‘Confusing open access to research findings and open data’* in their responses ( $n = 31$ , 52%). They described making their research findings or outputs freely available, but not the data used to generate them (Figure 87)<sup>354</sup>.

Few respondents indicated *‘Public availability of R&I data’* ( $n = 11$ , 18%). A higher proportion gave *‘general’* information ( $n = 7$ , 12%) as opposed to having listed *‘specific steps’* ( $n = 4$ , 7%). Most commonly, respondents indicated *‘Publishing research data to institutional/project websites’* ( $n = 3$ , 5%) and *‘Publishing data in public repositories’* ( $n = 3$ , 5%).

A considerable proportion of respondents ( $n = 16$ , 27%) gave a *‘Non-specific, vague, platitude or virtue signalling response’*. This applied to responses indicating respondents had made their data or generic *‘work’* freely available, without specifically indicating how.

Few respondents negated the necessity for open access. This was categorised as *‘Resisting/delimiting open data or supporting closed data’* ( $n = 3$ , 5%).

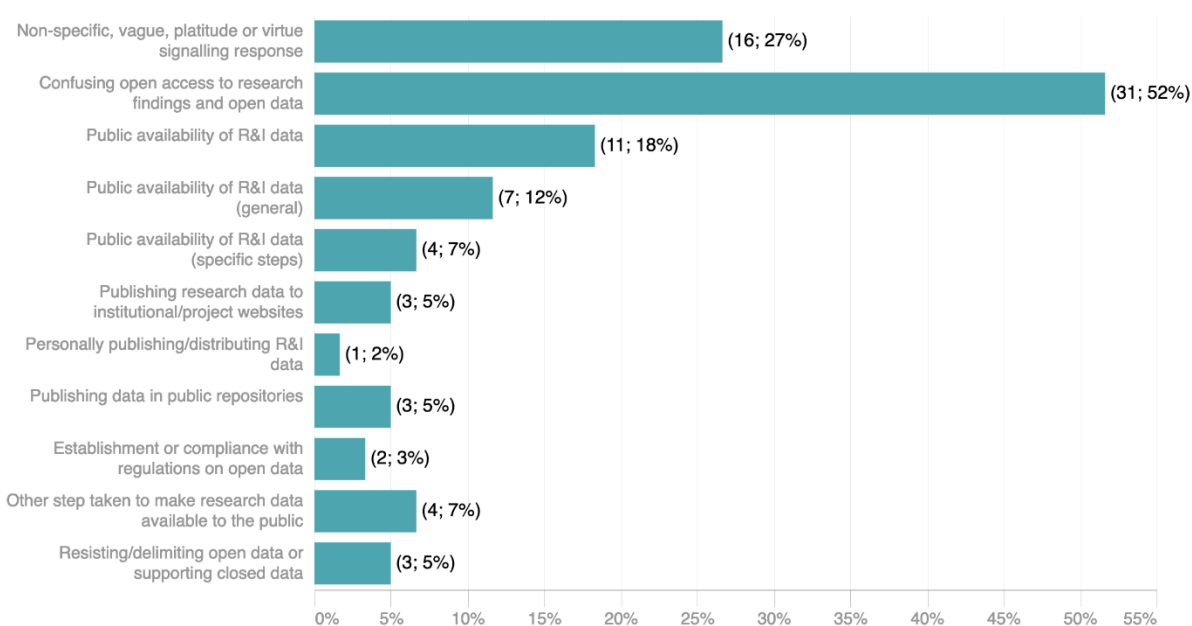


Figure 87: African States - Steps taken to make the data from research and innovation activities freely available to the public.

<sup>354</sup> The total number of responses:  $N = 85$

### 3.3.6.8 SOCIETAL NEEDS

This section explored the range of responses given to the question *‘What steps have you taken to ensure your research and innovation work addresses societal needs?’*.

A large proportion of respondents ( $n = 89$ , 95%) indicated they had taken steps toward *‘Addressing societal needs in R&I work’* (Figure 88)<sup>355</sup>. More gave *‘general’* information ( $n = 51$ , 18%), as opposed to listing *‘specific steps’* ( $n = 36$ , 38%).

The most common specific step was *‘Selection of research topic/problem defined by researchers’ perceptions of societal needs’* ( $n = 35$ , 37%). Other steps were less common, such as consulting with relevant public stakeholders, which was defined as *‘Participatory process: research topic/problem defined by societal needs’* ( $n = 16$ , 17%). A similar proportion indicated they included *‘Societal issues as a substantive dimension in R&I content/focus’* ( $n = 13$ , 14%). Few respondents indicated their research design or methodological approach were informed by societal needs, which was coded as *‘Participatory process: research design/approach defined by societal needs’* ( $n = 2$ , 2%). The least common step was *‘Compliance with institutional/funding requirements’* ( $n = 1$ , 1%), indicating few respondents ensured their work addressed societal needs because of bureaucratic requirements.

Few respondents ( $n = 7$ , 7%) gave a *‘Non-specific, vague, platitude or virtue signalling response’*.

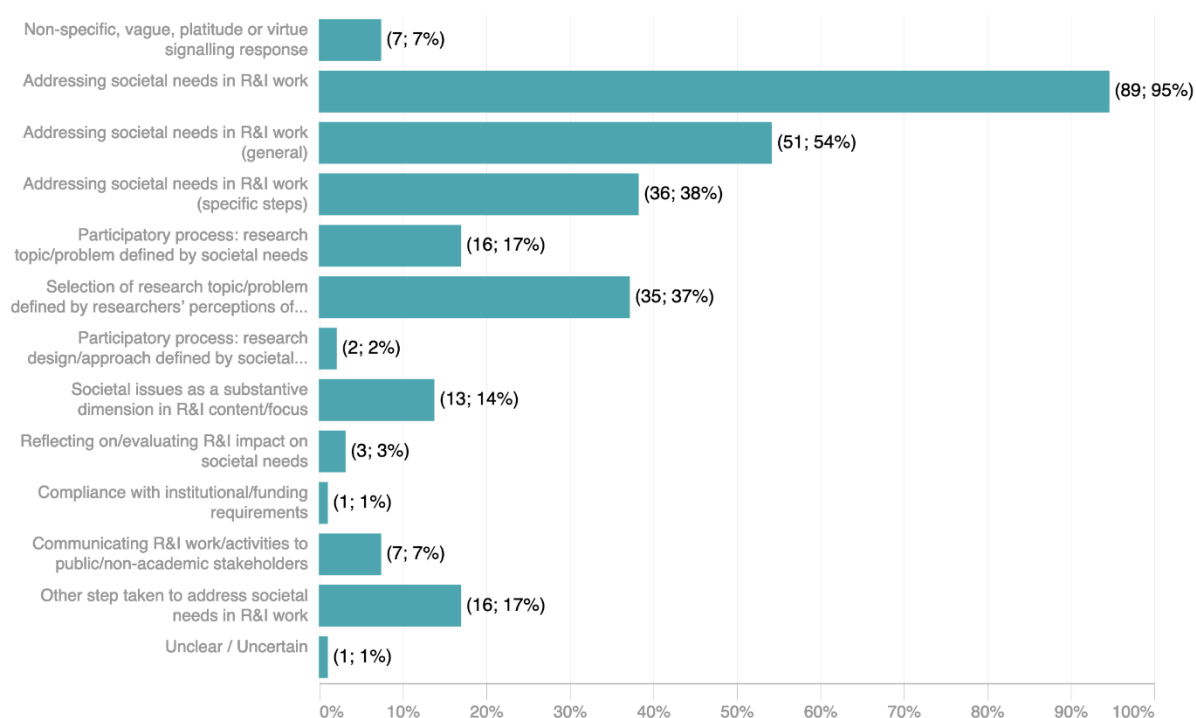


Figure 88: African States - Steps taken to ensure research and innovation work addresses societal needs.

<sup>355</sup> The total number of responses:  $N = 277$

### 3.3.6.9 SOCIETAL CONCERNS

This section explored the range of responses given to the question *‘What steps, if any, have you taken to ensure that the way you do your work does not cause concerns for society?’*.

A large proportion of respondents ( $n = 80$ , 82%) indicated *‘Addressing societal concerns about implementation of R&I work’*, meaning they were taking measures to ensure their work did not cause concerns for society, or integrating societal views and perspectives (Figure 89)<sup>356</sup>. More provided *‘general’* answers ( $n = 43$ , 44%), as opposed to listing *‘specific steps’* ( $n = 37$ , 38%). The most common practical steps included *‘Compliance with rules, regulations or legal obligations’* ( $n = 20$ , 21%) and *‘Seeking upstream feedback from non-R&I stakeholders on R&I ideas/plans’* ( $n = 11$ , 11%). Smaller proportions of respondents indicated *‘Addressing societal concerns as a substantive dimension of the R&I work’* ( $n = 8$ , 8%), while few reported *‘Mak[ing] the[ir] research directly responsive to societal needs or concerns’* ( $n = 2$ , 2%).

A few respondents ( $n = 12$ , 12%) reported addressing societal concerns in a *‘Non-specific, vague, platitude or virtue signalling’* way.

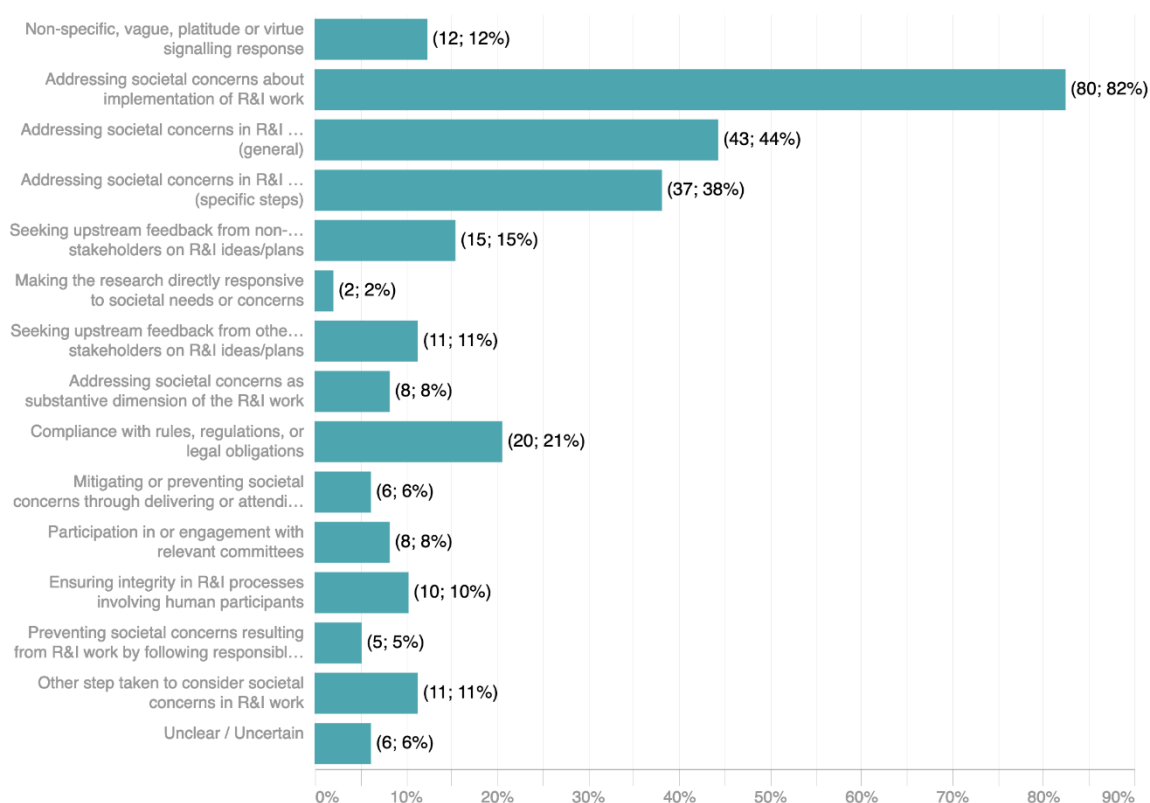


Figure 89: African States - Steps taken to ensure that the way work is done does not cause concerns for society.

<sup>356</sup> The total number of responses:  $N = 274$

### 3.3.6.10 ASSOCIATIONS WITH RRI

This section explored the range of responses given to the question “*What comes to mind when you think of ‘responsible research and innovation’?*”.

The majority of respondents referred to ‘*Ideas, practices or policies associated with RRI*’ ( $n = 79$ , 68%) (Figure 90)<sup>357</sup>. The most common associations with RRI were in a societal context. Many respondents associated it with ‘*Aligning research and innovation with societal benefits*’ ( $n = 31$ , 26%). This was applied to responses suggesting R&I needs to be socially relevant, create value for society, generate knowledge relevant to society, or contribute to a greater societal benefit. The next most common associations were ‘*Do no harm to people/society/participants with R&I*’ ( $n = 13$ , 11%) and ‘*Protecting the environment, preventing negative impacts of research and innovation on the environment*’ ( $n = 13$ , 11%). Fewer respondents associated RRI with ethics and integrity, as only small numbers indicated ‘*Ensuring ethical procedures and approvals are completed in R&I work*’ ( $n = 9$ , 8%) and ‘*Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty*’ ( $n = 9$ , 8%).

A notable proportion gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 37$ , 32%). This applied to responses effectively repeating the term ‘*responsible research and innovation*’ in different ways, using abstract terms that were not linked to a sense of responsibility or included generic mentions of research standards and societal issues without referring to ‘*responsibility*’ as such.

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<sup>357</sup> The total number of responses:  $N = 240$

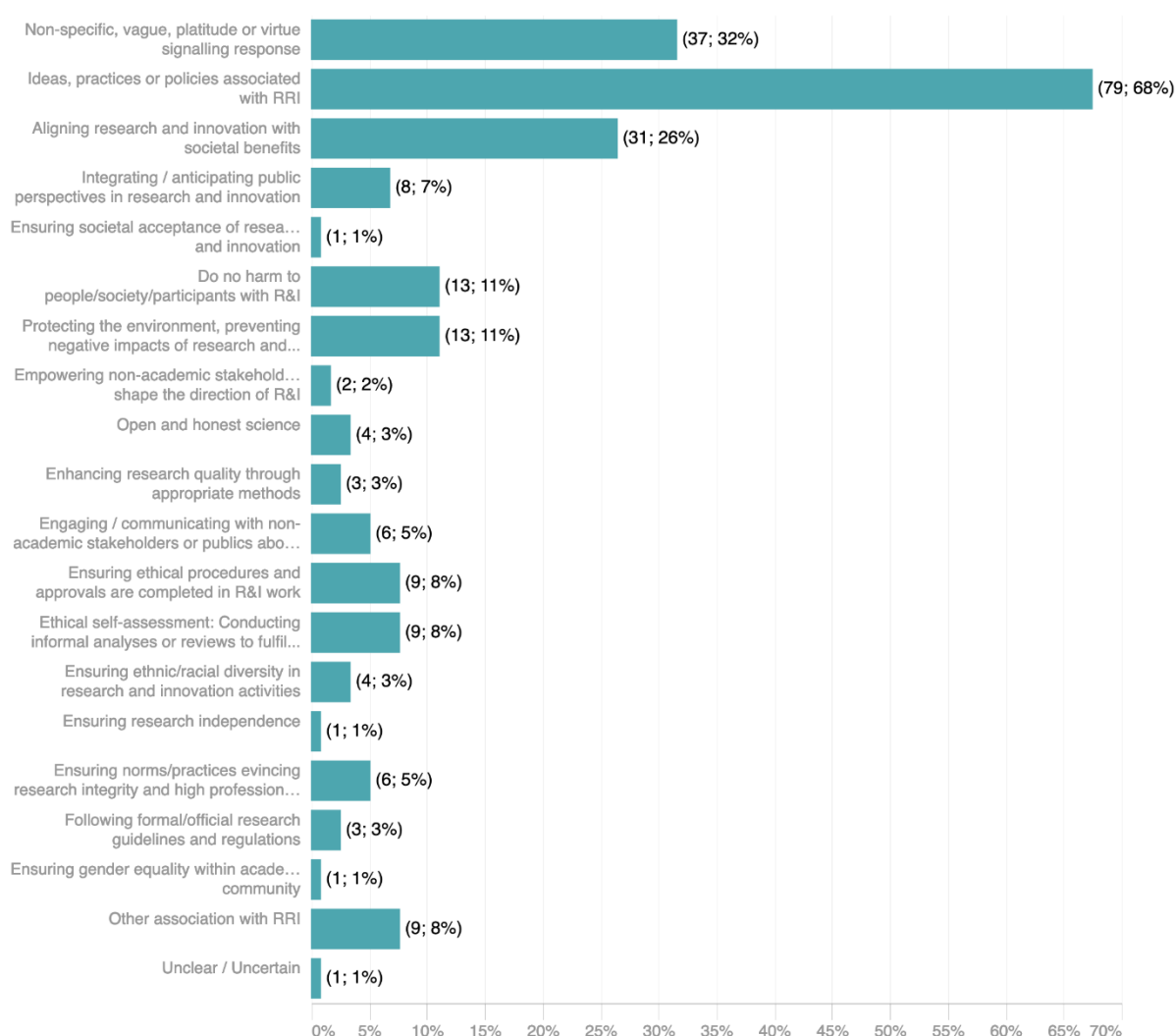


Figure 90: African States - What comes to mind when you think of 'responsible research and innovation'?

### 3.3.6.11 ASSOCIATIONS WITH UN SDGS

This section explored the range of responses given to the question 'What comes to mind when you think of the UN Sustainable Development Goals?'.

A major portion of respondents more specifically 'Defin[ed] sustainable development' ( $n = 82$ , 59%), as entailing social, economic, and environmental aspects, such as associations with health, natural resources, and climate change (Figure 91)<sup>358</sup>. 'Economic aspects of sustainable development' were indicated by most respondents ( $n = 53$ , 38%), followed by 'Diversity/inclusion aspects of sustainable development' ( $n = 25$ , 18%), and 'Educational aspects of sustainable development' ( $n = 25$ , 18%). Many respondents referred to 'Governance dimensions of SDGs' ( $n = 18$ , 13%), and did not actually define them. This was applied when respondents mentioned international and/or national governance issues or drivers related to sustainable development or the UN SDGs. This included national, multi-national or global

<sup>358</sup> The total number of response: N = 310

geopolitical dynamics, transnational collaboration, as well as challenges or shared targets at this level. Few respondents referred to ‘*Achieving the SDGs*’ in terms of specific implementation steps for successful delivery ( $n = 2$ , 1%).

A notable proportion of respondents responded in ways that were ‘*Non-specific, vague, platitude or virtue signalling response[s]*’ ( $n = 43$ , 31%). Respondents may have indicated they had heard of the UN SDGs, or referred to sustainability in general, but did not give any further relevant details about them.

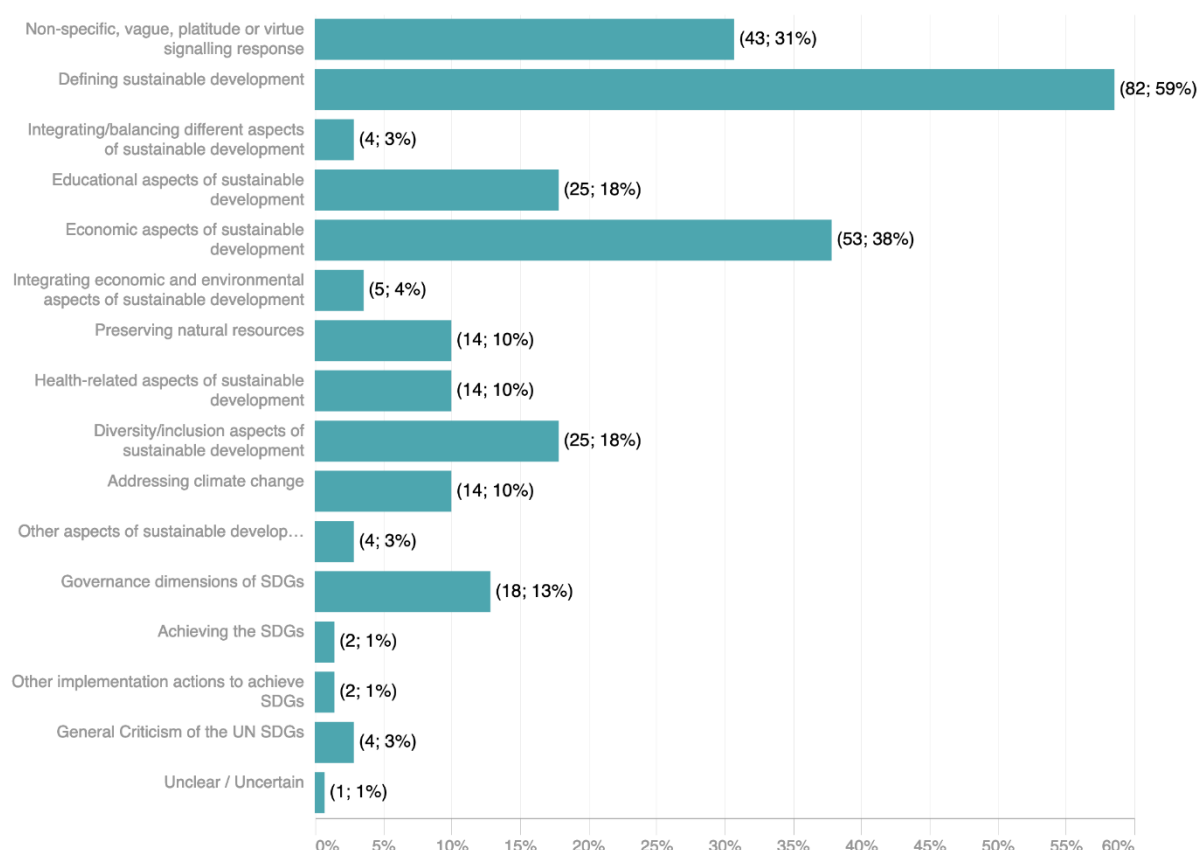


Figure 91: African States - What comes to mind when you think of the UN Sustainable Development Goals?

### 3.3.7 SUMMARY OF FINDINGS

Socio-demographic results from the African region revealed the sample's gender distribution was slightly skewed towards men, with most working in a ‘*University or similar research performing organisation*’ within the fields of ‘*Natural sciences, mathematics and statistics*’.

Results by dimension of Responsible Research & Innovation (RRI), showed overall agreement on an attitudinal level with value-action gaps for all measures. The gap was strongest for the inclusion of ethnic minorities, which displayed the lowest level of total agreement on an attitudinal level. The results showed a considerable disagreement regarding the importance of publicly and freely accessible research data, which further translated into a lack of practical steps. For all other questions regarding practical actions, most respondents indicated that steps

had been taken. However, within each RRI dimension, there were considerable discrepancies between the supportive attitudes and the behavioural components (i.e., putting their attitude into practice). This was most notable for both the ‘diverse and inclusive’ and ‘open and transparent’ dimensions. The closest alignment was for the ‘responsive and adaptive’ dimension.

Results by stakeholder categories indicated disproportionately higher engagement with research performing stakeholders, such as RPOs, academics and researchers. This is most likely due to academic collaborations and joint research projects. Levels of engagement were low for all other categories, and among these, civil society was interacted with most frequently.

Measuring diverse perspectives, as part of RRI, related to researchers and innovators reaching out beyond academia to diverse stakeholders. Results for ‘*Diverse Perspectives*’ showed that respondents most commonly connected with policy bodies and policy makers, and industry and business. The most frequently reported practical steps for reaching out were through ‘*Meetings, workshops, focus groups and “consultations”*’. Engagement with civil society organisations (CSOs) scored lowest, although respondents indicated frequent weekly interaction with this stakeholder category. Many respondents indicated they diversified their perspectives by approaching other researchers, academics and experts, which suggested that this is a common practice of many research processes.

Measures relating to ‘*Gender Equality*’ identified a shift towards monitoring equality within research teams and supporting female researchers. These steps were taken rather than, for example, boosting equality within the academic environment as a whole through supporting female researchers’ publications or providing gender training. Results showed its perceived importance as respondents mentioned specific steps, such as ensuring equality within research teams, in recruitment and staff selection, and promotion or membership of female researchers. A similar trend emerged in the ‘*Ethnic Minorities*’ results, as promoting researchers from ethnic minorities was as low as for the gender equality measures. However, promoting researchers from ethnic minorities was still one of the most frequently indicated steps. The overall low response rate for steps towards including ethnic minorities suggests this aspect of RRI is not yet widely implemented in respondents’ R&I work.

Results for ‘*Ethics of Research*’ indicated respondents had adopted practical steps to ensure the integration of ethical principles. The specific steps described indicated normative approaches widely embedded in RPOs through ethics committees, as well as rules, regulations, and legal obligations. Ensuring informed consent from participants, as well as ensuring their anonymisation and confidentiality, were frequently reported. Those tendencies might be explained by the high number of respondents working in health-related areas of study in the African sample.

The measures applied to identify ‘openness and transparency’ revealed respondents shared perspectives related to conventional research processes. Results for ‘*Transparency*’ indicated that a high number of respondents assumed one-way dissemination as a viable pathway for open and transparent methods and processes. Fewer respondents reported to document and

report their research and decision-making processes or seek upstream feedback on research projects from people affected by them.

Results for *'Public Accessibility'* showed that sharing R&I work within the respondents' professional field, and sharing them with non-academic and public stakeholders, were equally valued. Respondents who only indicated publications were not included in the data, although it was frequently mentioned. This suggests that respondents from African states associate dissemination and outreach activities with public accessibility. This trend became clearer when looking at the respondents' comprehension of making data publicly available. Results for *'Open Data'* revealed that respondents confused open data with open access by describing processes of making their research findings or outputs freely available. This implied that ensuring open access is the predominant step respondents associated with research findings and open data, and that this RRI measure is not considered a normative approach to research and innovation.

Addressing societal needs in R&I seemed to be predominantly related to finding a relevant research and innovation topic, rather than empowering relevant groups of people to decide how the process is shaped. However, results for *'Societal Needs'* showed that most respondents selected research topics based on their own perceptions of societal needs. Considerably fewer respondents indicated public or non-academic engagement and consultation processes to define their research and innovation focus. Focussing on the 'anticipative and reflective' dimension of R&I processes, results for *'Societal Concerns'* showed respondents mentioned diverse aspects with equal distributions. The categories reflected associations with societal concerns, such as complying with rules, regulations and legal obligations, which were referred to most often. Also mentioned were engagement and consultation activities, treatment of human research participants, and environmental concerns.

Identifying common associations with responsible research and innovation and the global blueprint on sustainable development showed respondents were familiar with some of these concepts' main ideas. Most respondents associated RRI with a general idea of doing no harm to society and protecting the environment. Results from *'Associations with RRI'* showed that many respondents referred to ethics. There were two distinct ethics categories in the data set, one relating to content on ensuring ethical procedures and the other on ethical self-assessment processes. Both categories received equal proportions, and suggested a trend towards ethical perceptions in R&I.

Results from *'Associations with UN SDGs'* showed that most respondents related sustainable development to economic aspects, basic human needs, the improvement of living standards, or poverty reduction. Governance dimensions were frequently mentioned, suggesting respondents were familiar with the idea underlying the SDGs to build relationships, collaborations and addressing geopolitical dynamics on national, multinational and global levels.

## 3.4 GLOBAL INTERVIEW RESEARCH: ARAB STATES

### 3.4.1 EXECUTIVE SUMMARY

The aim was to investigate the bottom-up perspectives and experiences of researchers and innovators in the Arab States. The focus here is on collecting data from researchers and innovators themselves to ascertain bottom-up views. Bottom-up views can show how and why research and innovation are supplied by those performing it.

In delivering this, it was also important that these insights are provided for other parts of the RRING project, specifically regarding: key RRI-related platforms, spaces and players operating in this region; interactions between different stakeholder types; domain-specific lessons related to Digital (ICT), Energy, Bioeconomy and Waste Management; as well as region-specific insights on what is shaping day-to-day research and innovation practice.

In attaining such insights and achieving this research aim, data from 29 structured interviews were analysed for the Arab States, covering: Egypt (10 interviews); Morocco (12), and Jordan (8). We undertook a qualitative content analysis approach to analysing these interview data. The content analysis relied on utilising code counts to identify the most prevalent sub-themes for further qualitative interrogation. The analysis was undertaken by a team of coders, with inter-coder reliability ensured through Krippendorff's alpha tests.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions. Within each of these themes, several prevalent sub-themes also emerged:

- *Gender equality and inclusivity*: Gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; lack or uncertainty of policy.
- *Public engagement*: Organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: Levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: Evaluation; and demand-drive research and innovation.
- *Science education*: The tools of science education; and research and innovation capacity building.
- *Ethics*: Positioning ethics – where does the responsibility lie?; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: Accounting for local contexts; and conflicts and tensions.

Within each of these sub-themes, accounts are provided for each of the RRING's four domains. Across these, we note the following:

- *Energy:*
  - Women said to be well-represented, including expert and decision-making roles
  - Evidence of the energy domain actively engaging local communities in project work
  - Very little insights available on open science, other than one instance of having to pay for energy data in Jordan
  - Energy is being shaped by societal need
  - Training and education were deemed essential due to new technologies
  - Little to no consideration of ethics in the energy domain
- *Waste management:*
  - Lacking in black representation
  - Public engagement exercises rarely used
  - Open science issues only mentioned once in connection to waste management, relating to organisational ownership of data/findings generated
  - Goals of managing waste closely tied to societal needs; training initiatives are commonplace, e.g. around new methods and forms of engagement
  - Customer-centric ideas of responsibility (linked to e.g. reputation, goodwill) connects waste management to ethics
  - The role of politics appeared crucial in shaping governance of RRI
- *Information and Communications Technology (ICT):*
  - In general, there was resistance to diversity
  - Engagement with various types of publics are valued
  - There were good possibilities for Open Science given that ICT-based systems are used for providing accessibility
  - Anticipation and responsiveness to future societal risks could be hampered by ICT's connections to other domains (e.g. health funding inequities)
  - Considerable possibilities exist for science education for/through ICT
  - There was an instance of ICT innovation happening outside of ethical practice because the innovator believed it was of benefit to society
  - The close, intersecting relationships between ICT and other domains could cause confusion in the governance of RRI (especially for RPOs)
- *Bioeconomy:*
  - Lack of gender equality and inclusivity arrangements in place
  - Local communities connections do exist and are ongoing
  - Open Science viewed with suspicion due to concerns of data misuse and the sensitive nature of biotechnologies
  - Anticipatory and responsiveness modes of research linked to affordability
  - Demonstration was used as a communications and education tool
  - A lack of perceived relevance for ethics in their work was noted

Key platforms, spaces and players who were explicitly noted as to progress various aspects of RRI practice across the Arab States included:

- *Gender equality and inclusivity*: No explicit mention of key actors in relation to this theme, perhaps due to a general lack of advancement in this area.
- *Public engagement*: SEKEM (acronym based on Ancient Egyptian: 'vitality from the sun'); Egyptian Ministry of Higher Education and Scientific Research; and local communities themselves.
- *Open Science*: Egyptian Knowledge Bank; Wellcome Trust.
- *Anticipative, reflective and responsiveness*: SEKEM.
- *Science education*: edX; Egyptian Knowledge Bank; Waste Marche (specifically for waste management in Egypt)
- *Ethics*: Science Technology and Development Fund (STDF); Egyptian Knowledge Bank.
- *Governance of RRI*: No explicit mentions of key actors advancing the governance of RRI.

Key stakeholders interact within and across their research and innovation sectors in different ways, according to the RRI themes that structure our analysis and discussion:

- *Gender equality and inclusivity*: In contrast to the other regions where the RFOs drive interactions between research and innovation stakeholders, there is no supporting evidence to substantiate this claim for inclusivity and diversity in this region. This is likely because they have fewer obligations in this region.
- *Public engagement*: RPOs depend on RFOs to fund public engagement, otherwise, engagement is limited to voluntary initiatives. As part of public engagement, the role of intermediaries who connect and bridge stakeholders was important.
- *Open Science*: Private and government institutions have power over Open Science because they have a large role in deciding the extent to which results are published. Also, the degree to which RPOs do Open Science is dependent on the requirements set by RFOs and the availability of other stakeholders' data.
- *Anticipative, reflective and responsiveness*: Evidence shows that societal needs are shaped collectively through the interactions of stakeholders. For example, societal needs considerations of Business and Industry are influenced by RPOs; and RPOs are shaped by governments and RFOs.
- *Science education*: RFOs had Science Education as a part of their funding arrangements, thereby bringing stakeholders together as a core requirement.
- *Ethics*: It was not only local institution-specific policies and regulations that shaped adherence to ethical standards, but also the norms and conventions set by collaborating stakeholders. RPOs' ethical ambitions were also impacted by relative neglect from Business and Industry collaborators.
- *Governance of RRI*: For this particular sub-theme of RRI, the experiences of interacting with stakeholders across the Arab States was poor. Such negative experience related to, for example: disconnected expectations, clashing interests (e.g. entrepreneurial vs. research), reporting requirements, and lack of trust.

### 3.4.2 INTRODUCTION

Chapter 3 presents findings from the RRING WP3's Task 3.3 – specifically its global interview task – for the region of the Arab States. RRING's Task 3.3 interviews aim to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data from researchers and innovators themselves.

This chapter is structured as follows:

- We begin by giving headline details of the methods adopted. This includes country selection procedures, interview participant sampling targets, and participant demographics (Section 3.4.1). Note that in-depth information on the methodological approach for all Task 3.3's global interviews, across all the UNESCO regions, can be found in the overarching report.
- The core of the report is then structured around our seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions (Sections 3.4.4 - 3.4.10). Within these sections, we detail the code counts part of that respective theme. Furthermore, a discussion of the most prevalent sub-theme follows. Each theme-focused section discusses what is unique for every domain (energy, waste management, bioeconomy, ICT) and each stakeholder type (Research Performing Organisations, Research Funding Organisations, Industry and Business, Civil Society Organisations, Policy Bodies), in the specific Arab States region. Each theme section finishes with a summary.
- The contents of these chapters feed into a dedicated conclusions section that summarises the key findings from the Task 3.3 interviews for the Arab States (Section 3.4.11).

### 3.4.3 METHODS

#### 3.4.3.1 DATA COLLECTION

Structured interviews were selected as the method for RRING's Task 3.3 qualitative study of research and innovation practices globally. Interviews were selected to provide in-depth perceptions, information and opinions of on-the-ground experiences concerning opportunities and bottlenecks in RRI in each of the five world regions (Arab States; Asian and Pacific States; European and North American States; Latin-American and Caribbean States; African States). A structured approach was taken to ensure consistency in questioning across the regions. The structured interviews ultimately provided more reliable, focused and uniform data coverage across domains and stakeholder types in each country and region.

The structured interview format consisted of questions on eight RRI themes and specific interview guidelines were provided. Interviews were conducted either face-to-face or through telephone/skype calls to facilitate participation. Further details of the data collection methods, guidelines and procedures used are provided in the overarching report.

In each region, the country selection was done on multi-based criteria. Four countries were studied in the Arab States. One high and one low ranked country was selected based on GDP (per capita in USD) and GERD (Gross Expenditure on Research and Development). Only countries with a Travel Advisory Level of 1 & 2 were selected. In case no partner was available in the primary selected country, partner availability was determined for the alternate country from the list in each category until coverage was established.

Based on these criteria, the following countries were selected:

1. Egypt
2. Morocco
3. Jordan

For the high GDP category, the primary selection for Northern/Western Arab States was Egypt. No country was selected for the Low GERD category since no partners were available to aid in data collection efforts in either the primary selection (Madagascar) or the alternative country (Sierra Leone).

### 3.4.3.2 SAMPLING

The selection of participants from each country was based on key selection considerations, including:

- Number of interviews: A minimum of five interviews was conducted per country.
- Gender: A 50-50 target split between males and females and/or other gender identities was recommended for interview participant selection. With an acceptable minimum of 40% representation of females and/or other gender identities.
- Domains: Interview participation of respondents from at least one of each domain category in the country sample was set as a target (ICT/digital; energy; waste management; bioeconomy).
- Stakeholder types: At least one of each stakeholder type was included in the interview sample (Research organisation; Research funding organisation; Industry and business; Civil society organisation; Policy body).
- Relevance of their professional work to the RRING project's RRI interests: Interview participants were selected based on their profiles indicating the presence of any publicly visible RRI-like activities undertaken to ensure that their work

complemented the innovation/research approaches that RRING would find useful to investigate.

Interviews were designed in accordance with ethical guidelines from the Global Sustainability Institute's (GSI) Departmental Research Ethics Panel, under the terms of Anglia Ruskin University's (ARU) Research Ethics Policy (Dated 8 September 2016, Version 1.7), as well as the Social Research Ethics Committee (SREC) under the terms of University College Cork. Once interviews were conducted, partners/sub-contractors were asked to submit audio-recordings, signed consent forms, transcripts (both in English, anonymised and non-anonymised, and local language), post-interview emails with transcriptions as attachments for participants to review, and proof of participants' background profiles demonstrating their suitability for participation and fieldnotes. Partners/sub-contractors were also requested to provide a statement of performance against the selection criteria, with justifications if targets were not met across the sample.

Following the set criteria for interview participation and data collection, a total of 29 interviews were undertaken for the Arab States, covering: Egypt (10 interviews); Morocco (12); Jordan (8). We used a qualitative content analysis approach to analysing these interview data. Details of the data and the specific Arab States sample are provided in Table 10.

Table 10: List of interview details and participant demographics for each country

Country	Interview Code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			Energy	Waste man.	ICT <sup>359</sup>	Bioeconomy	RPO <sup>360</sup>	RFO <sup>361</sup>	Industry & Business	CSO <sup>362</sup>	Policy body	Male	Female
Egypt	EG01	00:56:01				1	1					1	
	EG02	00:40:07	1	1	1	1		1				1	
	EG03	00:33:53			1						1		1
	EG04	00:51:33	1			1	1		1	1			1
	EG05	00:22:23			1		1					1	
	EG06	00:40:07	1				1						1
	EG07	00:33:00	1	1	1	1		1			1		1
	EG08	00:49:21	1				1					1	
	EG09	00:58:32				1	1			1		1	
	EG10	00:40:33		1					1			1	
Morocco	MO01	00:45:40	1						1			1	
	MO02	00:20:33	1		1				1	1		1	

<sup>359</sup> Information and Communications Technology<sup>360</sup> Research Performing Organisation<sup>361</sup> Research Funding Organisation<sup>362</sup> Civil Society Organisation

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

Country	Interview Code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT</i> <sup>359</sup>	<i>Bioeconomy</i>	<i>RPO</i> <sup>360</sup>	<i>RFO</i> <sup>361</sup>	<i>Industry &amp; Business</i>	<i>CSO</i> <sup>362</sup>	<i>Policy body</i>	<i>Male</i>	<i>Female</i>
	MO03	00:32:47			1		1					1	
	MO04	00:16:46		1			1						1
	MO05	00:30:35	1				1						1
	MO06	00:27:33	1	1			1			1			1
	MO07	00:39:12		1		1			1			1	
	MO08	00:56:58		1					1			1	
	MO10	00:10:31			1						1	1	
	MO11	00:31:21	1	1			1					1	
	MO12	00:35:24		1			1						1
Jordan	HKJ01	00:38:06				1	1			1			1
	HKJ02	00:58:21	1				1						1
	HKJ03	00:30:52			1		1	1			1		1
	HKJ04	00:47:07		2						2			2
	HKJ05	00:41:01	1	1	1	1	1					1	
	HKJ06	00:50:55		1			1					1	
	HKJ07	00:58:21	1				1					1	

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

Country	Interview Code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT</i> <sup>359</sup>	<i>Bioeconomy</i>	<i>RPO</i> <sup>360</sup>	<i>RFO</i> <sup>361</sup>	<i>Industry &amp; Business</i>	<i>CSO</i> <sup>362</sup>	<i>Policy body</i>	<i>Male</i>	<i>Female</i>
	HKJ08	00:54:03	1		1		1			1		1	

### 3.4.3.3 DATA ANALYSIS

Qualitative content analysis was used through coding of interviews in five phases:

1. In the first phase, 30 interviews (**26.5%** of the sample spanning all RRING regions) were inductively coded using NVivo 12 (a type of Computer-Aided Qualitative Data Analysis Software [CAQDAS]), with a line-by-line open coding approach. The 30 interviews were selected to ensure good distribution of countries. Within each country, at least one interview from each gender was included. Further selection was based on distribution of domains and stakeholder types. Coding was done for the respondents' social construction of responsible research and innovation practices and accounted for both cross-cutting themes and context-specific subject matter. Various cycles of review led to a codebook of 117 codes under 12 categories used for coder training.
2. The codebook was used to deductively code the remaining 94 interviews. The coders underwent extensive training in two practice rounds: (1) a full-day training workshop, and (2) each of the four coders was given a separate practice transcript to be coded independently. Coding was compared with the lead coder through dedicated virtual meetings, and inter-coder reliability was determined. This process led to further revisions of the codebook.
3. In the next stage, interview transcripts were distributed to coders using the revised codebook. During this stage, coders flagged any critical new codes and reached inter-coder agreement. Coding for the section on 'Responsibility' was carried out inductively due to the degree of variance in responses. This was a result of the open-ended nature of the question on responsibility and how participants understood it differently.
4. Inter-coder reliability was measured using Krippendorff's alpha. On average, coders achieved a Krippendorff's Alpha value of 0.95, and reliability of over 0.8 for 89% of variables.
5. Within each theme identified, code counting was done for each domain and stakeholder type in each region. After this, further in-depth qualitative interrogation of coded data was done to interpret the patterns in the selected codes (i.e. identified sub-themes).

The presentation of the qualitative data in this chapter uses example quotes for evidence and clarity. The following sections are based on seven themes: *gender equality and inclusivity*; *public engagement*; *open science: anticipative, reflective and responsiveness*; *science education*; *ethics*; and *governance of RRI*. Within each of these themes, we present two to four prevalent sub-themes.

We now discuss the most prevalent codes (i.e. identified sub-themes) for each of our seven RRI themes, beginning with details on the code counting outcomes for each theme, which in turn lead to the sub-themes themselves that we present within the rest of this chapter.

### 3.4.4 GENDER EQUALITY AND INCLUSIVITY

As one of the six key RRI policy priorities highlighted by the European Commission, gender equality has been defined as “promoting gender-balanced teams, ensuring gender balance in decision-making bodies, and considering always the gender dimension in R&I to improve the quality and social relevance of the results.”<sup>363</sup> Inclusivity accounts for diversity and can be understood as promoting underrepresented people (e.g. women, ethnicities, or economic minorities, etc.), and is concerned with who is included/excluded from the R&I process.

There are also “process dimensions” to achieving these outcomes, whereby establishing a diverse and inclusive process requires that all actors and publics involved in R&I work together. To yield more useful and higher quality knowledge actors should be included in R&I practice, deliberation, and decision-making from the beginning.<sup>364</sup> “Voices across a diversity of communities should be involved in research, from its beginnings to its commercialisation”, ensuring all viewpoints are accounted for, and generating higher quality science through different perspectives and expertise.<sup>365</sup>

These definitions outline the boundaries of the theme of gender equality and inclusivity within which the interviews and analyses were conducted. Out of the 14 codes identified for the theme in this region, the four specific codes that stood out in the data based on the total counts are: gender and sexual diversity [code 56]; organisational norms and practices [code 55]; discrimination and lack of diversity [code 65]; lack or uncertainty of policy [code 66]. This section focuses on these categories of results within the gender and inclusivity theme.

Chapter-wise code counts	Arab States			
	Egypt	Morocco	Jordan	Total
<b>53: Gender equality and inclusivity</b>				
54: Contextual understanding of diversity and inclusion-societal and cultural norms	7	0	4	11
55: Organisational norms and practices	8	0	4	12
56: Gender-Sexual diversity	13	16	8	37
57: Ethnic and religious diversity	3	0	1	6
58: Country-based representation	1	0	1	2
59: Disability	1	1	2	4
60: Academic diversity	0	0	0	0

<sup>363</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>364</sup> <https://www.rri-tools.eu/about-rri>

<sup>365</sup> <https://www.rri-tools.eu/documents/10184/16301/RRI+Tools.+A+practical+guide+to+Responsible+Research+and+Innovation.+Key+Lessons+from+RRI+Tools>

61: Age diversity	1	0	2	3
62: Socio-economic diversity and inclusion	0	0	0	0
63: Motives-Benefits of diversity and inclusion	1	0	1	2
64: Risks-Disadvantages associated with diversity and inclusion	0	0	0	0
65: Discrimination and lack of diversity	5	3	3	11
66: Lack or uncertainty of policy	15	2	3	20
67: Discrimination- a non-issue	8	11	3	22

The next four sections provide details about each of the four codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders (including key platforms, spaces and players) are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *gender equality and inclusivity*.

### 3.4.4.1 GENDER AND SEXUAL DIVERSITY

*Gender and sexual diversity* encompass any references to gender/sexual diversity in the workplace. This can include references to the need or methods employed for improving gender/sexual equality, inclusion/support for LGBTQ+, reducing the gender gap (e.g. a gap in pay, recruitment, promotion, participation, scientific/research domains, etc.) and providing relevant support structure.

While any negative responses to gender/sexual diversity are included in the sub-theme ‘Discrimination and lack of diversity’, some ambiguous comments, that are open to including women but closed to supportive intervention, are also included in this sub-theme.

Name	Description
Gender/Sexual diversity	Any references to gender/sexual diversity and inclusion in R&I/workplace. This can include references to the need or methods employed for improving gender/sexual equality, inclusion/support for LGBTQ+, reducing the gender gap (e.g. a gap in pay, recruitment, promotion, participation, scientific/research domains, etc.) and providing relevant support structure.  Rules: Any negative responses to gender/sexual diversity will be included in the code ‘Discrimination and lack of diversity’.

Across the Arab States, female participation had competing views within Jordan and Egypt about the existence of gender participation imbalance. Women in decision-making roles were briefly addressed but the gender pay gap was rarely mentioned. Focusing on female participation overlooks the more complex and progressive understandings of gender equality

and inclusivity. Crucial aspects of inclusivity, such as gender and sexual diversity, were largely absent from our participants' responses on this topic. More progressive and informed discussions would include women's part in decision-making and also recognise the presence of diverse partners throughout the process.

Motherhood is mentioned as one of the main obstacles to advancement for women, but there are no expressions of support for stronger interventions. Meritocratic framing is sometimes used to suggest that there are no problems that need intervention.

There is a perception is that gender equality has improved. One female participant from a policy body is of the impression that there is gender equality both in participation and the pay gap:

*"[...]in Egypt we cannot see differences between men and women in salaries although there are many European countries has this differentiation. There is no restriction for gender equality whatsoever, nothing saying you can't apply for this job because you are a woman or because you are a woman you can't travel."*

[Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>366</sup>]

However, according to the World Economic Forum, only 24.7% of women are in the labour force and the average male income is estimated to be 3.8 times that of an average woman in Egypt.<sup>367</sup>

Another participant also describes gender equality to be on an equal footing with men and that there are women in decision-making roles. However, she does raise the problem of a lack of flexibility towards motherhood:

*"[...] women are really empowered in Egypt [lately], we are given the chance to work on equal footage with men. However, we are not given all the possible chances to balance family life – that's the basic issue. Issues like flexible working hours and maternity leave are [still problems]."* [Female; Egypt; RPO; Energy<sup>368</sup>]

Others expressed concerns that barriers still exist, such as that of public opinion and the older generation possibly embedded in traditional gender norms:

*"[...] we still have barriers for young businesswomen, [such as] the issue of public perception and parents."* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>369</sup>]

A participant who works in a research team where the majority is female ascribed this to cultural factors and the public sector:

*"Regarding gender equality, as said earlier some cultural aspects must be considered when dealing with this topic. For my institution, majority of research*

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<sup>366</sup> EG07

<sup>367</sup> [http://www3.weforum.org/docs/WEF\\_GGGR\\_2020.pdf](http://www3.weforum.org/docs/WEF_GGGR_2020.pdf)

<sup>368</sup> EG06

<sup>369</sup> EG04

*team is female. Maybe because it is a governmental institution. Of course, it might be different in private sector.*” [Male; Egypt; RPO; Bioeconomy<sup>370</sup>]

Much of the gender-related aspects of the interviews in Jordan revolved around women in the role of housewives and how they were included in development projects:

*“For example, we worked on a project about domestic water saving where most of the people that were involved in it were housewives.”* [Male; Jordan; RPO; Waste Management<sup>371</sup>]

*“We found a lot of acceptance [with the] women participating. We even trained them, to work with the knowledge [that] they can simply apply in their houses.”* [Female; Jordan; RPO; Energy<sup>372</sup>]

In Jordan, women are included in the projects to improve gender equality:

*“When we have projects within the community itself, women are involved. Involving them in the projects is more than amazing [and a step towards gender equality].”* [Female; Jordan; RPO; Energy<sup>373</sup>]

The traditional divide between men and women in Jordan society can also act as an obstacle to carrying out research. As demonstrated by these two men that did not want to communicate with housewives:

*“[...] one of the challenges was that two staff municipality men we worked with. We wanted [...] them to communicate with the housewives, but they said they can’t. So we suggested they can communicate with them through a civil organization or engage female municipality staff [to] communicate with these housewives.”* [Female; Jordan; CSO; Waste management<sup>374</sup>]

The engagement projects also show signs of drawing on foreign resources and interactions that encourage and support greater involvement of women:

*“We even do [...] a project with the Swedish agency with the International Development. Dealing with them helped us [to] include women, local citizens and so on.”* [Female; Jordan; RPO; Energy<sup>375</sup>]

*“We don’t only focus [on] women, but we have a component [of] gender and social inclusion.”* [Female; Jordan; CSO; Waste management<sup>376</sup>]

However, a male participant does not view gender imbalance and biases as a problem in Jordan and supports his argument from a meritocratic standpoint:

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<sup>370</sup> EG01

<sup>371</sup> HKJ06

<sup>372</sup> HKJ02

<sup>373</sup> HKJ02

<sup>374</sup> HKJ04

<sup>375</sup> HKJ02

<sup>376</sup> HKJ04

*“When it comes to gender equality, females [have] a more important role than men, opposite to the other old days. That proves that they worked hard to reach such a thing. Females showed more dedication and motivation than males. [...] We didn't face any kind of problem when it came to equality between male and female [...]. [In] the end, knowledge and science don't know such things, it is based on the people's motivation and effort.”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>377</sup>]

The general view from the Moroccan sample is that women are not underrepresented here, and that gender participation is not a problem:

*“For the gender issue, women are overrepresented in clusters, since 60% of Moroccan clusters have female managers.”* [Male; Morocco; Industry & Business; Energy<sup>378</sup>]

*“Morocco has signed a lot of decrees on the equality of sexes [...] and especially in the different sectors that women have not had the right to exercise. [...] we have women working in the mechanical [industry], and as chairwomen. And in our association, we have a [woman as] president and I recruited a [female] engineer and marketer that means that [gender] equality does not pose any problems [for us].”* [Male; Morocco; Industry & Business, CSO; Energy, ICT<sup>379</sup>]

Meritocratic justification is again used to support some of the statements that there is no gender inequality because recruitment is simply based on competency and not gender:

*“Concerning this topic [...] we haven't had this problem. We are [open-minded] and [for] men or women it's the same [...]. If the person has enough skills to contribute to the project [...] it's the first recruitment that we have.”* [Male; Morocco; RPO; Energy, Waste Management<sup>380</sup>]

This type of meritocratic framing points towards the participant's opinion that gender diversity is not a problem at their organisation and intervention is not needed.

### 3.4.4.2 ORGANISATIONAL NORMS AND PRACTICES

The *organisational norms and practices* sub-theme covers any explicit or implicit mention of policies, formal/informal rules, norms, codes, guidelines, values, procedures, and models or frameworks used for diversity and inclusion within the organisation(s). Uncertainty about what such norms and practices entail are also included in this sub-theme.

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<sup>377</sup> HKJ08

<sup>378</sup> MO01

<sup>379</sup> MO02

<sup>380</sup> MO11

Name	Description
Organisational norms and practices	<p>Codes that describe organisational norms, policies and practices (i.e. formal/informal rules and procedures within the organisation or specific models or frameworks used) for diversity and inclusion <i>OR</i> if the respondent shows any uncertainty about what such norms and practices might be or how they might play a role in diversity and inclusion.</p> <p>Rules: This can include both explicit protocol (official institutional norms, codes, rules or guidelines) and implicit norms and values. If any norms/practices are mentioned regarding specific aspects of diversity and inclusion, they should be coded to the relevant codes below. This will NOT include any govt/supra-institutional policies, which will be coded in the relevant code.</p>

The interviewees provide mixed accounts of organisational approaches to equality and inclusivity with no detailed descriptions of concrete organisational rules or policies. Some organisational activities aim towards inclusivity and diversity, but they tend to be weakly defined and supported.

The Egyptian commentary is particularly mixed. Some say there are no policies or practices to speak of, whereas others note the existence of some actions in a funding body, civil societies, and government institutions:

*“I know that there are rules and policies allocating a percentage or quota for specific groups in applying for positions in a governmental institution.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>381</sup>]

*“I noticed that in Egypt we have a very good number of gender equality initiatives, mainly through civil societies.”* [Female; Egypt; Policy body; ICT<sup>382</sup>]

The funding body member describes their gender report that monitors the gender balance at different levels of research and describes affirmative actions that support younger researchers. They say that there is not a major gender balance problem but there is a deficit of male participating researchers:

*“We do generate a [gender] report to monitor that internally [...] but it is balanced here at [their organisation]. At the level of participating researchers, we actually need to support men, [so that] it is more than balanced. But there [are] some affirmative actions for age groups, [not for gender] to support younger researchers.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>383</sup>]

<sup>381</sup> EG07

<sup>382</sup> EG03

<sup>383</sup> EG02

The following account provides some insight into the cultural, geographical, and religious circumstances in which their organisation is involved. The circumstances are not always favourable to diversity and inclusivity. While there is not diversity in general, there are attempts to include women's concerns in their research findings, although it appears to be ad-hoc:

*“In general, as an institution, there is no such diversity, when it comes to gender, religion and so on. Even in our early days in the institution, our Christian colleagues were really helpful [...] and we can't deny their help. [...] when it comes to women equality, we aren't against that.”* [Male; Jordan; RPO; Energy<sup>384</sup>]

The rurality of the desert and its relationship to the construction of femininity provides an obstacle for some of this inclusivity:

*“But there are some cases, when we have a project and it takes place in a desert and we have to sleep out there in a tent, sometimes it is difficult to involve women in such things.”* [Male; Jordan; RPO; Energy<sup>385</sup>]

Projects within the community, however, do involve women, but cultural and religious sensitivities are always a concern and can restrict participation:

*“But, when we have projects within the community itself, women are involved. [...] But sometimes, we do face some rejections from the women, like some girls refuse to travel alone, depending on the culture and the background that we live in. [...] we try to [respect] gender equality, religions and so on.”* [Male; Jordan; RPO; Energy<sup>386</sup>]

The involvement of international agencies contributes to improved research output that can emerge from greater inclusivity:

*“We even do [...] a project with the Swedish agency with the International Development. Dealing with them helped us [to] include women, local citizens and so on.”* [Female; Jordan; RPO; Energy<sup>387</sup>]

This highlights the positive influence that international networking can have on inclusive research and innovation values.

### 3.4.4.3 DISCRIMINATION AND LACK OF DIVERSITY

*Discrimination and lack of diversity* refer to any ethnic, age, female or disability discrimination within the organisation. This sub-theme includes references to specific organisational norms and practices that lead to a lack of diversity and inclusion.

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<sup>384</sup> HKJ07

<sup>385</sup> HKJ07

<sup>386</sup> HKJ07

<sup>387</sup> HKJ02

Name	Description
Discrimination and lack of diversity	<p>Reference to a lack of diversity and inclusion within the organisation leads to discrimination. This can include references to lack of ethnic or age diversity, lack of female inclusion, lack of acknowledgement of disability, etc. This can include references to specific organisational norms and practices that lead to a lack of diversity and inclusion.</p> <p>Rules: It will NOT include any reference to lack or uncertainty of govt/institutional policy, which is included in the code below.</p>

In terms of discrimination and lack of diversity, religion and ethnicity feature throughout the interviews. Gender is noticeable by its absence. Sexual diversity is not commented on. There is strong meritocratic reasoning throughout too.

While describing their team of 25 as multicultural, one participant felt that ethnic and religious prejudices still surround the organisation:

*“If someone from Upper Egypt like Nubian might be seen as unusual by some people. This need to be addressed properly.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>388</sup>]

*“Dark skin people or Christians in Egypt shall be carefully considered in the governmental plans and policies.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>389</sup>]

The promotion of diversity also has its problems, particularly in Jordan. One interview participant was met with pushback when promoting diversity:

*“Well, we meet all kinds of people [when discussing diversity issues]. [Some] support us and understand [...] and others refuse. But unfortunately, the huge number is the refusal toward the diversity topic.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>390</sup>]

Meritocratic argumentation is again used as justification by a participant in Morocco:

*“[...] Competence is the most important point that promotes diversity in my work, if I have to choose between [a] man or women [...] it's the competency.”* [Male; Morocco; RPO; ICT<sup>391</sup>]

Another meritocratic standpoint is evident from an interviewee in Jordan when he argues that there are no limitations or obstacles to diversity, equality and inclusivity in their organisation because they only consider efficiency and qualifications:

<sup>388</sup> EG09

<sup>389</sup> EG09

<sup>390</sup> HKJ03

<sup>391</sup> MO03

*“At the end of the day, the parties involved in projects are being chosen according to efficiency and qualifications.” [Male; Jordan; RPO; Waste Management<sup>392</sup>]*

These meritocratic arguments suggest that there is no lack of diversity in the abovementioned organisations in Morocco and Jordan.

#### 3.4.4.4 LACK OR UNCERTAINTY OF POLICY

The *lack or uncertainty of policy* sub-theme includes any reference to uncertainty about government and supra-institutional policy beyond their organisation, or a lack of such policy on diversity and inclusion.

Name	Description
Lack or uncertainty of policy	Coding for any reference to respondent’s uncertainty about govt/supra-institutional policy or a lack of govt/supra-institutional policy regarding diversity and inclusion (beyond the organisation).
	Rules: This does NOT include any discussion on organisational norms and practices, which will be coded for each of the types of diversity and inclusion specified in the codes above.

The seven quoted participants suggest that policies are not present. There is one exception from Jordan that described a situation where policies exist, but their implementation is slow.

The consensus throughout the Egyptian sample is that no policies or standards exist. Additionally, two participants do not think that policies are needed:

*“We don’t see [...] that we need to develop policies or regulations to make sure things are going in the right direction because it’s already working fine.” [Male; Egypt; RPO; ICT<sup>393</sup>]*

*“[There are no specific norms or standard practices] to my knowledge that could affect this. Maybe because as I said I don’t see it as a concern or a problem.” [Female; Egypt; RPO; Energy<sup>394</sup>]*

One other participant raises concerns about the lack of policies:

*“There is nothing like that, but we need more vigorous regulations from the government against harassment, bullying or discrimination.” [Male; Egypt; RPO, CSO; Bioeconomy<sup>395</sup>]*

<sup>392</sup> HKJ06

<sup>393</sup> EG05

<sup>394</sup> EG06

<sup>395</sup> EG09

The participants from Morocco also indicate a policy void. Although the first participant suggests her support for gender policies:

*“Perhaps we need a norm to defend women in this field in Morocco [...] and the minister [also] have to be involved in this area.”* [Female; Morocco; RPO, CSO; Energy, Waste Management<sup>396</sup>]

*“I am not [...] aware of policy [and] I don’t think I am the [right person] to ask.”* [Male; Morocco; Industry & Business; Waste Management, Bioeconomy<sup>397</sup>]

While two interview participants based in Jordan said that there are no policies in their institutions, another participant said that policies exist, but it takes a long time to be approved:

*“Well, there are some updates and adjustments, but the process itself is very slow [...]. [...] it takes some policies and regulations up to 2-4 years to get approved.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>398</sup>]

This highlights the importance of implementing policies as early as possible in organisations because the process of policy approval can be slow.

### 3.4.4.5 DOMAIN RESULTS

The Arab States domains are unfortunately lacking in sufficient comments that directly reference the inclusivity and diversity dimensions. Consequently, much of the story they tell is fragmentary.

#### 3.4.4.5.1 Energy

However, in the energy domain women were said to be well-represented:

*“For the gender issue, women are overrepresented in clusters, since 60% of Moroccan clusters have female managers.”* [Male; Morocco; Industry & Business; Energy<sup>399</sup>]

Including, it seems, at expert and decision-making levels:

*“Morocco has signed a lot of decrees on the equality of sexes [...] and especially in the different sectors that women have not had the right to exercise. [...] we have women working in the mechanical [industry], and as chairwomen. And in our association, we have a [woman as] president and I recruited a [female] engineer*

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<sup>396</sup> MO06

<sup>397</sup> MO07

<sup>398</sup> HKJ03

<sup>399</sup> MO01

*and marketer that means that [gender] equality does not pose any problems [for us].” [Male; Morocco; Industry & Business, CSO; Energy, ICT<sup>400</sup>]*

According to these participants, women are well-represented in the energy domain and involved in key decision-making roles.

### 3.4.4.5.2 Information & Communications technology (ICT)

This participant expressed the issue of resistance to advocating diversity in the ICT field:

*“Well, we meet all kinds of people [when discussing diversity issues]. [Some] support us and understand [...] and others refuse. But unfortunately, the huge number is the refusal toward the diversity topic.” [Female; Jordan; RPO, RFO, Policy body; ICT<sup>401</sup>]*

### 3.4.4.5.3 Bioeconomy

Interview material on gender equality and inclusivity that relates to the bioeconomy is hard to find. However, there are issues with a lack of policy and regulations and the problems of inclusive research:

*“There is no such institutional policies, not up to my knowledge” [Male; Egypt; RPO; Bioeconomy<sup>402</sup>]*

*“I think there has to be institutional policies for gender equality, the thing is there are no regulations, no rules or policies to support [...].” [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>403</sup>]*

It was also noted that there were numerous difficulties when including women participants in studies due to cultural sensitivities:

*“The norms in the Egyptian community [affect the process of involving women]. This is sometimes difficult when you ask questions about income [because it is] very sensitive information. When you do some documentation like taking photos video-recording or even viewing videos this is sometimes difficult especially with women this kind of norms is sometimes challenging.” [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>404</sup>]*

Despite efforts to include minority and lower economic and often illiterate groups:

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<sup>400</sup> MO02

<sup>401</sup> HKJ03

<sup>402</sup> EG01

<sup>403</sup> EG04

<sup>404</sup> EG04

*“We try as much as we can to include both genders this is sometimes difficult, but we try not to forget people who are normally not well-served.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>405</sup>]

In the bioeconomy domain, several challenges still exist in terms of diversity with a lack of institutional policies and inclusivity.

### 3.4.4.6 STAKEHOLDER RESULTS

#### 3.4.4.6.1 Research performing organisations (RPO)

One RPO-based interview participant suggests gender improvements are occurring, but indicates that it may be part of being in a public institution, as opposed to private:

*“Regarding gender equality, as said earlier some cultural aspects must be considered when dealing with this topic. For my institution, majority of research team is female. Maybe because it is a governmental institution. Of course, it might be different in private sector.”* [Male; Egypt; RPO; Bioeconomy<sup>406</sup>]

This participant tentatively suggests that gender diversity is more important in the governmental public sector as opposed to the private sector.

#### 3.4.4.6.2 Research Funding Organisations (RFO)

An RFO director provides a rough breakdown of the gender balance for their very large pool of funded researchers. He describes the Co-PIs as balanced but that participating researchers require more support for men indicating that women currently outnumber them. However, they do not have specific calls to improve on the latter gender imbalance:

*“We do generate a [gender] report to monitor that internally [...] but it is balanced here at [their organisation]. At the level of participating researchers, we actually need to support men, [so that] it is more than balanced.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>407</sup>]

Affirmative action does exist, however, which supports younger researchers:

*“But there [are] some affirmative actions for age groups, [not for gender] to support younger researchers.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>408</sup>]

It remains unclear whether the latter is for rectifying an age imbalance or part of an ageist agenda geared towards more tech-savvy Millennials.

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<sup>405</sup> EG04

<sup>406</sup> EG01

<sup>407</sup> EG02

<sup>408</sup> EG02

### 3.4.4.6.3 Industry & Business

One businesswoman (and CSO/RPO member) saw obstacles for women in the business world, but also noted that it is just a matter of time before the perception of women as business leaders is normalised in society's consciousness:

*"[...] we still have barriers for young businesswomen, [such as] the issue of public perception and parents."* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>409</sup>]

This bias towards younger businesswomen might be because of traditional gender norms embedded in the older generation.

### 3.4.4.6.4 Civil Society Organisations (CSO)

Unfortunately, within the multi-stakeholder interviews, comments on gender equality and inclusivity relating to CSOs are not sufficiently distinguishable from other stakeholder types.

### 3.4.4.6.5 Policy bodies

One interview participant from a policy body suggests prejudicial posting was part of the body's own internal recruitment procedures:

*"However, we may have had some restrictions in [the] recruitment process where some vacancies or posts were oriented to males especially in the higher or senior managerial positions, but I see now this changed."* [Female; Egypt; Policy body; ICT<sup>410</sup>]

However, he noted that this gender imbalance in the recruitment process is being rectified.

### 3.4.4.6.6 Interactions between stakeholders

Outside of this example, there is little from interview participants demonstrating or suggesting interactions between stakeholders. In other reports, RFOs are mostly the main engine of interaction between stakeholders but that does not appear to be the case for inclusivity and equality in this regional sample. The three RFOs in the regional sample do not offer much discussion on the use of funding conditions to impose obligations on grantees to support gender equality and inclusivity. As the reference to EG02 quotation in the RFO subsection above suggests, this may be due to RFOs in this region not having any such obligations attached.

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<sup>409</sup> EG04

<sup>410</sup> EG03

#### 3.4.4.6.7 Key platforms, spaces and players

The interviews did not provide content relating to this section. This might be due to the regional sample lacking strong forms of inclusivity and equality policies or practices and subsequent agencies or actors who implement them.

#### 3.4.4.7 SUMMARY OF GENDER EQUALITY AND INCLUSIVITY

Female representation and participation are the main focus of comments relating to gender equality and inclusivity. Improvements are generally acknowledged and there are also some accounts of equal participation and decision-making (e.g. in the Moroccan energy domain). However, the gender pay gap is not addressed. More complex and progressive understandings of diversity are also not expressed, such as how greater inclusivity can broaden the research and industry perspectives.

Although some organisational activities aim towards some inclusivity and diversity. They tend to be weakly defined and supported with no detailed descriptions of concrete organisational rules or policies. Government and institutional policies also appear to be lacking. In addition, the three RFOs in the regional sample do not offer much discussion on the use of funding conditions to support gender equality and inclusivity, which signals that such obligations are not sufficiently being addressed.

Motherhood is mentioned as one of the main obstacles to advancement for women but there are no expressions of support for stronger interventions. Meritocratic framing is also used throughout to suggest that there are no problems in need of intervening

Other forms of diversity and inclusivity are generally not addressed. An absence of black researchers in environmental science is noted and religious and ethnic inclusive difficulties are referred to by one Egyptian interviewee.

There is a strong meritocratic reasoning present, where organisations are seen as progressive in that it does not select certain genders or ethnicities over others. This ignores deeper legacies of patriarchal biases, conservative cultures, and access issues, and fails to consider how this approach might reproduce the existing inequalities that stem from these problems.

### 3.4.5 PUBLIC ENGAGEMENT

*Public engagement* is one of the six key policy agendas of RRI. There are three key dimensions in how the EC define public engagement. It is collaborative, multi-actor, and should align with societal values, needs and expectations. For example, fostering collaborative and multi-actor research and innovation processes where “all societal actors work together during the whole process in order to align its outcomes to the values, needs and expectations of society.”<sup>411</sup>

<sup>411</sup> <https://www.rri-tools.eu/about-rri>

This definition outlines the boundaries of public engagement within which the interviews and subsequent analyses were conducted. Furthermore, the inclusion of the roles and interactions of the stakeholders facilitates the analysis of the collaborative and multi-actor dimension of the EC pillar definition.

Out of the 42 codes identified for the theme, the four specific codes that stood out through a total count of the relevant codes for all countries included in the interviews are: organisational norms and practices [code 2]; motives-benefits of public engagement and collaboration [code 4]; building a support network and strategic alliances [code 112]; integration of different domains and stakeholders [code 114].

The next four sections provide details about each of the four codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders (including key platforms, spaces and players) are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme of *public engagement*.

### 3.4.5.1 ORGANISATIONAL NORMS AND PRACTICES

The *organisational norms and practices* sub-theme covers any explicit or implicit mention of policies, formal/informal rules, norms, codes, guidelines, values, procedures, and models or frameworks used for diversity and inclusion within the organisation(s). Uncertainty about what such norms and practices entail are also included in this sub-theme.

Name	Description
Organisational norms and practices	<p>Codes that describe <u>organisational norms and practices</u> (i.e. formal/informal rules and procedures within the organisation) for public engagement <i>OR</i> if the respondent shows any <u>uncertainty</u> about what such norms and practices might be or how they might play a role in public engagement.</p> <p>Rules: This does NOT include govt/institutional level policy (coded below).</p>

Unfortunately, partially due to transcription problems, there is no coded data for Morocco. In general, there are relatively few findings to report for this sub-theme. This indicates that the concept of public engagement did not come across properly through the interviews and/or that it was misunderstood. From the comments, only a few formal rules and a limited set of norms and practices were in place for interacting with external groups. Apart from the minor mention of private sector stakeholders, there is nothing in the analysis about the engagement outcomes and whether they align with needs, expectations or values.

From the sample, we can see that there are very few rules or regulations in place for dealing with external groups and stakeholders:

*“We don’t have any regulations regarding [institutional policies or regulations]”*

[Male; Egypt; Industry & Business; Waste Management<sup>412</sup>]

*“We don’t have such institutional policies or regulations.”* [Male; Egypt; RPO,

CSO; Bioeconomy<sup>413</sup>]

Or if there is mention of policies or rules, it is unspecified and not particularly stringent. Interestingly the participant mentioned that the rules stricter and more when working with the private sector:

*“Yes, indeed, we have a set of policies that we are trying to follow [...] when we are engaging with [an] outside entity. [...] it is not really [tough] rules, it depends on the type of entity we are dealing with if public or private sector. If private sector we have additional rules to follow, but if it is public sector it is easier to meet.”*

[Male; Egypt; RPO; ICT<sup>414</sup>]

Relatedly, this interviewee is against too much administration or regulations for dealing with public organisations:

*“The problem with public organisations is that researchers have to focus on many aspects apart from their research like administrative issues, getting signatures from everyone that are, literally, everyone above you.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>415</sup>]

*“That’s why we don’t want to follow governmental footsteps and follow more efficient approach.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>416</sup>]

*“When you have an idea and want to work on it, most of the time we work on independent research lines, at BioKMT we try to bridge [the] gap and enhance cooperative spirits and limit the administrative hurdles.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>417</sup>]

This participant advocates working with independent researchers instead of public organisations to improve efficiency, cooperation, and curb administrative barriers.

### 3.4.5.2 MOTIVES-BENEFITS OF PUBLIC ENGAGEMENT AND COLLABORATION

The *Motives-Benefits of Public Engagement and Collaboration* sub-theme covers any reference to the motivation behind or the various types of benefits derived from engagement

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<sup>412</sup> EG10

<sup>413</sup> EG09

<sup>414</sup> EG05

<sup>415</sup> EG09

<sup>416</sup> EG09

<sup>417</sup> EG09

(for any/all stakeholders involved) and collaboration. Some of the motives and benefits could include understanding attitudes, developing trust, increasing awareness, developing credibility and legitimacy, influencing behaviour change, improving R&I outcomes.

Name	Description
Motives/benefits of public engagement/collaboration	Any reference to the motivation behind or the various types of benefits derived from engagement (for any/all stakeholders involved) and collaboration  Rules: This can include understanding attitudes, developing trust, increasing awareness, developing credibility and legitimacy, influencing behaviour change, improving R&I outcomes.

The interview discussion around *motives-benefits of public engagement and collaboration* is generally positive in tone and mainly talked about in terms of having advantages. Although engagement is occasionally framed as a two-way collaborative process, a lot of it is also framed as a one-way top-down relationship. Often the benefits mentioned are those that accrue to the interviewee's organisation rather than to the other stakeholders.

Still, there are some comments on the benefits of engagement and aligning with the needs and expectations of others. For instance, interview participants describe benefits and motivations to collaborative activities such as how engaging multi-actor stakeholders is viewed as part of 'best practice' in that it helps to reconcile impact to what was planned:

*"We found it as best practice to always engage stakeholders, for example, the government bodies, civil societies organisation, and NGOs also benefit us and [give] us access to public activities. This is important because you want to make sure that you achieve the impact that you initially planned to do."* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>418</sup>]

Similarly, in checking the quality of the results, further advantages appear to be possible from broadening the inclusivity of such engagement:

*"One important aspect of public engagement is that you want to check results and outputs produced from your research. Being more inclusive in this is really beneficial."* [Male; Egypt; RPO, CSO; Bioeconomy<sup>419</sup>]

Other possible benefits and motivations for collaborative practices involve gaining access to the knowledge that external groups have about other groups, which can perhaps help in engaging that group:

*"The municipalities had information on the community and understood the behaviour [and] had a plan on how to enhance it. We call this step, enhancing the*

<sup>418</sup> EG04

<sup>419</sup> EG09

*sustainable community behaviour, because later on the municipality staff wanted to talk to the community more on the 3 R's: Reduce, Reuse and Recycle.” [Female; Jordan; RPO, RFO, Policy body; ICT<sup>420</sup>]*

Others did not see value in public partnerships, viewing them as outside economic measurements of value:

*“I [...] work with many researchers from Europe, Morocco and Africa. We have partnerships and try to develop more and more partnerships. It's always in private partnerships there are no public partnerships because there is no [...] economic value.” [Male; Morocco; RPO; ICT<sup>421</sup>]*

There are also examples where the activities amount more to what can be described as outreach, rather than public engagement as defined in this chapter:

*“And in this domain, we provide several programs, programs to raise the awareness of the importance of science to those youngsters and to engage them in science and technology. We use to have scientific clubs and we organize [...] summer camps for the kids and it is part of the scientific culture activities” [Male; Egypt; RPO; ICT<sup>422</sup>]*

In the following, the benefits of engagement involve the sustainability of local renewable energy projects through training community members in maintaining technology. It is perhaps the closest a quote comes in this sub-theme to describing the benefits of alignment:

*“We aim to have some business going down there in their areas in order to make them benefit financially from the project. [...] the social impact is great, and it helps [with] societal needs. And if we don't engage them from the beginning of the project, that would cause us a problem.” [Male; Jordan; RPO; Energy<sup>423</sup>]*

Throughout the interviews, there was very little from the alignment side of engagement and the motivations or benefits remains somewhat unclear.

### 3.4.5.3 BUILDING SUPPORT NETWORKS AND STRATEGIC ALLIANCES

The *building support networks and strategic alliances* sub-theme covers references to opportunities for finding common grounds, building support networks and mutually beneficial relationships, and/or making connections for research and innovation. It also includes references to building relationships and making connections to facilitate useful outcomes for research and innovation. However, simple exchanges of knowledge are not included here.

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<sup>420</sup> HKJ03

<sup>421</sup> MO03

<sup>422</sup> EG05

<sup>423</sup> HKJ07

Name	Description
Building support networks and strategic alliances	Any reference to opportunities for finding common grounds, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.  Rules: This includes references to building relationships and making connections to facilitate useful outcomes for research and innovation (e.g. in terms of support for strategic ambitions). This does NOT include simple exchange/transfer of knowledge.

There is a lack of information in the interviews that suggests the development of support networks and strategic alliances are aimed towards the alignment part of the definition of public engagement.

One exception was this account on the importance of alliance with key members inside communities for maintaining the future of the organisation and identifying needs of farmers:

*“Having people from inside the community is [...] key. So this is strongly related to stakeholders engagement: when you are going into a village you have to find the one that [people] trust so you are not [...] treated as an outsider. So engaging key players from the community is a strong part [in engagement].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>424</sup>]

*“We have [...] key players or stakeholders in villages and governorates. These people are very important to us and they are like the intermediate body because they communicate the needs and the problems, and they transfer back any new solutions or products. [...] we don't use a very strict hierarchy, so we deal directly with the farmers and the people on the ground who are doing this, we hear the feedback, we invite them to meetings so that they feel no barriers.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>425</sup>]

Further, the interviews did not have much content on building support networks and strategic alliances. This suggests that such engagement is not really part of longer-term approaches to public engagement.

#### 3.4.5.4 INTEGRATION OF DIFFERENT DOMAINS AND STAKEHOLDERS

Any reference to the need for better integration and collaboration between different domains and stakeholders (both cross-disciplinary or otherwise) or involvement/participation at

<sup>424</sup> EG04

<sup>425</sup> EG04

different phases of research and innovation are included under the *integration of different domains and stakeholders* sub-theme.

Name	Description
Integration of different domains and stakeholders	Any reference to the need for better integration and collaboration between different domains and stakeholders (both cross-disciplinary or otherwise) or involvement/participation at different phases of R&I.

There are some examples of some interdisciplinary and integrative efforts in place in Egypt that are directed towards alignment with society values, expectations and needs. For example:

*“We did a code of ethics in engineering, for example, [...] engineer do’s and don’ts. Within this code, we included the syndicate for engineers, and they follow up the work by [a] list of sanctions.”* [Male; Egypt; RPO; Energy<sup>426</sup>]

*“We need also to raise awareness of the importance [of] sorting waste and include the contractors in any proposed system by the government.”* [Male; Egypt; Industry & Business; Waste Management<sup>427</sup>]

However, it is not without problems:

*“I think right now the government is trying to promote science and scientific methods, [but] there is some kind of a gap. I don’t want to be harsh but the current approach of science communication system and public engagement in Egypt [needs] to be reshaped and restructured.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>428</sup>]

It is unclear how much of the interview content solidly relates to public engagement, as defined at the start of this chapter. Consequently, only a few quotes have been reproduced here.

### 3.4.5.5 DOMAIN RESULTS

#### 3.4.5.5.1 Energy

In the energy domain in Jordan, there is a suggestion for community involvement to aid sustainable energy developments and transition. In this quote, the importance of public engagement is based on a local renewable energy project through training community members in maintaining the technology. This suggests the benefits that might come to an energy organisation from aligning with the needs of local communities:

<sup>426</sup> EG08

<sup>427</sup> EG10

<sup>428</sup> EG09

*“We aim to have some business going down there in their areas in order to make them benefit financially from the project. [...] the social impact is great, and it helps [with] societal needs. And if we don’t engage them from the beginning of the project, that would cause us a problem.”* [Male; Jordan; RPO; Energy<sup>429</sup>]

The interview participant also referred to the building of a strategic alliance to take advantage of local connections through local organisations and companies:

*“We looked for local organizations and companies to produce the solar water heaters and promote it to society. After a while, we got more involved directly to the society”* [Male; Jordan; RPO; Energy<sup>430</sup>]

### 3.4.5.5.2 Waste Management

Stakeholder engagement in the domain for this region is underrepresented in the commentary provided by participants.

In Jordan, the CSO works with municipalities to engage communities to move towards more sustainable personal waste management:

*“The municipalities had information on the community and understood the behaviour [and] had a plan on how to enhance it. We call this step, enhancing the sustainable community behaviour, because later on the municipality staff wanted to talk to the community more on the 3 R’s: Reduce, Reuse and Recycle.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>431</sup>]

The approach incorporates elements of how public engagement is defined using focus groups and situation analysis to access community perspectives. Additionally, the end goal is some form of societal improvement:

*“If they are looking for solutions to solid waste management, people need to cooperate because this [is] something [that] touches their daily life and health. The municipality cannot keep up cleaning on their behalf. But, if the community groups are [fully] involved and [know] more about the [best] waste management practises, they will realize the right way to do it [...].”* [Female; Jordan; CSO; Waste Management<sup>432</sup>]

Although, as evident from the last sentence, the methods are still weighed more towards an instructive rather than a co-creative type of approach.

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<sup>429</sup> HKJ07

<sup>430</sup> HKJ07

<sup>431</sup> HKJ03

<sup>432</sup> HKJ04

### 3.4.5.5.3 Information & Communications technology (ICT)

There is evidence of ICT workers recognising the value of engagement in terms of participation and resources:

*“In the research and innovation topics in general we aim to have the “participatory approach” and to be open with all people, that's to say; the participation of everyone.”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>433</sup>]

*“Resource issues can also be restrictive of ICT engagement activities and [this can] possibly [be] overcome by actors willing to volunteer. [...] in some projects we don't have enough funds, therefore, we need people to volunteer in that field.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>434</sup>]

Researchers, with ICT innovations that are of benefit to society, can be aided and facilitated by other stakeholders, e.g. CSOs assisting ICT experts to develop their idea:

*“[...] the researchers [are] there but we help [them] in giving instructions to develop an idea. We are providing [them with] a suitable environment when it comes to labs; we help them when they go to governmental departments. And last but not least, we help them work more on the idea and how we can connect with someone who can develop this idea.”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>435</sup>]

Although, there was one interview participant who did not see validity in collaborating with public groups. Instead, his preference for collaboration was strongly in favour of working with private companies, as part of delivering against commercial interests:

*“I [...] work with many researchers from Europe, Morocco and Africa. We have partnerships and try to develop more and more partnerships. It's always in private partnerships there are no public partnerships because there is no [...] economic value.”* [Male; Morocco; RPO; ICT<sup>436</sup>]

Therefore, according to this participant, public partnerships and engagements did not add to their economic value.

### 3.4.5.5.4 Bioeconomy

Some key bioeconomy players appear to be the trusted members of local communities, who can help in providing much needed ongoing access to the local communities and farmers, and their needs:

*“Having people from inside the community is [...] key. So this is strongly related to stakeholders engagement: when you are going into a village you have to find the*

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<sup>433</sup> HKJ08

<sup>434</sup> HKJ03

<sup>435</sup> HKJ08

<sup>436</sup> MO03

*one that [people] trust so you are not [...] treated as an outsider. So engaging key players from the community is a strong part [in engagement].” [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>437</sup>]*

*“We have [...] key players or stakeholders in villages and governorates. These people are very important to us and they are like the intermediate body because they communicate the needs and the problems, and they transfer back any new solutions or products. [...] we don’t use a very strict hierarchy, so we deal directly with the farmers and the people on the ground who are doing this, we hear the feedback, we invite them to meetings so that they feel no barriers.” [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>438</sup>]*

Thus, engagement in the bioeconomy domain with key members such as farmers can identify societal needs and motivate suitable solutions.

### 3.4.5.6 STAKEHOLDER RESULTS

#### 3.4.5.6.1 Research Performing Organisations (RPO)

The regional RPO position acknowledges the value of collaboration both with other research organisations and the industry.

Although multi-stakeholder engagement is supported in this region for RPOs, commercial alliances are by far the most dominant and prioritised avenue of collaboration and alliance-building. The following example is one of many that advance this relationship:

*“An initiative from [the] University called “Faculty for factory” [aims] to involve [...] academic members and students to look for [a] development agreement with factories. The developments were made based on the financial support we get for applied research as well as the technical experience. That involves everyone, from technical people working in the factories, owners, to students and professors to study, apply and test the results of these developments.” [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>439</sup>]*

In this case, the “faculty for factory” initiative clearly emphasises the dominant purpose of alliances.

#### 3.4.5.6.2 Research Funding Organisations (RFO)

The three RFO bodies do not discuss public engagement in relation to their RFO activities and consequently, there is nothing to report in this subsection.

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<sup>437</sup> EG04

<sup>438</sup> EG04

<sup>439</sup> HKJ05

### 3.4.5.6.3 Industry & Business

From the following industry and business interview participant, two-way engagement is not central to resolving issues with waste contractors:

*“I am not aware of any, apart from the mindset issue of the waste contractors and how to change it and convince them that we are here for their own good.”* [Male; Egypt; Industry & Business; Waste Management<sup>440</sup>]

However, for a participant from Egypt based at an organisation that is classified as both industry and business and a CSO, there is a clear interest in engaging a diverse set of stakeholders in a variety of ways:

*“Having people from inside the community is [...] key. So this is strongly related to stakeholders engagement: when you are going into a village you have to find the one that [people] trust so you are not [...] treated as an outsider. So engaging key players from the community is a strong part [in engagement].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>441</sup>]

*“[...] the model of my organization is built on fitting the societal needs - my university is part of the wide SEKEM umbrella. It includes [the] SEKEM foundation, an NGO and private SEKEM companies. [...] the research in the university comes from the needs of the society, fed by SEKEM NGO, or the industry needs [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>442</sup>]

*“We have [...] key players or stakeholders in villages and governorates. These people are very important to us and they are like the intermediate body because they communicate the needs and the problems, and they transfer back any new solutions or products. [...] we don't use a very strict hierarchy, so we deal directly with the farmers and the people on the ground who are doing this, we hear the feedback, we invite them to meetings so that they feel no barriers.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>443</sup>]

Collaboration is central to the business model of the following SME from Morocco:

*“The cluster unites key actors in the Energy sector (companies/SMS, universities, research centres) around a common goal, which is the emergence of innovative market-oriented projects in the fields Mechatronics [...] and energy.”* [Male; Morocco; Industry & Business; Energy<sup>444</sup>]

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<sup>440</sup> EG10

<sup>441</sup> EG04

<sup>442</sup> EG04

<sup>443</sup> EG04

<sup>444</sup> MO01

*“The activities of the cluster address the entire ecosystem of innovation, namely: universities and research centres, already established companies with an innovation structure and start-ups with strong development potential.”* [Male; Morocco; Industry & Business; Energy<sup>445</sup>]

The cluster approach is also part of the research and innovation development approach of this organisation to develop and advance innovation:

*“We work on project bases around innovation with collaborative project and research institutions. Our goal is to develop a new product [and process] so the innovation will [rely] on those developments [...].”* [Male; Morocco; Industry & Business; Waste Management, Bioeconomy<sup>446</sup>]

The industry and business sector displayed a strong involvement with stakeholders to meet societal or organisational needs.

#### 3.4.5.6.4 Civil Society Organisations (CSO)

In Jordan, the CSO works with municipalities to engage communities to move towards more sustainable personal waste management:

*“The municipalities had information on the community and understood the behaviour [and] had a plan on how to enhance it. We call this step, enhancing the sustainable community behaviour, because later on the municipality staff wanted to talk to the community more on the 3 R's: Reduce, Reuse and Recycle.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>447</sup>]

This approach incorporates elements of how public engagement is defined using focus groups and situation analysis to access community perspectives. Additionally, the end goal is some form of societal improvement:

*“If they are looking for solutions to solid waste management, people need to cooperate because this [is] something [that] touches their daily life and health. The municipality cannot keep up cleaning on their behalf. But, if the community groups are [fully] involved and [know] more about the [best] waste management practises, they will realize the right way to do it [...].”* [Female; Jordan; CSO; Waste Management<sup>448</sup>]

Although, as evident from the last sentence, the methods are still weighted more towards an instructive rather than a co-creative type of approach.

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<sup>445</sup> MO01

<sup>446</sup> MO07

<sup>447</sup> HKJ03

<sup>448</sup> HKJ04

The use of the ‘cluster’ of organisations is a recurring approach in Morocco in developing SMEs which this CSO is a part of:

*“Our cluster is based in Marrakech, so we are always in [connection] with other structures [there]. [...] we have to collaborate between us, to solve the problem of our SMEs and [especially] to introduce some new activities in our good area [of] food, industry and cosmetics.”* [Female; Morocco; RPO, CSO; Energy, Waste Management<sup>449</sup>]

*“We try to include people from outside [...] our group by first inviting them in our cluster and to take part in our [training meetings]. They can have a [...] role in our cluster to be part of this project.”* [Female; Morocco; RPO, CSO; Energy, Waste Management<sup>450</sup>]

In Jordan, researchers with ICT innovations that are of benefit to society are aided and facilitated by another stakeholder to develop their idea:

*“[...] the researchers [are] there but we help [them] in giving instructions to develop an idea. We are providing [them with] a suitable environment when it comes to labs; we help them when they go to governmental departments. And last but not least, we help them work more on the idea and how we can connect with someone who can develop this idea.”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>451</sup>]

An interviewee from an Egyptian sample also discusses the close collaborative activities that are undertaken with the private sector:

*“[...] the model of my organization is built on fitting the societal needs - my university is part of the wide SEKEM umbrella. It includes [the] SEKEM foundation, an NGO and private SEKEM companies. [...] the research in the university comes from the needs of the society, fed by SEKEM NGO, or the industry needs [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>452</sup>]

*“Having people from inside the community is [...] key. So this is strongly related to stakeholders engagement: when you are going into a village you have to find the one that [people] trust so you are not [...] treated as an outsider. So engaging key players from the community is a strong part [in engagement].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>453</sup>]

*“We have [...] key players or stakeholders in villages and governorates. These people are very important to us and they are like the intermediate body because they communicate the needs and the problems, and they transfer back any new*

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<sup>449</sup> MO06

<sup>450</sup> MO06

<sup>451</sup> HKJ08

<sup>452</sup> EG04

<sup>453</sup> EG04

*solutions or products. [...] we don't use a very strict hierarchy, so we deal directly with the farmers and the people on the ground who are doing this, we hear the feedback, we invite them to meetings so that they feel no barriers.” [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>454</sup>]*

Therefore, this region offers various examples of CSOs working or assisting in the development of businesses.

### 3.4.5.6.5 Policy bodies

Public engagement does not appear to be prioritised by our three representatives except for the following statement that merely acknowledges the use of partnership programmes:

*“We engage them like in the Partnerships program and their role is Exchange of experiences.” [Female; Egypt; Policy body; ICT<sup>455</sup>]*

Otherwise, the stakeholders did not refer to norms or practices for dealing with outside groups.

### 3.4.5.6.6 Interactions between stakeholders

RPOs are dependent on voluntary work for their collaborative projects:

*“There are some people who work with us as volunteers and others work with us because it's their job. [...] In some projects, we don't have enough funds, so we need people to volunteer in that field.” [Female; Jordan; RPO, RFO, Policy body; ICT<sup>456</sup>]*

A lot of stakeholder interaction in the Arab States indicates organisations acting as mediators and bridge-builders to other stakeholders such as in the following example:

*“Some of them have plans but they don't have any kind of financial support. And others have financial support but don't have great business minds. We come as an integral supporter on both financial and technical development aspects as needed.” [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>457</sup>]*

Therefore, RPOs are dependent on RFOs for more reasons than simply their demands for engagement, including being able to afford the involvement of stakeholders.

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<sup>454</sup> EG04

<sup>455</sup> EG03

<sup>456</sup> HKJ03

<sup>457</sup> HKJ05

### 3.4.5.7 KEY PLATFORMS, SPACES AND PLAYERS

In Egypt, the social entrepreneurial and cultural transformation umbrella organisation, SEKEM, is mentioned as a key player in adjoining societal needs to universities:

*“[...] the model of my organization is built on fitting the societal needs - my university is part of the wide SEKEM umbrella. It includes [the] SEKEM foundation, an NGO and private SEKEM companies. [...] the research in the university comes from the needs of the society, fed by SEKEM NGO, or the industry needs [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>458</sup>]

Some key players for the Egyptian bioeconomy appear to be the trusted members of local communities:

*“Having people from inside the community is [...] key. So this is strongly related to stakeholders engagement: when you are going into a village you have to find the one that [people] trust so you are not [...] treated as an outsider. So engaging key players from the community is a strong part [in engagement].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>459</sup>]

*“We have [...] key players or stakeholders in villages and governorates. These people are very important to us and they are like the intermediate body because they communicate the needs and the problems, and they transfer back any new solutions or products. [...] we don't use a very strict hierarchy, so we deal directly with the farmers and the people on the ground who are doing this, we hear the feedback, we invite them to meetings so that they feel no barriers.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>460</sup>]

Another key player in Egypt is the Ministry of Higher Education and Scientific Research, which has direct connections to multi-actor stakeholders including universities and affiliated community centres:

*“Having the Minister for scientific research [as] the same person for higher education is important. We are benefiting from the exposure to the universities in Egypt. We have more than 46 universities in Egypt and we have over 3 Million Students as undergrads, so this is a big segment in addition to the staff working in the universities and the community centres affiliated to the universities.”* [Female; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>461</sup>]

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<sup>458</sup> EG04

<sup>459</sup> EG04

<sup>460</sup> EG04

<sup>461</sup> EG07

It is clear that Egypt uses key platforms and players such as SEKEM, stakeholder engagement, and the ministry of higher education and scientific research to address societal needs.

### 3.4.5.8 SUMMARY OF PUBLIC ENGAGEMENT

It is not clear that the concept of public engagement is understood in a way that connects to the EU pillar definition. Engagement is occasionally framed as a two-way collaborative process, however, a lot of it is also framed as a one-way top-down relationship. Collaboration is generally positive in tone and talked about in terms of having advantages. However, collaboration without a sense of alignment is not exactly public engagement as defined in this chapter.

Apart from the minor mention of private sector stakeholders, there is little about the engagement outcomes and whether they align with needs, expectations or values.

Often the benefits mentioned are those that accrue to the interviewee's organisation, rather than to the other stakeholders. Still, there are some comments on the benefits of engagement and aligning with the needs and expectations of others.

The interviews indicate that there are very few formal rules and a very limited set of norms and practices in place for interacting with external groups.

### 3.4.6 OPEN SCIENCE

*Open science* includes both the EU 'open access' pillar and 'open and transparent' process dimension. The open-access pillar definition incorporates the FAIR principle (Findable, Accessible, Interoperable, Reusable). According to the principle, the attributes of open access are the easy accessibility and findability of data, shareability of data without reconfiguration. Open access is intended to encourage collaboration; catalyse innovation; be cost-effective, facilitate productive dialogue; and improve research quality.<sup>462</sup>

The 'open and transparent' dimension involves inclusivity and the provision of meaningful information at all stages of the process. All actors should be encouraged and enabled to engage with, discuss, and scrutinise science and technology. This will empower them to make more informed decisions. Openness and transparency should develop a multiple-way dialogue with all relevant parties, foster accountability and public trust. This R&I process then includes those that are not normally part of science and technology systems.

These definitions define the boundaries of the theme of open science within which the interviews and analyses were conducted. Out of the 10 codes identified for the theme, the four specific codes that stood out through a total count of the relevant codes for all countries

<sup>462</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

included in the interviews are: levels and limits of open access [code 46]; lack or uncertainty of policy [code 50]; risks-disadvantages associated with open data access [code 51]; motives-benefits of open access and data [code 52].

Chapter-wise code counts	Arab States			
	Egypt	Morocco	Jordan	Total
<b>45: Open Science</b>				
46: Level and limits of open access	12	0	13	25
47: Data protection	0	11	1	12
48: Data accessibility	4	5	3	13
49: Organisational norms and practices	15	2	3	20
50: Lack or uncertainty of policy	15	5	2	22
51: Risks-Disadvantages associated with open data-access	19	3	7	29
52: Motives-Benefits of open access and data	14	9	9	32
76: Transparency	8	4	2	14
77: Accountability	1	2	1	4
106: Financial constraints and considerations	5	1	5	11

*Lack or uncertainty of policy* with a code count of 15 has the second-lowest count for this region. However, to improve comparability the top four for all regions in total, it is nevertheless included and discussed here in this Arab States report.

The next four sections provide details about each of the four codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders (including key platforms, spaces and players) are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *open science*.

### 3.4.6.1 LEVELS AND LIMITS OF OPEN ACCESS

Included in this *levels and limits of open access* sub-theme are references to limits on open access or different rules, procedures or criteria for open access/data needed at different levels of the organisation. References to sharing only particular forms of data and not others are included.

Name	Description
Levels and limits of open access	<p>Any reference to limits on open access or different rules, procedures or criteria for open access/data needed at different levels of the organisation (or beyond).</p> <p>Rules: This can include any references to sharing only particular forms of data (e.g. sharing results and outcomes, not data or vice versa; sharing policy-driven research, not market-driven research, sharing with key stakeholders and not the general public, etc.)</p> <p>This should also be distinguished from risks/disadvantages of open access/data, which are concerned with negative consequences, while this includes the limits that need to be applied in certain specific instances to open access/data.</p>

According to one interviewee from the Egyptian sample, the release of primary data is problematic and may lead to loss of copyright:

*“Primary research data or raw data is problematic. I think it wouldn’t allow me to maintain copyright [...]. I believe it has to be confidential unless otherwise requested by someone. [...]”* [Male; Egypt; RPO; Bioeconomy<sup>463</sup>]

They advocate open access but for researcher visibility rather than for open science, however, affordability remains a problem:

*“Honestly, I believe this is a very important topic. As a researcher, I always wish to publish in open access journals because usually, it could enhance the visibility of my publication and accordingly more citations. However, open access fees [are] expensive and not really affordable for many researchers.”* [Male; Egypt; RPO; Bioeconomy<sup>464</sup>]

Authorship rights can be weighed up against innovation when deciding what to disclose:

*“Making data available is important, however, we have to preserve the rights of the author [...]. Unless the idea has know-how or an innovation component, then it is not necessary to disclose it all to preserve the rights of the author.”* [Male; Egypt; RPO; Energy<sup>465</sup>]

The issue of financing sustained data collection forms part of the considerations for the different levels of access. Community-based data appear to be viewed almost as part of a commons, and specific data is costly:

<sup>463</sup> EG01

<sup>464</sup> EG01

<sup>465</sup> EG08

*“The first kind is that the data [belongs] to that certain organization or institution, and I can't publish it or do anything to it [...]. The second kind is [...] community or society based, where [it] should be public to everyone and that everyone should benefit from it. And I think that it's people's right to have an access to these data, especially researchers. [...] The third and last kind is the specific data [...]. We pay in order to have this data [...] and it costs me a lot of money for maintenance and operation.” [Female; Jordan; RPO; Energy<sup>466</sup>]*

Private and government institutions have a large role in deciding whether results are published:

*“[...] If publishing research data help in [the] development of the research subject without affecting the institution that we took these results from, usually they don't mind allowing us to publish them. And some governmental institutions helped us with their research data results, but since their data is critical, they [...] make us not publish the data in any way. When it comes to private sectors or governmental ones, we should respect their opinion and decisions since they own or even played major role helped in the research data results.” [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>467</sup>]*

Only results, however, are considered and not all stages of the process. An identical situation is described by this researcher – and again towards results only:

*“Well, the research results are connected to the organization that helped in producing [them]. In other words, the results of a [...] study requested from companies or industries are [their] property, and usually, it is prohibited by the agreements made with them from being published in any way.” [Male; Jordan; RPO; Waste Management<sup>468</sup>]*

In the sub-theme, commercialisation and intellectual property rights are often prioritised first over open access and RPOs are subject to the data requirement of their collaborators. Funding plays a key role in establishing the levels at which open access is allowed. There is no indication that the available access is intended for all stages of R&I processes or that efforts are being made to make the information more meaningful. References to primary data appear to be more restrictive towards release than for the results.

### 3.4.6.2 LACK OR UNCERTAINTY OF POLICY

The *lack or uncertainty of policy* sub-theme includes any reference to respondents' uncertainty about government and institutional policy beyond their organisation. Therefore, any discussion on organisational norms and practices are not included here.

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<sup>466</sup> HKJ02

<sup>467</sup> HKJ05

<sup>468</sup> HKJ06

Name	Description
Lack or uncertainty of policy	<p>Coding for any reference to respondent's uncertainty about govt/institutional policy or a lack of govt/institutional policy for open access and open data (beyond the organisation).</p> <p>Rules: This does NOT include any discussion on organisational norms and practices (both formal and informal) (coded above).</p>

This quote contains no references to the type of policy or access that should be encouraged:

*“Up to my knowledge, there are no such [government] policies”* [Male; Egypt; RPO; Bioeconomy<sup>469</sup>]

According to other policy body members, there are no Egyptian government policies, but there is currently work underway to do more in this area for open access:

*“There is no such regulation [...] but we are going to make one since we support open access.”* [Female; Egypt; Policy body; ICT<sup>470</sup>]

And, at present, they perceive that the absence of such regulations is relatively inconsequential, as there are no regulations explicitly pushing in the opposite direction:

*“There is no governmental regulations or policies [and there is no] supporting regulations so it is neutral.”* [Male; Egypt; RPO; ICT<sup>471</sup>]

With a lack of policy, there is a sense here that open access responsibility is individualised to the researcher:

*“I am not aware of regulations related to this, but I think they are in favour of supporting open source. And for the open access, it is not the say of the government, it is the say of the researcher because he is the sole owner [...]”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>472</sup>]

Indeed, this is only emphasised by another Egyptian researcher and CSO member saying that:

*“I think government is not aware of it in Egypt. There are no policies on communicating results out of research.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>473</sup>]

Perhaps because of such uncertainty and lack of policy, open access is deprioritised over number of citations:

<sup>469</sup> EG01

<sup>470</sup> EG03

<sup>471</sup> EG05

<sup>472</sup> EG07

<sup>473</sup> EG09

*“In Egypt, no one really cares if it is [an] open access publication or not. Not even quality of data or the journal itself, it is all about citations.” [Male; Egypt; RPO, CSO; Bioeconomy<sup>474</sup>]*

They also point to several tensions that need to be teased out between open access and high impact or patents:

*“There [are] so many questions [that] need to be handled, like are we after high impact journals, or follow open access models, or increase patent applications, or supporting ways of communication?” [Male; Egypt; RPO, CSO; Bioeconomy<sup>475</sup>]*

The Jordan sample indicates a lack of coherency with regard to publication policy and individual responsibility:

*Yes [with regard to publishing limits], sometimes it is from the government and sometimes it's from the individual concern itself.” [Female; Jordan; RPO, RFO, Policy body; ICT<sup>476</sup>]*

From the Moroccan sample, there are some suggestions of a lack of policy as well:

*“There is no [governmental] policies; we are doing this by ourselves because we don't have the opportunity to be part of the big project to have the free access.” [Female; Morocco; RPO, CSO; Energy, Waste Management<sup>477</sup>]*

There are many expressions of uncertainty or absence of policy running through this sub-theme.

### 3.4.6.3 RISKS-DISADVANTAGES ASSOCIATED WITH OPEN DATA ACCESS

The *risks-disadvantages associated with open data access* sub-theme includes references to the disadvantages of open data access.

Name	Description
Risks/Disadvantages associated with open data/access	Any reference to the negative consequences/disadvantages of having data open access (e.g. in terms of IP rights, patents, commercially sensitive data, competitive advantage, data distortion, financial concerns, data overload, misuse/shortcomings or negative perceptions attached to open-access journals, etc.).

<sup>474</sup> EG09

<sup>475</sup> EG09

<sup>476</sup> HKJ03

<sup>477</sup> MO06

Low status and impact factors are ascribed to open access journals by Egyptian researchers:

*“I found that open access local periodicals or local journals in Egypt, despite being free or of low cost, [...] doesn’t have an impact factor and accordingly [is] not attractive. There are no national repositories to share primary research data.”*  
[Male; Egypt; RPO; Bioeconomy<sup>478</sup>]

This, according to another interviewee, is why there is a low preference for publishing in them:

*“I think researchers in my university, and normally in Egypt, are keen to publish but not specifically in open access journals which [are] related to the motive to do so.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>479</sup>]

*“I do think [...] our researchers consider open access journals, they usually select the journal that they publish according to how relevant it is [looking at] its impact factor, and the fees required for publication. But the open-access journals could be the fifth or sixth preference of choice.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>480</sup>]

Although that is partially disputed by another interviewee:

*“Yes there are some norms or practices about this, some people think that publishing in open access journal indicates it is not a good journal. I think maybe because there are many journals with open access nature with [a] bad reputation, so researchers relate this [to] the definition of open access, but of course is not the truth about it.”* [Female; Egypt; Policy body; ICT<sup>481</sup>]

Relatedly, open access journals are seen as deviating from performance metrics that are used to evaluate the quality of a researcher’s work for promotion:

*“This is left to author and his preferences, because when he applies for [a] promotion, he has to have a certain number of published research [articles]. And after that, the evaluators decide the grades of each published article or journals [depending] on their point of view of the conferences and journals.”* [Male; Egypt; RPO; Energy<sup>482</sup>]

*“No specific grades or extra points could be provided if it is open access, so no preferences in open access.”* [Male; Egypt; RPO; Energy<sup>483</sup>]

*“There is [a] wide perception that open access means low quality [...].”* [Female; Egypt; RPO; Energy<sup>484</sup>]

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<sup>478</sup> EG01

<sup>479</sup> EG04

<sup>480</sup> EG04

<sup>481</sup> EG03

<sup>482</sup> EG08

<sup>483</sup> EG08

<sup>484</sup> EG06

Another interviewee contradicts this account:

*“However, in career promotion committees they are considering the open access journals the same as other journals and the most important thing for them if it [is] indexed internationally or not.”* [Female; Egypt; Policy body; ICT<sup>485</sup>]

The cost of open access is considered a disadvantage that is off-putting for researchers:

*“However, open access fees [are] expensive and not really affordable for many researchers.”* [Male; Egypt; RPO; Bioeconomy<sup>486</sup>]

Maintaining ownership of raw data is viewed as problematic under open access:

*“Primary research data or raw data is problematic. I think it wouldn’t allow me to maintain copyright [...].”* [Male; Egypt; RPO; Bioeconomy<sup>487</sup>]

Similarly, commercial interests are the main risk considered here:

*“[...] in research we try to develop a new process or product and [...] we need to protect this work by publication. Of course, when we make the publication we can have open access. But when we protect our innovation by patent there is some condition we need to respect. The access must respect patent [requirements because] we need to sell the innovation to sell our new product for the industry.”* [Male; Morocco; RPO; Energy, Waste Management<sup>488</sup>]

Open access is viewed as in conflict with patents at some universities:

*“For universities, they have some researchers [that] don’t like to publish in open access [because] it couldn’t be shared over open access until they have this patent in place that’s actually what makes the preferences of choosing open or closed access [journals].”* [Male; Egypt; RPO; ICT<sup>489</sup>]

The cost to publish in open access journals is seen as preventing researchers from using open access:

*“Well we have concerns about this, open access [is] supposed to be for all the people around the world to know more about research and increase their visibility and [...] citations to elevate [their] H-Index, but this costs a lot of money and not all institutes in Egypt provide the money for this.”* [Female; Egypt; RPO; Energy<sup>490</sup>]

Another interviewee views the expenses of providing open access data as a disadvantage and an obstacle:

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<sup>485</sup> EG03

<sup>486</sup> EG01

<sup>487</sup> EG01

<sup>488</sup> MO11

<sup>489</sup> EG05

<sup>490</sup> EG06

*“If we make a piece of information available [...] I cannot make it available for everybody. I have to do this [for a] fee [since] I need to cover my expenses and we don’t have any financial support or particular funding from anybody, in term of grants.”* [Male; Egypt; Industry & Business; Waste Management<sup>491</sup>]

Involving the public in all stages of the research process is considered a big risk, as is evident from the fears of publishing primary data, which are perceived as potentially being misinterpreted and misrepresented:

*“I don’t think it is a good idea, because primary data [is] collected according to surveys designed by researchers who are still pursuing their idea. [...] if we are doing research [other researchers] can contact the author [for] primary data. [...] also the media, we don’t have mature media to use this primary data and they might manipulate it.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>492</sup>]

The perception that open access comes with restrictive costs is mentioned a lot in this sub-theme, as well as the low prestige attributed to open access journals which are viewed as threatening promotion prospects.

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<sup>491</sup> EG10

<sup>492</sup> EG07

### 3.4.6.4 MOTIVES-BENEFITS OF OPEN ACCESS AND DATA

Any reference to the benefits or motivations of open access, such as influencing public opinion, furthering research and policy, improved visibility, allowing corrective measures, etc. are covered by this *motives-benefits of open access and data* sub-theme.

Name	Description
Motives/ Benefits of open access and data	Any reference to benefits of open access, such as influencing public opinion, furthering research and policy, improved visibility, allowing corrective measures, etc.

Improving the profile and visibility of researchers and their publications are named as benefits by several interviewees, particularly by those from the Egyptian sample:

*“Honestly, I believe this is a very important topic. As a researcher, I always wish to publish in open access journals because usually, it could enhance the visibility of my publication and accordingly more citations. However, open access fees [are] expensive and not really affordable for many researchers.”* [Male; Egypt; RPO; Bioeconomy<sup>493</sup>]

*“The motive for journals to go open access is for the visibility.”* [Female; Egypt; Policy body; ICT<sup>494</sup>]

*“Usually around the world, it is [an] institutional thing to support open access. I am not sure, but I think that some institutes in Egypt provide these fees for their researchers or at least give them incentives if they publish something in a well-known journal. Because visibility for the research is visibility for the institute. [Also] for better identification of researchers who work in specific fields to raise the visibility and opportunities for engagement in international projects and the collaborations.”* [Female; Egypt; RPO; Energy<sup>495</sup>]

Increasing citations through improved access is also mentioned in this quote:

*“[...] open access not only [serves] the community but also serves the research facilities, institutes, and universities. Their content and articles are really outreaching and accordingly, the citations of those articles are increasing, and this helps and [benefits] the institution ranks.”* [Male; Egypt; RPO; ICT<sup>496</sup>]

The increased citations are viewed by the interviewee as improving the world ranking for Egyptian universities:

<sup>493</sup> EG01

<sup>494</sup> EG03

<sup>495</sup> EG06

<sup>496</sup> EG05

*“[...] we are [focused to] raise the rank of the universities and institutions here in Egypt [so] we lean more towards open access. Open access [...] really benefits the universities. And we can see this, starting from 2017 we only had 3 universities in the top 500 ranked universities, [and now] we have about 19.” [Male; Egypt; RPO; ICT<sup>497</sup>]*

The improvements open access brings to the quality of research overall is another recurring benefit. Open access is viewed as benefitting society in general and that it helps to avoid unintentional duplication:

*“[...] the main goal of research and knowledge is to keep on developing what benefits mankind. [...] the more data published the better because more people can benefit from it. Also, I encourage [the] publication of barriers and obstacles in the implementation process, so that people can [...] avoid [them] and to avoid duplications in research methodologies and procedures in the same areas and fields.” [Male; Jordan; RPO; Waste Management<sup>498</sup>]*

Another interviewee from Jordan views open access as leading to improvements in the speed and depth of the research:

*“Yes, I'm with having open access to the results. I think the whole world should go from closed to open access. [...] because it will motivate the researcher to dig more and get to the information [faster] and build on other experience.” [Male; Jordan; RPO, CSO; Energy, ICT<sup>499</sup>]*

Finally, open access was also discussed as a means of reducing the cost of access to articles for researchers:

*“[...] in our university we have to pay [for article access], so [with] open access it's available for everybody.” [Female; Morocco; RPO; Energy<sup>500</sup>]*

Research quality and the visibility of both the researcher and their research are the main benefits-motives. The role that visibility might play on citations is apparent from the perspective of the researcher, but also in relation to the universities and to the journal editors.

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<sup>497</sup> EG05

<sup>498</sup> HKJ06

<sup>499</sup> HKJ08

<sup>500</sup> MO05

### 3.4.6.4.1 Energy

Interview participants from the energy domain do not directly address open science in relation to energy except for the following comment, which emphasises the different forms of data he uses in public accessibility:

*“The first kind is that the data [belongs] to that certain organization or institution, and I can't publish it or do anything to it [...]. The second kind is [...] community or society based, where [it] should be public to everyone and that everyone should benefit from it. And I think that it's people's right to have an access to these data, especially researchers. [...] The third and last kind is the specific data [...]. For example, we have 35 stations to measure the "Wind-Speed" in Jordan [...]. We pay in order to have this data [...] and it costs me a lot of money for maintenance and operation.”* [Female; Jordan; RPO; Energy<sup>501</sup>]

### 3.4.6.4.2 Waste Management

Waste management is not commented on directly in relation to open science, with the following exception:

*“[...] usually we cooperate with the local community especially when we have environmental impacts assessment, but we have contracts with companies, [but sometimes] these results are critical for them, thus [they] don't allow for publishing or sharing it with others.”* [Male; Jordan; RPO; Waste Management<sup>502</sup>]

This quotation makes clear that even though certain activities necessitate the involvement of local stakeholders (in this case, for Environmental Impact Assessment), their involvement provides no guarantees that those involved will ever see the data. This is because the data itself would normally be regarded as property of the company.

### 3.4.6.4.3 Bioeconomy

Due to concerns over misuse of data and the sensitive nature of biotechnology data, open access is viewed with suspicion in this domain:

*“[...] Depending on some projects, we have some projects under the "classified" title. There are some people who don't use these data in the [...] correct way.”* [Female; Jordan; RPO, CSO; Bioeconomy<sup>503</sup>]

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<sup>501</sup> HKJ02

<sup>502</sup> HKJ06

<sup>503</sup> HKJ01

### 3.4.6.5 STAKEHOLDER RESULTS

#### 3.4.6.5.1 Research Performing Organisations (RPO)

For some researchers, working with potentially commercial research maintaining ownership of raw data is viewed as problematic under open access:

*“Primary research data or raw data is problematic. I think it wouldn’t allow me to maintain copyright [...].”* [Male; Egypt; RPO; Bioeconomy<sup>504</sup>]

Similarly, commercial interests are the main risk considered here:

*“[...] in research we try to develop a new process or product and [...] we need to protect this work by publication. Of course, when we make the publication we can have open access. But when we protect our innovation by patent there is some condition we need to respect. The access must respect patent [requirements because] we need to sell the innovation to sell our new product for the industry.”* [Male; Morocco; RPO; Energy, Waste Management<sup>505</sup>]

The perception of the low impact of open access journals negatively affecting the performance metrics used to measure their careers is a key disadvantage pointed out by several researchers. Low status and impact factors are ascribed to open access journals by Egyptian researchers:

*“I found that open access local periodicals or local journals in Egypt, despite being free or of low cost, [...] doesn’t have an impact factor and accordingly [is] not attractive. There are no national repositories to share primary research data.”* [Male; Egypt; RPO; Bioeconomy<sup>506</sup>]

This, according to another interviewee, is why there is a low preference for publishing in them:

*“I do think [...] our researchers consider open access journals, they usually select the journal that they publish according to how relevant it is [looking at] its impact factor, and the fees required for publication. But the open-access journals could be the fifth or sixth preference of choice.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>507</sup>]

Although that is partially disputed by another interviewee:

*“Yes there are some norms or practices about this, some people think that publishing in open access journal indicates it is not a good journal. I think maybe because there are many journals with open access nature with [a] bad reputation, so researchers relate this [to] the definition of open access, but of course is not the truth about it.”* [Female; Egypt; Policy body; ICT<sup>508</sup>]

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<sup>504</sup> EG01

<sup>505</sup> MO11

<sup>506</sup> EG01

<sup>507</sup> EG04

<sup>508</sup> EG03

Relatedly, open access journals are seen as deviating from performance metrics that are used to evaluate the quality of a researcher's work for promotion:

*"This is left to [the] author and his preferences because when he applies for [a] promotion, he has to have a certain number of published research [articles]. And after that, the evaluators decide the grades of each published article or journals [depending] on their point of view of the conferences and journals."* [Male; Egypt; RPO; Energy<sup>509</sup>]

*"No specific grades or extra points could be provided if it is open access, so no preferences in open access."* [Male; Egypt; RPO; Energy<sup>510</sup>]

*"There is [a] wide perception that open access means low quality [...]."* [Female; Egypt; RPO; Energy<sup>511</sup>]

Another interviewee contradicts this position, however:

*"However, in career promotion committees they are considering the open access journals the same as other journals and the most important thing for them if it [is] indexed internationally or not."* [Female; Egypt; Policy body; ICT<sup>512</sup>]

And the increase in citations through open access is viewed by another interviewee as improving the world ranking for Egyptian universities:

*"[...] we are [focused to] raise the rank of the universities and institutions here in Egypt [so] we lean more towards open access. Open access [...] really benefits the universities. And we can see this, starting from 2017 we only had 3 universities in the top 500 ranked universities, [and now] we have about 19."* [Male; Egypt; RPO; ICT<sup>513</sup>]

The cost of open access is considered a disadvantage that is off-putting for researchers:

*"However, open access fees [are] expensive and not really affordable for many researchers"* [Male; Egypt; RPO; Bioeconomy<sup>514</sup>]

Or it is viewed as not compensating for the cost of the work that goes into producing the data:

*"The third and last kind is the specific data [...]. For example, we have 35 stations to measure the "Wind-Speed" in Jordan [...]. We pay in order to have this data [...] and it costs me a lot of money for maintenance and operation."* [Female; Jordan; RPO; Energy<sup>515</sup>]

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<sup>509</sup> EG08

<sup>510</sup> EG08

<sup>511</sup> EG06

<sup>512</sup> EG03

<sup>513</sup> EG05

<sup>514</sup> EG01

<sup>515</sup> HKJ02

### 3.4.6.5.2 Research Funding Organisations (RFO)

For the regional funders, open access attachments to research are not commented on and the lack of policy at institutional level suggests a lack of support for open science funding requirements:

*“We don’t have institutional policy for open access or open data at STDF [...] yet.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>516</sup>]

### 3.4.6.5.3 Industry & Business

There was a general absence of any comments on their application of open science approaches signals that it is not being applied or used by the Moroccan industries.

### 3.4.6.5.4 Civil Society Organisations (CSO)

One CSO representative reported real difficulties and frustrations in sharing and/or accessing data despite being keen to access such data. It was noted that government datasets can be sources of critique for the government and that industry and business interests are restricting access to protect their commercial interests:

*“Unfortunately, when it comes to open data [...] some data types at the governmental institutions are of critical nature thus it is hard to declare them to others. Even if we needed such data, and we need to work on it we cannot get it [...]”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>517</sup>]

### 3.4.6.5.5 Policy bodies

Whilst the aforementioned CSO representative’s view was that the government is not eager to share data that may reflect poorly on them, the policy bodies provided a more nuanced account. For instance, it was noted that individuals within government department had agency to make these decisions, rather than a wider government approach:

*Yes [with regard to publishing limits], sometimes it is from the government and sometimes it's from the individual concern itself.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>518</sup>]

In Morocco, the interview participant does support the general concept of open access policies:

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<sup>516</sup> EG02

<sup>517</sup> HKJ08

<sup>518</sup> HKJ03

*“Open and free access is a good thing. It permits [...] researchers to exchange and evaluate the level and degree of pertinence in research.”* [Male; Morocco; Policy body; ICT<sup>519</sup>]

Difficulties in collecting project data is a frequent occurrence due to restrictions over how data may be shared for many:

*“Yes. We do face many struggles and resistance when it comes to collecting data. Sometimes, there are some projects, [that] are stopped [due] to the fact [that] specific information [is withheld].”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>520</sup>]

It is clear that governments hold considerable power over what data can be published or made available because they are commonly the owners of such datasets:

*“[...] We have some restrictions concerning [data publication]. Because when it comes to some statistical data from any government, some governments might have [it] and [...] should allow publishing of the data [to] avoid any kind of conflicts.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>521</sup>]

### 3.4.6.5.6 Interactions between stakeholders

RPOs are largely dependent on other groups for the levels of access that they offer. For example, as funders, the Wellcome Trust, requires open access:

*“Lots of universities that receive funds from companies or associations like Wellcome trust [...] require open access and [need to] make [research] available to the public.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>522</sup>]

Private and government institutions can be granted a large role by RPOs in deciding whether results are published:

*“[...] And there are some governmental institutions that helped us with their research data results but since their data is of critical nature they refuse [to] publish the data in any way. When it comes to private sectors or governmental ones, we should respect their opinion and decisions since they own or [...] played a major role in the research data results.”* [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>523</sup>]

RPOs are also restricted access to data of a critical nature and view this as an obstacle for their research:

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<sup>519</sup> MO10

<sup>520</sup> HKJ03

<sup>521</sup> HKJ03

<sup>522</sup> EG09

<sup>523</sup> HKJ05

*“Unfortunately, when it comes to open data [...] some data types at the governmental institutions are of critical nature thus it is hard to declare them to others. Even if we needed such data, and we need to work on it we cannot get it [...].”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>524</sup>]

### 3.4.6.6 KEY PLATFORMS, SPACES AND PLAYERS

The Egyptian Knowledge Bank (EKB) is referred to by two participants as a key player and platform for digital open access in Egypt:

*“[...] All those non-open access content through the EKB and having it nationally availed, and [...] some tools like waiving the fees [are utilized] like an open domain.”* [Male; Egypt; RPO; ICT<sup>525</sup>]

As a funder the Wellcome Trust, according to this researcher, requires open access:

*“Lots of universities that receive funds from companies or associations like Wellcome trust [...] require open access and [need to] make [research] available to the public.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>526</sup>]

### 3.4.6.7 SUMMARY OF OPEN SCIENCE

It can be seen that commercialisation and intellectual property rights are often prioritised over open access, with RPOs being subject to the data requirements of their collaborators. Funding also plays a key role in establishing the levels at which open access is allowed.

Research quality and the visibility of both the researcher and their research are the main benefits-motives to open access. Improving the profile and visibility of researchers and their publications was common across all Arab States countries but was especially prevalent in the Egyptian sample.

More negative associations involve the perception that open access comes with restrictive costs and low prestige which are viewed as threatening promotion prospects.

There is little indication that access should be available for all stages of research and innovation processes. For example, references to primary data appear to be more restrictive towards release than for the results.

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<sup>524</sup> HKJ08

<sup>525</sup> EG05

<sup>526</sup> EG09

### 3.4.7 ANTICIPATIVE, REFLECTIVE AND RESPONSIVENESS

*Anticipative, reflective and responsiveness* includes both the ‘anticipative and reflective’ and ‘responsive and adaptive’ process dimension definitions. For research and innovation to be responsible it requires actors to engage in a process of anticipating and reflecting on the future they are trying to create. They need to consider how that future can be achieved, and what possible impacts and unintended consequences may arise. Responsible actors should reflect on why that future is desirable, and on the underlying assumptions, values and purposes of the tasks and objectives to achieve that future. The insights generated from such anticipation and reflection should guide more responsible action.

Research and innovation must also be responsive and adaptive to change. Actors must include responsiveness to the views of the public and stakeholders in their process. It is also necessary to adapt and change goals and methods if these views and changing circumstances require it.<sup>527</sup>

These definitions define the boundaries of this theme of anticipative, reflective and responsiveness, within which the interviews and subsequent analyses were conducted. Out of the 17 codes identified for this theme, the four specific codes that stood out through a total count of the relevant codes for all countries included in the final interview sample: evaluation [code 100]; demand-driven research and innovation [code 81]; targeting critical societal challenges [code 82]; furthering research-developing policy or standards [code 84]. Note that meeting societal needs [code 80] is an aggregation of seven of the codes listed here and therefore overcounted. Demand-driven research and innovation on the other hand is also an aggregation of three codes, including code 82 and code 84. As demand-driven research and innovation sufficiently reflected the two amalgamated codes, as well as containing its own additional coding, we decided to treat the three codes as one section.

Chapter-wise code counts	Arab States			
	Egypt	Morocco	Jordan	Total
<b>88: Anticipative, reflective and responsive RRI</b>				
89: Future societal needs and challenges	2	2	3	7
90: Environmental sustainability	3	11	7	21
91: Responsive approach	6	3	6	15
92: Organisational norms and practices	4	0	1	5
93: Lack or uncertainty of anticipation policy and framework	6	5	0	11
100: Evaluation	10	3	13	26
101: Importance of feedback	2	5	1	8
103: Participation in upstream R&I	3	1	6	10

<sup>527</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

80: Meeting societal needs	44	33	45	122
81: Demand-driven research and innovation	34	28	39	101
82: Targeting critical societal challenges	15	18	21	54
83: Benefiting specific groups	5	3	4	12
84: Furthering research-developing policy or standards	9	7	4	20
85: Organisational norms and practices	3	0	2	5
86: Lack of consideration of societal benefits	0	0	2	2
87: Lack or uncertainty of policy for meeting societal needs	6	5	2	13
105: Time frames and time constraints	2	0	0	2

The next two sections provide details about each of the two codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *anticipative, reflective and responsiveness*.

An important point about the interview participants is that many displayed difficulties with grasping the concept of anticipation. The interviewers substituted “anticipation” for “future implications” for clarity. However, “future implications” also appeared to be too abstract for the participants. In the end, the data that is coded for this theme contains very little future perspective.

### 3.4.7.1 EVALUATION

The sub-theme refers to the evaluation of research and innovation. This can include formative evaluation; implementation evaluation; and impact evaluation. Evaluation here is understood in terms of the formal procedures and established methods used. It also includes references to evaluation for any stage of the research and innovation process. Therefore, this sub-theme is not reduced to including anticipatory or future-oriented processes only.

Name	Description
Evaluation	<p>Any reference to undertaking research and innovation through evaluation processes. This can include formative evaluation (such as assessing risk, feasibility, forecasting, etc.); implementation evaluation (such as assessing/ensuring applicability, implementation, etc.); and impact evaluation.</p> <p>Rule: Evaluation here is understood more in terms of the formal procedures and established methods used, e.g. quality testing, forecasting, risk assessment, impact assessment, etc.</p>

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This code will include references to evaluation FOR AND AT *any stage* of the R&I process. It will NOT be confined to anticipatory (future-oriented) processes only.

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A common discussion point across the Arab States interviews was evaluation, which we can think of as a process to plan the future. However, the interview participants mainly refer to standard evaluation instruments or procedures being in place. The following examples are typical:

*“We meet with each university or research centre [and] plan from the beginning of the year, and then we implement the plan. We [also] have this kind of interim evaluation and then [we] have a meeting to evaluate what’s going on.”* [Female; Egypt; Policy body; ICT<sup>528</sup>]

Much of the *anticipatory and reflective* and *adaptive and responsive* aspects that would align with an RRI form of evaluation are absent.

This comment involving a CSO organisation member is suggestive of concern for societal implications:

*“If [we] are dealing with farmers we need to know [their] socio-economic state, [...] we use this information to examine if our approach is impactful at the end or not through having pre and post findings or measurements.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>529</sup>]

Also:

*“You can make something and find the impact [after] ten years. You find how people changed [to] more sustainable agriculture even people who did not move to organic but at least used the pesticides more wisely [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>530</sup>]

The main future-oriented measures are ones aimed at ensuring projects and innovations can be sustained:

*“During these years you should [make] qualified trained persons to sustain such systems for the longest period possible and maximize their benefits.”* [Female; Jordan; RPO; Energy<sup>531</sup>]

Feasibility studies are also future-oriented, but they can be highly technocentric and not offer much room for reflection and responsiveness to the social inputs:

*“One of our main goals [with] case studies is that we make a feasibility study for the projects with big data and information [...] because we need to have*

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<sup>528</sup> EG03

<sup>529</sup> EG04

<sup>530</sup> EG04

<sup>531</sup> HKJ02

*predictions of what will happen within the next 5, 10 and 15 years.*” [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>532</sup>]

The environmental impact assessment is suggestive of a possible form of institutionalised reflection of future implications:

*“When we do an Environmental Impact Assessment we do this based on 3 stages: Construction, Operation and Installation and commissioning. Therefore, you need to take into consideration the impacts in these three stages. [...] we are trying to take into consideration and guide [the companies] to "Life-cycle thinking" [to] minimize the cons of the project before it starts and after outcomes are produced [...].”* [Male; Jordan; RPO; Waste Management<sup>533</sup>]

Trying to influence stakeholders towards life-cycle thinking is an attempt at a more sustainable future, where the entire life-cycle of products and services are examined to anticipate environmental impacts.

The same interview participant suggests the concerns of the community are part of their research and innovation anticipatory approach:

*“If the community will benefit from it or not if it will improve [...] society or not and so on.”* [Male; Jordan; RPO; Waste Management<sup>534</sup>]

A large part of the reflective process is also meeting bureaucratic and legal requirements as is the nature of environmental management:

*“[...] having project pros and cons allows the company to compare the expected and real outcomes and impacts [...] of the project. The "Environmental Management Plan" should be supervised by the "Ministry of Environment" to ensure [those] project outcomes are within the accepted limit or guide for [corrective] actions if not within [the] legal frame.”* [Male; Jordan; RPO; Waste Management<sup>535</sup>]

A participant from Morocco highlights one of the key problems with anticipation and reflection in high-tech R&I is the massive complexity of modern products and the systems through which they are produced and distributed:

*“The evaluation of the impact of the use of bio nanocomposite films [...] on the environment is very complex because it is not [...] only taking into account the combustion of fuel but the whole sector. It is, therefore, necessary to take into account both agricultural practices, fuel production and its use. Taking all these steps into account makes analysis difficult. It can lead to significant variations*

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<sup>532</sup> HKJ05

<sup>533</sup> HKJ06

<sup>534</sup> HKJ06

<sup>535</sup> HKJ06

*depending on the assumptions used, the year, and place that are taken into consideration.” [Male; Morocco; Industry & Business, CSO; Energy, ICT<sup>536</sup>]*

### 3.4.7.2 DEMAND-DRIVEN RESEARCH AND INNOVATION

The *demand-driven research and innovation* sub-theme encompasses references of solutions to societal problems as part of setting the goals and agenda for research and innovation. This can include references to meeting societal needs through a focus on UN SDGs, local development, developing the right types of products etc. In coding terms, it is the parent node for targeting critical societal challenges and furthering research/developing policy/standards.

Name	Description
Demand-driven research and innovation	Reference to setting the goal/agenda for R&I based on providing specific solutions to specific problems existing in society.  Rules: This can include references to meeting societal needs through a focus on UN SDGs, local development, developing the right types of products that are needed etc.

*Targeting critical societal challenges* codes any reference to existing or imminent critical challenges that research and innovation focus on. This can include issues of health and wellbeing and environmental protection etc. *Furthering research-developing policy or standards* references to local policy development or support in the development of regulations. Both these codes are about meeting societal needs and have very little to do with future-oriented thinking.

Name	Description
Targeting critical societal challenges	Any reference to existing or imminent critical challenges that R&I focuses on (can be around the UN SDGs). This can include issues of health and wellbeing, waste management, access to resources and infrastructure, environmental protection, etc.
Furthering research/Developing policy/standards	Any reference to local policy development or support in development of regulations/standards.

*Targeting critical societal challenges* includes reference to *existing or imminent* critical challenges that R&I focuses on (can be around the UN SDGs). This can include issues of health and wellbeing, waste management, access to resources and infrastructure, environmental

<sup>536</sup> MO02

protection, etc. *Furthering research-developing policy or standards* includes references to local policy development or support in development of regulations/standards. Both these are about meeting societal needs and have very little to do with future-oriented thinking.

For the sub-theme, the most relevant points of focus are how societal needs are defined and the large role of domains in shaping anticipation with reference to the countries where the organisations are based.

Many interview participants are open to identifying societal needs for the purpose of research and innovation, but how they arrive at those needs varies. One approach is surveying the public in order to identify needs:

*“All our work and research address societal needs. We often consult public groups. We do surveys with society to identify needs.”* [Male; Egypt; RPO; Bioeconomy<sup>537</sup>]

Another is through the use of focus groups:

*“[...] sometimes we conduct focus groups for the housewives [to] make them benefit. [Also] because the [housewives] are most affected by the project activities.”* [Male; Jordan; RPO; Waste Management<sup>538</sup>]

And also through engaging specialist agencies that have in-depth knowledge of the societal problems at hand:

*“[...] we have [a] technical specialist "social economy" to help us [...] by figuring out the main topics concerning the society's needs and concerns.”* [Male; Jordan; RPO; Waste Management<sup>539</sup>]

Discussions with community members are also involved in the process of deliberating on needs:

*“[...] we should [have] meetings and involve the community members to discuss their needs, concerns questions and so on [...].”* [Male; Jordan; RPO; Waste Management<sup>540</sup>]

Others appear to accept a focus on societal needs that emerged from elsewhere. This industry-based interviewee seems to suggest some sort of societal-needs imprint is left by the university from which the project emerged:

*“Our work is for societal needs because when we work with the university the project [we try] to make it in the same road of societal need because we think that all projects must give solutions to societal needs.”* [Male; Morocco; Industry & Business; Waste Management<sup>541</sup>]

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<sup>537</sup> EG01

<sup>538</sup> HKJ06

<sup>539</sup> HKJ06

<sup>540</sup> HKJ06

<sup>541</sup> MO08

In another case, societal needs are subdivided by municipalities:

*“The current situation at each municipality was identified and the social needs were determined.”* [Female; Jordan; CSO; Waste Management<sup>542</sup>]

While societal needs are relevant in this interview participant’s organisation economic impact, potential growth and the needs of ministers are also part of the equation:

*“We have [...] targeted calls which are coming from Societal needs eminent topics (hepatitis C, Pollution, industrial challenges). We [did] a study on which field [has] more potential to grow with other bodies in the ministry, and we spotted two industries that have more [economic impact], and we are actually now designing calls for this.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>543</sup>]

In the Egyptian sample, the government plays a considerable role in defining societal needs. For example, this Egyptian RPO finds its direction from the government for societal needs being considered:

*“[...] we consider challenges that [come] from studies that have been conducted for assessing societal needs. We also consider the societal needs indicated in the strategy of the Ministry of Scientific Research in Egypt. [...] we tailored our research to answer those [...] and prioritize them. [...] we have to demonstrate that we are addressing them.”* [Female; Egypt; RPO; Energy<sup>544</sup>]

The Egyptian government is also instrumental in setting societal needs agenda for this RPO:

*“We address national societal needs received from ministries and we make it available and clear to our researchers to work on.”* [Male; Egypt; RPO; Energy<sup>545</sup>]

Government policy is also crucial in defining the targeted future:

*“We [...] used the production of digging (after analysis of [...] the soil) and [embedded] it into the building process which serves Egypt’s Vision for 2030 to increase the land [inhabitation] from 7% to 15%. So, we have to create new methods to reduce the use of natural resources and to reduce the use of the [harmful] building materials.”* [Male; Egypt; RPO; Energy<sup>546</sup>]

It was also shown that funding bodies potentially have a large role in defining societal needs:

*“All the [funding] calls of the program are addressing societal needs because it is based on national priorities, so it is definitely for the benefit of the society [...].”*

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<sup>542</sup> HKJ04

<sup>543</sup> EG02

<sup>544</sup> EG06

<sup>545</sup> EG08

<sup>546</sup> EG08

[Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>547</sup>]

Each domain also has a considerable role in framing and shaping the impacts, purposes and possible futures being targeted. For example, the bioeconomy domain frames the research around the affordability of health products in Egypt:

*“In general, our research is [...] triggered by industrial or societal need. Our aim is to serve society and industry. My institution is also concerned with enhancing the availability of affordable, safe and quality health products, services and tools [...].”* [Male; Egypt; RPO; Bioeconomy<sup>548</sup>]

### 3.4.7.3 DOMAIN RESULTS

#### 3.4.7.3.1 Energy

In this case, energy as a domain shapes the conceptualisation of societal needs:

*“We checked [...] the national priorities and we are trying to address it, [...] the main challenges that we can address [are] building in the desert, databases for places [...] renewable energy and how we can embed it in our new concept for construction.”* [Male; Egypt; RPO; Energy<sup>549</sup>]

*“We produced green pyramid rating systems to assess [...] how far they are following sustainability and green orientation.”* [Male; Egypt; RPO; Energy<sup>550</sup>]

The energy domain frames the means of assessment as well:

*“We have been working in the [...] Renewable Energy and Energy Efficiency field. [...] In the energy field, when it comes to energy efficiency, [and] consuming the energy in public buildings, industries, houses, and so on [...] we had to create an “Energy Assessment” for those sectors through simulation and modelling. We need to see the potential optimum energy savings in these sectors.”* [Male; Jordan; RPO; Energy<sup>551</sup>]

#### 3.4.7.3.2 Waste Management

Here the similar framing of societal needs and objectives by the domain and country can be found in waste management:

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<sup>547</sup> EG07

<sup>548</sup> EG01

<sup>549</sup> EG08

<sup>550</sup> EG08

<sup>551</sup> HKJ07

*“We have a success story with one of the factories that [used to] bury their waste in the desert. We [did] some research and figured out that it could be recycled to be used for animal or bird food. [This] will have a big return on the economy and result in a [positive] environmental impact. Especially [since] Egypt has joined Paris agreement to lower CO2 emissions among many other indicators, that’s why I think our role in addressing societal need is being maximized now with our activities.”* [Male; Egypt; Industry & Business; Waste Management<sup>552</sup>]

And here the waste management influence is evident from the reference to the three Rs:

*“These 12 municipalities [want] to improve solid waste management services in Jordan, focusing on the three R’s (Reduce, Reuse and Recycle), and community engagement.”* [Female; Jordan; CSO; Waste management<sup>553</sup>]

Environmental impact assessment also appears to be a key concern for the waste management domain and is suggestive of a possible form of institutionalised reflection of future implications:

*“When we do an Environmental Impact Assessment we do this based on 3 stages: Construction, Operation and Installation and commissioning. Therefore, you need to take into consideration the impacts in these three stages. [...] we are trying to take into consideration and guide [the companies] to “Life-cycle thinking” [to] minimize the cons of the project before it starts and after outcomes are produced [...].”* [Male; Jordan; RPO; Waste Management<sup>554</sup>]

A large part of the waste management reflective process is also meeting bureaucratic and legal requirements as is the nature of environmental management:

*“[...] having project pros and cons allows the company to compare the expected and real outcomes and impacts [...] of the project. The “Environmental Management Plan” should be supervised by the “Ministry of Environment” to ensure [those] project outcomes are within the accepted limit or guide for [corrective] actions if not within [the] legal frame.”* [Male; Jordan; RPO; Waste Management<sup>555</sup>]

In this domain, there are possibilities for company stakeholders to move towards anticipatory approaches like life-cycle thinking, as this RPO attempts to encourage.

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<sup>552</sup> EG10

<sup>553</sup> HKJ04

<sup>554</sup> HKJ06

<sup>555</sup> HKJ06

### 3.4.7.3.3 Bioeconomy

The bioeconomy domain can frame its anticipatory and responsiveness modes of research as being around the affordability of products, in this case, health products in Egypt:

*“In general, our research is [...] triggered by industrial or societal need. Our aim is to serve society and industry. My institution is also concerned with enhancing the availability of affordable, safe and quality health products, services and tools [...].”* [Male; Egypt; RPO; Bioeconomy<sup>556</sup>]

### 3.4.7.4 STAKEHOLDER RESULTS

#### 3.4.7.4.1 Research Performing Organisations (RPO)

The main future-oriented measures are ones aimed at ensuring projects and innovations can be sustained, which are employed by this RPO:

*“During these years you should [make] qualified trained persons to sustain such systems for the longest period possible and maximize their benefits.”* [Female; Jordan; RPO; Energy<sup>557</sup>]

Feasibility studies used by the following RPO are also future-oriented, but they can be highly technocentric and not appear to offer much room for reflection and responsiveness to the social inputs:

*“One of our main goals [with] case studies is that we make a feasibility study for the projects with big data and information [...] because we need to have predictions of what will happen within the next 5, 10 and 15 years.”* [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>558</sup>]

Many RPO interviewees are open to identifying societal needs for the purpose of research and innovation, but how they arrive at those needs varies. One approach is surveying the public in order to identify needs:

*“All our work and research address societal needs. We often consult public groups. We do surveys with the society to identify needs.”* [Male; Egypt; RPO; Bioeconomy<sup>559</sup>]

*“[...] sometimes we conduct focus groups for the housewives [to] make them benefit. [Also] because the [housewives] are most affected by the project activities.”* [Male; Jordan; RPO; Waste Management<sup>560</sup>]

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<sup>556</sup> EG01

<sup>557</sup> HKJ02

<sup>558</sup> HKJ05

<sup>559</sup> EG01

<sup>560</sup> HKJ06

*“[...] we have [a] technical specialist "social economy" to help us [...] by figuring out the main topics concerning the society's needs and concerns.” [Male; Jordan; RPO; Waste Management<sup>561</sup>]*

Discussions with community members are also involved in the process of deliberating on needs:

*“[...] we should [have] meetings and involve the community members to discuss their needs, concerns questions and so on [...].” [Male; Jordan; RPO; Waste Management<sup>562</sup>]*

### 3.4.7.4.2 Research Funding Organisations (RFO)

For one of the few RFOs coded the societal needs that are made relevant in this interviewee's organisation are economic impact, potential growth and the needs of ministers:

*“We have [...] targeted calls which are coming from Societal needs eminent topics (hepatitis C, Pollution, industrial challenges). We [did] a study on which field [has] more potential to grow with other bodies in the ministry, and we spotted two industries that have more [economic impact], and we are actually now designing calls for this.” [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>563</sup>]*

### 3.4.7.4.3 Industry & Business

The data from Industry & Business interviewees for this sector is not particularly revealing of the stakeholder in relation to the theme. However, the Interaction of Stakeholders section below provides an example of how the stakeholder can be dependent on university partners.

### 3.4.7.4.4 Civil Society Organisations (CSO)

Perhaps some CSOs are more open to the views of stakeholder impacts:

*“If [we] are dealing with farmers we need to know [their] socio-economic state, [...] we use this information to examine if our approach is impactful at the end or not through having pre and post findings or measurements.” [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>564</sup>]*

And:

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<sup>561</sup> HKJ06

<sup>562</sup> HKJ06

<sup>563</sup> EG02

<sup>564</sup> EG04

*“You can make something and find the impact [after] ten years. You find how people changed [to] more sustainable agriculture even people who did not move to organic but at least used the pesticides more wisely [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>565</sup>]

In this case, the openness develops trust from stakeholders, which in turn further contributes to access the views of the farmers.

#### 3.4.7.4.5 Policy bodies

The data in this section provides no new insights into this stakeholder.

#### 3.4.7.4.6 Interactions between stakeholders

It would seem that the societal needs being addressed by several organisations find their inspiration and direction from other stakeholders. There is a suggestion that RPOs influence the considerations of the societal needs of business and industry. This industry-based interviewee seems to suggest some sort of societal-needs imprint is left by the university from which the project emerged:

*“Our work is for societal needs because when we work with university the project [we try] to make it in the same road of societal need because we think that all projects must give solutions to societal needs.”* [Male; Morocco; Industry & Business; Waste Management<sup>566</sup>]

Similarly in line with the argument that the expectations of other stakeholders are shaping others’ actions and perception of societal needs. Thus, the socially and collectively shaped dimensions of societal needs as an RRI pillar is especially clear. An Egyptian RPO interviewee describes how the RPO finds its direction from the government for societal needs:

*“[...] we consider challenges that [come] from studies that have been conducted for assessing societal needs. We also consider the societal needs indicated in the strategy of the Ministry of Scientific Research in Egypt. [...] we tailored our research to answer those [...] and prioritize them. [...] we have to demonstrate that we are addressing them.”* [Female; Egypt; RPO; Energy<sup>567</sup>]

The RFOs are also seeking to align their visions of societal needs into their funding calls, which in turn shape the broader consideration and agenda-setting of societal:

*“All the [funding] calls of the program are addressing societal needs because it is based on national priorities, so it is definitely for the benefit of the society [...].”*

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<sup>565</sup> EG04

<sup>566</sup> MO08

<sup>567</sup> EG06

[Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>568</sup>]

#### 3.4.7.4.7 Key Platforms, Spaces and Players

The Egyptian organisation, SEKEM, is referred to as a key player in encouraging R&I that is focused on societal needs:

*“[...] the model of my organization is built on fitting the societal needs - my university is part of the wide SEKEM umbrella. It includes [the] SEKEM foundation, an NGO and private SEKEM companies. [...] the research in the university comes from the needs of the society, fed by SEKEM NGO, or the industry needs [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>569</sup>]

#### 3.4.7.5 SUMMARY OF ANTICIPATIVE, REFLECTIVE AND RESPONSIVENESS

The qualitative account contained in this theme cautions that this is one of the RRI areas that need much more work. It was common for the perspectives expressed by the interview participants to be somewhat confused.

It is clear that the interview participants, and many interviewers, struggled with grasping an RRI conceptualisation of anticipation. For example, ‘anticipation’ was often unsuccessfully substituted with ‘future implications’. Consequently, it appears that the whole idea of anticipation is too difficult an idea, or is too rarely considered, for it to be articulated and elaborated upon for the research and innovation professionals working in the Arab States at this time. In the end, our findings for this theme contains very little future perspective, and was more concerned about the present state, particularly through a frame of quality assurance.

Nevertheless, while there is little direct account of desirable futures and how they are anticipated, there are signs that the structuring of these futures and societal needs is influenced by the nature of domains and how they intersect with the country or government.

### 3.4.8 SCIENCE EDUCATION

As per the European Commission pillar definition, *science education* involves developing current processes to spread scientific knowledge, understanding, insight, and critical capacity to better equip citizens with the necessary skills to be part of research and innovation debates.

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<sup>568</sup> EG07

<sup>569</sup> EG04

A second component is to expand the number of scientific researchers and promote science as a vocation.<sup>570</sup>

Additional components include the “promotion of innovative problem-solving and critical thinking”; “embedding social, economic and ethical principles”; “promoting engagement and an entrepreneurial mindset”; “empowering citizens to participate in science policymaking”; “sharing responsibility while solving social challenges”; “facilitating a strong interdisciplinary approach, and stakeholders' involvement”.<sup>571</sup>

Chapter-wise code counts	Arab States			
	Egypt	Morocco	Jordan	Total
<b>Science education</b>				
18: Tools for engagement	16	11	28	55
19: Information-based tools	0	1	0	1
20: Training and workshops	9	2	10	21
21: Conferences, symposiums, talks and exhibitions	6	7	6	19
22: Research publications and policy reports	10	2	4	16
23: Information centres	0	0	0	0
24: University open days	0	0	0	0
25: Media	8	0	2	10
34: Tie-ups with local schools	3	0	6	9
102: R&I Capacity Building	2	0	3	5

The codes (i.e. sub-themes) used for this science education theme are chosen on their closeness to the concept of science education. The first sub-theme deals with *the tools of science education* [codes 18-25, 34]. The second concerns *R&I Capacity Building* [code 102].

The next two sections provide details about each of the two codes and descriptions of the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme of *science education*.

<sup>570</sup> <https://www.rri-tools.eu/about-rri>

<sup>571</sup> <https://www.rri-tools.eu/science-education>

### 3.4.8.1 THE TOOLS OF SCIENCE EDUCATION

*The tools of science education* sub-theme include seven categories. The seven categories are as follows: information-based tools; conferences, symposiums, talks and exhibitions; training and workshops; research publications and policy reports; information centres; university open days; and media.

Name	Description
Information-based tools	Any references to tools that provide information for understanding R&I in the organisation and its norms, procedures and practices related to it.  Rules: This will include only one-way communication strategies and NOT two-way communication or engagement.
Conferences, symposiums, talks and exhibitions	Any reference to providing information through different presentation-focused events, such as conferences, seminars, lectures, talks, etc.
Training and workshops	Any reference to setting up training sessions and/or workshops, where the aim is skills development and capacity building (as opposed to simple information sharing, as in the above two codes; conferences and talks).
Research publications and policy reports	Any reference to providing information through research journals, publication, online research repositories, digital research platforms, and public databases, policy reports, etc.
Information centres	Any reference to providing information through information centres, such as visitor centres.
University open days	Any reference to communication/providing information through university open days.
Media	Any reference to communication through different media, including print media, broadcast media, and the Internet. Examples include newspapers, brochures, films, radio, TV, websites, blogs and social media.  Rules: This will NOT include any online research sources such as research papers and online data sets, rather it will include online sources used for communication, such as websites or blogs. Research-based sources should be included in the code 'Research publications and policy reports.'

*Information-based tools* broadly cover any references to tools that provide information for understanding research and innovation in the organisation. This will include only one-way communication strategies and NOT two-way communication or engagement.

There is nothing to note for this region, in this regard.

*Conferences, symposiums, talks and exhibitions* include any reference to providing information through different presentation-focused events, such as conferences, seminars, lectures, talks, etc.

Insights available are mostly concerning specifics and tend to provide more of a list of tools applied by the organisations. For instance, beginning with conferences – conference references are more in relation to communications and/or interactions amongst researchers and not in relation to wider citizenship:

*“Conferences, giving lectures and seminars.”* [Female; Egypt; RPO; Energy<sup>572</sup>]

*“We make many international and local conferences.”* [Male; Egypt; RPO; Energy<sup>573</sup>]

*“In my job, I attend many meetings, conferences and workshops.”* [Female; Jordan; RPO, CSO; Bioeconomy<sup>574</sup>]

*“[...] it is an important worldwide topic, and there is an international worldwide conference [...] and when I attended [I saw] how the whole world [was] interested in this topic.”* [Female; Jordan; RPO, CSO; Bioeconomy<sup>575</sup>]

Local community lectures form another tool:

*“So the Ministry of Environment and Agricultural Engineers Association conduct different lectures to [distribute] information during the project life span on a national level to local community.”* [Female; Jordan; RPO, CSO; Bioeconomy<sup>576</sup>]

Forums are referred to by this interviewee:

*“To date, [...]20 forums, each of which has brought together some one hundred participants, have been organized in different university institutions, hotels, exhibition centres.”* [Male; Morocco; Industry & Business; Energy<sup>577</sup>]

In one of the more detailed interview discussions, the use of demonstration as a communicative tool is also raised:

*“We have [...] a model or a best practice [to] show before we ask them to do something. We invite them to come and see a similar model, it could be a farm as*

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<sup>572</sup> EG06

<sup>573</sup> EG08

<sup>574</sup> HKJ01

<sup>575</sup> HKJ01

<sup>576</sup> HKJ01

<sup>577</sup> MO01

*an example or a demonstration site, and we usually do some comparative studies on the field [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>578</sup>]

*Training and workshops* provide us with a small list of reference to setting up training sessions and/or workshops, where the aim is skills development and capacity building (as opposed to simple information sharing, as in the above two codes: conferences and talks).

The interviews provide us with a clear list of the tools being applied, but not the specific details as to the objectives of their application:

*“Also we even help them [...] by giving them training courses if the nature of the project in their area requires [it].”* [Male; Jordan; RPO; Waste Management<sup>579</sup>]

*“[...] We have many other projects that we demonstrated in conferences and workshops.”* [Female; Jordan; RPO; Energy<sup>580</sup>]

*“[...] courses on innovation.”* [Female; Morocco; RPO; Waste Management<sup>581</sup>]

*“Our usual practices in the university is also to organise workshops and public events.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>582</sup>]

*“We do support students within these fields via study visits [and] training.”* [Male; Egypt; RPO; Bioeconomy<sup>583</sup>]

Some of the training mentioned is to equip students and researchers for proposal writing and the contemporary funding structure:

*“We are trying to do two things: one is [...] to increase or attract more young researchers. The other thing is to help researchers write better proposals, we realise it is not in our culture yet, but we are getting there.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>584</sup>]

*“[...] Training seminars and workshops on how to write proposals or how to apply for international programs or [...] contests like Famelab.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>585</sup>]

The more obvious science education-related material includes this quote from an interviewee on developing a science communication culture with journalists:

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<sup>578</sup> EG04

<sup>579</sup> HKJ06

<sup>580</sup> HKJ02

<sup>581</sup> MO04

<sup>582</sup> EG04

<sup>583</sup> EG01

<sup>584</sup> EG02

<sup>585</sup> EG07

*“We organize workshops [...] and co-funded many competitions to spread science communication culture. We also [have] workshops dedicated to science journalists to train them on how to deliver scientific information to the public and to engage in [the] advancement of science using simple techniques.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>586</sup>]

Some projects have taken on the task of training the stakeholders in the application of their research or technologies:

*“We made training sessions for ZABALEN (informal collectors of waste materials) in addition to the local contractors at their areas.”* [Male; Egypt; Industry & Business; Waste Management<sup>587</sup>]

*“[...] we had training on solar energy systems, how to deal with it and [how] to do maintenance [on] it and what its components are. [...] we even provided them transportation.”* [Female; Jordan; RPO; Energy<sup>588</sup>]

*“We have trained some people from the local community, in order to run their job well [...].”* [Female; Jordan; RPO; Energy<sup>589</sup>]

Research publications and policy reports provide a list of tools referred to by interviewees used for providing information such as research journals, publication, online research repositories, digital research platforms, and public databases, policy reports, etc.

Studies are a part of how this RFO targets areas of funding:

*“We have [...] targeted calls which are coming from Societal needs eminent topics (hepatitis C, Pollution, industrial challenges). We [did] a study on which field [has] more potential to grow with other bodies in the ministry, and we spotted two industries that have more [economic impact], and we are actually now designing calls for this.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>590</sup>]

And:

*“We have several agreements with [publishers] and we have our local journal system that is running in cooperation with Egyptian Knowledge Bank, and it has [...] 250 journals published.”* [Male; Egypt; RPO; ICT<sup>591</sup>]

And:

*“We have those 250 journals that are published through [the] EKB agreement and they are all open access. We are providing them with an editorial management*

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<sup>586</sup> EG07

<sup>587</sup> EG10

<sup>588</sup> HKJ02

<sup>589</sup> HKJ02

<sup>590</sup> EG02

<sup>591</sup> EG05

*platform, the online platform for the content and [...] it's all open access.” [Male; Egypt; RPO; ICT<sup>592</sup>]*

The indexation of scientific journals is another activity listed:

*“We do also support indexing journals internationally and now we reached 35% increase in the level of indexation for articles and journals, that goes very well with our internationalisation strategy” [Female; Egypt; Policy body; ICT<sup>593</sup>]*

Providing a repository is arguably the *raison d'être* for this Egyptian organisation:

*“One of our recent initiatives at [anonymised organisation] is that we will have a publishing tool, [and a] Egyptian repository. [...] most of our content or articles, [theses], educational materials will be in this repository. [...] it is a national initiative, and we have an agreement with the ministries [for the] repositories to be available for everybody.” [Female; Egypt; Policy body; ICT<sup>594</sup>]*

Data banks is another online instrument that is mentioned by interviewees:

*“[...] in the Bat Project we had this data-bank where everyone [could] benefit from the data at the end of the project.” [Female; Jordan; RPO, CSO; Bioeconomy<sup>595</sup>]*

*Information centres* cover any reference to providing information through information centres, such as visitor centres. There is no discussion in the Arab States interviews on these.

*University open days* includes any reference to communication/providing information through university open days. There is no discussion in the Arab States interviews on these.

The *Media* covers references to communication through different media, including print media, broadcast media, and the Internet. Examples include newspapers, brochures, films, radio, TV, websites, blogs and social media:

*“[...] it became a necessity that the governmental organization have their web portal and Facebook pages to engage the public with their activities.” [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>596</sup>]*

Introductory animated infographics are also employed, but the science communication of the organisation is merely a secondary activity:

*“We are using some techniques to produce [...] animated infographics and it's like an introductory material to our calls. Maybe we are also going to [...] raise awareness and the value of scientific research.” [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>597</sup>]*

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<sup>592</sup> EG05

<sup>593</sup> EG03

<sup>594</sup> EG03

<sup>595</sup> HKJ01

<sup>596</sup> EG07

<sup>597</sup> EG02

### 3.4.8.2 RESEARCH AND INNOVATION (R&I) CAPACITY BUILDING

*Research and innovation (R&I) capacity building* provide a list of references to building capacity for research and innovation as a means of improving responsibility. This can be in terms of local development, contextual development, etc.

Name	Description
R&I building	Any reference to building capacity for research and innovation as a means of improving responsibility. This can be in terms of local development, contextual development, etc.

This participant implied that the centres themselves are lacking in capacity building programmes:

*“[...] the problem is not the policies [but] rather the Research centres themselves that need more capacity building programs to satisfy their needs and satisfy the need of the society and the country.”* [Female; Egypt; Policy body; ICT<sup>598</sup>]

There is an important link between capacity, funding and social networks:

*“[...] when it comes to the PAIR project, it is already funded by the "The Dutch Embassy". 200-250 young researchers applied for PAIR and based on certain criteria 120 [researchers] were chosen based on how motivated the people are, how self-dependent they are and how they can present themselves and their ideas. [...] we believe that this project will succeed based on the fact that these young researchers have been selected wisely. [...] they will be supported by certain organizations so that they can develop their ideas more. We are working on [spreading] our project out of Jordan to the whole region and Arab world.”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>599</sup>]

### 3.4.8.3 DOMAIN RESULTS

#### 3.4.8.3.1 Energy

Training appears necessary for a domain where technologies on energy transition will be new to many:

*“[...] we had training on solar energy systems, how to deal with it and [how] to do maintenance [on] it and what its components are. [...] we even provided them transportation.”* [Female; Jordan; RPO; Energy<sup>600</sup>]

<sup>598</sup> EG03

<sup>599</sup> HKJ08

<sup>600</sup> HKJ02

### 3.4.8.3.2 Waste Management

One of the waste business organisations have taken on the task of training the stakeholders in the application of their methods:

*“We made training sessions for ZABALEN (informal collectors of waste materials) in addition to the local contractors at their areas.”* [Male; Egypt; Industry & Business; Waste Management<sup>601</sup>]

Civil society elements are found to be promoting community waste management through training local authorities:

*“[...] After the focus group, the municipalities made sessions concerning the enhancement of the solid waste management in the community.”* [Female; Jordan; CSO; Waste Management<sup>602</sup>]

### 3.4.8.3.3 Bioeconomy

The use of demonstration as a communicative and educative tool was suggested, indicating some commitment to inform stakeholders:

*“We have [...] a model or a best practice [to] show before we ask them to do something. We invite them to come and see a similar model, it could be a farm as an example or a demonstration site, and we usually do some comparative studies on the field [...].”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>603</sup>]

### 3.4.8.3.4 Research Performing Organisations (RPO)

The RPOs are typically engaged in the publication of journals although some support the availability to a wider audience.

The indexation of scientific journals is another activity listed:

*“We [...] also support indexing journals internationally and now we reached 35% increase in the level of indexation for articles and journals. That goes very well with our internationalisation strategy.”* [Female; Egypt; Policy body; ICT<sup>604</sup>]

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<sup>601</sup> EG10

<sup>602</sup> HKJ04

<sup>603</sup> EG04

<sup>604</sup> EG03

### 3.4.8.3.5 Research Funding Organisations (RFO)

Studies are a part of how this RFO targets areas of funding:

*“We have [...] targeted calls which are coming from Societal needs eminent topics (hepatitis C, Pollution, industrial challenges). We [did] a study on which field [has] more potential to grow with other bodies in the ministry, and we spotted two industries that have more [economic impact], and we are actually now designing calls for this.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>605</sup>]

Introductory cartoons are also employed by the RFO however, as may be the case for most of the organisations, the science communication is merely a secondary activity:

*“We are using some techniques to produce [...] animated infographics and it’s like an introductory material to our calls. Maybe we are also going to [...] raise awareness and the value of scientific research.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>606</sup>]

### 3.4.8.3.6 Industry & Business

For one business project training of stakeholders it appears is required to ensure its functionality:

*“We made training sessions for ZABALEN (informal collectors of waste materials) in addition to the local contractors at their areas.”* [Male; Egypt; Industry & Business; Waste Management<sup>607</sup>]

### 3.4.8.3.7 Civil Society Organisations (CSO)

According to an interviewee from Jordan civil society concerns can be promoted through training local authorities:

*“[...] After the focus group, the municipalities made sessions concerning the enhancement of the solid waste management in the community.”* [Female; Jordan; CSO; Waste Management<sup>608</sup>]

*“We gave workshops to the municipalities so that when they give workshops to society, they think from the perspective of "GBA [Gender-Based Analysis] Plus”* [Female; Jordan; CSO; Waste Management<sup>609</sup>]

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<sup>605</sup> EG02

<sup>606</sup> EG02

<sup>607</sup> EG10

<sup>608</sup> HKJ04

<sup>609</sup> HKJ04

### 3.4.8.3.8 Policy bodies

One policy actor argues for the need to develop a science communication culture (e.g. via enhanced or new collaborations with science journalists), to improve the skills required of e.g. policy actors to successfully translate scientific evidence for non-expert audiences:

*“We organize workshops [...] and co-funded many competitions to spread science communication culture. We also [have] workshops dedicated to science journalists to train them on how to deliver scientific information to the public and to engage in [the] advancement of science using simple techniques.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>610</sup>]

### 3.4.8.3.9 Interactions between Stakeholders

There is a suggestion across the interviews that science education is part of funding arrangements, and thus that stakeholders are brought together to interact and learn from one another as part of a core requirement of the funding provision itself:

*“We have trained some people from the local community, in order to run their job well [...]”* [Female; Jordan; RPO; Energy<sup>611</sup>]

### 3.4.8.3.10 Key platforms, spaces and players

For publishing articles, several publishers’ and the Egyptian Knowledge Bank platforms are mentioned:

*“We have several agreements with [publishers] and we have our local journal system that is running in cooperation with Egyptian Knowledge Bank, and it has [...] 250 journals published.”* [Male; Egypt; RPO; ICT<sup>612</sup>]

And:

*“We have those 250 journals that are published through [the] EKB agreement and they are all open access. We are providing them with an editorial management platform, the online platform for the content and [...] it’s all open access.”* [Male; Egypt; RPO; ICT<sup>613</sup>]

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<sup>610</sup> EG07

<sup>611</sup> HKJ02

<sup>612</sup> EG05

<sup>613</sup> EG05

### 3.4.8.4 SUMMARY OF SCIENCE EDUCATION

No insights from the Arab States interviews were available on the following, suggesting that these are not common issues or tools of relevance in this region:

- Information-based tools, which broadly covers any references to tools that provide information for understanding R&I in the organisation and its norms, procedures and practices related to it. These concerns include only one-way communication.
- Information centres, which covers any reference to providing information through information centres, such as visitor centres.
- University open days, which includes any reference to communication/providing information through university open days.

In contrast, the following tools and resources were frequently discussed:

- Conferences, symposiums, talks and exhibitions, which includes any reference to providing information through different presentation-focused events, such as conferences, seminars, lectures, talks, etc.
- Training and workshops, which includes setting up training sessions and/or workshops, where the aim is skills development and capacity building (as opposed to simple information sharing, as in the above two codes: conferences and talks).
- Research publications and policy report, which includes e.g. research journals, publication, online research repositories, digital research platforms, and public databases, policy reports, etc.

For these latter tools and resources, there was much to be said about the specifics used, but very little at all on the rationales and objectives behind the use of these. This suggests a lack of strategy and planning.

### 3.4.9 ETHICS

As part of the European Commission's RRI agenda, ethics focuses on (1) preventing research and research practices that lack integrity, and on (2) the relationship between science and society. For policymakers, this definition requires that R&I policy consciously meets the ethical demands of society. For the research community, scientific processes and outcomes should meet the demands of research integrity. Within Business & Industry-related research "social actors should work together from the beginning to embed ethical considerations in their R&I processes." Finally, R&I should be "aligned with society's values and demands, while minimising risks and maximising benefits."<sup>614,615</sup>

This definition defines the boundaries of the *ethics* theme within which the interviews and subsequent coding were conducted. They also guide how coded content is presented in this

<sup>614</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>615</sup> <https://www.rri-tools.eu/ethics>

chapter. Out of the nine codes identified for the theme, the four specific codes that stood out through a total count of the relevant codes for all countries included are: positioning ethics – where does the responsibility lie [code 69]; Organisational norms and practices [code 72]; Lack or uncertainty of ethical standards and policies [code 78]; Protection of rights [code 79].

Chapter-wise code counts	Arab States			
	Egypt	Morocco	Jordan	Total
68: Ethics				
69: Positioning ethics- where does the responsibility lie	12	1	2	15
70: Disidentification with ethical responsibility	8	1	0	9
71: Personal responsibility and morality	1	0	1	2
72: Organisational norms and practices	7	1	0	8
73: Safety and security	1	1	2	4
74: Justice and fair dealing	0	1	0	1
75: Quality assurance and testing	3	4	2	9
78: Lack or uncertainty of ethical standards and policies	10	2	1	13
79: Protection of rights	16	4	7	27

For comparability with the other region-specific reports, these codes have been selected based on the total count. In the case of this region, however, with a count of eight, *organisational norms and practices* have a lower count than *disidentification with ethical responsibility*; *safety and security*; *quality assurance and testing*.

The next four sections provide details about each of the four codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders (including key platforms, spaces and players) are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *ethics*.

### 3.4.9.1 POSITIONING ETHICS – WHERE DOES THE RESPONSIBILITY LIE?

The *positioning ethics – where does the responsibility lie?* sub-theme includes perceptions of where ethical responsibilities are located. Whether they are found in existing rules/standards/policies within or beyond the organisation at the individual, institutional, national or international level.

Name	Description
Positioning ethics- where does the responsibility lie?	Reference to where the ethical responsibilities lie and who defines them (within the organisation or beyond). This can be in terms of rules/standards within the organisation or beyond, national vs international level policies, etc.

Identifiable patterns in this sub-theme include how the interviewees had difficulty positioning ethics, especially in relation to themselves and with no clear sense of ethical standards there is a tendency towards ethics becoming an issue of personal responsibility and morality. Many spoke as though disidentifying with ethics as if it is of little or no relevance to them and their work.

Within the Egyptian sample, there are recurring expressions of their research and work falling outside ethical bounds:

*“Our work doesn’t cause concerns for groups outside.”* [Male; Egypt; RPO; Energy<sup>616</sup>]

*“I don’t see a point where we can cause of conflict of interest or a concern to the society.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>617</sup>]

*“I think [ethics] is not relevant to us.”* [Female; Egypt; Policy body; ICT<sup>618</sup>]

Ethics is also treated as a formality and more as a part of the approval stage and not the research process:

*“Once approval is granted from the ethics committee, then it is like a clearance and it is expected not to cause major concerns.”* [Male; Egypt; RPO; Bioeconomy<sup>619</sup>]

With an absence of ethical standards at an organisational or wider level, this participant adopts personal ethical responsibilities:

*“Usually people [are] afraid of the term microorganisms [...] so we have to communicate with them and make sure they understand it will not cause them any harm. [There is no] formal consent, norms or regulations affecting this. However, we do that [...] based on our personal ethical values.”* [Female; Egypt; RPO; Energy<sup>620</sup>]

<sup>616</sup> EG08

<sup>617</sup> EG09

<sup>618</sup> EG03

<sup>619</sup> EG01

<sup>620</sup> EG06

In Jordan, there is a positioning of ethics with the Government:

*“[In the Ministry of Higher Education] there is a jury [where] they have rules and ethics that we should follow when it comes to scientific research.”* [Female; Jordan; RPO, CSO; Bioeconomy<sup>621</sup>]

An organisation with a normative approach to encouraging alignment with society from the very beginning of the research process, although it would appear to still be a personal choice:

*“[...] We always aim to teach them how to define the problem and to see if there is a [societal need] or not. They should also build the idea based on the society's tradition, culture and behaviour, whether in Jordan or the world for such ideas to succeed.”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>622</sup>]

Unfortunately, from the Moroccan sample, there is just one coded word on positioning ethics which simply states “no” [Male; Morocco; Industry & Business; Energy] MO01 in response to a question concerning what steps are taken to ensure their work does not cause concern for society.

### 3.4.9.2 ORGANISATIONAL NORMS AND PRACTICES

The *organisational norms and practices* sub-theme refers to the treatment of ethics within the organisation's structure and operations. It also covers uncertainty about what such norms and practices might be and their role in the organisation's approach to ethics.

Name	Description
Organisational norms and practices	<p>Codes that describe organisational norms and practices (i.e. formal/informal rules and procedures within the organisation) for ethics <i>OR</i> if the respondent shows any uncertainty about what such norms and practices might be or how they might play a role in ethics.</p> <p>Rules: This can include both explicit protocol (official institutional norms, codes, rules or guidelines) and implicit norms and values. It will NOT include any reference to lack or uncertainty of govt/institutional policy, which is included in the relevant code below.</p>

It appears participants were not sure about what ethics norms or practices exist in their organisation. Their excerpts are generally lacking in specifics.

<sup>621</sup> HKJ01

<sup>622</sup> HKJ08

One RPO interviewee states they follow the policies and regulations set by partners rather than their own organisation:

*“[...] we have engagement with other entities to make sure that we are following their regulations and best practices. By this, we are sure that we are following the ethical policies that they use to follow.”* [Male; Egypt; RPO; ICT<sup>623</sup>]

Another researcher describes ethics in terms of health and safety commitments:

*“[...] if we are using chemical or contacting people from outside we have to tell them what kind of chemicals we are using [...] before we go on. Even for researchers within our environment about the precautions they have to [take] before conducting any research.”* [Female; Egypt; RPO; Energy<sup>624</sup>]

There were few insights available for this sub-theme for the Arab States. There was no discussion on this in the Jordanian interview participants and only one mention from a single Moroccan interview participant. This is because the interviewers either did not ask the ethics question in the interview or did not probe further with a follow-up question on this sub-theme. Whilst ethics was discussed in the Egyptian interviews, the data produced is too small to provide relevant insights. Perhaps the silences are themselves indicative of limited ethical commitments overall within this region.

### 3.4.9.3 LACK OR UNCERTAINTY OF ETHICAL STANDARDS AND POLICIES

Participants’ uncertainties about government or institutional policy regarding ethics are included under this sub-theme. This refers to policy beyond the organisation and does not include any discussion on organisational norms and practices, which is covered in the previous section/sub-theme.

Name	Description
Lack or uncertainty of ethical standards/policy	Coding for any reference to respondent’s uncertainty about govt/institutional policy or a lack of govt/institutional policy regarding ethics (beyond the organisation).  Rules: This does NOT include any discussion on organisational norms and practices, which will be coded above in the relevant code.

There is not much regional insight to be obtained from the coding in question due to the brief excerpts of code for many of the countries in the sample. However, analysis shows that the Egyptian participants believe there to be a lack of government and institutional policies concerning ethics:

<sup>623</sup> EG05

<sup>624</sup> EG06

*“No, there is no institutional policies or regulations apart from the work of the ethical committee.”* [Female; Egypt; Policy body; ICT<sup>625</sup>]

*“Nothing [no government or institutional policies and regulations] that I am aware of.”* [Male; Egypt; Industry & Business; Waste Management<sup>626</sup>]

*“There are no [...] regulations or policies that handle our work, [or] support our work.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>627</sup>]

*“There is nothing like this [government or institutional policies and regulations], up to my knowledge.”* [Male; Egypt; RPO; Energy<sup>628</sup>]

*“We don’t really have ethical regulations in my field as I am not into medical or social fields. However, [...] we work with microorganisms in a contained environment to make sure that bacteria we are using is contained and we don’t send anything out to the environment.”* [Female; Egypt; RPO; Energy<sup>629</sup>]

The lattermost quote is perhaps an example of reasoning that fields outside medical or social research are somehow separate from ethics.

### 3.4.9.4 PROTECTION OF RIGHTS

The content under this sub-theme covers references to protecting the rights of all stakeholders through: ensuring consent, confidentiality, ownership and intellectual rights, preventing copyright infringement, plagiarism and fraud, protection from liabilities, and avoiding conflict of interest.

Name	Description
Protection of rights	Any reference to protecting the rights of all stakeholders by ensuring consent, confidentiality, ownership and intellectual rights, preventing copyright infringement, plagiarism and fraud, avoiding conflict of interest, protection from liabilities, etc.

In terms of project ownership and publication authorship rights the participant mentioned the following:

*“The owner of the project [...] is the institution, not the PI. The PI is an executive but to protect him he cannot be taken out by a decision of the head of the*

<sup>625</sup> EG03

<sup>626</sup> EG10

<sup>627</sup> EG04

<sup>628</sup> EG08

<sup>629</sup> EG06

*organization because [...] each project has an owner, a team, and [as] one package.*” [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>630</sup>]

Or monitoring plagiarism:

*“We also [use] tools like plagiarism check, to make sure the published content fits [into] the scientific community.”* [Male; Egypt; RPO; ICT<sup>631</sup>]

Or excluding the plagiarisers:

*“[...] we make sure that the participants are good scientists, and none accused [of] fabricated research, plagiarism or any kind of issues. I think in this way, we are protecting the process.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>632</sup>]

Or the practicalities concerning the protection of animals:

*“[...] an agreement was signed according to certain protocols to allow us using animals regarding ethics and animal protection [...].”* [Female; Jordan; RPO, CSO; Bioeconomy<sup>633</sup>]

And preventing conflicts of interest through signing nondisclosure agreements:

*“[...] Anyone who works with us, signs an "NDA", to guarantee that person won't let any kind of information slip to the third-party, since they are competitors.”* [Female; Jordan; RPO, RFO, Policy body; ICT<sup>634</sup>]

Protection of rights can also play a part in the connection between patents and open access publishing:

*“For universities, they have some researchers [that] don't like to publish in open access, [because they are] seeking a patent. [...] it couldn't be shared over open access until they have this patent in place.”* [Male; Egypt; RPO; ICT<sup>635</sup>]

Some other aspects include how the cultural and religious landscape of Egypt can create obstacles for protecting stakeholders as this researcher's experiences illustrate:

*“[...] The challenges we faced in interacting with specific groups like women is that it is not really convenient to ask a veiled woman to uncover her hair or even ask about specific questions regarding, for example, the tinea capitis which is a skin fungal infection.”* [Male; Egypt; RPO; Bioeconomy<sup>636</sup>]

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<sup>630</sup> EG02

<sup>631</sup> EG05

<sup>632</sup> EG09

<sup>633</sup> HKJ01

<sup>634</sup> HKJ03

<sup>635</sup> EG05

<sup>636</sup> EG01

And:

*“[...] we have performed a study to identify needs in North Sinai which is a really conservative community in Egypt. Here you are not even allowed to talk to women [only] to her husband.”* [Male; Egypt; RPO; Bioeconomy<sup>637</sup>]

Finally, there is only one direct mention in the interviews of protecting workers rights:

*“[...] if the people are working in the company we need to protect them and to give them the best condition [for] their work.”* [Male; Morocco; RPO; Energy, Waste Management<sup>638</sup>]

Ensuring responsibilities, consent, ownership and intellectual property rights were the fundamental concerns within this sub-theme of protection of rights.

### 3.4.9.5 DOMAIN RESULTS

#### 3.4.9.5.1 Energy

According to this participant from the Egyptian sample, there are no ethical standards, norms or restrictions in the energy field:

*“Usually people [are] afraid of the term microorganisms [...] so we have to communicate with them and make sure they understand it will not cause them any harm. [There is no] formal consent, norms or regulations affecting this. However, we do that [...] based on our personal ethical values.”* [Female; Egypt; RPO; Energy<sup>639</sup>]

#### 3.4.9.5.2 Waste Management

There is evidence that customer-centric idea of responsibility exists which includes characteristics of reputation and goodwill:

*“[There] is the professionalism in following up on our work and building trust with our customers.”* [Male; Egypt; Industry & Business; Waste Management<sup>640</sup>]

*“There are general legal frames for the accepted possible impacts of such projects. The "Ministry of Environment" and the funding institutions also play a role in that.”* [Male; Jordan; RPO; Waste Management<sup>641</sup>]

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<sup>637</sup> EG01

<sup>638</sup> MO11

<sup>639</sup> EG06

<sup>640</sup> EG10

<sup>641</sup> HKJ06

### 3.4.9.5.3 Bioeconomy

There is a view that as trusted organisations they fall outside the need for ethical standards:

*“We don’t have a certain practice because we don’t do anything that might harm the society, [on] the contrary we are working for their own good.”* [Male; Egypt; RPO; Energy<sup>642</sup>]

*“Maybe later we can experience something but so far we don’t foresee something that can cause concern. [...] people trust our science activities. It has been 10 years since BioKMT was operating, and we didn’t face critical situations.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>643</sup>]

Several Egyptian participants describe a lack of ethical relevance or restrictions in what they do.

### 3.4.9.5.4 Research Performing Organisations (RPO)

For many RPO interview participants, ethics is a step in the approval process more than an actual embedded, recurring, part of the R&I process:

*“[...] We do have [an] ethics committee and we submit a request for ethical approval which is a requirement for initiating the implementation process.”* [Male; Egypt; RPO; Bioeconomy<sup>644</sup>]

In this example, ethics is almost discardable:

*“Once approval is granted from the ethics committee, then it is like a clearance and it is expected not to cause major concerns.”* [Male; Egypt; RPO; Bioeconomy<sup>645</sup>]

For others, ethics is a part of the publication process, which again distinguishes it from the overall RPO research process:

*“We are following [...] ethical rules for this publishing to make sure of all materials and articles that [are] published.”* [Male; Egypt; RPO; ICT<sup>646</sup>]

This RPO member personalises ethical responsibility, suggesting a lack of ethical guidance and institutionalisation:

*“Usually people [are] afraid of the term microorganisms [...] so we have to communicate with them and make sure they understand it will not cause them any harm. [There is no] formal consent, norms or regulations affecting this. However,*

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<sup>642</sup> EG08

<sup>643</sup> EG09

<sup>644</sup> EG01

<sup>645</sup> EG01

<sup>646</sup> EG05

*we do that [...] based on our personal ethical values.*” [Female; Egypt; RPO; Energy<sup>647</sup>]

*“We don’t have a certain practice because we don’t do anything that might harm the society, [on] the contrary we are working for their own good.”* [Male; Egypt; RPO; Energy<sup>648</sup>]

*“Maybe later we can experience something but so far we don’t foresee something that can cause concern. [...] people trust our science activities. It has been 10 years since BioKMT was operating, and we didn’t face critical situations.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>649</sup>]

A common thread across the Arab States interviews was that regional ethical sensitivities existed, as demonstrated by a number of quotations:

*“[...] The challenges we faced in interacting with specific groups like women is that it is not really convenient to ask a veiled woman to uncover her hair or even ask about specific questions regarding, for example, the tinea capitis which is a skin fungal infection.”* [Male; Egypt; RPO; Bioeconomy<sup>650</sup>]

*“[...] we have performed a study to identify needs in North Sinai which is a really conservative community in Egypt. Here you are not even allowed to talk to women [only] to her husband.”* [Male; Egypt; RPO; Bioeconomy<sup>651</sup>]

*“[...] We always aim to teach them how to define the problem and to see if there is a [societal need] or not. They should also build the idea based on the society's tradition, culture and behaviour, whether in Jordan or the world for such ideas to succeed.”* [Male; Jordan; RPO, CSO; Energy, ICT<sup>652</sup>]

### 3.4.9.5.5 Research Funding Organisation (RFO)

RFOs clearly prioritise ethics within the funding provisions and proposal evaluations that they oversee:

*“In our calls for proposals, the applicants should declare that there is no violation of any ethical rules.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>653</sup>]

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<sup>647</sup> EG06

<sup>648</sup> EG08

<sup>649</sup> EG09

<sup>650</sup> EG01

<sup>651</sup> EG01

<sup>652</sup> HKJ08

<sup>653</sup> EG07

The RFOs also strongly rely on the local support structures and the integrity of the institutions being funded:

*“We rely on ethical committees in universities and research centres [especially] in the medical field.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>654</sup>]

Indeed, approvals from ethical committees from all sides appear to be somewhat standard – in this case, e.g. from governments:

*“We try to line up with the [centralised] ministry plan. However, when it comes to ethics we make sure they have the proper approvals from the prospective ethical committees.”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>655</sup>]

### 3.4.9.5.6 Industry & Business

A customer-centric idea of responsibility also emerged in one interview, where notions of professionalism and trust-building with their customers was a key driver in ensuring ethical adherence:

*“[There] is the professionalism in following up on our work and building trust with our customers.”* [Male; Egypt; Industry & Business; Waste Management<sup>656</sup>]

### 3.4.9.5.7 Civil Society Organisations (CSO)

One participant talked in detail about the experiences of being a CSO with regards to ethics adherence. It was noted that formalised rules existed that drove local implementation and reporting on ethics:

*“[The] ministry of solidarity has rules and regulations that we need to follow because BioKMT is a non-governmental organisation.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>657</sup>]

Whether it was because of the top-down centralisation of ethics procedures or not, it would seem that to date they have had no issues with adhering to high ethical standards:

*“Maybe later we can experience something but so far we don’t foresee something that can cause concern. [...] people trust our science activities. It has been 10 years*

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<sup>654</sup> EG02

<sup>655</sup> EG02

<sup>656</sup> EG10

<sup>657</sup> EG09

*since BioKMT was operating, and we didn't face critical situations.*” [Male; Egypt; RPO, CSO; Bioeconomy<sup>658</sup>]

### 3.4.9.5.8 Policy bodies

For a member of the Egyptian sample, ethics is viewed as irrelevant to the work of their policy body:

*“I think [ethics] is not relevant to us.”* [Female; Egypt; Policy body; ICT<sup>659</sup>]

Paradoxically, the same policy body is pushing for ethics standards in publishing:

*“The most important thing within the area of publishing [is] ethics and [...] we are pushing that all research centres and universities follow.”* [Female; Egypt; Policy body; ICT<sup>660</sup>]

However, it seems that their own approach to implementing policy as a knowledge database for Egyptian society is seen as outside ethics.

### 3.4.9.5.9 Interactions between stakeholders

Evidence suggested that stakeholders were sometimes influenced, not by the policies and regulations set by their organisation, but instead were influenced by the norms and conventions set by the other collaborating stakeholders:

*“[...] we have engagement with other entities to make sure that we are following their regulations and best practices. By this, we are sure that we are following the ethical policies that they use to follow.”* [Male; Egypt; RPO; ICT<sup>661</sup>]

In addition, the legal issue of copyright ownership was also stated as a common query within of shaping stakeholder interactions in terms of ethics:

*“Sometimes you will be asked about copyrights. And you may need to think about if this work is considered as owned by the university or research centre or who has the [rights].”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>662</sup>]

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<sup>658</sup> EG09

<sup>659</sup> EG03

<sup>660</sup> EG03

<sup>661</sup> EG05

<sup>662</sup> EG09

### 3.4.9.6 KEY PLATFORMS, SPACES AND PLAYERS

The Science Technology and Development Fund (STDF), according to one of its members, is a key player in reinforcing the role of university ethics committees in research proposals. They are also trying to encourage a government-backed ethical framework:

*“The focus was more on [the] ethical conduct of research with regard to the implementation of accepted STDF proposals. Sometimes we do plagiarism checks, but we rely on ethical committees in universities and research centres, [especially] in the medical field. We also try to line up with the centralised ministry plan.”*  
[Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>663</sup>]

The Egyptian Knowledge Bank is trying to enforce ethical standards in academic publishing:

*“The most important thing within the area of publishing [is] ethics and [...] we are pushing that all research centres and universities follow.”* [Female; Egypt; Policy body; ICT<sup>664</sup>]

### 3.4.9.7 SUMMARY OF ETHICS

There are a lot of gaps and unanswered issues concerning ethics for this region. Perhaps the silences are themselves indicative of limited ethical commitments overall. Indeed, our analysis of what *was* said in the interviews shows participants are not sure about what ethics norms or practices exist in their organisation. Their excerpts are, notably, generally lacking on specifics.

Identifiable patterns include how the interviewees had difficulty positioning ethics, especially in relation to themselves and with no clear sense of ethical standards. There is a tendency towards ethics to become an issue of personal responsibility and morality. Many spoke as though disidentifying with ethics as if it is of little or no relevance to them and their work. With the Egyptian sample, for example, there are recurring expressions of research and work falling outside ethical bounds and of a lack of government and institutional policies.

### 3.4.10 GOVERNANCE OF RESPONSIBLE RESEARCH & INNOVATION (RRI)

Governance of RRI is defined by the European Commission as “arrangements that lead to acceptable and desirable futures.”<sup>665</sup> Such arrangements have to be “robust and adaptable” to unpredictable R&I development; “familiar enough to align with existing practices in R&I”;

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<sup>663</sup> EG02

<sup>664</sup> EG03

<sup>665</sup> <https://www.rri-tools.eu/about-rri#why>

shares “responsibility and accountability among all actors” and “provide governance instruments to foster this shared responsibility.”<sup>666</sup>

This defines the boundaries of the governance theme within which the subsequent coding is presented. The parent nodes from which the codes are derived are *accounting for local contexts* [codes 95, 96, 97, 98, 99]; and *conflicts and tensions* [code 109, 110]. The constituent codes for the former include:

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
Governance of RRI in Latin America & the Caribbean				
94: Enablers	26	24	25	75
95: Accounting for local contexts	22	9	8	39
96: Importance of customisation	1	1	2	4
97: Contextualising technology and innovation	3	0	2	5
98: Importance of politics	5	2	2	9
99: Accounting for geographic scale	5	4	1	10
109: Conflicts between theory and practice	16	20	11	47
110: Conflicts and tensions in R&I expectations	16	16	11	43
105: Time frames and time constraints	2	4	2	8
108: Lack of (perceived) applicability of RRI	1	0	0	1

The next two sections provide details about each of the two codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *governance of RRI*.

### 3.4.10.1 ACCOUNTING FOR LOCAL CONTEXTS

This sub-theme includes any reference to the role of context in determining and/or undertaking RRI practices. In coding terms, it is the aggregated parent node for the subcategory codes in this section, which are: Importance of customisation; Contextualising technology and innovation; Importance of politics; and Accounting for geographic scale. We now discuss each of these in turn.

<sup>666</sup> <https://www.rri-tools.eu/about-rri#why>

Name	Description
Importance of customisation	Any reference to the importance of a custom-tailored approach for R&I in all/varying aspects of responsibility (e.g. communication and engagement, ethics, etc.)
Contextualising technology and innovation	Any reference to not simply focusing on the technology development, but also providing space for experimentation and dissemination <i>in context</i> for maximising positive impact
Importance of politics	Any reference to how local/international politics or internal politics within the organisation can play a role or influence (R)RI practices
Accounting for geographic scale	Text coded to references of differences in or accounting for geographical scales to highlight how local/ area-specific policies might influence/apply to technologies or products that are, in fact, for global use or how local policies are applied to/influenced by larger national, international or even global standards/policies.  Rules: This code can include any implications on the difference in scale of policies. It can also include interactions or comparisons between different contexts like the Global North and South.

In Egypt, a policy body and funder instil both government and EU standards into its funding programmes:

*“The impact of these projects should impact the research and development in the country and enhance [...] international cooperation. In this context, we are aligning our agenda with the agenda of the EU-Egypt cooperation, and also aligning it with the national agenda.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>667</sup>]

*“From both sides from EU side and the government, [...] we have to follow both regulations, so I would say it is a strict process.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>668</sup>]

### 3.4.10.2 CONFLICTS AND TENSIONS

*Conflicts between theory and practice* [code 109] are the aggregated parent node for *conflicts/tensions in R&I expectations* [code 110]. It includes any reference to conflicts between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as any tensions between what is 'wanted' and what is 'needed'. The

<sup>667</sup> EG07

<sup>668</sup> EG07

conflicts can be because of different normative frames or different research priorities and end goals.

Name	Description
Conflicts/tensions in R&I expectations	<p>Any reference to conflicts between the motivations and priorities of scientific R&amp;I and those of different stakeholders. Any tensions between what is 'wanted' and what is 'needed'.</p> <p>Any reference to tensions, conflicts or disconnects between:</p> <ul style="list-style-type: none"> <li>- Fundamental and applied research</li> <li>- Scientific theory and practice</li> <li>- Research and industry/business</li> <li>- Research and policy, etc.</li> <li>- Regulations versus research progress</li> </ul> <p>Rules: These can be because of different normative frames or different research priorities and end goals.</p>

An interesting finding is how an RFO has never been able to distribute all its money due to the reviewing process:

*“[When it] comes to money spending it is actually well [designed] to protect public money from corruption, but [...] it actually slows down things quite a bit. This has been reflected [in] the ability to fund [...]. We have never been able to spend all [the money we are allocated for funding].”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>669</sup>]

Exchange of data might also be hampered by what is described as inefficiencies government rules in Egypt:

*“Sometimes, [...] exchanging data or information is not well perceived by the government in an efficient way [...]. We struggle with some rules, for example, when working with NGOs or civil societies they require a sequence of approvals before starting the work or collaboration.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>670</sup>]

In Jordan, there are trust issues that appear to affect the collaborative R&I efforts between businesses and RPOs. It appears to be related to how the RPO is perceived as close to the government:

*“They fear the idea that we are related to the government and going to dig after them and check on their production rate and quality of the product or if there [are]*

<sup>669</sup> EG02

<sup>670</sup> EG04

*any legal violations in their establishment in order to tax or fine them.” [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>671</sup>]*

With regard to the area of waste management in Jordan, local authorities are a crucial governance factor. There appears to be some attempt to overcome the regulatory differences between municipalities:

*“[Our] biggest challenges were that we don’t have one specific regulation here in Jordan. Each municipality had its own regulation different from the others. But now, recently, the ministry of municipalities is [...] working on the Solid-waste management law, but it is not confirmed yet.” [Female; Jordan; CSO; Waste Management<sup>672</sup>]*

### **3.4.10.3 DOMAIN RESULTS**

#### **3.4.10.3.1 Energy**

No insights available specifically for the energy domain with regard to RRI governance.

#### **3.4.10.3.2 Waste Management**

There is also evidence that local authorities are a crucial governance factor for waste management issues where there appears to be some attempt to overcome the regulatory differences between municipalities:

*“[Our] biggest challenges were that we don’t have one specific regulation here in Jordan. Each municipality had its own regulation different from the others. But now, recently, the ministry of municipalities is [...] working on the Solid-waste management law, but it is not confirmed yet.” [Female; Jordan; CSO; Waste Management<sup>673</sup>]*

#### **3.4.10.3.3 Information & Communications technology (ICT)**

No insights available specifically for the ICT domain with regard to RRI governance.

#### **3.4.10.3.4 Bioeconomy**

No insights available specifically for the bioeconomy domain regarding RRI governance.

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<sup>671</sup> HKJ05

<sup>672</sup> HKJ04

<sup>673</sup> HKJ04

### 3.4.10.4 STAKEHOLDER RESULTS

#### 3.4.10.4.1 Research Funding Organisations (RFO)

In Egypt, a policy body and funder are instilling both government and EU standards into its funding programmes:

*“The impact of these projects should impact the research and development in the country and enhance [...] international cooperation. In this context, we are aligning our agenda with the agenda of the EU-Egypt cooperation, and also aligning it with the national agenda.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>674</sup>]

And:

*“From both sides from EU side and the government, [...] we have to follow both regulations, so I would say it is a strict process.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>675</sup>]

An interesting finding is how an RFO has never been able to distribute all its money due to the reviewing process:

*“[When it] comes to money spending it is actually well [designed] to protect public money from corruption, but [...] it actually slows down things quite a bit. This has been reflected [in] the ability to fund [...]. We have never been able to spend all [the money we are allocated for funding].”* [Male; Egypt; RFO; Energy, Waste Management, ICT, Bioeconomy<sup>676</sup>]

#### 3.4.10.4.2 Industry & Business

Governance structures can be a problem for some. The different restrictions on data provisioning and transfer of money could hinder RRI as in the following examples:

*“Sometimes, [...] exchanging data or information is not well perceived by the government in an efficient way [...]. We struggle with some rules, for example, when working with NGOs or civil societies they require a sequence of approvals before starting the work or collaboration.”* [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>677</sup>]

National standards are seen as contributing to some movement towards RRI in industry:

*“[...] in my opinion environmental policies in the [Moroccan] government is very important because we [invest] in our company to have these standards in our work. [...] all the policies about work and chemical products [are] very important and I*

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<sup>674</sup> EG07

<sup>675</sup> EG07

<sup>676</sup> EG02

<sup>677</sup> EG04

*think this will [be] very good for the environment and life in Morocco.” [Male; Morocco; Industry & Business; Waste management<sup>678</sup>]*

#### 3.4.10.4.3 Civil Society Organisations (CSO)

A CSO member based in Egypt points to the greater legitimacy and representation of people from the central cities. This can overlook the more innovative possibilities and opportunities for RI in the other regions:

*“Underrepresentation is viewed [...] from the geographical point of view, people sometimes think [...] that everything starts from Cairo and Alexandria and big cities. However, large potential exists in other regions because that’s where the opportunities are.” [Female; Egypt; RPO, Industry & Business, CSO; Energy, Bioeconomy<sup>679</sup>]*

A comment by an RPO representative suggests NGOs in Egypt have a conflictual and restrictive relationship with government that may be undermining government capacity through underutilizing NGOs. They state that there is a need for a common RRI aim between both parties:

*“For some reasons, there is a gap between what the government [needs] and what the government can achieve. This gap could be filled with nongovernmental bodies. But sometimes these nongovernmental bodies struggle to get the required authorisation from the government. This widens the gap. Both governmental and non-governmental bodies need to know that they have [a] common aim.” [Male; Egypt; RPO, CSO; Bioeconomy<sup>680</sup>]*

In Jordan, CSOs can be exposed to inconsistent governance arrangements based on differences between municipalities, although for the following participant this might be about to improve:

*“[Our] biggest challenges were that we don’t have one specific regulation here in Jordan. Each municipality had its own regulation different from the others. But now, recently, the ministry of municipalities is [...] working on the Solid-waste management law, but it is not confirmed yet.” [Female; Jordan; CSO; Waste Management<sup>681</sup>]*

#### 3.4.10.4.4 Policy bodies

The Egyptian policy body member commends the Egyptian president for advancing RRI:

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<sup>678</sup> MO08

<sup>679</sup> EG04

<sup>680</sup> EG09

<sup>681</sup> HKJ04

*“Our president el-Sisi has helped a lot [in] encouraging women in all domains.”*

[Female; Egypt; Policy body; ICT<sup>682</sup>]

Internationalisation of research is viewed as a core part of the governance structure for developing a country’s RRI. There is recognition of the need to shape agenda according to this relationship:

*“The impact of these projects should impact the research and development in the country and enhance [...] international cooperation. In this context, we are aligning our agenda with the agenda of the EU-Egypt cooperation, and also aligning it with the national agenda.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>683</sup>]

This participant sees this joint agenda aspect as leading to stricter regulatory requirements due to needing to fulfil both national and EU standards.

*“From both sides from EU side and the government, [...] we have to follow both regulations, so I would say it is a strict process.”* [Female; Egypt; RFO, Policy body; Energy, Waste Management, ICT, Bioeconomy<sup>684</sup>]

#### 3.4.10.4.5 Interaction of stakeholders

CSOs and government bodies are described as having conflictual relations based on a failure to receive authorisation and the lack of recognition of a common aim:

*“For some reasons, there is a gap between what the government [needs] and what the government can achieve. This gap could be filled with nongovernmental bodies. But sometimes these nongovernmental bodies struggle to get the required authorisation from the government. This widens the gap. Both governmental and non-governmental bodies need to know that they have [a] common aim.”* [Male; Egypt; RPO, CSO; Bioeconomy<sup>685</sup>]

There are also trust issues that appear to affect the collaborative R&I efforts between businesses and RPOs. It appears to be related to how the RPO is perceived as close to government:

*“They fear the idea that we are related to the government and going to dig after them and check on their production rate and quality of the product or if there [are] any legal violations in their establishment in order to tax or fine them.”* [Male; Jordan; RPO; Energy, Waste Management, ICT, Bioeconomy<sup>686</sup>]

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<sup>682</sup> EG03

<sup>683</sup> EG07

<sup>684</sup> EG07

<sup>685</sup> EG09

<sup>686</sup> HKJ05

#### 3.4.10.4.6 Key platforms, spaces, and players

There is no data to inform this section.

### 3.4.11 INTERVIEW FINDINGS

Chapter 3 presents findings from the RRING WP3's Task 3.3 – specifically its global interview task for the region of the Arab States. The aim of RRING's Task 3.3 interviews is to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data through and from researchers and innovators themselves, in the Arab States.

In total, 29 interviews were undertaken for the Arab States covering: Egypt (10 interviews); Morocco (12); and Jordan (8). We undertook a qualitative content analysis approach to analysing these interview data.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions, and indeed are core to structuring the interview sections of this report. Within each of these themes, a number of prevalent sub-themes (all of which are shaping how research and innovation professionals in the Arab States are doing their work) also emerged:

- *Gender equality and inclusivity*: gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; and lack or uncertainty of policy.
- *Public engagement*: organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: evaluation; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.
- *Ethics*: positioning ethics – where does the responsibility lie?; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: accounting for local contexts; and conflicts and tensions.

Taking each of these themes in turn, we now briefly reiterate salient findings that have been generated through our analysis:

### **1. Gender equality and inclusivity (Section 3.4.4)**

Female representation and participation are the main focus of comments relating to gender equality and inclusivity. Improvements are generally acknowledged and there are also some accounts of equal participation and decision-making (e.g. in the Moroccan energy domain). However, the gender pay gap is not addressed and more complex and progressive understandings are not expressed. For example, how diverse partners and greater gender inclusivity throughout the process can broaden the research and industry perspectives.

Although some organisational activities aim towards some form of inclusivity and diversity, they tend to be weakly defined and supported, with generally no detailed descriptions of concrete organisational rules or policies and a lack of government and institutional policies. In addition, the three RFOs in the regional sample do not offer much discussion on the use of funding conditions to impose obligations on grantees to support gender equality and inclusivity, which signals that such obligations are not sufficiently being addressed.

Motherhood is mentioned as one of the main obstacles to advancement for women but there are no expressions of support for stronger interventions. In fact, meritocratic framing is sometimes used to suggest that there are no problems in need of intervening. Other forms of inclusivity and diversity are almost completely absent.

Other forms of diversity and inclusivity are generally not addressed. An absence of black researchers in environmental science is noted and religious and ethnic inclusive difficulties are referred to by a single Egyptian interviewee.

There is a strong meritocratic reasoning present, where it is seen as progressive in that it does not select certain genders or ethnicities over others. This ignores deeper legacies of patriarchal biases, conservative cultures, and access issues, and fails to consider how this approach might reproduce the existing inequalities that stem from these problems.

### **2. Public engagement (Section 3.4.5)**

It is not clear that the concept of public engagement is understood in a way that connects to the EU pillar definition. Engagement is occasionally framed as a two-way collaborative process, however, a lot of it is also framed as a one-way top-down relationship. Collaboration is generally positive in tone and talked about in terms of having advantages. However, collaboration without a sense of alignment is not exactly public engagement as defined in this chapter.

Apart from the minor mention of private sector stakeholders, there is little about the engagement outcomes and whether they align with needs, expectations or values.

Often the benefits mentioned are those that accrue to the interviewee's organisation, rather than to the other stakeholders. Still, there are some comments on the benefits of engagement and aligning with the needs and expectations of others.

The interviews indicate that there are very few formal rules and a very limited set of norms and practices in place throughout for interacting with external groups.

### **3. Open Science (Section 3.4.6)**

It can be seen that commercialisation and intellectual property rights are often prioritised over open access, with RPOs being subject to the data requirements of their collaborators. Funding clearly plays a key role in establishing the levels at which open access is allowed.

Research quality and the visibility of both the researcher and their research are the main benefits-motives to open access. Improving the profile and visibility of researchers and their publications was common across all Arab States countries but was especially prevalent in the Egyptian sample.

More negative associations involve the perception that open access comes with restrictive costs, which is another common thread throughout the interview, in addition to low prestige being attributed to open access journals (which are viewed as threatening promotion prospects).

There is little indication that access should be intended for all stages of research and innovation processes or that much effort is being made to make the information more meaningful. For example, references to primary data appear to be more restrictive towards release than for the results.

### **4. Anticipative, reflective and responsiveness (Section 3.4.7)**

The qualitative account contained in this theme cautions that this is one of the RRI areas that need much more work. It was common for the perspectives expressed by the interview participants to be somewhat confused.

It is clear that the interview participants and many interviewers struggled with grasping the RRI conceptualisation of anticipation with for example ‘anticipation’ often unsuccessfully substituted with ‘future implications’. Consequently, it appears that the whole idea of anticipation is too difficult an idea, or is too rarely considered, for it to be articulated and elaborated upon for the research and innovation professionals working in the Arab States at this time. In the end, our findings for this theme contains very little future perspective and was thus more concerned about the state of the present, particularly through a frame of quality assurance.

Nevertheless, while there is little direct account of desirable futures and how they are anticipated, there are signs that the structuring of these futures and societal needs is influenced by the nature of domains and how they intersect with the country or government.

## 5. Science education (Section 3.4.8)

No insights from the Arab States interviews were available on the following, suggesting that these are not common issues or tools of relevance in this region:

- Information-based tools, which broadly covers any references to tools that provide information for understanding R&I in the organisation and its norms, procedures and practices related to it. These concerns include only one-way communication.
- Information centres, which covers any reference to providing information through information centres, such as visitor centres.
- University open days, which includes any reference to communication/providing information through university open days.

In contrast, the following tools and resources were frequently discussed:

- Conferences, symposiums, talks and exhibitions, which includes any reference to providing information through different presentation-focused events, such as conferences, seminars, lectures, talks, etc.
- Training and workshops, which includes setting up training sessions and/or workshops, where the aim is skills development and capacity building (as opposed to simple information sharing, as in the above two codes: conferences and talks).
- Research publications and policy report, which includes e.g. research journals, publication, online research repositories, digital research platforms, and public databases, policy reports, etc.

For these latter tools and resources, there was much to be said about the specifics used, but very little at all on the rationales and objectives behind the use of these. This suggests a lack of strategy and planning.

## 6. Ethics (Section 3.4.9)

There are a lot of gaps and unanswered issues concerning ethics for this region. Perhaps the silences are themselves indicative of limited ethical commitments overall. Indeed, our analysis of what *was* said in the interviews shows participants are not sure about what ethics norms or practices exist in their organisation. Their excerpts are, notably, generally lacking on specifics.

Identifiable patterns include how the interviewees had difficulty positioning ethics, especially in relation to themselves and with no clear sense of ethical standards there is a tendency towards ethics becoming an issue of personal responsibility and morality. Many spoke as though disidentifying with ethics as if it is of little or no relevance to them and their work. With the Egyptian sample, there are recurring expressions of research and work falling outside ethical bounds and of a lack of government and institutional policies.

## **7. Governance of RRI (Section 3.4.10)**

For this particular sub-theme, the experiences of interacting with stakeholders across the Arab States was poor. Such negative experience related to, for example: disconnected expectations, clashing interests (e.g. entrepreneurial vs. research), reporting requirements, and lack of trust.

Governance structures presented several problems by restricting data provisioning and funding with some inefficient rules and regulations. Therefore, a conflictual relationship exists between the government and RRI organisations. Trust issues also appear to affect collaborative R&I efforts between businesses and RPOs if they are perceived as close to the government.

In general, the governance of RRI in the Arab States is inconsistent and differences between municipalities hamper progress. However, internationalisation of research is viewed as a core part of the governance structure for developing a country's RRI, and there is recognition of the need to shape agenda according to this relationship.

## 3.5 GLOBAL SURVEY RESEARCH: ARAB STATES

### 3.5.1 INTRODUCTION

The sample size from Arab states represented only part of the complete global picture, with about half of the respondents coming from Egypt. The socio-demographic measures showed the dominant age group as 39 to 48, and the gender distribution was slightly skewed toward men. More than half of the respondents indicated working in one of the four key RRING domains. Most of the respondents worked in a university or similar RPO, with the most dominant professional fields relating to agricultural sciences.

RPOs and other academics were by far the stakeholder type most engaged with, suggesting a higher internal engagement in comparison with non-academic stakeholders. This is most likely due to academic collaborations and joint research projects. RRI was mostly associated with the socially beneficial aspects of R&I, and dominant associations with the SDGs were for economic aspects of sustainable development.

There was an overall agreement on the importance of diverse and inclusive RRI dimensions, and results suggested that engaging other researchers and academics was a typical part of research processes. Gender equality was ensured internally by creating equal research teams but lacked widely adopted measures to integrate gender equality on a more substantive level. This also applied to ethnic minorities, as their inclusion was not as highly valued as the other diverse and inclusive RRI measures. Other measures relating to the inclusion of ethnic minorities indicated a lack of practical action towards this aspect of RRI.

Respondents expressed broad agreement towards the anticipative and reflective dimension of RRI, which translated into various practical steps. These mostly referred to rules, regulations, and legal obligations, but also aspects relating to making research directly responsive to societal needs or concerns.

Transparency of research at all levels of R&I work was broadly ensured through one-way dissemination, presumably as it was considered a viable pathway towards open and transparent methods and processes. Researchers and innovators indicated sharing their work more within the academic field than with public and non-academic stakeholders. Making research findings and data openly available to the public was widely confused with open access of research results.

The attitudinal agreement for societal needs was the highest in comparison with other RRI dimensions. In practice, rather than empowering relevant groups of people to shape the R&I process, there seemed to be a dominant and less responsive top-down approach when selecting research topics.

## 3.5.2 OVERVIEW

This section focuses on the sample of respondents from Arab states. It was represented by a majority of respondents from Egypt ( $n = 107$ , 52%). The sample size for Arab states was  $n = 206$  (completed surveys), making up 8% of the global sample.

### 3.5.2.1 SOCIO-DEMOGRAPHICS OF ARAB STATES

The dominant age group was 39 to 48 ( $n = 84$ , 43%) (Figure 92)<sup>687</sup>, and the gender distribution was skewed towards men ( $n = 116$ , 57%) rather than women ( $n = 88$ , 43%) (Figure 93)<sup>688</sup>.

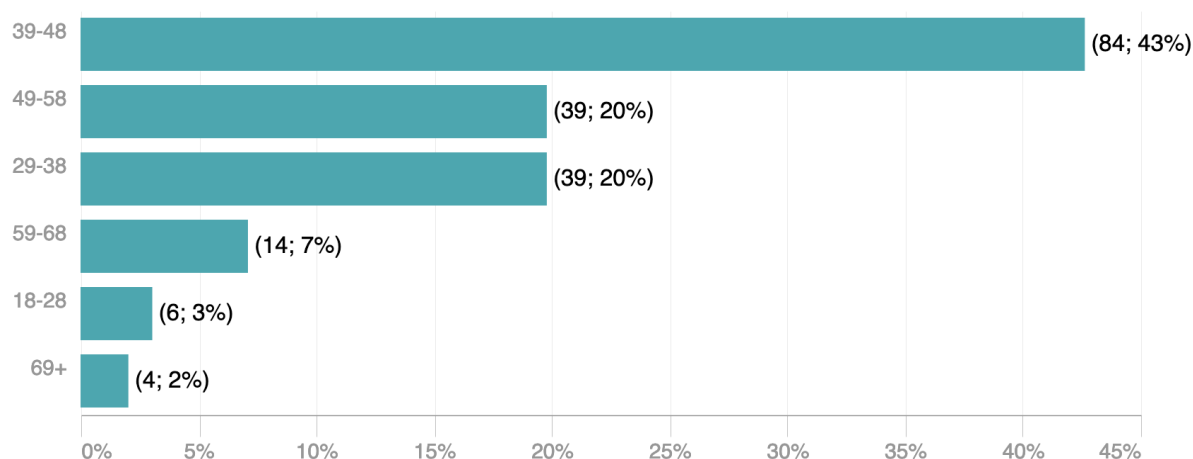


Figure 92: Arab States - Distribution of age.

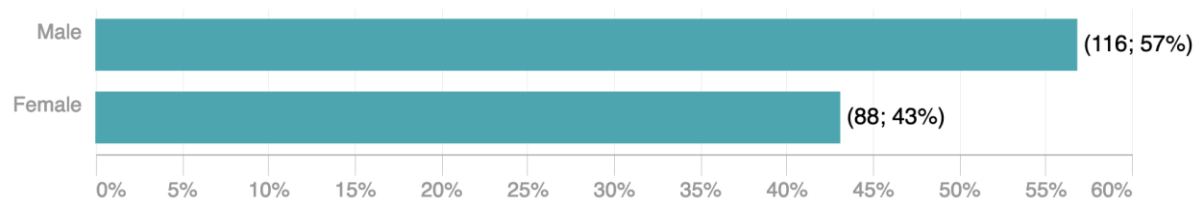


Figure 93: Arab States - Distribution of gender.

Most respondents indicated that they are not currently participating in an educational programme ( $n = 169$ , 86%) (Figure 94)<sup>689</sup>. The overall level of formal education was high. Most held a *Doctoral degree* ( $n = 169$ , 86%), while fewer respondents reported completing a *Bachelor's degree* ( $n = 29$ , 14%) or *Master's degree* ( $n = 48$ , 24%) (Figure 95)<sup>690</sup>.

<sup>687</sup> The total number of responses:  $N = 186$

<sup>688</sup> The total number of responses:  $N = 204$

<sup>689</sup> The total number of responses:  $N = 197$

<sup>690</sup> The total number of responses:  $N = 200$

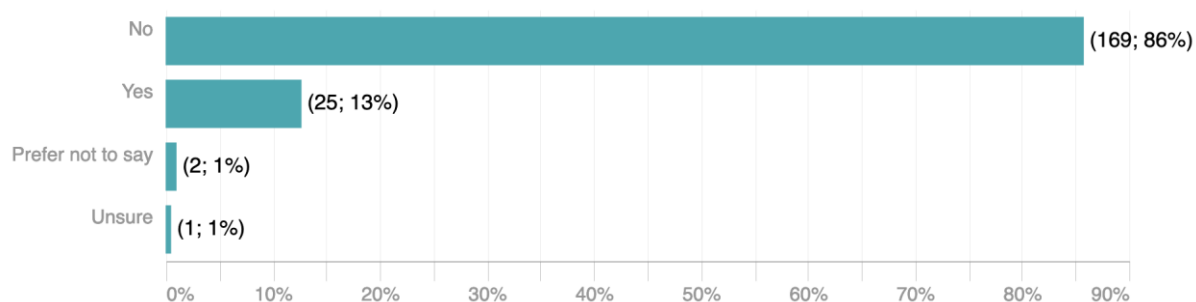


Figure 94: Arab States - Currently studying at school, college or university.

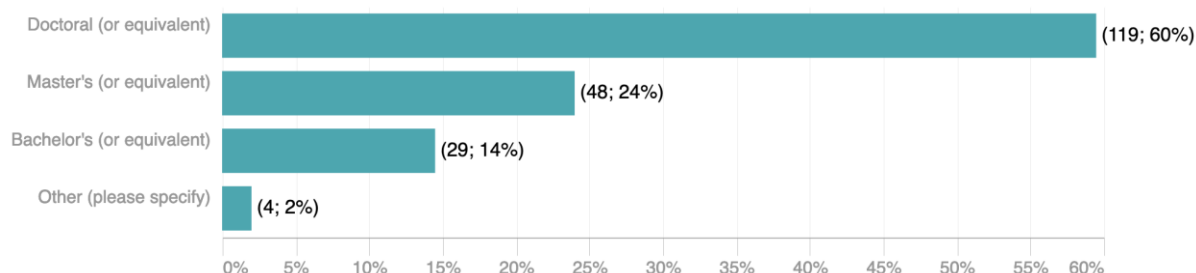


Figure 95: Arab States - Highest level of formal education completed.

In general, the subject areas of respondents' degrees were diverse (Figure 96)<sup>691</sup>. Among the degree subject areas, 'Agriculture, forestry, fisheries and veterinary' ( $n = 63$ , 26%) represented the largest group, followed by 'Engineering, manufacturing and construction' ( $n = 41$ , 17%), 'Natural sciences, mathematics and statistics' ( $n = 34$ , 14%), 'Health and welfare' ( $n = 33$ , 14%), 'Other' ( $n = 26$ , 11%), 'Business, administration and law' ( $n = 29$ , 9%), 'Information and Communication Technologies (ICTs)' ( $n = 12$ , 5%), 'Education' ( $n = 7$ , 3%), 'Arts and humanities' ( $n = 3$ , 1%), 'Social sciences, journalism and information' ( $n = 3$ , 1%), and 'Services' ( $n = 1$ , 0%).

<sup>691</sup> The total number of responses:  $N = 242$

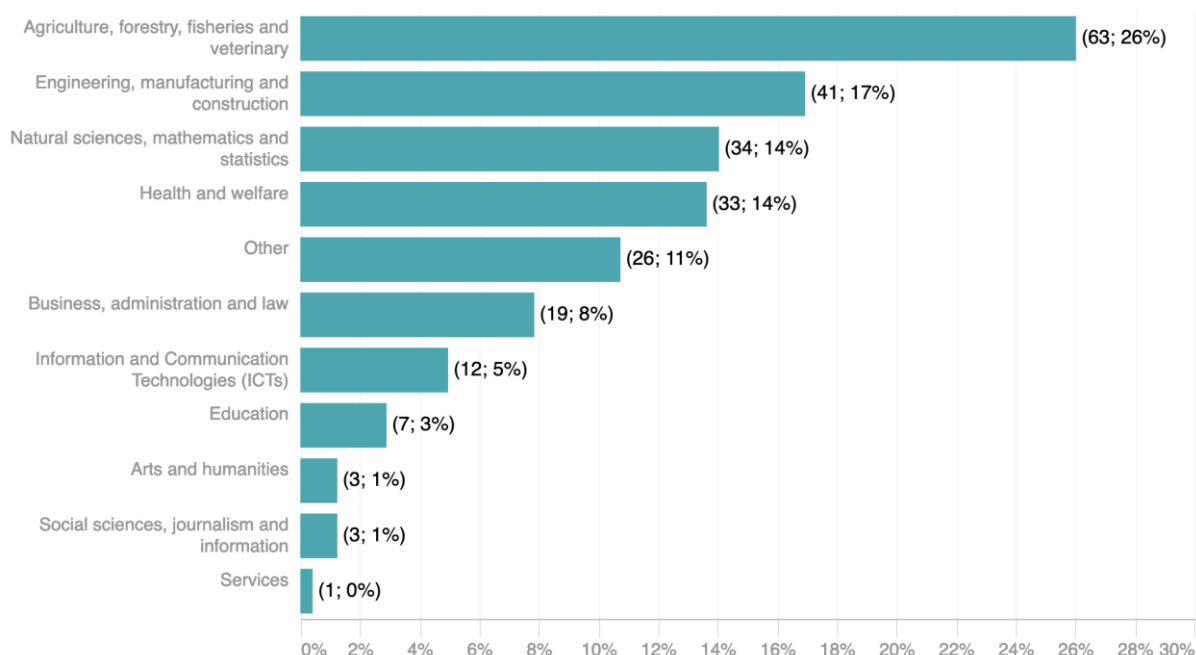


Figure 96: Arab States - Distribution of degrees by subject area (multiple choice).

Respondents tended to have many years of professional experience, both in total ( $Mdn = 19$  years) and after completing their doctoral degree ( $Mdn = 9$  years) (Figure 97)<sup>692</sup>.

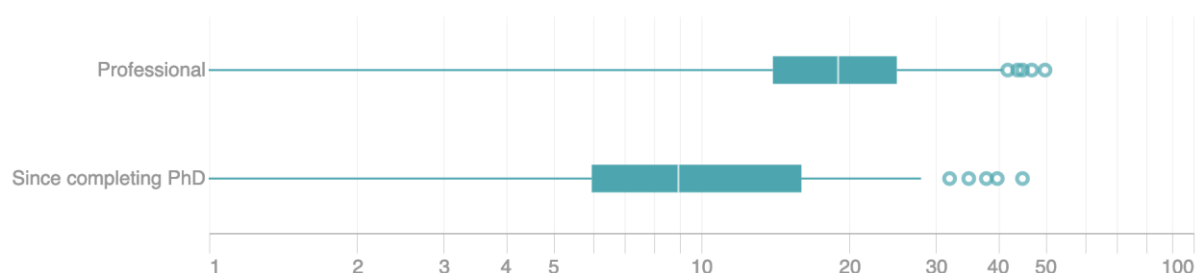


Figure 97: Arab States - Years of experience as professional / since completing PhD (log scale).

In terms of respondents' academic fields of work, the most dominant were 'Agricultural sciences' ( $n = 54$ , 28%) and 'Engineering and technology' ( $n = 38$ , 19%) (Figure 98)<sup>693</sup>.

<sup>692</sup> The total number of responses for 'Professional'  $N = 159$ , 'Since completing PhD'  $N = 105$

<sup>693</sup> The total number of responses:  $N = 220$

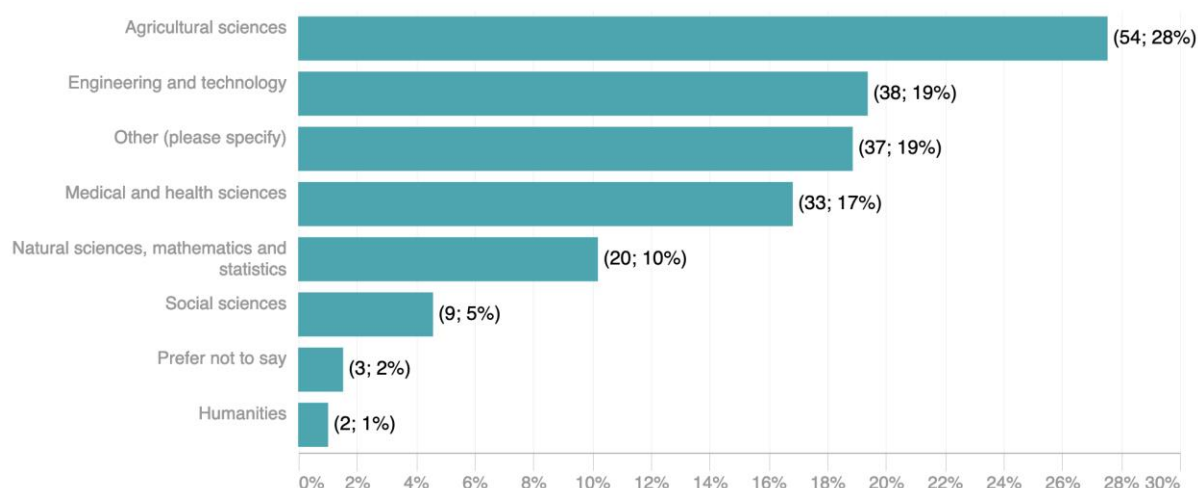


Figure 98: Arab States - Fields or professions in which respondents work.

The most commonly reported sub-fields within these categories were ‘Agriculture, forestry and fisheries’ ( $n = 19, 36\%$ ) (Figure 99)<sup>694</sup> and ‘Electrical/electronic/information engineering’ ( $n = 12, 32\%$ ) respectively (Figure 100)<sup>695</sup>.

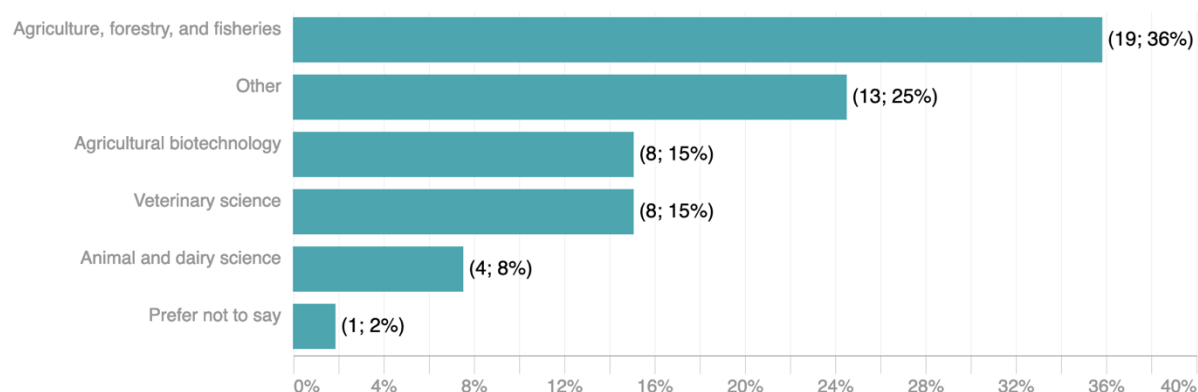


Figure 99: Arab States - Sub-fields of agricultural sciences.

<sup>694</sup> The total number of responses:  $N = 53$

<sup>695</sup> The total number of responses:  $N = 37$

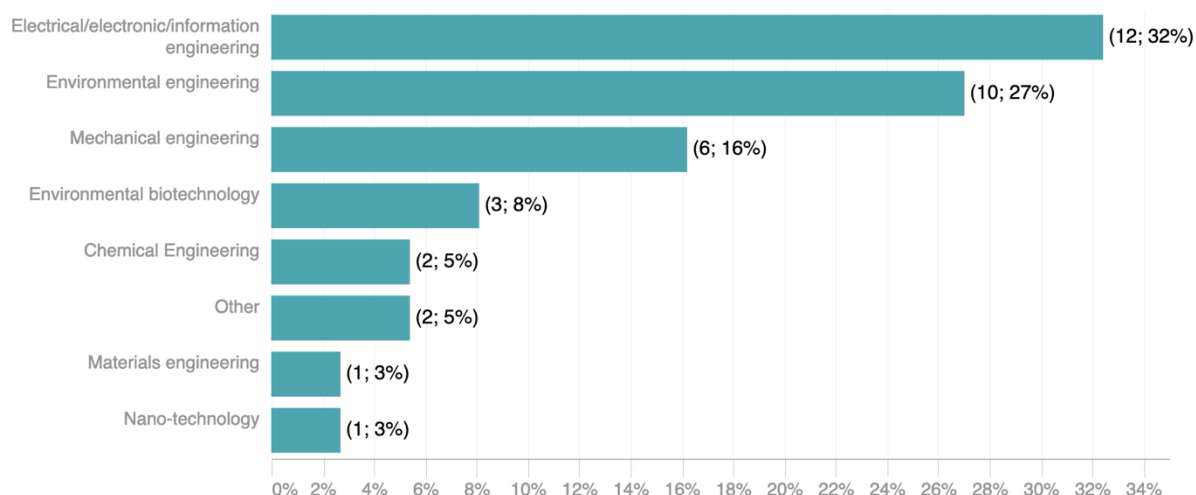


Figure 100: Arab States - Sub-fields of engineering and technology.

Other sub-fields were 'Health sciences' ( $n = 9$ , 27%) within 'Medical and health sciences' (Figure 101)<sup>696</sup>, and 'Biological sciences' ( $n = 12$ , 63%) within 'Natural sciences, mathematics and statistics' (Figure 102)<sup>697</sup>.

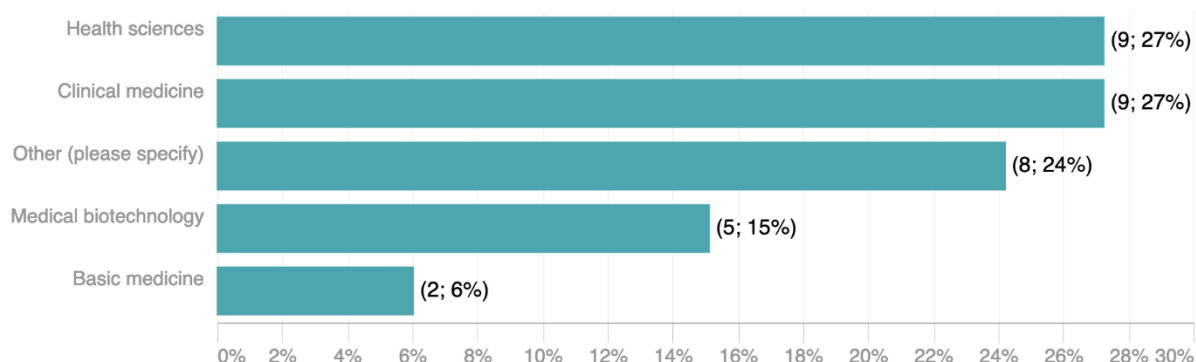


Figure 101: Arab States - Sub-fields of medical and health sciences.

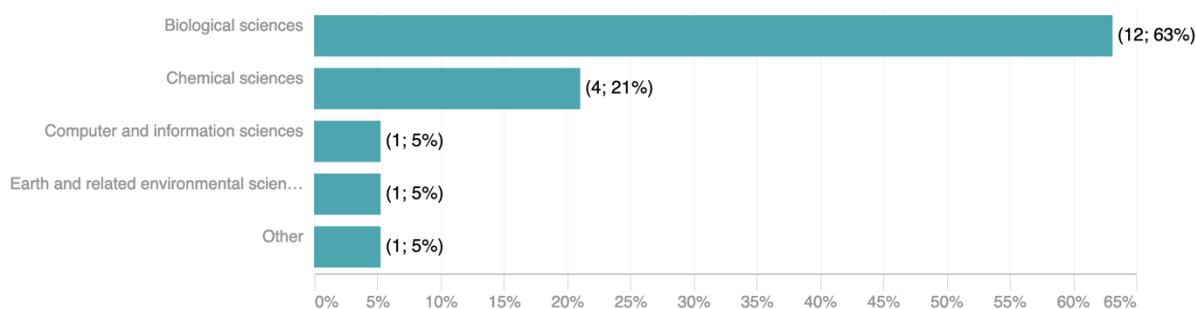


Figure 102: Arab States - Sub-fields of natural sciences, mathematics and statistics.

<sup>696</sup> The total number of responses:  $N = 33$

<sup>697</sup> The total number of responses:  $N = 19$

The most common sub-fields of ‘*Social sciences*’ was ‘*Economics and business*’ ( $n = 6$ , 67%) (Figure 103)<sup>698</sup>. For ‘*Humanities*’, the only responses were ‘*History and archaeology*’ ( $n = 1$ , 50%), and ‘*Other*’ ( $n = 1$ , 50%) (Figure 104)<sup>699</sup>.

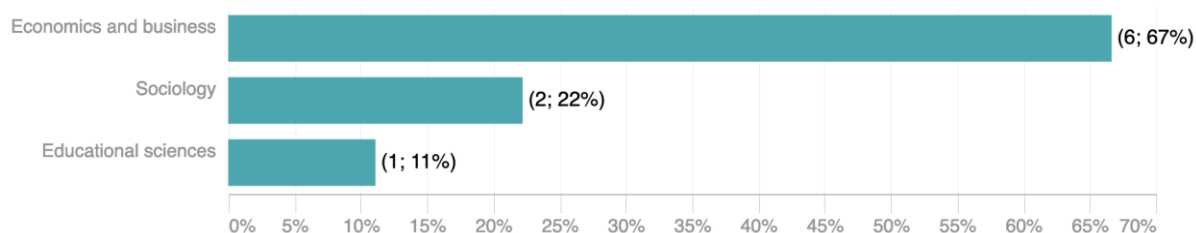


Figure 103: Arab States - Sub-fields of social sciences.

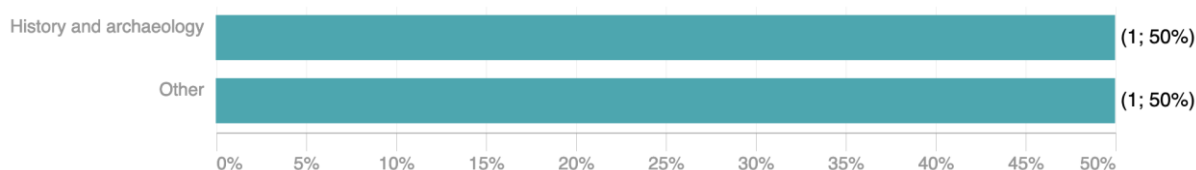


Figure 104: Arab States - Sub-fields of humanities.

Most respondents worked full-time ( $n = 172$ , 88%) (Figure 106)<sup>700</sup> in ‘*Universit[ies] or similar research performing organisation[s]*’ ( $n = 86$ , 45%), ‘*National governmental organisation[s]*’ ( $n = 59$ , 31%), or ‘*Other*’ ( $n = 14$ , 7%) (Figure 105)<sup>701</sup>.

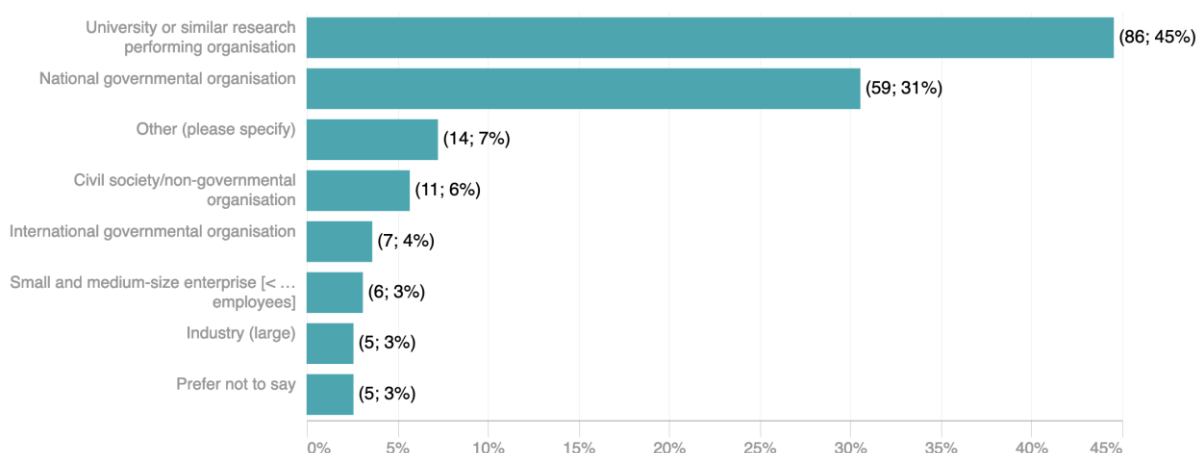


Figure 105: Arab States - Sectors in which participants work[ed].

<sup>698</sup> The total number of responses:  $N = 9$

<sup>699</sup> The total number of responses:  $N = 2$

<sup>700</sup> The total number of responses:  $N = 195$

<sup>701</sup> The total number of responses:  $N = 193$

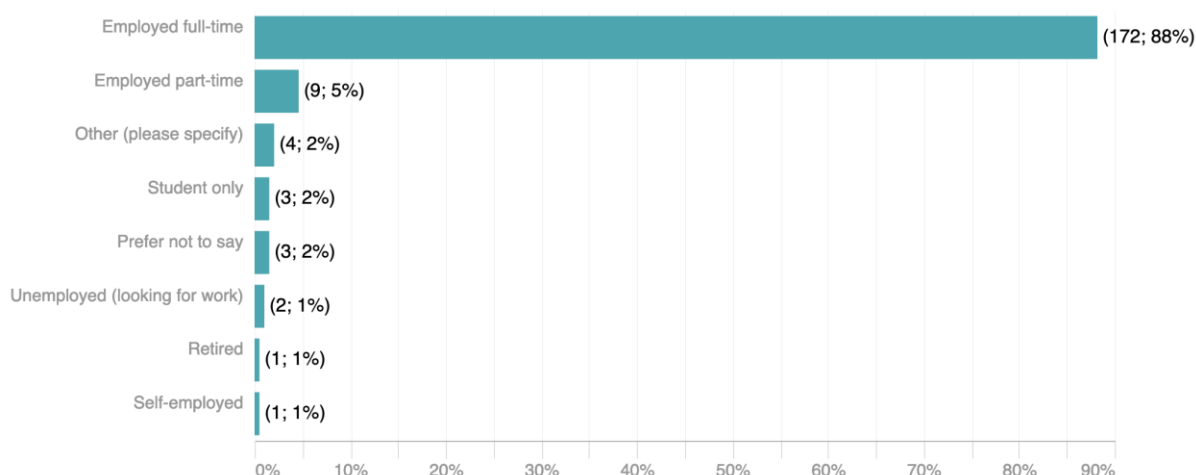


Figure 106: Arab States - Participants' employment status.

In general, respondents spent their working hours on a diverse range of tasks. The most time was spent on 'Research and innovation work' (Mdn = 15 hours)<sup>702</sup>, 'Seeking or managing research/innovation funding' (Mdn = 8 hours) and 'Teaching or capacity building (including training)' (Mdn = 8 hours) (Figure 107)<sup>703</sup>.

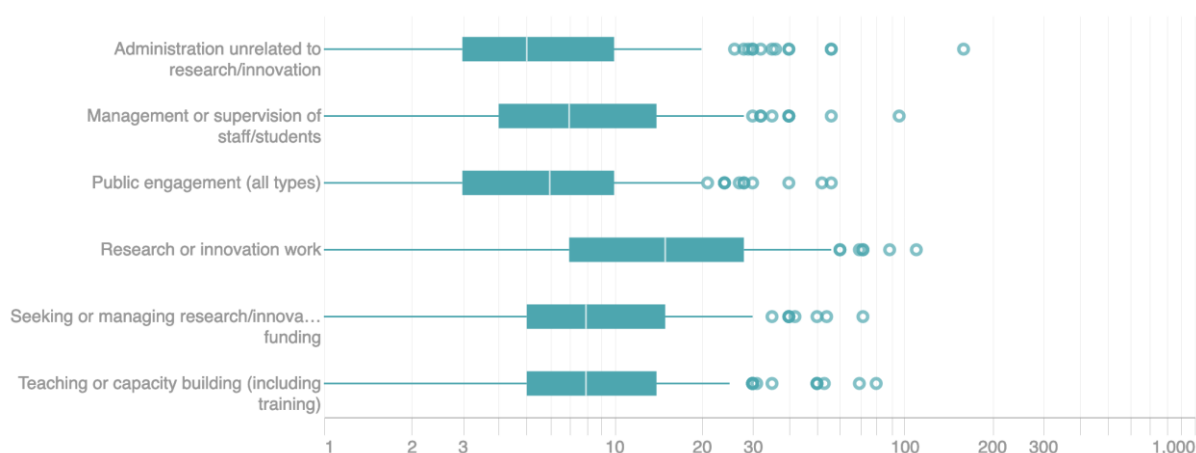


Figure 107: Arab States - Hours spent on activities in the last 7 days (log scale).

The median number of years that respondents had worked as researchers and innovators was 12 years. In terms of their current positions, the median number of years of respondents' work experience was 10 years (Figure 108)<sup>704</sup>. Respondents tended to have worked longer as a researcher and innovator than in their current role.

<sup>702</sup> The total number of responses  $N = 164$

<sup>703</sup> The total number of responses  $N = 146$

<sup>704</sup> The total number of responses:  $N = 150$

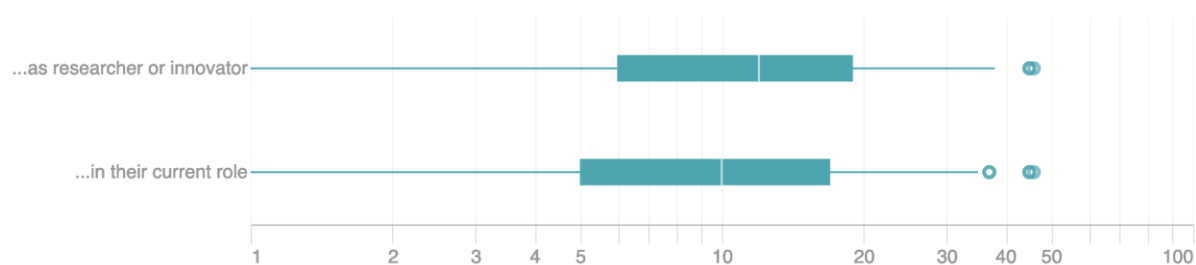


Figure 108: Arab States - Years that respondents worked in their current role / as researcher or innovator (log scale).

From the four key RRING domains, respondents most frequently indicated working in 'None of these' ( $n = 89$ , 40%), followed by 'Digital (ICT)' ( $n = 36$ , 16%) and 'Waste Management' ( $n = 36$ , 16%). Less common were 'Bio-economy' ( $n = 31$ , 14%) and 'Energy' ( $n = 29$ , 13%) (Figure 109)<sup>705</sup>.

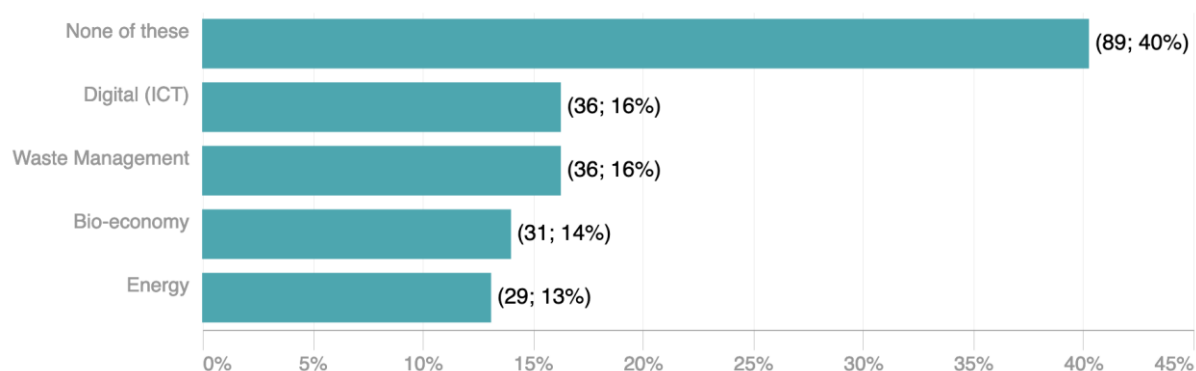


Figure 109: Arab States - Domains relating to participants' recent work.

### 3.5.3 RESULTS BY DIMENSION OF RESPONSIBLE RESEARCH & INNOVATION

This section describes the level of engagement with the four RRI process dimensions, both on an attitudinal and practical level.

#### 3.5.3.1 RRI DIMENSION – DIVERSE AND INCLUSIVE

While there was overall agreement on an attitudinal level, there were value-action gaps for each measure. This was most apparent for the inclusion of ethnic minorities, as attitudes and reporting practical steps did not align. This measure also had the lowest level of total attitudinal agreement (74%, compared to 85% for gender equality, and 91% for diverse perspectives, and 93% for ethics).

<sup>705</sup> The total number of responses:  $N = 221$

### 3.5.3.1.1 Diverse and Inclusive – Diverse Perspectives

The majority of respondents agreed, but with differing levels of strength, that it is important to involve stakeholders with diverse perspectives and expertise ( $n = 178$ , 91%) (Figure 110)<sup>706</sup>. Nearly half expressed the strongest level of agreement ( $n = 80$ , 49%), whereas only minor proportions disagreed ( $n = 6$ , 4%) or responded neutrally ( $n = 9$ , 6%).

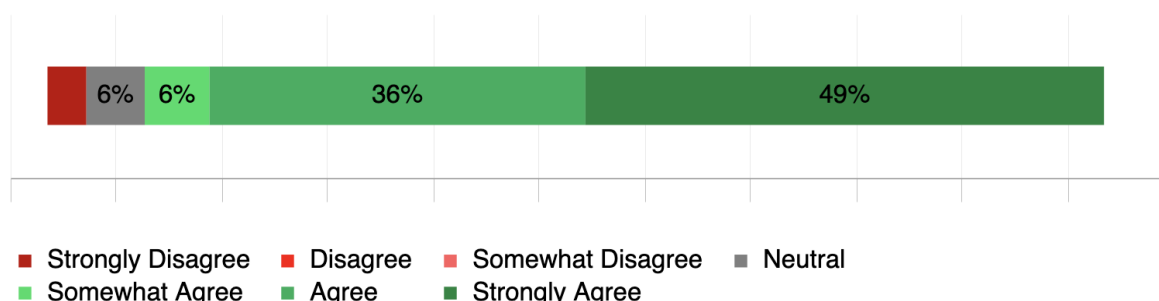


Figure 110: Arab States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work.'

Two-thirds of respondents ( $n = 112$ , 66%) reported taking practical steps to involve diverse stakeholders (Figure 111)<sup>707</sup>. This represents 76% of those who indicated a positive attitude towards involving diverse perspectives and is one of the two smallest value-action gaps of all RRI measures. There was still a moderate proportion ( $n = 36$ , 24%) whose attitudinal agreement had not translated into practical action or who had not answered the question. A small portion explicitly reported taking no steps ( $n = 25$ , 15%) or thought taking action did not apply to them or had no opinion ( $n = 14$ , 8%).

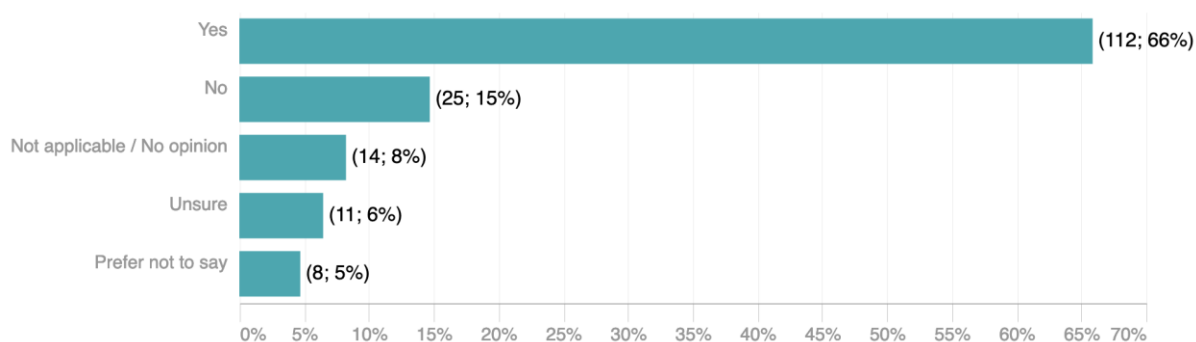


Figure 111: Arab States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.

Respondents involved different sectors in their R&I process (Figure 112)<sup>708</sup>. Most frequently 'Universit[ies] or college[s]' ( $n = 77$ , 22%) were specified, followed by 'Research

<sup>706</sup> The total number of responses:  $N = 163$

<sup>707</sup> The total number of responses:  $N = 170$

<sup>708</sup> The total number of responses:  $N = 348$

*organisation[s]*' ( $n = 64, 18\%$ ), *'Research funding organisation[s]'* ( $n = 49, 14\%$ ), and *'Government agenc[ies]'* ( $n = 44, 13\%$ ).

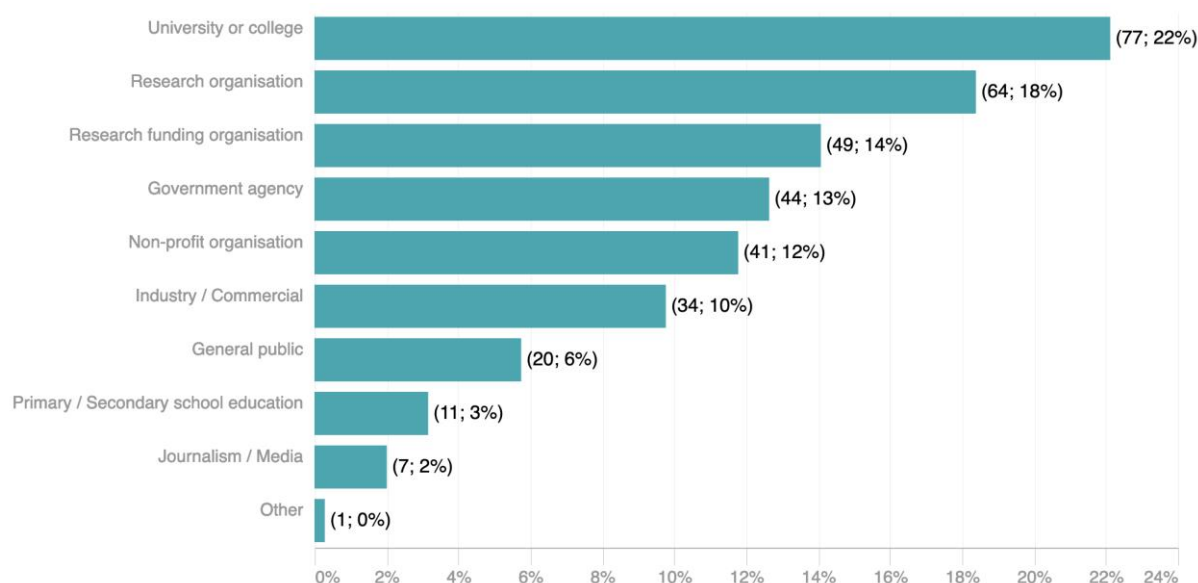


Figure 112: Arab States - Sectors' participants involved in research and innovation practice.

In general, respondents reported similar proportions of involved stakeholders for R&I practice and dissemination (Figure 113)<sup>709</sup>. Again, the sectors most frequently involved were *'Universit[ies] or college[s]'* ( $n = 76, 23\%$ ) and *'Research organisation[s]'* ( $n = 57, 17\%$ ). However, *'Government agenc[ies]'* ( $n = 41, 12\%$ ) and *'Research funding organisation[s]'* ( $n = 41, 12\%$ ) had an equal frequency of involvement for dissemination. They were followed by *'Non-profit organisation[s]'* ( $n = 32, 10\%$ ), the *'General public'* ( $n = 30, 9\%$ ).

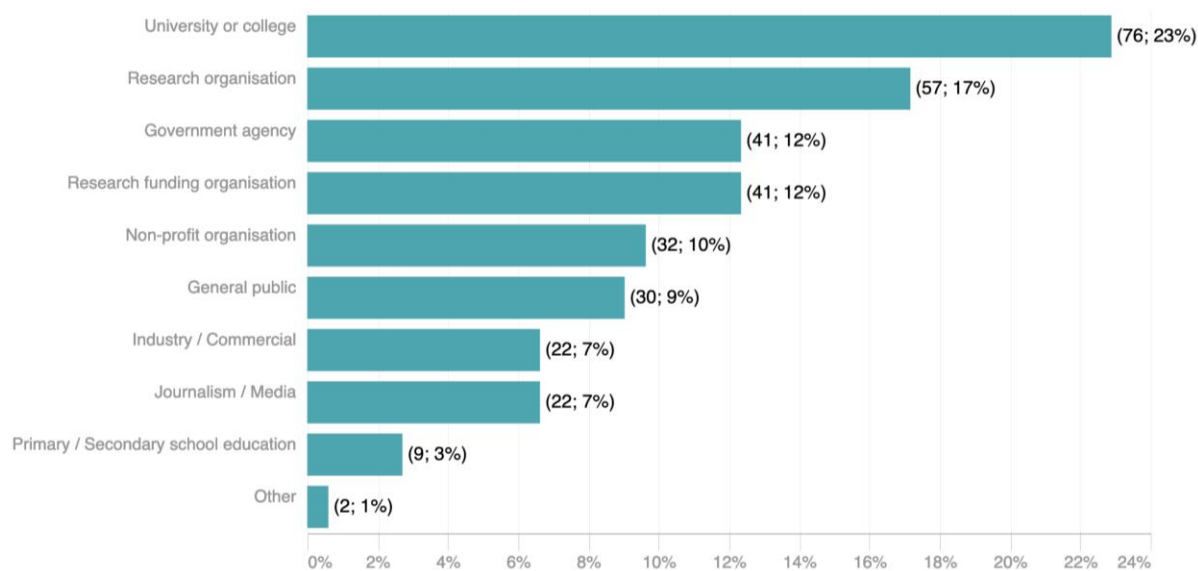


Figure 113: Arab States - Sectors' participants involved in research and innovation dissemination.

<sup>709</sup> The total number of responses:  $N = 332$

### 3.5.3.1.2 Diverse and Inclusive – Gender Equality

There was broad agreement with the importance of promoting gender equality in R&I work (Figure 114)<sup>710</sup>. The majority of respondents ( $n = 134$ , 85%) responded positively, with almost half ( $n = 76$ , 48%) expressing the strongest level of agreement. A minority ( $n = 24$ , 15%) responded neutrally or disagreed that promoting gender equality was important in their work.

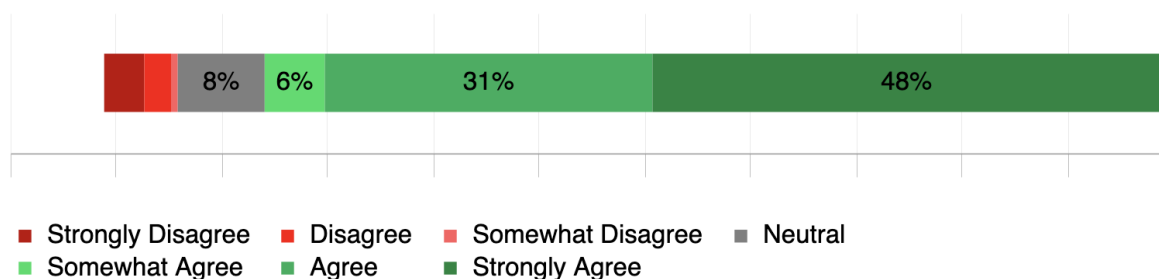


Figure 114: Arab States - 'It is important to promote gender equality in my research and innovation work.'

More than half of respondents ( $n = 86$ , 51%) had taken steps to promote gender equality in their work over the past 12 months (Figure 115)<sup>711</sup>. This represents 64% of those respondents who indicated a positive attitude towards gender equality. There was a proportion of those who thought it was attitudinally important ( $n = 48$ , 36%), but had not explicitly confirmed any actions.

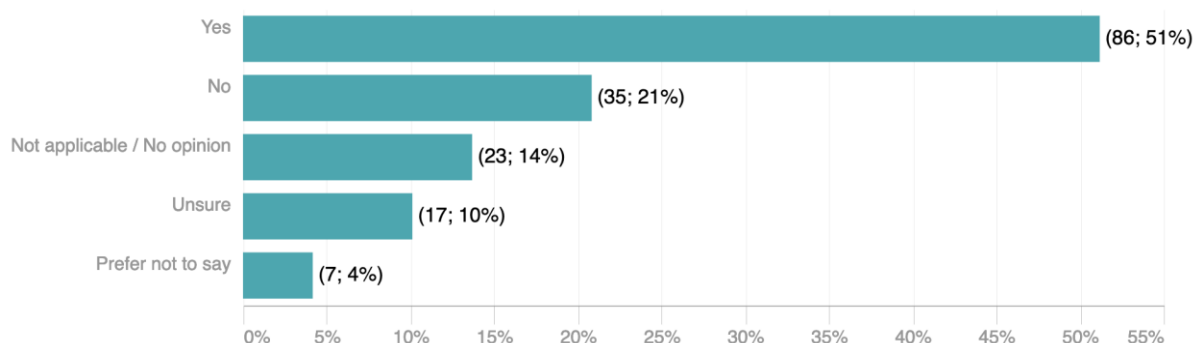


Figure 115: Arab States - Promoted gender equality in research and innovation work in the past 12 months.

### 3.5.3.1.3 Diverse and Inclusive – Ethnic Minorities

The majority of respondents ( $n = 104$ , 74%) agreed it was important to include ethnic minorities in R&I work (Figure 116)<sup>712</sup>. However, this was to a lower degree than for the previous diverse perspectives and gender equality measures. Fewer respondents agreed at the strongest level ( $n = 45$ , 32%) when compared to the same level of agreement for the gender

<sup>710</sup> The total number of responses:  $N = 168$

<sup>711</sup> The total number of responses:  $N = 141$

<sup>712</sup> The total number of responses:  $N = 190$

equality measure (48%). Disagreement was expressed by a small proportion ( $n = 7$ , 5%), but there was a considerable proportion who responded neutrally ( $n = 30$ , 21%).

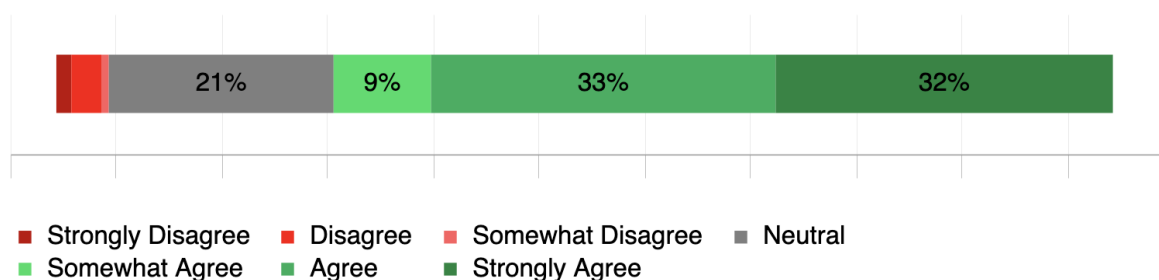


Figure 116: Arab States - 'It is important to include ethnic minorities in my research and innovation work.'

Few respondents explicitly confirmed they had acted on including ethnic minorities ( $n = 36$ , 22%) (Figure 117)<sup>713</sup>. This represents 35% of those respondents who indicated a positive attitude towards including ethnic minorities. This was the lowest indication of practical steps in comparison with all other RRI measures. A significant proportion of the respondents ( $n = 68$ , 65%) thought including ethnic minorities was important, but had not explicitly taken steps to ensure this or had not answered the question. A plurality considered taking steps to include ethnic minorities not applicable to them or had no opinion ( $n = 52$ , 32%).

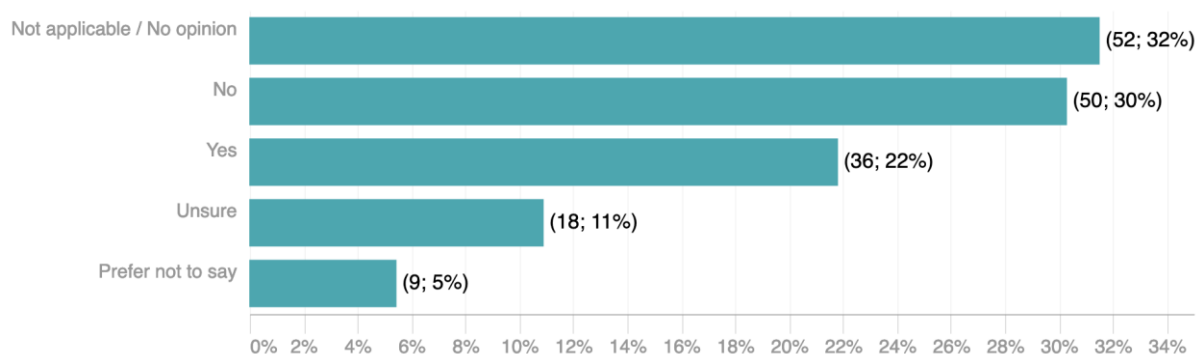


Figure 117: Arab States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.

### 3.5.3.1.4 Diverse and Inclusive – Ethics

There was broad agreement amongst respondents regarding the importance of ethics (Figure 118)<sup>714</sup>. The majority ( $n = 146$ , 93%) responded positively and about two-thirds of the respondents ( $n = 103$ , 65%) expressed the strongest level of agreement. A small portion of respondents ( $n = 4$ , 3%) explicitly disagreed that ensuring ethical guidelines was important in their work.

<sup>713</sup> The total number of responses:  $N = 165$

<sup>714</sup> The total number of responses:  $N = 158$

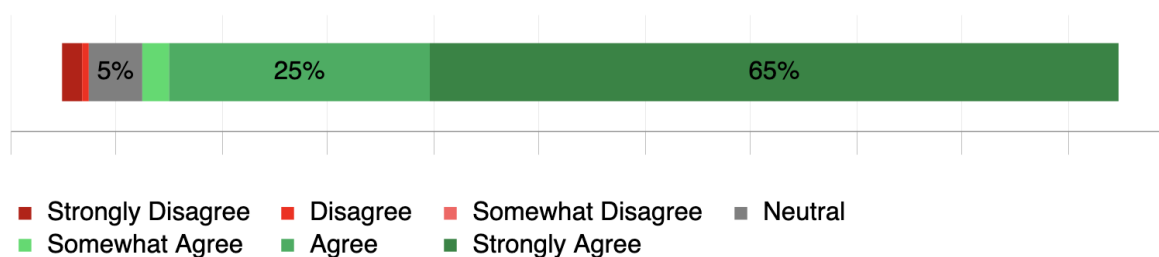


Figure 118: Arab States - 'Ethical principles guide my research and innovation work.'

The majority of respondents ( $n = 94$ , 58%) had taken steps to be guided by ethical principles (Figure 119)<sup>715</sup>. This represents 64% of respondents who considered it important. A notable proportion thought ethics were important ( $n = 52$ , 36%), but had not explicitly taken steps to ensure this or had not answered the question.

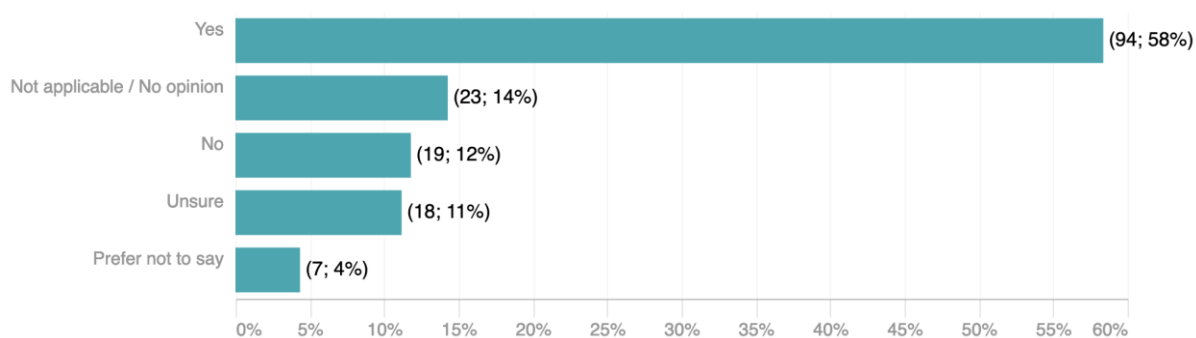


Figure 119: Arab States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.

<sup>715</sup> The total number of responses:  $N = 161$

### 3.5.3.1.5 Further Diverse and Inclusive Agreement Statements

The previous findings on RRI measures are further explored through results on the levels of agreement towards the following statements regarding detailed perspectives on the UN SDGs (Figure 120).

Most respondents agreed that *'It is important to maintain an equal number of men and women in research and innovation teams'* ( $n = 84, 69\%$ )<sup>716</sup>, with a slightly lower proportion agreeing that *'It is important to take gender into account when developing [their] research and innovation work'* ( $n = 72, 58\%$ )<sup>717</sup>. However, at the same time, a relatively large proportion of respondents agreed that *'Gender is irrelevant in [their] work'* ( $n = 55, 47\%$ ) with a minority disagreeing with this statement ( $n = 44, 38\%$ )<sup>718</sup>.

The majority of respondents agreed that *'It is important to take ethnic diversity into account when developing [their] research and innovation work.'* ( $n = 66, 60\%$ )<sup>719</sup>. However, the majority also agreed that *'Ethnic differences are irrelevant in [their] work.'* ( $n = 73, 63\%$ )<sup>720</sup>.

A large proportion of respondents agreed ( $n = 81, 71\%$ ) that *'The best time to talk to public audiences about [their] research and innovation work is at the very end of the process after all the work has been completed'* compared to those who disagreed ( $n = 28, 22\%$ )<sup>721</sup>. Similarly, more respondents agreed that *'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals'* ( $n = 88, 71\%$ ) as opposed to those who disagreed ( $n = 24, 19\%$ ). Most agreed they *'feel a professional responsibility to communicate findings from [their] research or innovation work to public audiences'* ( $n = 106, 87\%$ )<sup>722</sup>.

Concerning the communication of findings to the public, the majority of respondents agreed that *'[their] organisation encourages [them] to communicate findings from [their] research or innovation work to public audiences'* ( $n = 90, 73\%$ )<sup>723</sup>. Most also disagreed that *'[their] organisation [...] discourages [them] from communicating the results of my research or innovation work to public audiences'* ( $n = 75, 67\%$ )<sup>724</sup>.

<sup>716</sup> The total number of responses:  $N = 122$

<sup>717</sup> The total number of responses:  $N = 122$

<sup>718</sup> The total number of responses:  $N = 118$

<sup>719</sup> The total number of responses:  $N = 111$

<sup>720</sup> The total number of responses:  $N = 116$

<sup>721</sup> The total number of responses:  $N = 125$

<sup>722</sup> The total number of responses:  $N = 122$

<sup>723</sup> The total number of responses:  $N = 122$

<sup>724</sup> The total number of responses:  $N = 112$

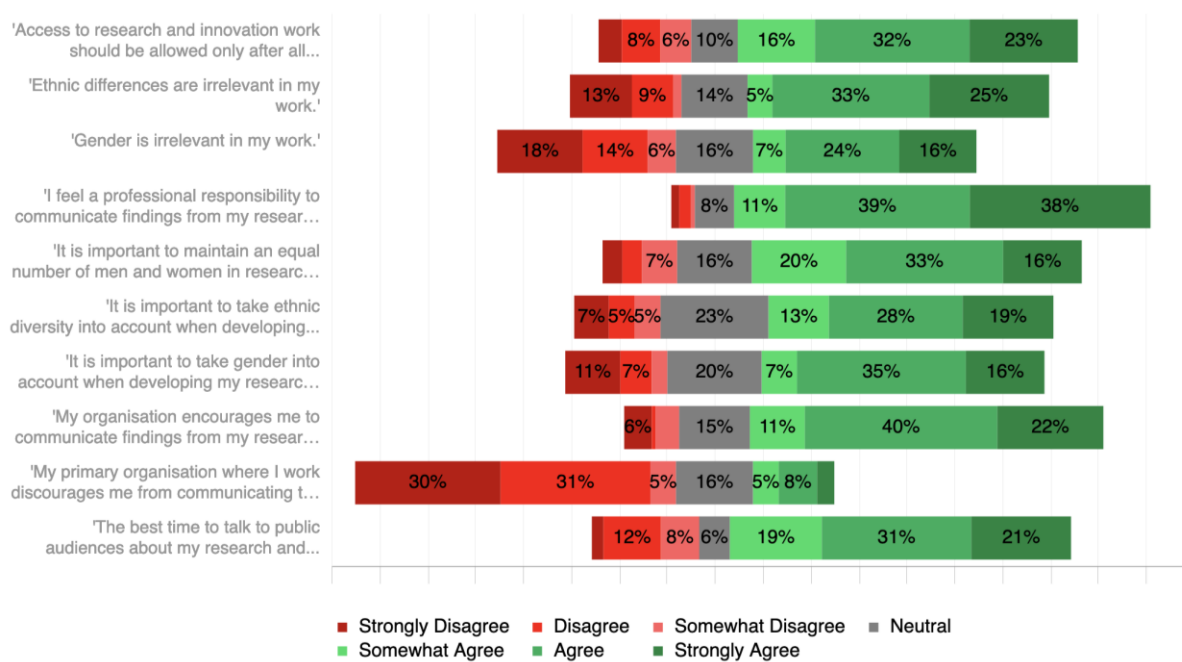


Figure 120: Arab States - Statements related to working in research and innovation.

### 3.5.3.2 RRI DIMENSION – ANTICIPATIVE AND REFLECTIVE

Overall, there was broad agreement that R&I work should recognise societal concerns. This was noticeable on a moderately high attitudinal level, but lower regarding practical action.

#### 3.5.3.2.1 Anticipative and Reflective – Societal Concerns

The majority of respondents agreed it was important that their work did not cause concerns for society ( $n = 132$ , 85%) (Figure 121)<sup>725</sup>. Almost half strongly agreed with this statement ( $n = 69$ , 45%). A small portion ( $n = 12$ , 8%) explicitly disagreed, with just a few neutral responses ( $n = 10$ , 7%).

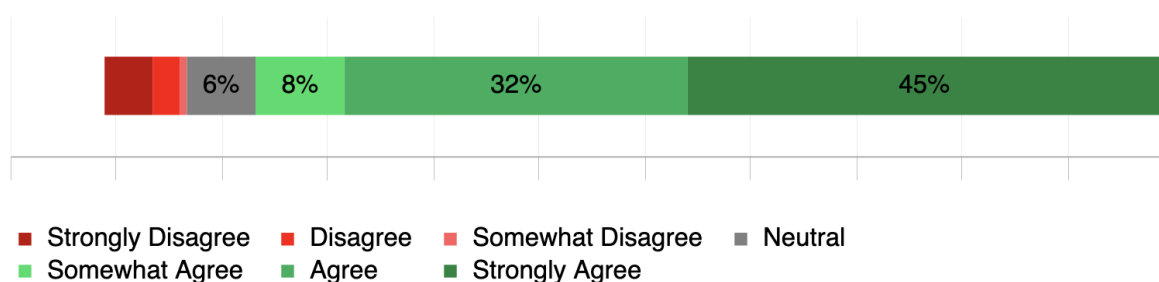


Figure 121: Arab States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society.'

<sup>725</sup> The total number of responses:  $N = 154$

Most respondents confirmed they had taken steps to ensure their work did not cause concerns for society ( $n = 62$ , 38%) (Figure 122)<sup>726</sup>. However, this represents only 47% of those respondents who indicated a positive attitude towards societal concerns. The next highest category was 'No' ( $n = 36$ , 22%) followed by 'Unsure' ( $n = 30$ , 18%) and 'Not applicable / No opinion' ( $n = 29$ , 18%). This indicates that ensuring R&I work does not cause concerns for society is surrounded by ambiguity, particularly regarding practical steps.

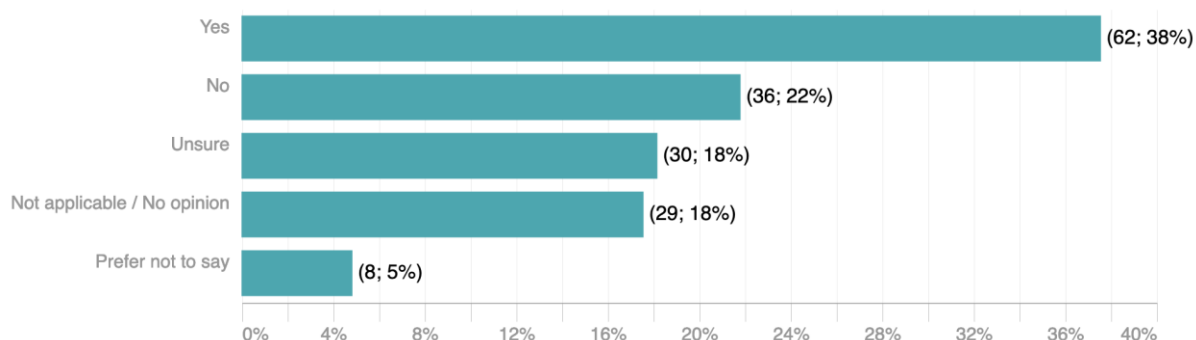


Figure 122: Arab States - Ensured work does not cause concerns for society in the past 12 months.

### 3.5.3.3 RRI DIMENSION – OPEN AND TRANSPARENT

Overall, there was a level of support towards openness and transparency and public accessibility of results, which was reflected in consistent majorities taking practical steps towards this dimension (with the exception of open data). In particular, measures relating to making research results publicly accessible showed the smallest value-action gap compared to the other RRI measures. This indicates that in Arab states, the perception is that there are implementable steps within the R&I systems to ensure research results are made accessible to as wide a public as possible.

#### 3.5.3.3.1 Open and Transparent – Open and Transparent Methods and Processes

The majority of respondents ( $n = 148$ , 89%,) agreed on the importance of ensuring methods and processes were open and transparent (Figure 123)<sup>727</sup>. Almost half of the respondents were in strong agreement ( $n = 75$ , 45%), while a small portion disagreed ( $n = 7$ , 4%).

<sup>726</sup> The total number of responses:  $N = 165$

<sup>727</sup> The total number of responses:  $N = 148$

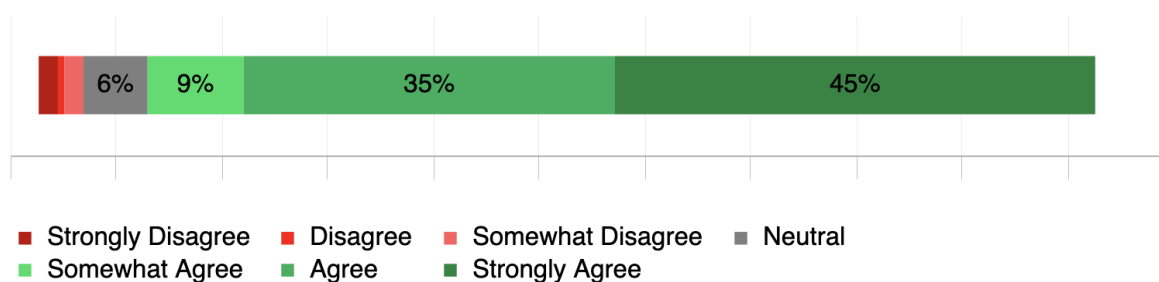


Figure 123: Arab States - 'It is important to make my research and innovation methods/processes open and transparent.'

The majority of respondents ( $n = 101$ , 59%) reported taking practical steps to ensure R&I methods/processes are open and transparent (Figure 124)<sup>728</sup>. This represents 68% of those respondents who indicated a positive attitude towards openness and transparency. A small but notable portion explicitly said they did not take practical steps to make their research methods/processes open and transparent - 'No' ( $n = 24$ , 14%).

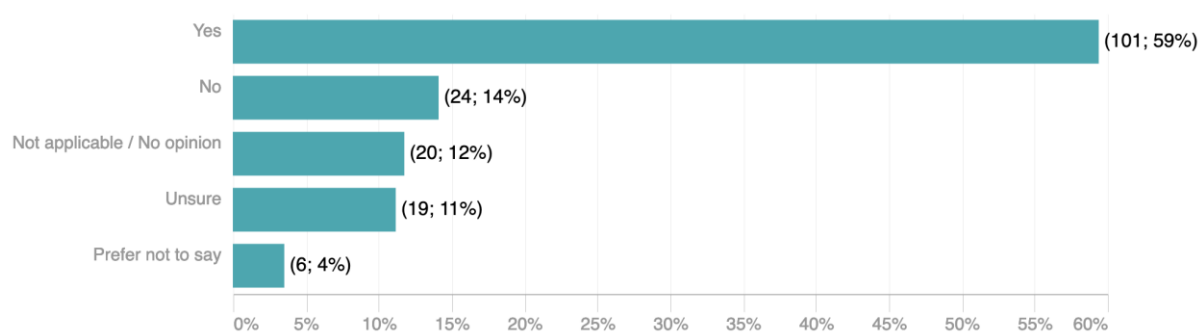


Figure 124: Arab States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.

### 3.5.3.3.2 Open and Transparent – Public Accessibility

The majority of respondents agreed that wide public accessibility of results was important ( $n = 147$ , 90%) (Figure 115)<sup>729</sup>. Overall disagreement was low ( $n = 9$ , 6%).

<sup>728</sup> The total number of responses:  $N = 170$

<sup>729</sup> The total number of responses:  $N = 163$

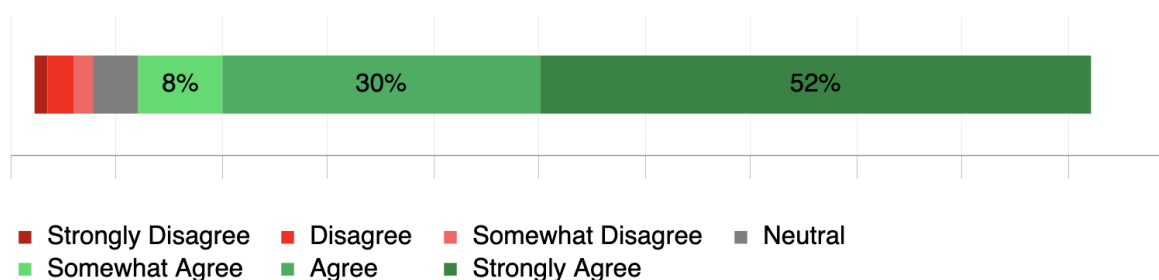


Figure 125: Arab States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible.'

Two-thirds of all respondents reported taking practical steps to make their work publicly accessible ( $n = 111$ , 66%). This represents 76% who indicated a positive attitude towards public accessibility (Figure 126)<sup>730</sup>, meaning this measure, alongside diverse perspectives, was the measure in which supportive attitudes and practical steps taken were most aligned. A comparatively small proportion of respondents indicated taking no steps ( $n = 25$ , 15%).

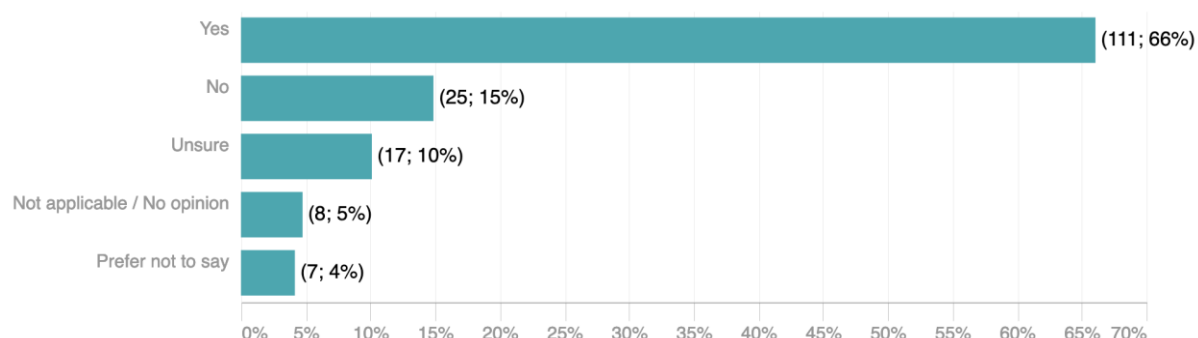


Figure 126: Arab States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.

### 3.5.3.3.3 Open and Transparent – Open Data

The majority of respondents agreed on the importance of ensuring their research data was freely and publicly available ( $n = 127$ , 78%) (Figure 127)<sup>731</sup>. Disagreement was limited to just one-tenth ( $n = 17$ , 11%).

<sup>730</sup> The total number of responses:  $N = 168$

<sup>731</sup> The total number of responses:  $N = 162$

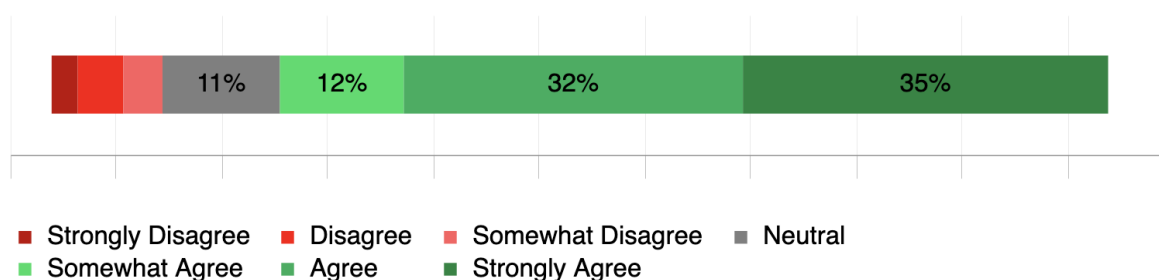


Figure 127: Arab States - 'It is important to make data from my research and innovation activities freely available to the public.'

Nearly half of respondents reported taking practical steps toward making data freely and publicly available ( $n = 81$ , 49%) towards taking practical steps (Figure 128)<sup>732</sup>. This represents 64% of those who agreed that making data freely available was important. In contrast, about a quarter of respondents did not take any practical steps ( $n = 41$ , 25%).

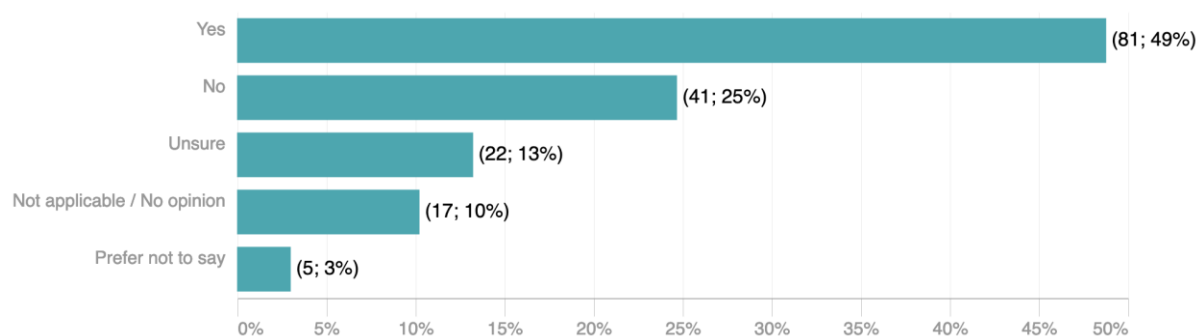


Figure 128: Arab States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.

### 3.5.3.4 RRI DIMENSION – RESPONSIVE AND ADAPTIVE TO CHANGE

There was broad agreement regarding being responsive to societal needs. This was the case on both an attitudinal and practical level.

#### 3.5.3.4.1 Responsive and Adaptive to Change – Societal Needs

The overwhelming majority of respondents agreed that it is important to ensure their work addressed societal needs ( $n = 156$ , 96%). Nearly two-thirds of the respondents agreed at the strongest level ( $n = 156$ , 63%), very few explicitly disagreed ( $n = 5$ , 3%), and even fewer responded neutrally ( $n = 2$ , 1%) (Figure 129)<sup>733</sup>.

<sup>732</sup> The total number of responses:  $N = 166$

<sup>733</sup> The total number of responses:  $N = 163$

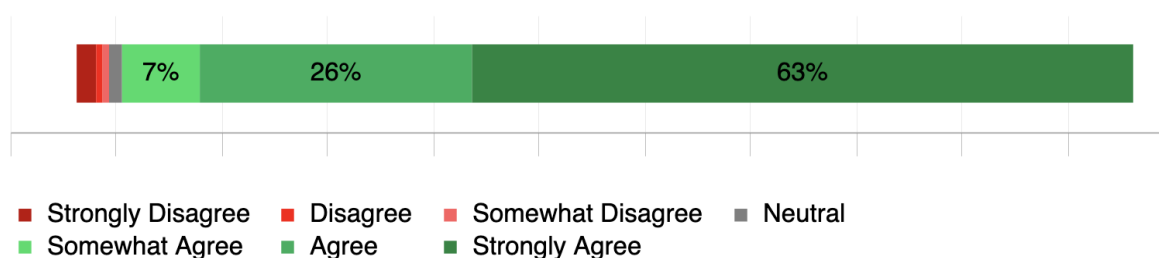


Figure 129: Arab States - 'Research and innovation should address societal needs.'

This agreement clearly translated into practical action for the majority who confirmed taking practical steps ensuring their work addressed societal needs ( $n = 114$ , 68%) (Figure 130)<sup>734</sup>. This accounted for 73% of respondents who agreed it was important. A minority stated they had not taken any steps ( $n = 16$ , 10%), or were 'Unsure' ( $n = 17$ , 10%).

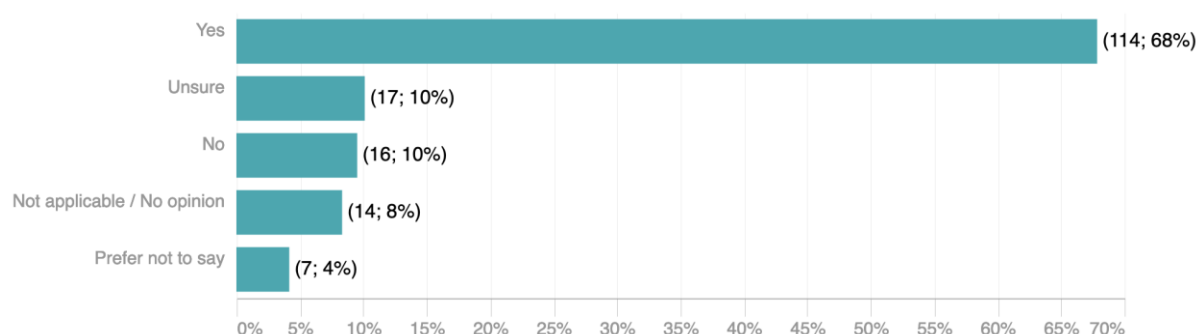


Figure 130: Arab States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.

### 3.5.3.4.2 Regulatory Frameworks Relevant to Social Responsibility

Most respondents indicated their work was 'Always' ( $n = 25$ , 19%) or 'Usually' ( $n = 25$ , 19%) guided by regulatory frameworks covering relevant aspects of social responsibility (Figure 131)<sup>735</sup>. This was followed by 'Frequently' ( $n = 24$ , 18%) and 'Sometimes' ( $n = 24$ , 18%).

<sup>734</sup> The total number of responses:  $N = 168$

<sup>735</sup> The total number of responses:  $N = 131$

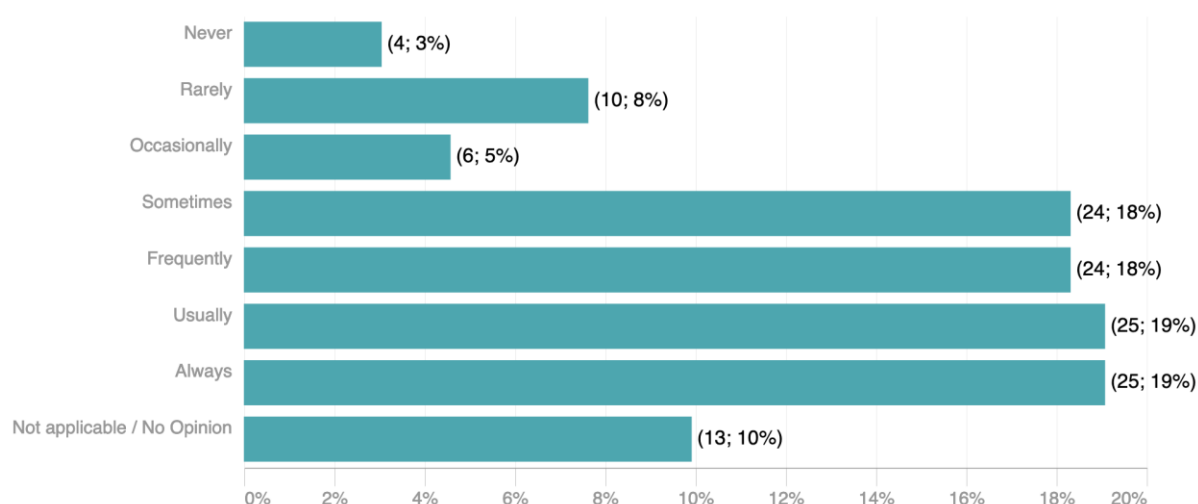


Figure 131: Arab States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.

### 3.5.3.4.3 Crosscutting Findings

Overall, there were positive attitudes towards all RRI dimensions, although there was considerable disagreement to statements regarding the relevance of gender and ethnic differences to respondents' research and innovation work (section 3.5.3.1.5). In addition, including ethnic minorities was the area in which the fewest respondents reported taking practical steps. Respondents were most attitudinally supportive of ensuring research and innovation work addresses societal needs, and the importance of ethics guiding this work.

Within each RRI dimension, there were considerable discrepancies between supportive attitudes and their translation into action. This was most notable for the inclusion of ethnic minorities and ensuring work did not cause concerns for society. In contrast, the smallest discrepancies were found for including diverse perspectives and ensuring public accessibility of R&I work.

## 3.5.4 RESULTS BY STAKEHOLDER CATEGORIES

### 3.5.4.1 STAKEHOLDER CATEGORY 1 – RESEARCH PERFORMING ORGANISATIONS / ACADEMICS / RESEARCHERS

Respondents indicated a substantial level of engagement with this category compared to others ( $Mdn = 12$  h/w) (Figure 132)<sup>736</sup>. This was also the stakeholder type most engaged with for over ten hours in the last seven days ( $n = 72$ , 47%).

<sup>736</sup> The total number of responses:  $N = 152$

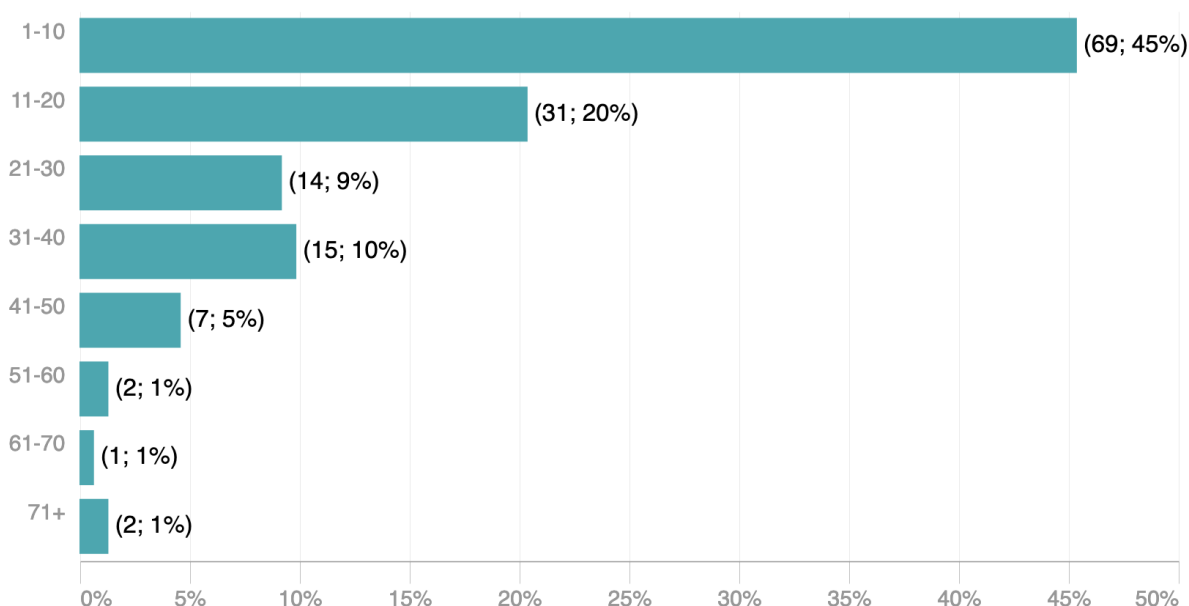


Figure 132: Arab States - Hours interacting with research performing organisations/academics/researchers in the last 7 days.

### 3.5.4.2 STAKEHOLDER CATEGORY 2 – RESEARCH FUNDING ORGANISATIONS

On average, engagement with RFOs was relatively low ( $Mdn = 5$  h/w) (Figure 133)<sup>737</sup>. A small proportion of respondents ( $n = 2$ , 2%) indicated interacting with RFOs over 20 hours in the last week. This could mean that activities, such as writing proposals for funding applications, did not fall under most respondents' duties.

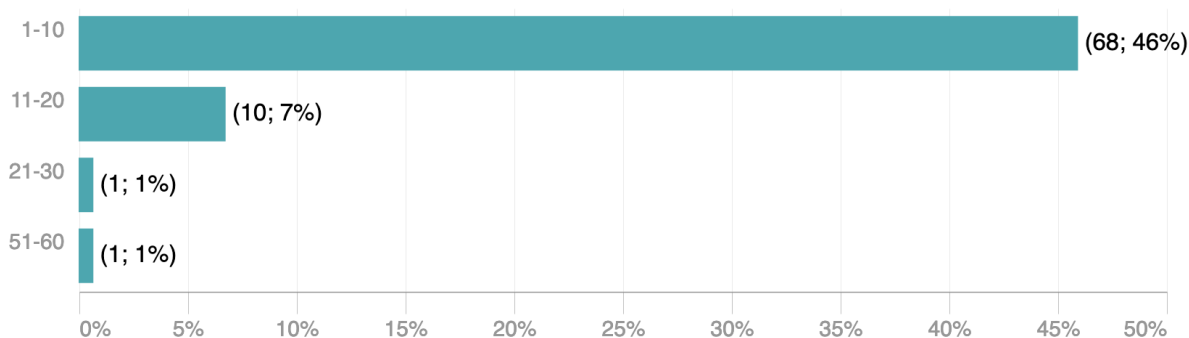


Figure 133: Arab States - Hours interacting with research funding organisations in the last 7 days.

<sup>737</sup> The total number of responses:  $N = 148$

### 3.5.4.3 STAKEHOLDER CATEGORY 3 – INDUSTRY / SMALL- AND MEDIUM-SIZED ENTERPRISES

On average, engagement with industry or small- and medium-sized enterprises was lower than with all other stakeholder types (except policymakers, the median for which was equally as low) ( $Mdn = 4$  h/w) (Figure 134)<sup>738</sup>. Only a few respondents ( $n = 7$ , 5%) indicated a medium to high level of engagement (i.e., between 11 and 40 hours in the last week), and only one respondent ( $n = 1$ , 1%) indicated a high level of interaction (i.e., over 40 hours in the last week).

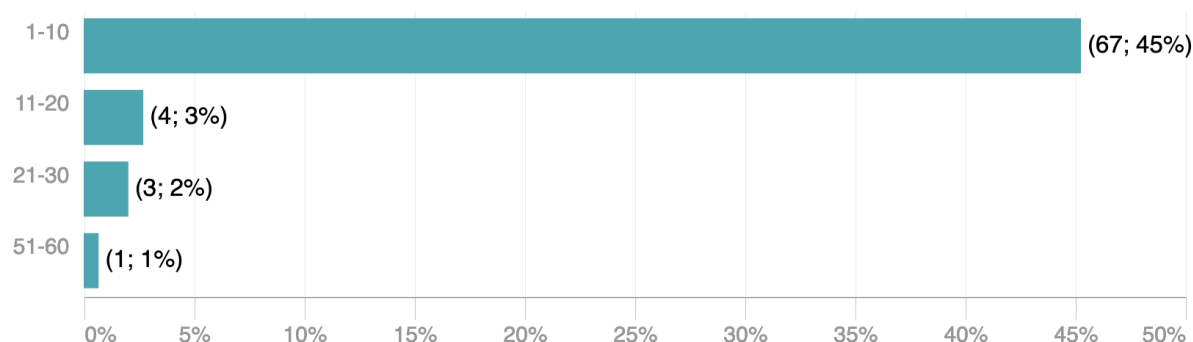


Figure 134: Arab States - Hours interacting with industry/small- and medium-sized enterprise in the last 7 days.

### 3.5.4.4 STAKEHOLDER CATEGORY 4 – CIVIL SOCIETY / CITIZENS

Most respondents ( $n = 79$ , 53%) spent little time engaging with this category ( $Mdn = 5$  h/w) (Figure 135)<sup>739</sup>, and indicated engaging for less than ten hours in the last week. A small proportion of respondents indicated medium to high levels of interaction time (i.e., between 11 and 40 hours in the last week) ( $n = 11$ , 7%), and even fewer spent more than 40 hours engaging with civil society or citizens ( $n = 3$ , 2%).

<sup>738</sup> The total number of responses:  $N = 148$

<sup>739</sup> The total number of responses:  $N = 148$

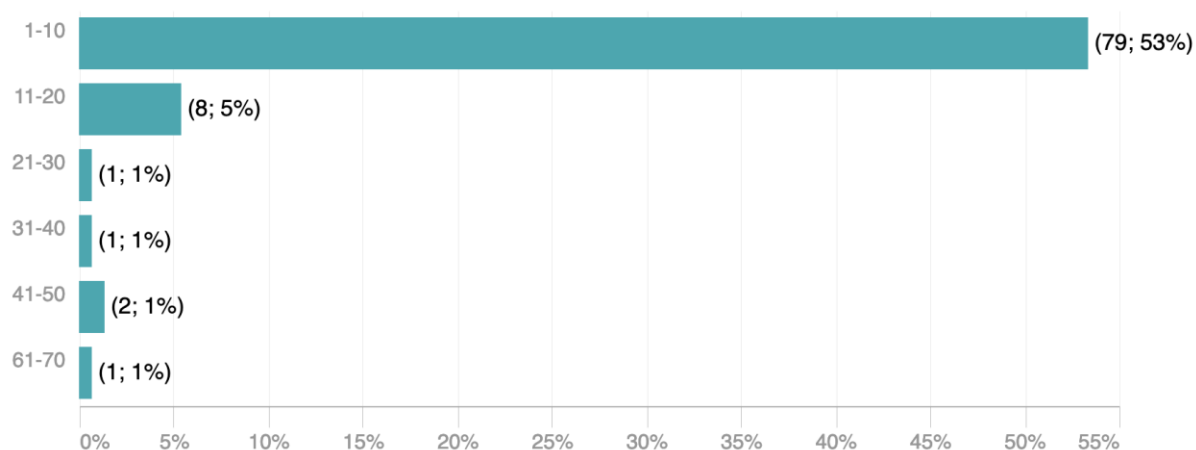


Figure 135: Arab States - Hours interacting with civil society/citizens in the last 7 days.

### 3.5.4.5 STAKEHOLDER CATEGORY 5 – POLICY MAKERS

Respondents engaged with policy makers at an equally low rate as the industry or small- and medium-sized enterprises category ( $Mdn = 4$  h/w) (Figure 136)<sup>740</sup>. When there was time spent, many ( $n = 63$ , 43%) indicated the least amount of time (i.e., between 1 and 10 hours in the last week). Few respondents had medium to high levels of engagement (i.e., between 11 and 40 in the last week) ( $n = 4$ , 3%) and no respondents reported engaging for more than 50 hours.

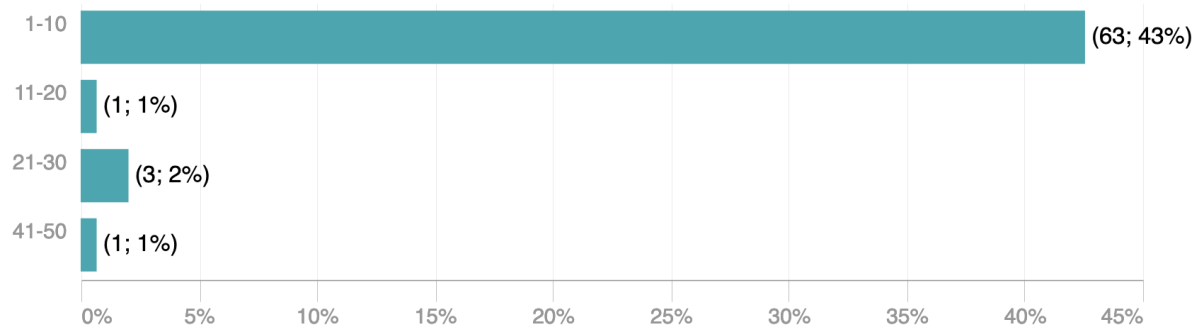


Figure 136: Arab States - Hours interacting with policy makers in the last 7 days.

### 3.5.4.6 STAKEHOLDER CATEGORY 6 – NON-GOVERNMENTAL ORGANISATIONS

Engagement with this category tended to be relatively low ( $Mdn = 5$  h/w) (Figure 137)<sup>741</sup>. Most respondents indicated interacting with non-governmental organisations between one and ten hours in the last week ( $n = 73$ , 49%). A few respondents ( $n = 13$ , 9%) indicated a medium level

<sup>740</sup> The total number of responses.  $N = 148$

<sup>741</sup> The total number of responses:  $N = 149$

of engagement (i.e., between 11 and 40 hours in the last week), and notably fewer ( $n = 2$ , 2%) indicated a high level (i.e., over 40 hours in the last week).

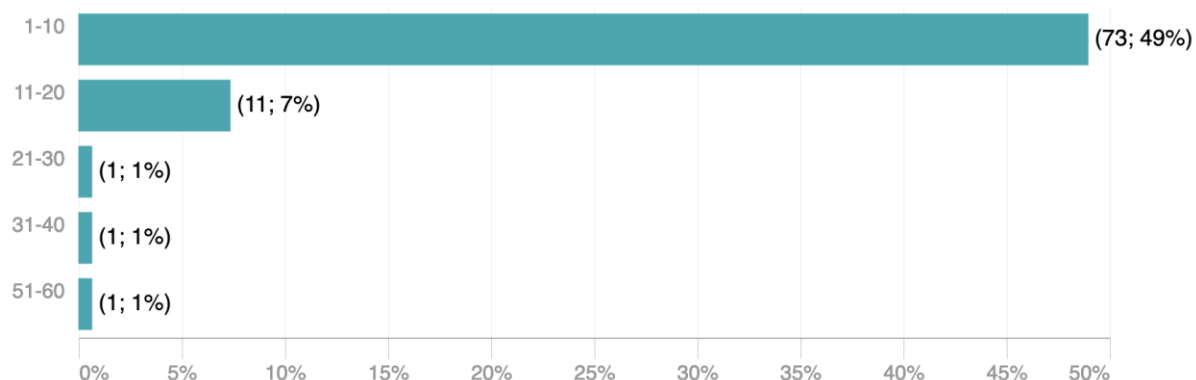


Figure 137: Arab States - Hours interacting with NGOs/international organisations in the last 7 days.

### 3.5.4.7 OVERVIEW AND COMPARISON OF FINDINGS ACROSS STAKEHOLDER CATEGORIES

Participants engaged disproportionately more frequently with *RPOs*, *academics* and *researchers* ( $Mdn = 12$  h/w) (Figure 138)<sup>742</sup>. Engagement with all other categories was relatively low, with the median weekly interaction time being four or five hours. Among all categories, respondents tended to interact least often with policy makers and industry/small- and medium-sized enterprises ( $Mdn = 4$  h/w, each).

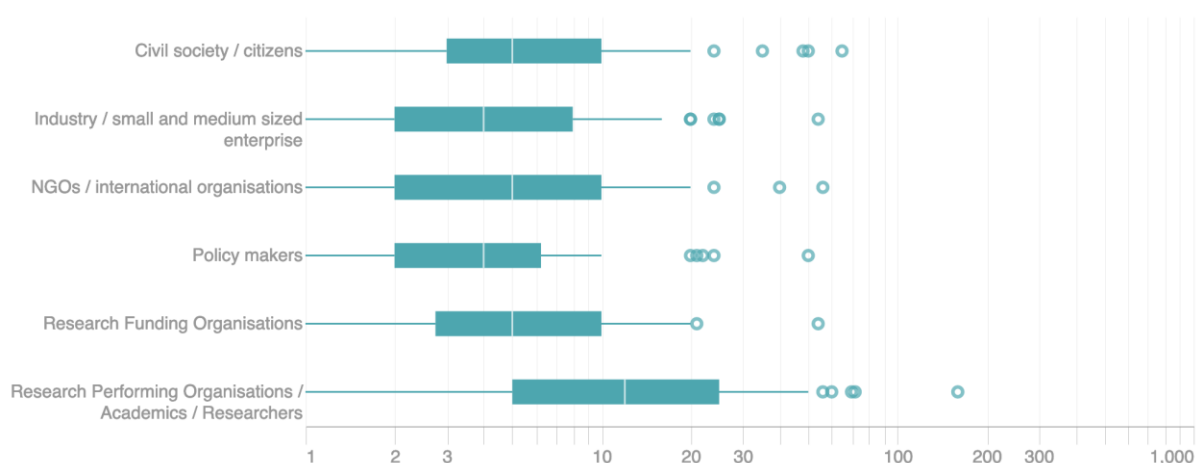


Figure 138: Arab States - Hours interacting with types of people in the last 7 days (log scale).

<sup>742</sup> The total number of responses:  $N = 152$

### 3.5.5 RESULTS SPECIFIC TO THE UN SUSTAINABLE DEVELOPMENT GOALS

This section explores respondents' level of exposure, attitudes towards, and detailed perspectives about the UN SDGs.

The majority of respondents indicated familiarity with the UN SDGs ( $n = 124$ , 81%) (Figure 139)<sup>743</sup>. Respondents expressed being '*Moderately Familiar*' ( $n = 45$ , 29%), while there was less self-reported extreme familiarity ( $n = 49$ , 23%). Fewer respondents indicated being '*Not at all Familiar*' ( $n = 30$ , 20%), '*Somewhat Familiar*' ( $n = 22$ , 14%), and '*Slightly Familiar*' ( $n = 21$ , 14%).

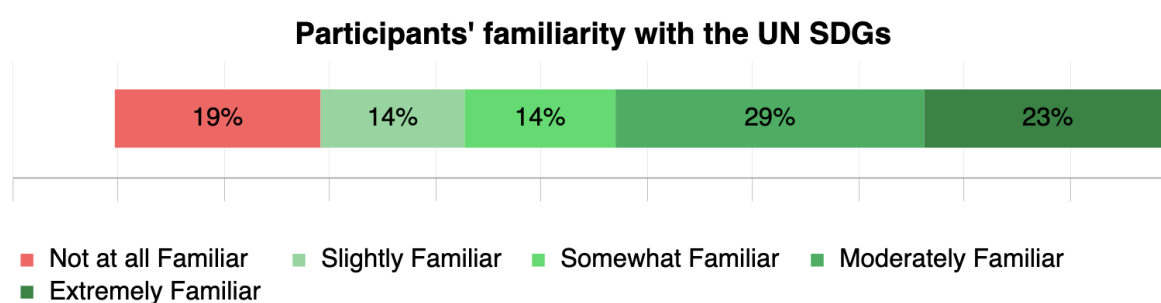


Figure 139: Arab States - Participants' familiarity with the UN SDGs.

The majority of respondents ( $n = 95$ , 77%) heard or read about the UN SDGs in the last month (Figure 140)<sup>744</sup>. Among the frequencies, '*Once*' ( $n = 24$ , 19%) represented the largest group, followed by '*2-3 times a week*' ( $n = 22$ , 18%), '*2-3 times*' ( $n = 22$ , 18%), '*Not at all*' ( $n = 18$ , 15%), '*Daily*' ( $n = 15$ , 12%), '*Unsure*' ( $n = 11$ , 9%), '*4-6 times per week*' ( $n = 7$ , 6%), and '*Once per week*' ( $n = 5$ , 4%).

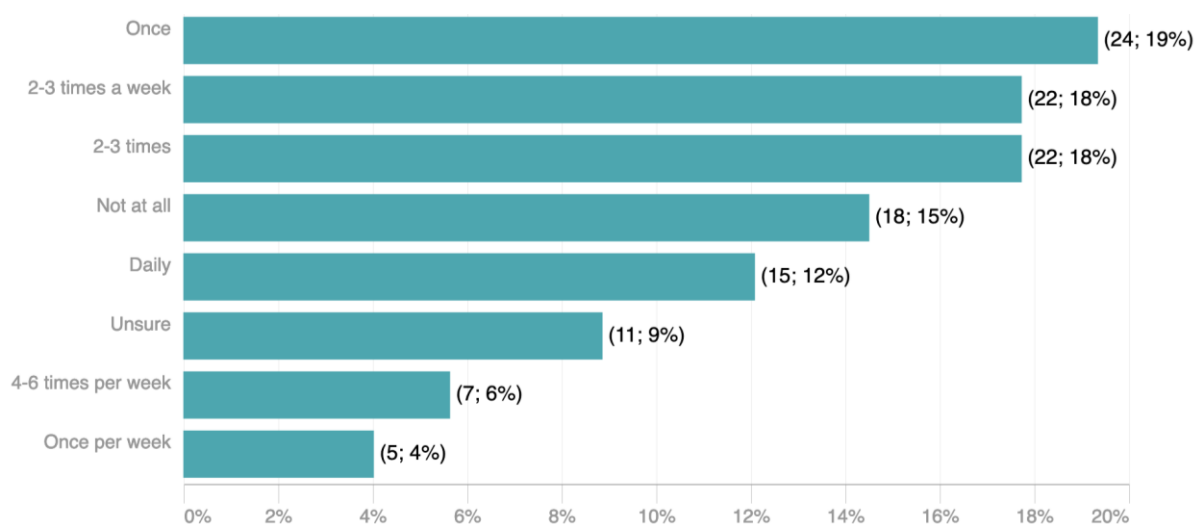


Figure 140: Arab States - Heard or read about the UN Sustainable Development Goals in the last 30 days.

<sup>743</sup> The total number of responses:  $N = 154$

<sup>744</sup> The total number of responses:  $N = 124$

The majority of respondents ( $n = 98$ , 79%) thought about the UN SDGs in the last month (Figure 141)<sup>745</sup>. Among the frequencies, '2-3 times' ( $n = 28$ , 23%) represented the largest group, followed by 'Not at all' ( $n = 21$ , 17%), '4-6 times' ( $n = 15$ , 12%), 'Daily' ( $n = 15$ , 12%), 'Once' ( $n = 15$ , 12%), '2-3 times a week' ( $n = 14$ , 11%), 'Once per week' ( $n = 11$ , 9%), and 'Unsure' ( $n = 5$ , 4%).

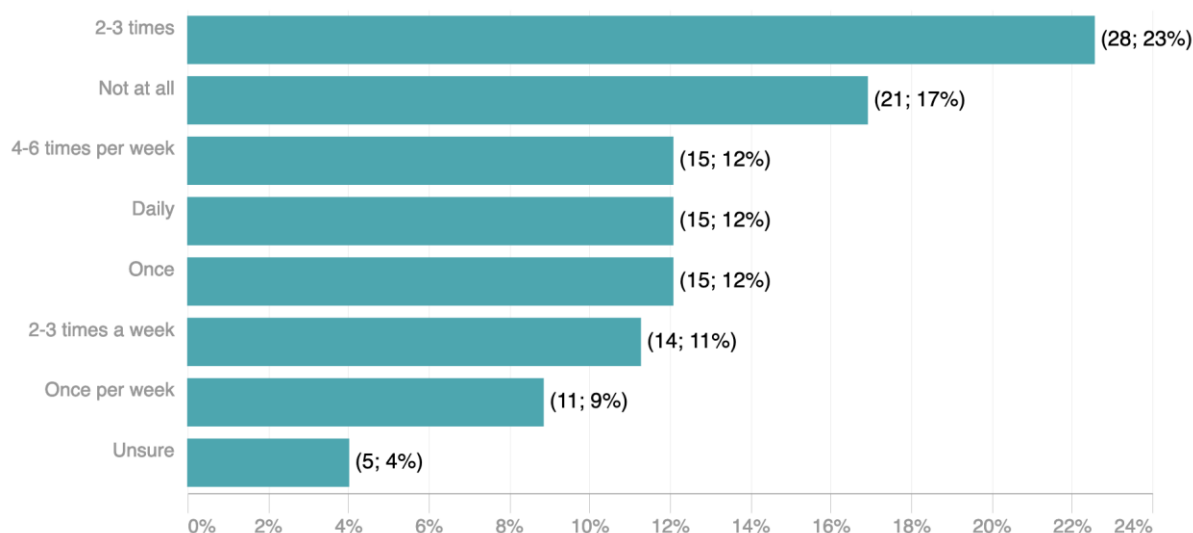


Figure 141: Arab States - Thought about the UN Sustainable Development Goals in the last 30 days.

Respondents held mostly positive attitudes about the UN SDGs (Figure 142). Respondents most frequently perceived them as 'Beneficial' ( $n = 113$ , 92%)<sup>746</sup>, 'Valuable' ( $n = 112$ , 92%)<sup>747</sup>, 'Relevant' ( $n = 110$ , 91%)<sup>748</sup>, 'Important' ( $n = 109$ , 90%)<sup>749</sup>, 'Useful' ( $n = 111$ , 91%)<sup>750</sup>, 'Essential' ( $n = 111$ , 92%)<sup>751</sup>. However, some respondents perceived the UN SDGs as 'Irrelevant' ( $n = 6$ , 5%).

<sup>745</sup> The total number of responses:  $N = 124$

<sup>746</sup> The total number of responses:  $N = 123$

<sup>747</sup> The total number of responses:  $N = 122$

<sup>748</sup> The total number of responses:  $N = 121$

<sup>749</sup> The total number of responses:  $N = 122$

<sup>750</sup> The total number of responses:  $N = 122$

<sup>751</sup> The total number of responses:  $N = 121$

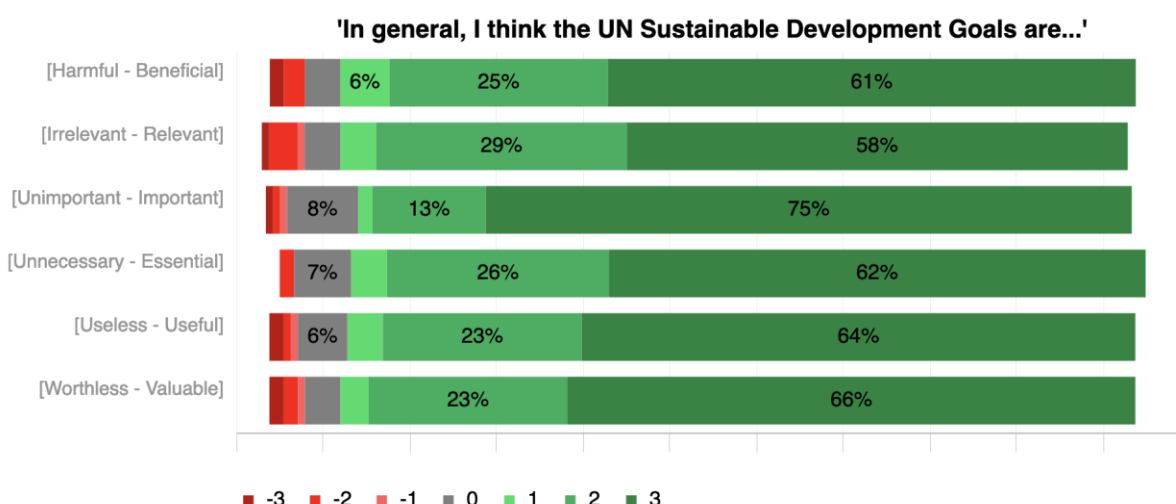


Figure 142: Arab States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

Similarly, respondents held mostly positive attitudes about the UN SDGs related to their work (Figure 143). Respondents most frequently perceived the UN SDGs as *Useful* ( $n = 112$ , 91%)<sup>752</sup>, *Important* ( $n = 111$ , 90%)<sup>753</sup>, *Beneficial* ( $n = 110$ , 90%)<sup>754</sup>, *Valuable* ( $n = 110$ , 89%)<sup>755</sup>, *Relevant* ( $n = 109$ , 89%)<sup>756</sup>, and *Essential* ( $n = 108$ , 89%)<sup>757</sup>.

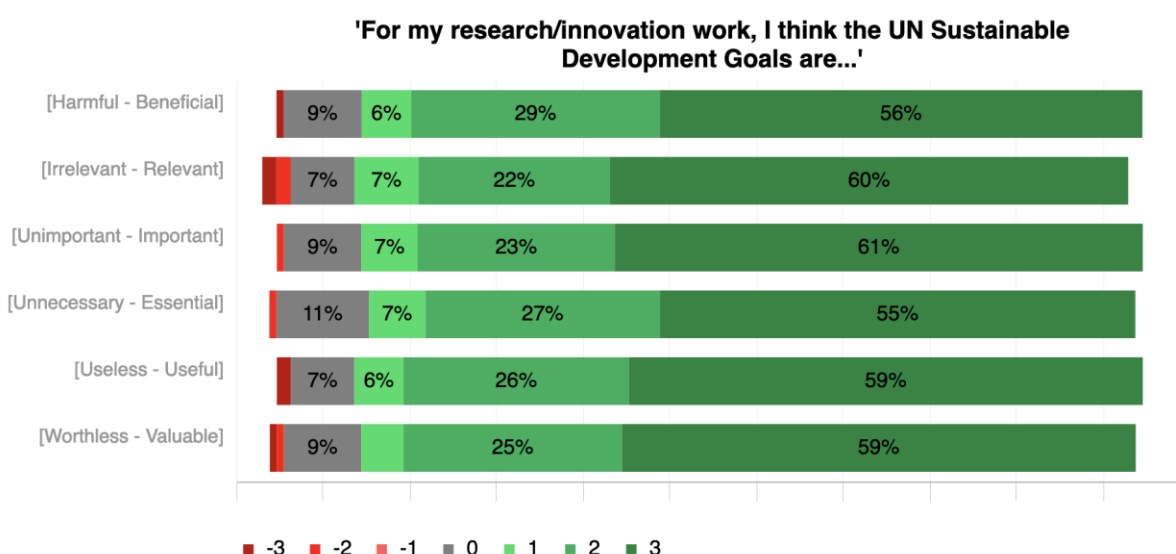


Figure 143: Arab States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

<sup>752</sup> The total number of responses:  $N = 123$

<sup>753</sup> The total number of responses:  $N = 123$

<sup>754</sup> The total number of responses:  $N = 122$

<sup>755</sup> The total number of responses:  $N = 123$

<sup>756</sup> The total number of responses:  $N = 122$

<sup>757</sup> The total number of responses:  $N = 122$

Most respondents held positive perceptions on UN SDGs (Figure 144). Most agreed with the statement *‘The UN Sustainable Development Goals should be a priority for my professional field.’* ( $n = 108, 90\%$ )<sup>758</sup>, followed by *‘The UN Sustainable Development Goals are a priority for me.’* ( $n = 103, 86\%$ )<sup>759</sup>. Results were varied but still positive for *‘I follow stories in the news about the UN Sustainable Development Goals.’* ( $n = 85, 72\%$ )<sup>760</sup> and *‘The UN Sustainable Development Goals represent legally binding international treaties to protect the environment.’* ( $n = 93, 78\%$ ), although they are not actually legally binding<sup>761</sup>. A significant portion disagreed with the statement *‘The UN Sustainable Development Goals are focussed only on long-term financial development.’* ( $n = 44, 37\%$ )<sup>762</sup>.

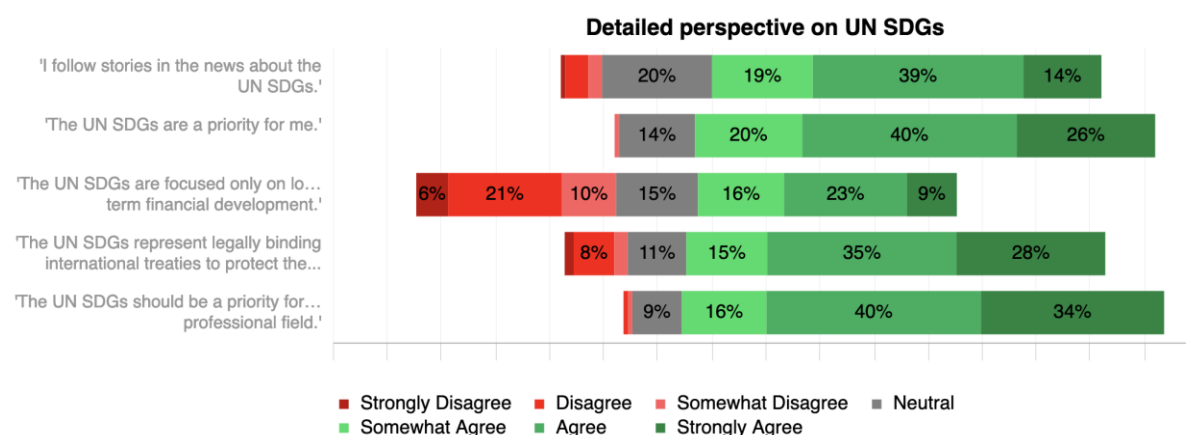


Figure 144: Arab States - Detailed perspective on UN SDGs.

### 3.5.6 OPEN-ENDED CONTENT ANALYSIS RESULTS

This section sets out results of the content analysis conducted on the qualitative data obtained through the RRING Research and Innovation Global Survey.

#### 3.5.6.1 DIVERSE PERSPECTIVES

This section explored the range of responses given to the question *‘Please list the steps you have taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning your research and innovation work.’*

A moderate portion of respondents indicated they had reached out to diverse stakeholders ( $n = 14, 18\%$ ), with more indicating this engagement in a *‘general’* way ( $n = 11, 14\%$ ). Few respondents specified the actual steps they had taken in a specific way ( $n = 3, 4\%$ ) (Figure

<sup>758</sup> The total number of responses:  $N = 121$

<sup>759</sup> The total number of responses:  $N = 121$

<sup>760</sup> The total number of responses:  $N = 118$

<sup>761</sup> The total number of responses:  $N = 120$

<sup>762</sup> The total number of responses:  $N = 119$

145)<sup>763</sup>. Most commonly, respondents referred to engaging industry and businesses ( $n = 5$ , 7%), and other non-academic stakeholder types ( $n = 4$ , 5%). Civil society organisations (CSOs) and policy bodies/policy makers were mentioned less often ( $n = 2$ , 3% each). This category included entities separated either from the state or the market that have a declared social mandate, such as NGOs.

A large proportion of respondents indicated contributing *'In-reach to other disciplines, researchers, academics, experts or students'* ( $n = 24$ , 32%). Another notable proportion indicated involvement in *'Meetings, workshops, focus groups and 'Consultations''* ( $n = 20$ , 26%) which meant respondents included diverse perspectives from within their academic or professional environment.

A small number of respondents indicated taking *'Steps for building collaboration/teams/consortia with no connection to diversity per se'* ( $n = 10$ , 13%), or referred to *'General dissemination/broadcasting/dissemination of information about the research/innovation work'* ( $n = 5$ , 7%). This category was assigned when respondents indicated one-way dissemination, rather than including external views.

A notable proportion of respondents ( $n = 15$ , 20%) responded with *'Non-specific, vague, platitude or virtue signalling response'*.

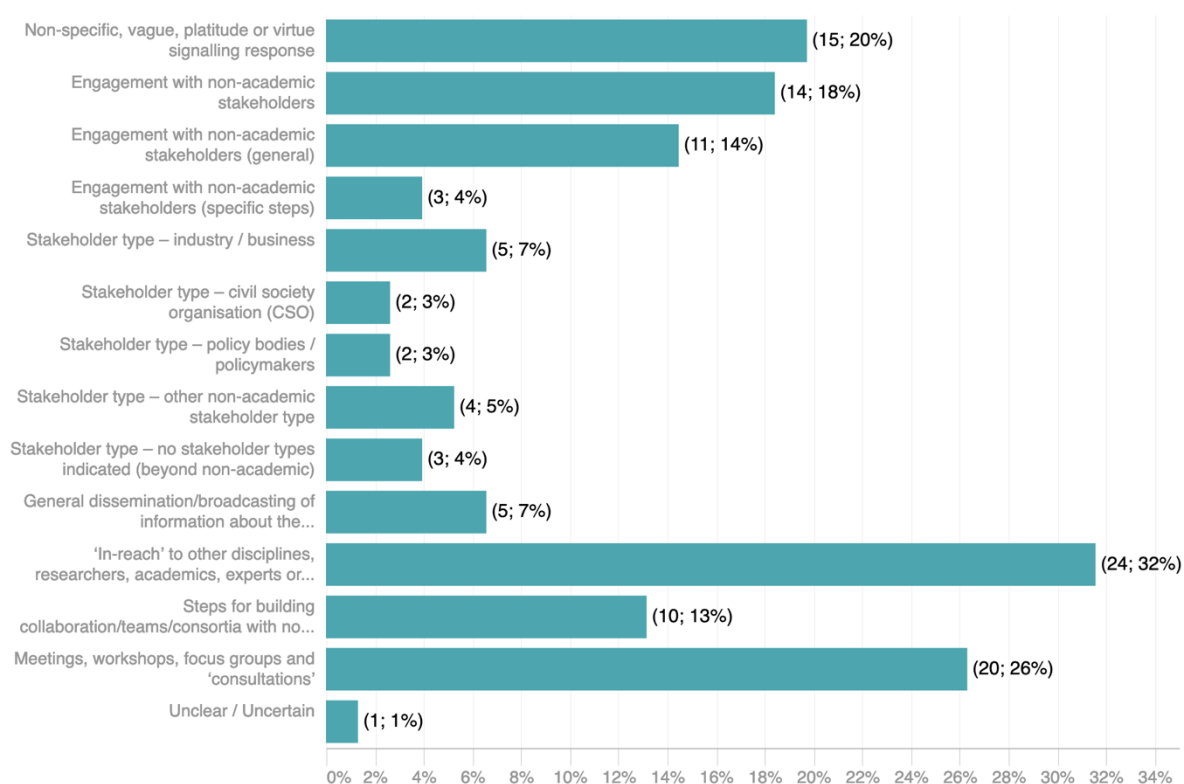


Figure 145: Arab States - Steps taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning research and innovation work.

<sup>763</sup> The total number of responses:  $N = 119$

### 3.5.6.2 GENDER EQUALITY

This section explored the range of responses given to the question *‘Please list the steps you have taken to promote gender equality in your research and innovation work.’*

A majority of respondents ( $n = 41$ , 66%) indicated they had promoted gender equality. More respondents referred to taking *‘specific steps’* ( $n = 25$ , 40%), over a smaller proportion promoting gender equality in a *‘general’* way ( $n = 16$ , 26%) (Figure 146)<sup>764</sup>.

The most common steps were *‘Fostering gender equality in research/innovation teams/workforce’* ( $n = 18$ , 29%), and *‘Promotion/mentorship of female researchers’* ( $n = 7$ , 11%). Very few respondents ( $n = 3$ , 5% each) indicated *‘Promoting gender equality through delivering or attending training’*, or *‘Integrating gender equality in research participant selection’*. A tiny proportion of the respondents mentioned *‘Integrating gender as a substantive dimension/focus of R&I content/practice’* ( $n = 2$ , 3%), *‘Supporting female researchers’ publications, co-authorship, academic citations’*, *‘Participation in or engagement with equality committees’*, *‘Promoting women in R&I decision-making roles and senior positions’*, and *‘Ensuring gender equality in the process of recruitment and selection of R&I staff’* ( $n = 1$ , 2% for each). Many respondents indicated steps that could not be easily categorised ( $n = 12$ , 19%).

A considerable proportion of respondents gave a *‘Non-specific, vague, platitude or virtue signalling response’* ( $n = 18$ , 29%). This indicated they had promoted or supported gender equality without mentioning the steps they had taken.

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<sup>764</sup> The total number of responses:  $N = 152$

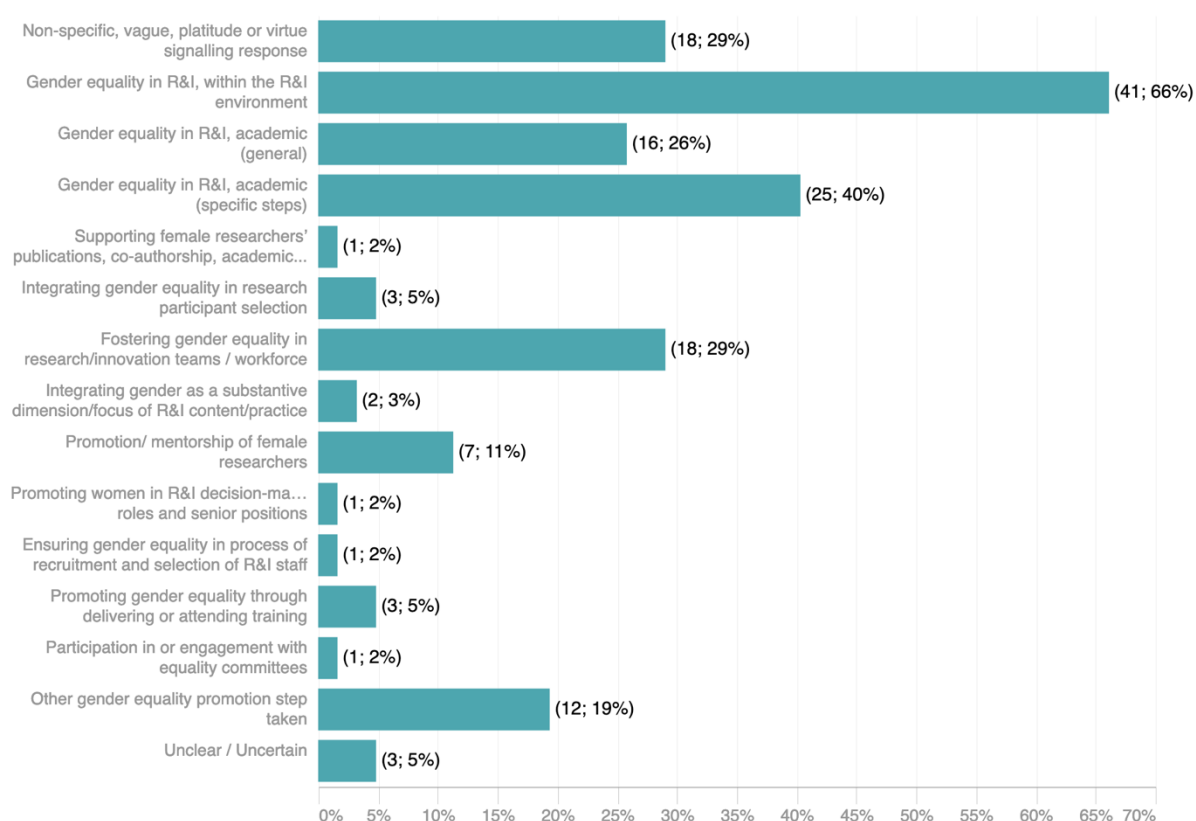


Figure 146: Arab States - Steps taken to promote gender equality in research and innovation work.

### 3.5.6.3 ETHNIC MINORITIES

This section explored the range of responses given to the question *'Please list the steps you have taken to include ethnic minorities in your research and innovation work.'*

As mentioned in section 3.5.3.1.3, a comparatively small proportion of respondents from Arab states reported taking practical steps to include ethnic minorities in their work, resulting in fewer open-ended answers compared to other domains. Of those that did, the majority of respondents ( $n = 12$ , 60%) indicated they had promoted diversity of ethnic minorities, with more indicating 'general' views ( $n = 7$ , 35%), over 'specific steps' ( $n = 5$ , 25%) (Figure 147)<sup>765</sup>. The most common identifiable step was 'Integrating racial/ethnic equality in research participant selection' ( $n = 3$ , 15%). Marginally less common was 'Integrating race/ethnicity as a substantive dimension/focus of R&I content/practice' ( $n = 2$ , 10%), and 'Supporting racial/ethnic minority researchers' publications, co-authorship, academic citations' ( $n = 2$ , 10%). A slightly higher proportion indicated 'Other racial/ethnic equality promotion step[s] taken' ( $n = 4$ , 20%), while very few indicated 'Downplaying, minimising and excusing ethnic diversity issues in R&I' ( $n = 2$ , 10%),

<sup>765</sup> The total number of responses:  $N = 47$

A significant proportion ( $n = 8$ , 40%) provided ‘*Non-specific, vague, platitude or virtue signalling response[s]*’, meaning their responses indicated general support for equality of ethnic minorities without listing practical steps.

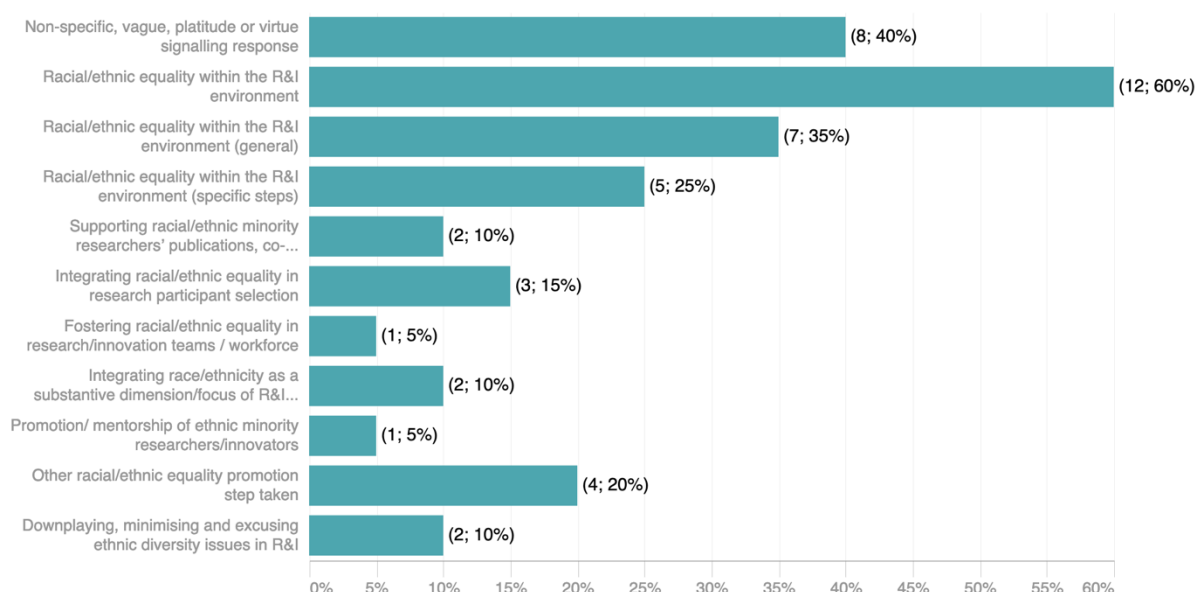


Figure 147: Arab States - Steps taken to include ethnic minorities in research and innovation work.

### 3.5.6.4 ETHICS OF RESEARCH

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to ensure ethical principles guide your research and innovation work?*’.

Many respondents ( $n = 49$ , 79%) indicated they ‘*Integrat[ed] ethics in [their] R&I work*’, although most provided ‘*general*’ responses ( $n = 36$ , 58%) rather than ‘*specific steps*’ ( $n = 13$ , 21%) (Figure 148)<sup>766</sup>.

The most common ways respondents ensured ethical working practices were through ‘*Participation in or engagement with ethics committees*’ ( $n = 20$ , 32%) and ‘*Compliance with rules, regulations, and legal obligations*’ ( $n = 10$ , 16%). This indicated respondents either contributed to or sought advice from ethical committees, while complying with internal rules and legal obligations. Other steps focussed on the treatment of research participants, such as ‘*Integrating ethics through respecting intellectual property rights and academic referencing*’ ( $n = 9$ , 15%), and ‘*Promoting research ethics through delivering or attending training*’ ( $n = 4$ , 6%). The least common steps were ‘*Ensuring informed consent with participants*’, ‘*Ensuring participant anonymisation or confidentiality*’ ( $n = 2$ , 3% for each), ‘*Integrating research ethics as a substantive focus of respondent’s R&I work*’, and ‘*Ensuring that R&I outputs are used to deliver positive societal impact*’ ( $n = 1$ , 2% for each).

<sup>766</sup> The total number of responses:  $N = 167$

A considerable proportion of respondents ( $n = 13$ , 21%) indicated a general commitment to ethical principles but did not mention any steps, providing a ‘*Non-specific, vague, platitude or virtue signalling response*’.

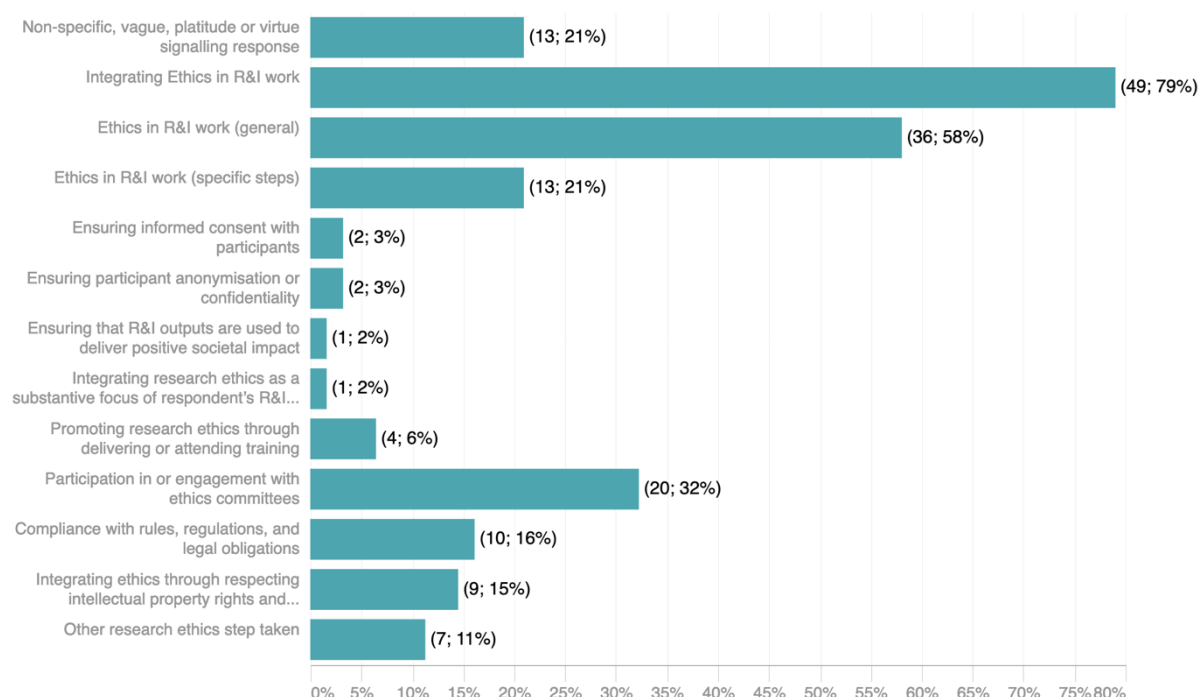


Figure 148: Arab States - Steps taken to ensure that ethical principles guide research and innovation work.

### 3.5.6.5 TRANSPARENCY

This section explored the range of responses given to the question ‘*What steps have you taken to ensure your research and innovation methods/processes are open and transparent?*’.

Many respondents indicated they carried out ‘*One way dissemination with no reference to research methods/processes*’ ( $n = 32$ , 44%) without specifying how they ensured transparency (Figure 149)<sup>767</sup>. A similar portion of respondents ( $n = 36$ , 50%) indicated having taken ‘*Pathways to open and transparent R&I methods and outputs*’. Fewer respondents provided ‘*general*’ steps ( $n = 15$ , 21%), in comparison with those who indicated having taken ‘*specific steps*’ ( $n = 19$ , 26%).

In terms of practical steps, most ‘*Document[ed]/report[ed] research and decision-making processes*’ ( $n = 18$ , 25%) in at least a semi-public form that allowed for scrutiny of methods and decision-making. Another common step was ‘*Seeking upstream feedback on research ideas/plans from non-academics/non-researchers*’ ( $n = 7$ , 10%), which ensured their research was informed by non-academic stakeholders. Some specified having published ‘*Open access publication[s]*’ ( $n = 5$ , 7%), ‘*Seeking approval for methods/processes in research applications*’

<sup>767</sup> The total number of responses:  $N = 159$

( $n = 4$ , 6%) and ‘Participation in or engagement with relevant committees’ ( $n = 4$ , 6%). Very few respondents indicated ‘Disclosing research data, raw data, codes, and statistics’ ( $n = 3$ , 4%) while ‘Participation in or engagement with relevant committees’ ( $n = 4$ , 6%) was the least frequently taken step.

A notable proportion of respondents provided answers coded as a ‘Non-specific, vague, platitude or virtue signalling response’ ( $n = 12$ , 17%).

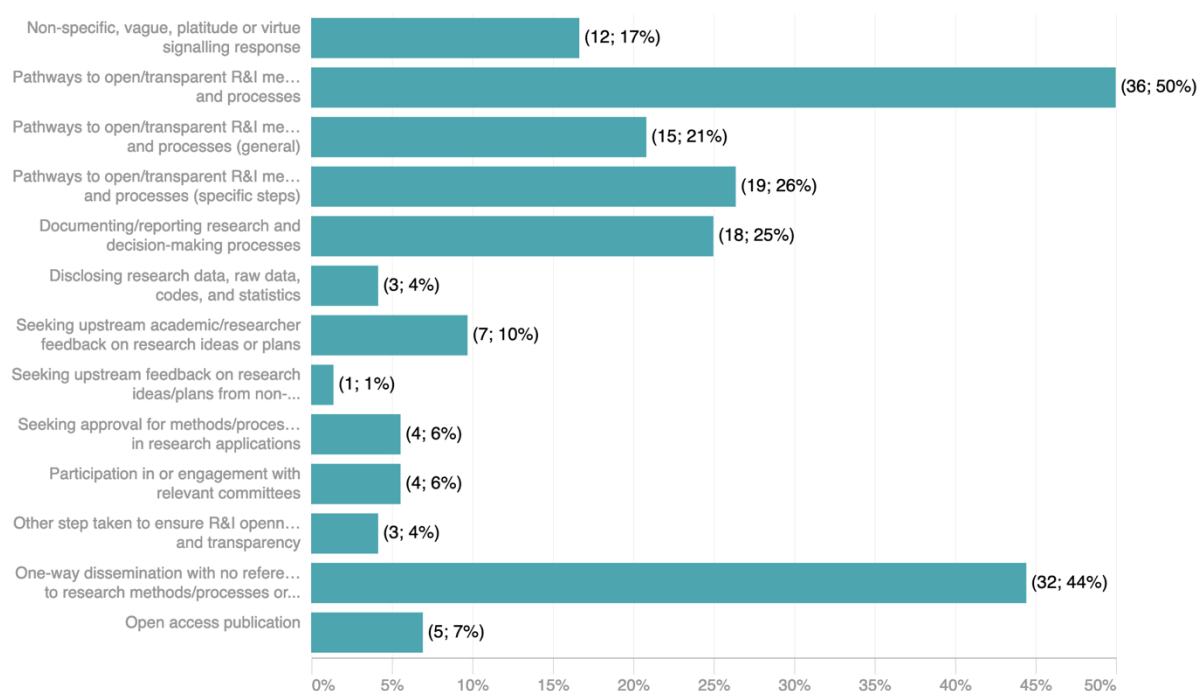


Figure 149: Arab States - Steps taken to ensure research and innovation methods/processes are open and transparent.

### 3.5.6.6 PUBLIC ACCESSIBILITY

This section explored the range of responses given to the question *‘What steps, if any, have you taken to make the results of your research and innovation work accessible to as wide a public as possible?’*.

A considerable proportion of respondents described steps on *‘Sharing R&I work within professional R&I stakeholder environments’* ( $n = 56$ , 60%). This indicated they had not made their research results available to the general, non-academic public (Figure 150)<sup>768</sup>.

A lower proportion ( $n = 45$ , 48%) indicated they had taken steps to share their findings with the public. More respondents ( $n = 43$ , 46%) reported taking *‘specific steps’* towards public accessibility of R&I results, compared to only a very small proportion who referred to a *‘general’* compliance ( $n = 4$ , 4%).

The most common steps were *‘Personally publishing/disseminating R&I outputs to the public outside of scholarly publishing’* ( $n = 17$ , 18%) and *‘Open access scholarly publishing’* ( $n = 11$ , 12%). Some respondents indicated *‘Promoting R&I results in the media’* ( $n = 8$ , 9%), and *‘Engaging with non-academic/public stakeholders through outreach activities after research is completed’* ( $n = 7$ , 7%). The least common steps were *‘Publishing/disseminating R&I outputs using institutional open access repositories or external open access databases’* ( $n = 4$ , 4%) and *‘Institutional- or project-based/supported publishing of research findings (outside of scholarly publishing)’* ( $n = 1$ , 1%).

Only one respondent provided an answer which was coded as a *‘Non-specific, vague, platitude or virtue signalling response’* ( $n = 1$ , 1%).

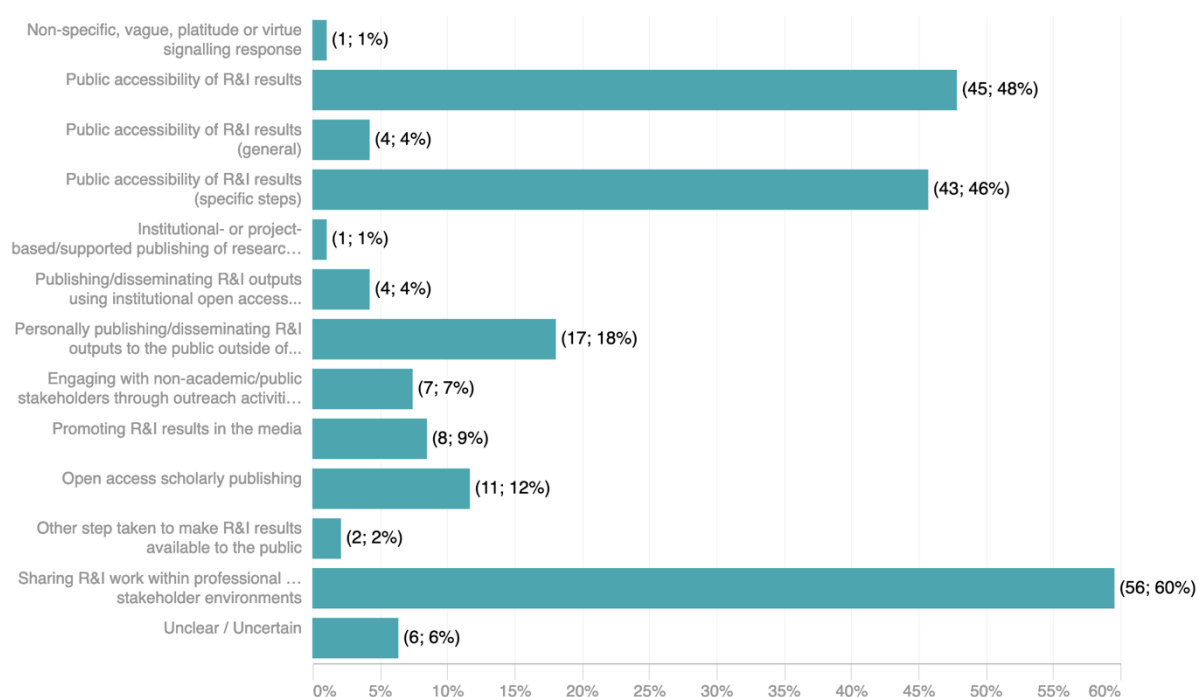


Figure 150: Arab States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.

### 3.5.6.7 OPEN DATA

This section explored the range of responses given to the question *‘What steps, if any, have you taken to make the data from your research and innovation activities freely available to the public?’*.

Relative to the other categories, most respondents were *‘Confusing open access to research findings and open data’* in their responses ( $n = 43$ , 69%). They described making their research findings or outputs freely available, but not the data used to generate them (Figure 151)<sup>769</sup>.

Few respondents indicated *‘Public availability of R&I data’* ( $n = 5$ , 8%). A marginally higher proportion gave *‘general’* information ( $n = 3$ , 5%) as opposed to having listed *‘specific steps’* ( $n = 2$ , 3%). The only categorizable step respondents from Arab states indicated taking to make data freely available was *‘Personally publishing/distributing R&I’* ( $n = 3$ , 5%).

A considerable proportion of respondents ( $n = 12$ , 19%) gave a *‘Non-specific, vague, platitude or virtue signalling response’*. This applied to responses indicating respondents had made their data or generic *‘work’* freely available, without specifically indicating how.

Few respondents negated the necessity for open access. This was categorised as *‘Resisting/delimiting open data or supporting closed data’* ( $n = 2$ , 3%).

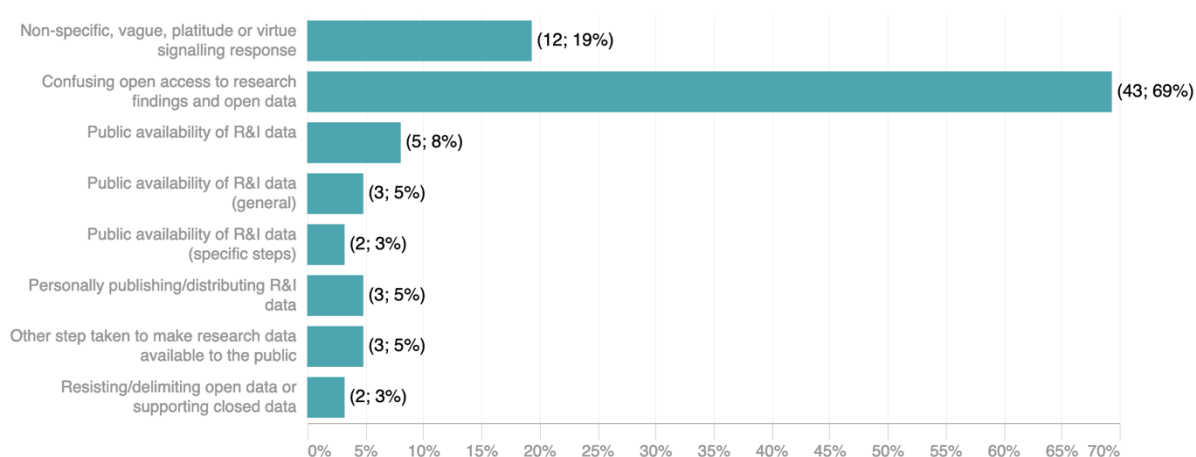


Figure 151: Arab States - Steps taken to make the data from research and innovation activities freely available to the public.

### 3.5.6.8 SOCIETAL NEEDS

This section explored the range of responses given to the question *‘What steps have you taken to ensure your research and innovation work addresses societal needs?’*. A large proportion of respondents ( $n = 89$ , 32%) indicated they had taken steps toward *‘Addressing societal needs’*.

<sup>768</sup> The total number of responses:  $N = 205$

<sup>769</sup> The total number of responses:  $N = 73$

in R&I work’ (Figure 152)<sup>770</sup>. More gave ‘general’ information ( $n = 36$ , 14%), as opposed to listing ‘specific steps’ ( $n = 46$ , 18%).

The most common specific step was ‘Selection of research topic/problem defined by researchers’ perceptions of societal needs’ ( $n = 38$ , 15%). Other steps were less common, such as ‘Societal issues as a substantive dimension in R&I content/focus’ ( $n = 20$ , 8%). A smaller proportion indicated they consulted with relevant public stakeholders to define the topic, which was defined as ‘Participatory process: research topic/problem defined by societal needs’ ( $n = 6$ , 2%). Few respondents indicated they were ‘Communicating R&I work/activities to public/non-academic stakeholders’ ( $n = 4$ , 2%). The least common steps were ‘Participatory process: research design/approach defined by societal needs’ ( $n = 2$ , 1%), ‘Reflecting on/evaluating R&I impact on societal needs’ ( $n = 1$ , 0%), and ‘Compliance with institutional/funding requirements’ ( $n = 1$ , 0%).

Few respondents ( $n = 5$ , 2%) gave a ‘Non-specific, vague, platitude or virtue signalling response’.

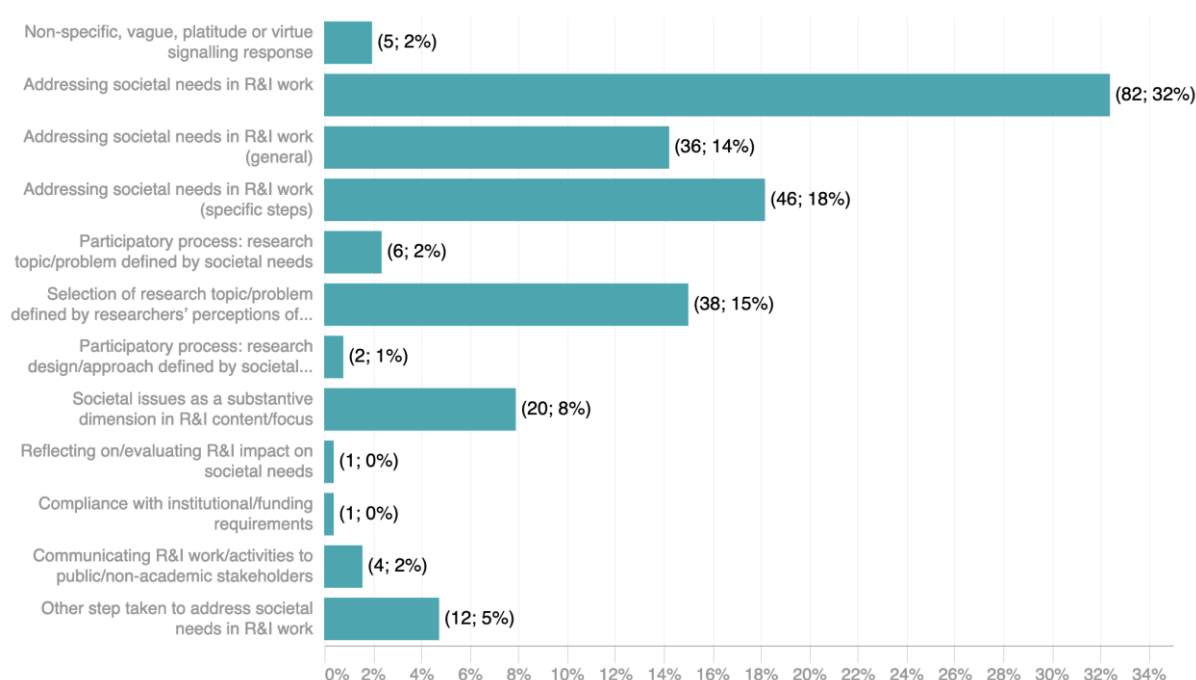


Figure 152: Arab States - Steps taken to ensure research and innovation work addresses societal needs.

### 3.5.6.9 SOCIETAL CONCERNS

This section explored the range of responses given to the question ‘What steps, if any, have you taken to ensure that the way you do your work does not cause concerns for society?’.

A large proportion of respondents ( $n = 36$ , 82%) indicated ‘Addressing societal concerns about implementation of R&I work’, meaning they were taking measures to ensure their work did not

<sup>770</sup> The total number of responses:  $N = 253$

cause concerns for society, or integrating societal views and perspectives (Figure 153)<sup>771</sup>. More provided ‘general’ answers ( $n = 17$ , 39%), as opposed to listing ‘specific steps’ ( $n = 19$ , 43%).

The most common practical steps included ‘Compliance with rules, regulations or legal obligations’ ( $n = 7$ , 16%). The next most common steps were equally ‘Making the research directly responsive to societal needs or concerns’, ‘Seeking upstream feedback from other stakeholders on R&I ideas/plans’, ‘Participation or engagement with relative committees’, and ‘Preventing societal concerns resulting from R&I work by following responsible safety and waste practices to avoid damage’ ( $n = 5$ , 11% for all). Smaller proportions of respondents indicated ‘Seeking upstream feedback from non-academic stakeholders on R&I ideas/plans’ ( $n = 4$ , 9%) and ‘Addressing societal concerns as a substantive dimension of the R&I work’ ( $n = 3$ , 7%), while few reported ‘Mitigating or preventing societal concerns through delivering or attending training’ and ‘Ensuring positive outcomes for society, without explicitly mentioning the prevention of societal concerns’ ( $n = 1$ , 2% for both).

A few respondents ( $n = 5$ , 11%) reported addressing societal concerns in a ‘Non-specific, vague, platitude or virtue signalling’ way.

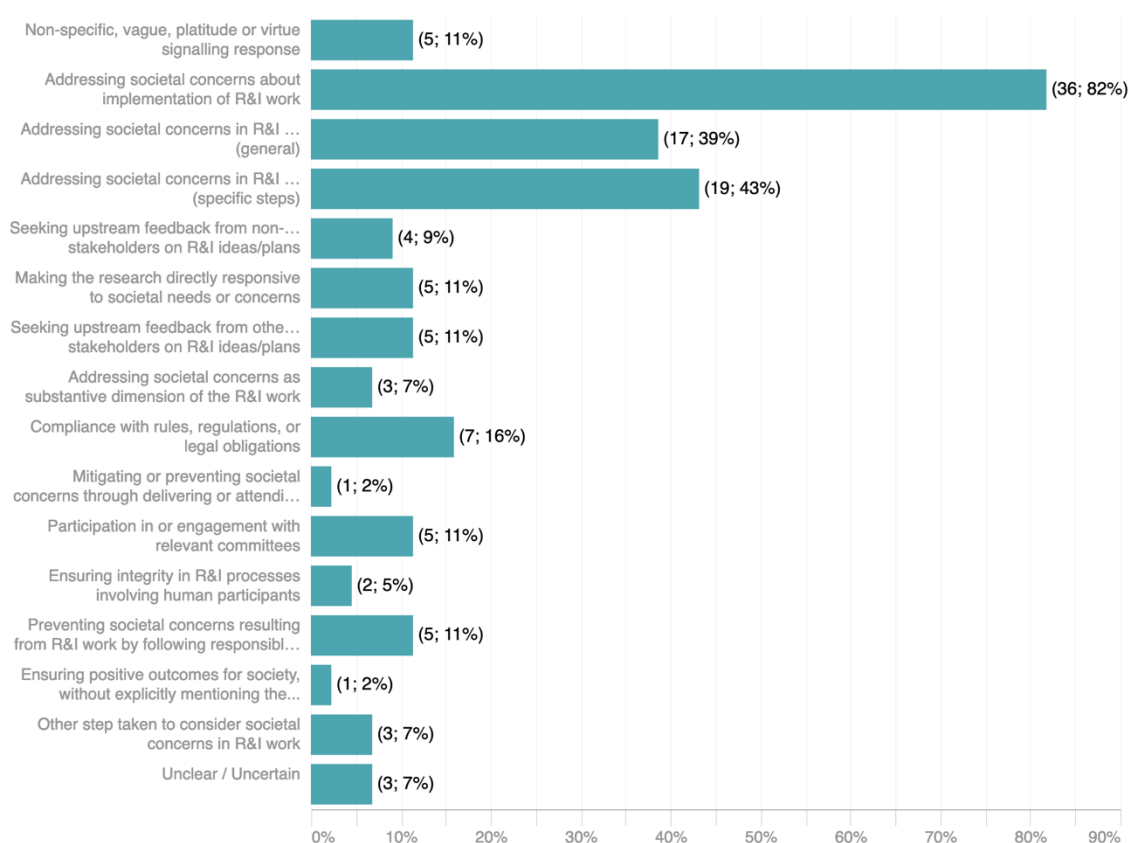


Figure 153: Arab States - Steps taken to ensure that the way work is done does not cause concerns for society.

<sup>771</sup> The total number of responses:  $N = 121$

### 3.5.6.10 ASSOCIATIONS WITH RRI

This section explored the range of responses given to the question “*What comes to mind when you think of ‘responsible research and innovation’?*”.

The majority of respondents referred to ‘*Ideas, practices or policies associated with RRI*’ ( $n = 53, 53\%$ ) (Figure 154)<sup>772</sup>. The most common associations with RRI were in a societal context, with many associating it with ‘*Aligning research and innovation with societal benefits*’ ( $n = 35, 35\%$ ). This was applied to responses suggesting R&I needs to be socially relevant, create value for society, generate knowledge relevant to society, or contribute to a greater societal benefit. The next most common associations had much lower frequencies, and were ‘*Protecting the environment, preventing negative impacts of research and innovation on the environment*’ ( $n = 8, 8\%$ ) and ‘*Integrating/anticipating public perspectives in research and innovation*’ ( $n = 7, 7\%$ ). Fewer respondents associated RRI with ethics and integrity, as only small numbers indicated ‘*Ensuring ethical procedures and approvals are completed in R&I work*’ ( $n = 6, 6\%$ ), ‘*Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty*’ ( $n = 4, 4\%$ ), and ‘*Ensuring norms/practices evincing research integrity and high professional standards*’ ( $n = 3, 3\%$ ).

A notable proportion gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 46, 46\%$ ). This applied to responses effectively repeating the term ‘*responsible research and innovation*’ in different ways, in particular using abstract terms that were not linked to a sense of responsibility or included generic mentions of research standards and societal issues without referring to ‘*responsibility*’ as such.

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<sup>772</sup> The total number of responses:  $N = 184$

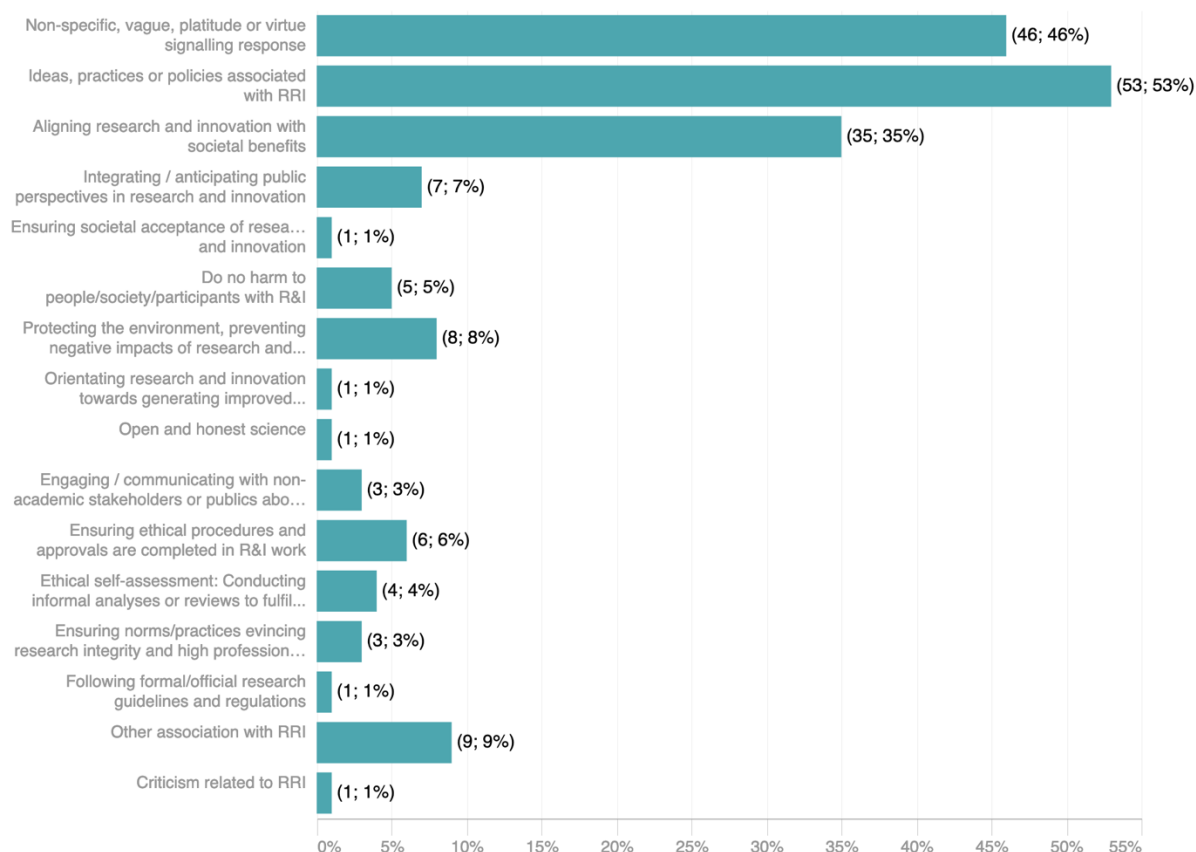


Figure 154: Arab States - What comes to mind when you think of 'responsible research and innovation'?

### 3.5.6.11 ASSOCIATIONS WITH UN SDGS

This section explored the range of responses given to the question *'What comes to mind when you think of the UN Sustainable Development Goals?'.*

A major portion of respondents more specifically *'Definin[ed] sustainable development'* ( $n = 65, 66\%$ ), as entailing social, economic, and environmental aspects, such as associations with health, natural resources, and climate change (Figure 155)<sup>773</sup>. *'Economic aspects of sustainable development'* were indicated by most respondents ( $n = 43, 43\%$ ), followed by *'Diversity/inclusion aspects of sustainable development'* ( $n = 21, 21\%$ ), *'Preserving natural resources'* ( $n = 20, 20\%$ ), and *'Health-related aspects of sustainable development'* ( $n = 19, 19\%$ ). Less common were descriptions of *'Educational aspects of sustainable development'* ( $n = 12, 12\%$ ). A few respondents referred to *'Governance dimensions of SDGs'* ( $n = 12, 12\%$ ), and therefore did not actually define them. This was applied when respondents mentioned international and/or national governance issues or drivers related to sustainable development or the UN SDGs. This included national, multi-national or global geopolitical dynamics, transnational collaboration, as well as challenges or shared targets at this level. Fewer respondents referred to *'Integrating economic and environmental aspects of sustainable*

<sup>773</sup> The total number of responses:  $N = 252$

*development*', 'Addressing climate change', and 'Other aspects of sustainable development' ( $n = 9$ , 9% for each). Few respondents gave responses about 'Achieving the SDGs', which described specific implementation steps for their successful delivery ( $n = 3$ , 3%), which included 'Contribution of technological innovation to sustainable development' ( $n = 1$ , 1%) and 'Other implementation actions to achieve the SDGs' ( $n = 2$ , 2%).

A notable proportion of respondents responded in ways that were 'Non-specific, vague, platitude or virtue signalling response[s]' ( $n = 17$ , 17%). Respondents may have indicated they had heard of the UN SDGs, or referred to sustainability in general, but did not give any further relevant detail. Few gave 'General criticism of the UN SDGs' ( $n = 3$ , 3%).

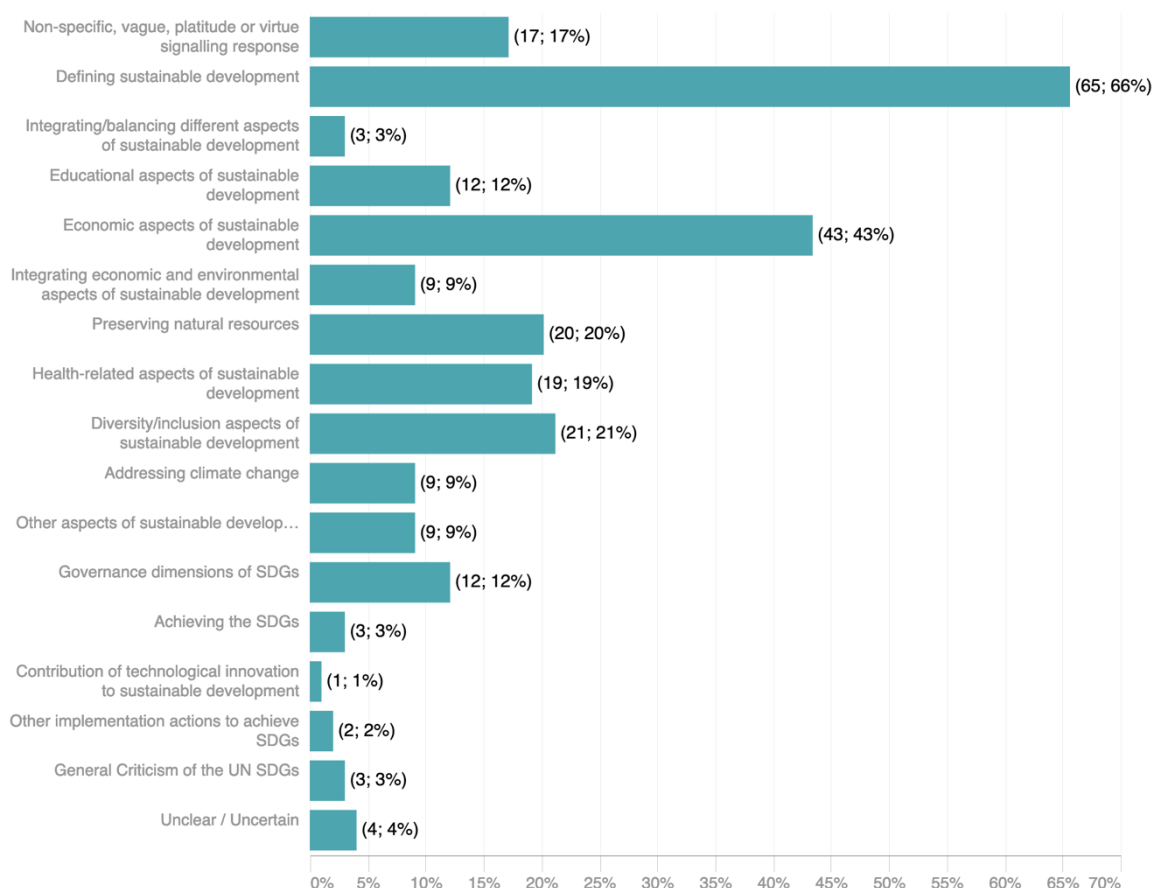


Figure 155: Arab States - What comes to mind when you think of the UN Sustainable Development Goals?

### 3.5.7 SUMMARY OF FINDINGS

Socio-demographic results from the Arab states revealed the sample's gender distribution was slightly skewed towards men, with the majority working in a 'University or similar research performing organisation' within the fields of 'Agricultural sciences'.

Results by dimension of Responsible Research & Innovation (RRI) showed overall agreement with the importance of RRI on an attitudinal level, though this was to a lesser extent for measures relating to perceptions of the relevance of gender and ethnic differences to respondents' work (section 3.5.3.1.5). This indicates that gender and ethnic differences are not

currently perceived as universal, crosscutting aspects of all R&I work. There were value-action gaps for all measures (i.e., gaps between the putting attitudes into practice by taking practical steps). The gap was strongest for the inclusion of ethnic minorities – which was also the area in which the fewest respondents reported taking practical steps – and ensuring work did not cause concerns for society.

Results by stakeholder categories indicated disproportionately higher engagement with research performing stakeholders, such as RPOs, academics and researchers. This is most likely due to academic collaborations and joint research projects. Levels of engagement were almost equally low for all other categories, though civil society/citizens, NGOs/international organisations, and research funding organisations tended to be engaged with slightly more than policy makers and industry/small- and medium- sized enterprises.

Measuring diverse perspectives as part of RRI related to researchers and innovators reaching out beyond academia to diverse stakeholders. Results for *‘Diverse Perspectives’* showed that respondents most commonly engaged with industry and businesses and other non-academic stakeholder types. The most frequently reported practical step to engaging with diverse perspectives was through *‘In-reach to other disciplines, researchers, academics, experts or students’*. Engagement with civil society organisations (CSOs) scored lowest, although just over half of respondents indicated one to ten hours of weekly interaction with this stakeholder category (section 3.5.4.4).

Measures relating to *‘Gender Equality’* identified a trend towards monitoring equality within research teams and promoting or mentoring female researchers. These steps were taken rather than, for example, boosting equality within the academic environment as a whole through supporting female researchers’ publications or providing gender training.

There was a low response rate for open-ended responses describing steps taken toward ensuring the inclusion of *‘Ethnic Minorities’*, with an even smaller proportion giving responses which actually listed specific practical steps. The overall low response rate for steps towards including ethnic minorities suggests this aspect of RRI is not yet widely implemented in respondents’ R&I work.

Results for *‘Ethics of Research’* indicated respondents had adopted practical steps to ensure the integration of ethical principles. The specific steps described indicated normative approaches widely embedded in RPOs through ethics committees, as well as rules, regulations, and legal obligations.

The measures applied to identify ‘openness and transparency’ revealed respondents generally shared perspectives related to conventional research processes. Results for *‘Transparency’* indicated that a high portion of respondents perceived one-way dissemination as a viable pathway for open and transparent methods and processes. Fewer respondents reported documenting and reporting their research and decision-making processes or seeking upstream feedback on research projects from non-academics/non-researchers.

Results for *'Public Accessibility'* showed that sharing the results of R&I work within the respondents' professional field was more common than sharing openly with the public. Where there were efforts to make results accessible to the public, respondents most frequently described sharing work outside the traditional routes of scholarly publishing, instead personally publishing results. Respondents who indicated publications but no further steps to make them publicly accessible were not included in the data, though they were frequently mentioned. This trend became clearer when looking at the respondents' comprehension of making data publicly available. Results for *'Open Data'* revealed that respondents confused open data with open access by describing processes of making their research findings or outputs freely available. This implied ensuring open access is the predominant step respondents associated with openness and transparency, and that taking steps specifically to do with open data are not widely considered a normative approach to ensuring openness and transparency in research and innovation.

Addressing societal needs in R&I seemed to be predominantly related to finding a relevant research and innovation topic, rather than empowering relevant groups of people to decide how the process is shaped. However, results for *'Societal Needs'* showed that most respondents selected research topics based on their own perceptions of societal needs. Considerably fewer respondents indicated public or non-academic engagement and consultation processes to define their research and innovation focus. This might imply top-down thinking. Focussing on the 'anticipative and reflective' dimension of R&I processes, results for *'Societal Concerns'* showed respondents mentioned diverse aspects with similar distributions. The categories reflected associations with societal concerns, such as complying with rules, regulations and legal obligations, which were referred to most often. Also mentioned were efforts to make research directly responsive to societal needs or concerns, and stakeholder engagement and consultation activities.

Identifying common associations with responsible research and innovation and the global blueprint on sustainable development showed respondents were familiar with some of these concepts' main ideas. Most respondents associated RRI with a general idea of aligning R&I to societal benefits.

Results from *'Associations with UN SDGs'* showed that most respondents defined the sustainable development goals as relating to economic aspects, followed by diversity/inclusion, environmental (i.e., preserving natural resources), or health aspects. Governance dimensions were not as frequently mentioned, suggesting respondents were not as familiar with the idea underlying the UN SDGs to build relationships, collaborations and addressing geopolitical dynamics on national, multinational and global levels.

## 3.6 GLOBAL INTERVIEW RESEARCH: ASIAN AND PACIFIC STATES

### 3.6.1 EXECUTIVE SUMMARY

The aim was to investigate bottom-up perspectives and experiences of researchers and innovators in Asian and Pacific States. The focus here is on collecting data through and from researchers and innovators themselves (i.e. ascertaining bottom-up views). We prioritise how and why research and innovation are supplied from those who are actually supplying it.

In delivering this, it was also important that these insights are provided for other parts of the RRING project, specifically regarding: key RRI-related platforms, spaces and players operating in this region; interactions between different stakeholder types; domain-specific lessons related to Digital (ICT), Energy, Bioeconomy and Waste Management; as well as region-specific insights on what is shaping day-to-day research and innovation practice.

In attaining such insights and achieving this research aim, data from 21 structured interviews were analysed for Asian and Pacific States, covering: India (6 interviews); Singapore (2); Japan (5). We undertook a Qualitative Content Analysis approach to analysing these interview data, which relied on utilising code counts to identify the most prevalent sub-themes for further deeper qualitative interrogation (and thus ultimately what was included in this report). The analysis was undertaken by a team of coders, with inter-coder reliability ensured through Inter-coder reliability was measured using Krippendorff's Alpha tests.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions, and indeed are core to structuring the interview sections of this report. Within each of these themes, a number of prevalent sub-themes (all of which are shaping how research and innovation professionals in Asian and Pacific States are doing their work) also emerged:

- *Gender equality and inclusivity*: gender equality and diversity in the R&I workplace; the different roles of women in R&I; current interventions and policies in place; and interventions and support structures needed.
- *Public engagement*: building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: levels and limits of open access; and the cost of open access and data.
- *Anticipative, reflective and responsiveness*: reflecting on desirable RRI futures; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.
- *Ethics*: ethical responsibility; organisational norms and practices; and protection of rights.
- *Governance of RRI*: the influence of politics; and conflicts and tensions.

Within each of these sub-themes, accounts are provided for each of RRING four domains. Across these, we note the following:

- *Energy:*
  - Female leaders in engineering were more common than in science.
  - Public engagement utilised strategic alliances operating internationally.
  - Little to no consideration of open science in this domain.
  - Energy, alongside the climate crisis, were directly definitions of societal need.
  - Environmental destruction (linked to energy) was impetus for science education.
  - International (ethics) standards used a reference point for whether research and innovation were causing concerns for society.
  - Lacking government support, with the energy domain relying on market forces.
- *Waste management:*
  - Gender-based targets used for women in leadership (and other) roles.
  - Public engagement used to ensure local social acceptance of a particular scheme. Multi-stakeholder collaboration was essential to engagement's success.
  - Little to no consideration of open science theme in this domain.
  - Little to no consideration of anticipative, reflective and responsiveness theme in this domain.
  - Environmental destruction (linked to waste management) was impetus for science education.
  - Perception that ethics policies specifically on waste management were lacking.
  - Collaboration between stakeholders should not be encouraged via governance, due to different expectations on timescales for delivery across stakeholders.
- *Information and Communications Technology (ICT):*
  - Lack of women working in ICT recognised as a major concern. Problems of speaker gender balance persisting at conferences.
  - Perception that ICT is more open than other domains to engagement broad set of actors. Interdisciplinarity was central to their engagement efforts.
  - Open source-led research and innovation enhanced (perceived) credibility.
  - Technologies (connected to AI and IoT) were inherently futuristic, and were expected to help tackle societal needs, e.g. inequalities, communications.
  - Online training used to for ICT skills development initiatives. Public discussions and debate also occurred.
  - Little to no consideration of ethics theme in this domain.
  - International politics and the eagerness to be competitive (e.g. between Japan and China/USA) shaped ICT's engagement with RRI practices.
- *Bioeconomy:*
  - Low numbers of female leaders and evidence of exclusionary (male-dominated) social circles.

- Public engagement was hampered by the public's fear of bioeconomy. Inter-domain relationships (e.g. with energy) shaped engagement approach.
- Open access ambitions sometimes conflicted with sensitivity of data and analyses used.
- Bioeconomy innovation able to benefit society through improving product consumption, e.g. lowering costs of pharmaceuticals.
- Little to no consideration of science education theme in this domain.
- Perception that ethics was more relevant when directly involving live subjects and for work with tangible impacts and end products.
- Little to no consideration of the governance of RRI theme in this domain.

Key platforms, spaces and players who were explicitly noted as being key to progress various aspects of RRI practice across Asian and Pacific States included:

- *Gender equality and inclusivity*: India's Department of Science and Technology.
- *Public engagement*: India's Government Department of Science and Technology; Japan's Ministry of Internal Affairs and Communications' AI and Society networks committee; Japan's Acceptable Intelligence with Responsibility; India's CMS Vatavaran film festival.
- *Open Science*: no platforms, spaces or players explicitly raised in the interviews.
- *Anticipative, reflective and responsiveness*: domain- and country-specific spaces were clear boundaries for framing societal needs that research and innovation responded to.
- *Science education*: GAG and Sameeksha platforms used for India's IPCC reports; ResearchGate; little consideration given to local spaces (mainly [inter]national).
- *Ethics*: Indian National Science Academy; Indian Council of Medical Research.
- *Governance of RRI*: National Research Foundation of Singapore; CMS Vatavaran film festival.

Key stakeholders interact within and across their research and innovation sectors in different ways, according to the RRI themes that structure our analysis and discussion:

- *Gender equality and inclusivity*: stakeholder interactions on gender equality and inclusivity tended to be driven by the Research Funding Organisations.
- *Public engagement*: open Intellectual Property policy encouraged collaboration between Research Performing Organisations and industry/business. Research Funding Organisations were key in building strategic alliances and avoiding duplication.
- *Open Science*: Research Funding Organisations shaped how/whether Research Performing Organisations and Civil Society Organisations could release data. Suggestion that funder requirements might not actually be being enforced.
- *Anticipative, reflective and responsiveness*: Feedback in and between stakeholders (e.g. via periodic impact assessments) dominated here, as part of 'tick-box' exercises.
- *Science education*: No relevant interview insights for this theme.
- *Ethics*: Research Funding Organisations had ethical requirements that Research Performing Organisations had to follow.

- *Governance of RRI:* Certain Research Funding Organisations deemed not sufficiently responsible to be a source of funding for Research Performing Organisations. Research Funding Organisations still shaped many rules of governance.

## 3.6.2 INTRODUCTION

This Chapter 3 presents findings from the RRING Work Package 3's Task 3.3 – specifically its global interview task – for Asian and Pacific States. The aim of RRING's Task 3.3 interviews is to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data through and from researchers and innovators themselves, in Asian and Pacific States.

This Chapter is structured as followed:

- We begin by giving headline details of methods adopted, including what country selection procedures, interview participant sampling targets, participant demographics, and analyses undertaken (Section 3.6.1). Note that in-depth information on the methodological approach undertaken for all Task 3.3's global interviews, across all the UNESCO regions we are reporting, can be found in the overarching report.
- The core of the report is then structured around our seven RRI-related themes, which are inspired by the EC pillars and AIRR dimension (Sections 3.6.4 - 3.6.10). Within these sections, we begin each by briefly detailing the code counts for all codes deemed to be part of that respective theme, as part of setting the scene for the sub-themes that are subsequently discussed. Furthermore, following this discussion of the most prevalent sub-themes, each theme-focused section then discusses what is unique for each domain (energy, waste management, bioeconomy, ICT) and for each stakeholder type (Research Performing Organisations, Research Funding Organisations, Industry and Business, Civil Society Organisations, Policy Bodies), in the specific region. Each theme section finishes with a brief summary.
- The contents of this chapters feed into a dedicated conclusions section that summarises the key findings from the Task 3.3 interviews for Asian and Pacific States (Section 3.6.11.2).

## 3.6.3 METHODS

### 3.6.3.1 DATA COLLECTION

Structured interviewing was selected as the method for RRING's Task 3.3 qualitative study of state-of-the-art research and innovation practices globally. Interviews were selected to provide in-depth perceptions, information and opinions of on-the-ground experiences concerning opportunities and bottlenecks in RRI in each of the five world-regions (Arab States; Asian and Pacific States; European and North American States; Latin-American and Caribbean States; African States). A structured approach was taken to ensure consistency in lines of questioning

(including allowable follow-up questions) across the regions, which was deemed especially important given the range of interviewer experiences. The structured interviews ultimately provided more reliable, focused, and uniform data coverage across domains and stakeholder-types in each country and region.

The structured interview format consisted of questions on eight RRI themes and specific interview guidelines were provided to interviewers on how the interview was to be conducted. Interviews were conducted either face-to-face or through telephone/skype calls to facilitate participation. Further details of the data collection methods, guidelines and procedures used are provided in overarching report.

In each region, country selection was done on a multi-based criterion. Initially, four countries were to be studied from Asian and Pacific States. One high (Japan) and one low (Myanmar) ranked country was to be selected based on GERD (Gross Expenditure on Research and Development). The country with the highest GDP (Singapore) was also selected, in addition to any countries that we had a commitment to consider as per our Grant Agreement with the European Commission (India).

1. India: GDP= 1717.47 (2016); GERD= 0.85 (2015)
2. Singapore: GDP= 55243.13 (2016); GERD= 2.20 (2014)
3. Japan: GDP= 38972.46 (2016); GERD= 3.15 (2016)
4. Myanmar: GDP= 1195.52 (2016); GERD= 0.02 (2009)

Whilst interviews were collected for all countries, Myanmar interview were excluded from our analysis given that sub-contractor led data did not meet our quality control standards.

### 3.6.3.2 SAMPLING

The selection of participants from each country was based on key selection considerations, including:

- Number of interviews: A minimum of five interviews were to be conducted per country.
- Gender: A 50-50 target split between males and females and/or other gender identities was recommended for interview participant selection, with an acceptable minimum of 40% representation of females and/or other gender identities.
- Domains: Interview participation of respondents from at least one of each domain category in the country sample was set as a target (ICT/digital; energy; waste management; bioeconomy).

- Stakeholder types: At least one of each stakeholder type was to be included in the interview sample (Research organisation; Research funding organisation; Industry and business; Civil society organisation; Policy body).
- Relevance of their professional work to the RRING project's RRI interests: Interview participants were to be selected based on their profiles indicating the presence of any publicly visible RRI-like activities undertaken to ensure that their work complemented the innovation/research approaches that RRING would find useful to investigate.

Interviews were designed and undertaken in accordance with ethical guidelines from the Global Sustainability Institute's (GSI) Departmental Research Ethics Panel, under the terms of Anglia Ruskin University's (ARU) Research Ethics Policy (Dated 8 September 2016, Version 1.7), as well as the Social Research Ethics Committee (SREC) under the terms of University College Cork. Once interviews were conducted, partners/sub-contractors were asked to submit audio-recordings, signed consent forms, transcripts (both in English, anonymised and non-anonymised, and local language), post-interview emails with transcriptions as attachments for participants to review, and proof of participants' background profiles demonstrating their suitability for participation and fieldnotes. Partners/sub-contractors were also requested to provide a statement of performance against the selection criteria, with justifications if targets were not met across the sample.

Following the set criteria for interview participation and data collection, a total of 13 interviews were undertaken for Asian and Pacific States, covering: India (6 interviews); Singapore (2); Japan (5). We undertook a Qualitative Content Analysis approach to analysing these interview data – details of the data and the specific Asian and Pacific States sample are provided in Table 11.

Table 11: List of interview details and participant demographics for each country

Asian and Pacific States	Interview code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			Energy	Waste man.	ICT <sup>774</sup>	Bioeconomy	RPO <sup>775</sup>	RFO <sup>776</sup>	Industry & Business	CSO <sup>777</sup>	Policy body	Male	Female
India	IND01	00:42:20				1	1					1	
	IND02	00:46:37	1		1						1	1	
	IND03	00:47:00		1	1		1			1			1
	IND04	00:41:00		1			1			1			1
	IND05	01:03:00	1					1		1		1	
	IND06	00:33:00	1	1					1			1	
Singapore	SGP01	01:12:38	1				1					1	
	SGP02	01:08:47			1		1				1		1
Japan	J01	01:09:49			3		2	2				1	2
	J02	01:27:44				1	1						1
	J03	1:22:18			1		1						1
	J04	01:09:49			1		1					1	

<sup>774</sup> Information and Communications Technology<sup>775</sup> Research Performing Organisation<sup>776</sup> Research Funding Organisation<sup>777</sup> Civil Society Organisation

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Asian and Pacific States	Interview code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT</i> <sup>774</sup>	<i>Bioeconomy</i>	<i>RPO</i> <sup>775</sup>	<i>RFO</i> <sup>776</sup>	<i>Industry &amp; Business</i>	<i>CSO</i> <sup>777</sup>	<i>Policy body</i>	Male	Female
	J05	01:05:58	1	1	1	1	1						1

### 3.6.3.3 DATA ANALYSIS

Qualitative Content Analysis was used as the primary data analysis method. This was achieved through coding and analysis of interviews in five phases:

1. In the first phase, 30 interviews (**26.5%** of the sample spanning all RRING regions) were inductively coded using NVivo 12 (a type of CAQDAS- Computer Aided Qualitative Data Analysis Software), with an inductive line-by-line open coding approach. The 30 interviews were selected to ensure a good distribution of countries (and UNESCO regions). Within each country, at least one interview from each gender was also included for this inductive coding phase. Following these country and gender considerations, selection was then based on distribution of domains and stakeholder types. Coding was done for the respondents' social construction of (responsible) research and innovation practices and accounted for both cross-cutting (i.e. across all the interview questions and all the geographies/domains/etc.) themes (e.g. enablers, constraints, conflicts, etc.), as well as context- and question section-specific subject matter based on the structured interview-based themes (e.g. public engagement, open access and open data, etc.). Various cycles of review and revision led to the development of a codebook containing 117 codes under 12 categories. This was used in the next phase for coder training.
2. The codebook was used by a team of coders to deductively code the remaining 94 interviews (again, this was for all of RRING's UNESCO regions). For this, the coders were provided extensive training in two practice rounds: (1) a full-day training workshop, in which the coders familiarised themselves with the codebook, practiced coding a pre-prepared transcript extract, and discussed their coding for greater inter-coder reliability; and (2) in the second practice round, each of the four coders was given a separate second practice transcript to be coded independently. Coding was then compared with the lead coder through dedicated virtual meetings with each coder, and inter-coder reliability was determined, and agreement reached. This process led to further revisions of the codebook based on mutual discussions and inter-coder agreements.
3. In the next stage, interview transcripts were distributed among the coders for coding deductively, using the revised codebook. During this stage, coders were expected to flag any critical new codes and reach a satisfactory inter-coder agreement. Coding for the interview section on 'Responsibility' was carried out inductively for all interviews, due to the degree of variance in responses and because of how it sat distinctly away from the RRI and AIRR structure of this report's themes. This was a result of the open-ended nature of the question on responsibility and how different participants understood responsibility very differently, based on their subjective interpretation of the term.
4. Inter-coder reliability was measured using Krippendorff's Alpha. On average, coders achieved a Krippendorff's Alpha value of 0.95, and a reliability of over 0.8 for 89% of variables.

5. Within each theme identified, as a first step code counting was done for each domain and stakeholder type in each region, as well separate counts for each country, to get a sense of what is in the data. After this, further in-depth qualitative interrogation of the coded data was then undertaken to interpret the patterns found in the selected codes (i.e. identified sub-themes).

The presentation of the qualitative data in this chapter uses example quotes for evidence and clarity. The quote blocks are often quite large to maintain the integrity of the original coding and to, critically, ensure richness and depth to the handover of data from this Task 3.3 to the rest of the RRING project, as well as be of use to other readers who may be interested to know more about our source data, and thus the claims we subsequently make based on these.

Our discussion in the following sections is based around seven themes: *gender equality and inclusivity*; *public engagement*; *open science: anticipative, reflective and responsiveness*; *science education*; *ethics*; and *governance of RRI*. Within each of these themes, we present two to four prevalent sub-themes, whereby a sub-theme is usually a single dominant code that cuts across a high proportion of the interview transcripts. There are a small number of sub-themes that represent a small number of codes, but which logically cluster together as part of us drawing out broader meanings from the interview data.

We now discuss the most prevalent codes (i.e. identified sub-themes) for each of our seven RRI themes, beginning with details on the code counting outcomes for each theme, which in turn lead to the sub-themes themselves that we present within the rest of this chapter.

### 3.6.4 GENDER EQUALITY AND INCLUSIVITY

As one of the six key RRI policy priorities highlighted by the European Commission, gender equality has been defined as being “about promoting gender balanced teams, ensuring gender balance in decision-making bodies, and considering always the gender dimension in R&I [research and innovation] to improve the quality and social relevance of the results”.<sup>778</sup>

Inclusivity is understood as promoting people in research and innovation who are underrepresented (e.g. women, ethnicities, or economic minorities, etc.). Inclusivity deals with people who are included/excluded from the research and innovation process, whether intentionally or not.

There are also “process dimensions” to achieving these outcomes, whereby establishing a ‘diverse and inclusive’ process, requires that all actors and publics involved in and affected by research and innovation work together and are included early in research and innovation practice, deliberation, and decision-making, to yield more useful and higher quality knowledge.<sup>779</sup> “Voices across a diversity of communities should be involved in research, from

<sup>778</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>779</sup> <https://www.rri-tools.eu/about-rri>

its beginnings to its commercialisation”, ensuring all points of view are accounted for, and generating higher quality science through different perspectives and expertise.<sup>780</sup>

The interviews and analyses were conducted with these definitions in mind. Of the 14 codes identified, four codes were seen most extensively: *gender and sexual diversity* [code 56]; *organisational norms and practices* [code 55]; *discrimination and lack of diversity* [code 65]; *lack or uncertainty of policy* [code 66].

Codes	Asian and Pacific States			
	India	Singapore	Japan	Total
<b>53: Gender equality and inclusivity</b>				
54: Contextual understanding of diversity and inclusion-societal and cultural norms	5	1	4	10
55: Organisational norms and practices	6	2	7	15
56: Gender equality	15	8	17	40
57: Ethnic and religious diversity	2	0	3	5
58: Country-based representation	0	2	5	7
59: Disability	0	1	3	4
60: Academic diversity	0	1	3	4
61: Age diversity	0	0	2	2
62: Socio-economic diversity and inclusion	3	0	0	3
63: Motives-Benefits of diversity and inclusion	2	1	0	3
64: Risks-Disadvantages associated with diversity and inclusion	0	0	1	1
65: Discrimination and lack of diversity	3	4	7	14
66: Lack or uncertainty of policy	10	1	5	16
67: Discrimination- a non-issue	2	0	0	2

The following sections provide details regarding these four codes and descriptions of the findings. The sections provide information about female participation in the workplace, the different roles of women in research, the need for female role models, as well as interventions and awareness campaigns needed.

In the results section, findings relating to specific domains of R&I and stakeholders (including key platforms, spaces, and players) are provided.

<sup>780</sup><https://www.rri-tools.eu/documents/10184/16301/RRI+Tools.+A+practical+guide+to+Responsible+Research+and+Innovation.+Key+Lessons+from+RRI+Tools>

In the summary section, the findings relating to the theme *gender equality and inclusivity* are brought together.

### 3.6.4.1 GENDER EQUALITY AND FEMALE PARTICIPATION IN THE R&I WORKPLACE

In the framework of this report, *gender equality* encompasses any references to gender diversity and inclusion in R&I workplace.

This includes references to the need or methods employed for improving gender equality, inclusion, reducing the gender gap (such as a gap in salary, recruitment, promotion, participation, scientific and research domains, etc.) and providing relevant support structures. The results for each country are discussed in each section in this chapter.

In contrast to other deliverables (for the other global regions), the participants from Asian and Pacific States emphasise the pace and level of progression for women in R&I as opposed to men, including the effects of motherhood on career progression. The need to increase the number of women in leadership and decision-making roles is mentioned by the participants. Furthermore, motherhood in Japan and Singapore is considered a hindrance to women attaining senior and management positions. This is due to a lack of female networks and support, according to participants.

The Science, Technology, Engineering and Mathematics (STEM) disciplines are lacking in female enrolment, especially at higher levels of research and education.

Participants focused predominantly on gender and, while other minorities were mentioned, there were no comments on sexual diversity. In addition, process-dimension considerations, such as the contribution to knowledge production and broadening of perspectives, are not mentioned by the participants.

#### 3.6.4.1.1 India

On the one hand, according to this participant, gender equality is a western concept:

*“...gender equality is more a western phenomenon... In India even when we have developed the constitutions, the constitution of India, we have only talked about the citizen of the country and certain communities which has been historically side-lined. Whom we have at that point of time, demarcated as Scheduled Castes and Scheduled Tribe. Other than that, we have not talked about anything else...”* [Male; India; RFO, CSO; Energy<sup>781</sup>]

On the other hand, participants from India speak about efforts towards gender equality in their organisation. One male participant says their organisation takes gender equality seriously:

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<sup>781</sup> IND05

*“...It has been a very conscious effort from the institute and also personally that we actually like have a balance of gender...”* [Male; India; RPO; Bioeconomy<sup>782</sup>]

According to this participant, gender equality is considered in their organisation, but other diversities are neglected. It is not clear which other diversities she is referring to:

*“...the sector is conscious about gender. It's become an important dimension, but other than that, I don't think that any practices specifically for being more inclusive of other diversities.”* [Female; India; RPO, CSO; Waste Management, ICT<sup>783</sup>]

The same participant says their organisation takes diversity seriously, but that more can be done:

*“...But in innovation also we tried to engage large groups, but I'm not sure we've done enough to target all the diversities. Gender, ethnic and other different stakeholders we've done. But the, unreached, the poorest for the poor, the inaccessible, the last mile; I think that is something still, I think that's where we need to go up.”* [Female; India; RPO, CSO; Waste Management, ICT<sup>784</sup>]

Another participant mentions attempts at equal or higher than equal gender representation efforts at different levels at their organisation:

*“...we have almost 50% women representation in the organisation at different levels, so we internally follow that even among our grantee partners, there is a good representation of women...”* [Male; India; RFO, CSO; Energy<sup>785</sup>]

One participant mentions percentage targets for women in leadership positions and the development of women within the organisation:

*“[anonymised organisation] has a very strong policy on gender equality. Their diversity involvement in all sections, be it innovation or be a part of the board or leadership team. If you go through a sustainability report or the annual report, it comes out clearly how, how we are developing women within the organisation. And if you just go through the office, you'll see a lot of diversity...”* [Male; India; Industry & Business; Energy, Waste Management<sup>786</sup>]

According to the same participant, their organisation has a target of 30% for women in leadership positions:

*“[anonymised organisation] has a very strong policy on gender equality. Their diversity involvement in all sections, be it innovation or be a part of the board or leadership team. So, chairman has given a task of having at least 30% women in*

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<sup>782</sup> IND01

<sup>783</sup> IND03

<sup>784</sup> IND03

<sup>785</sup> IND05

<sup>786</sup> IND06

*the leadership positions... we are almost reaching there... ” [Male; India; Industry & Business; Energy, Waste Management<sup>787</sup>]*

A RPO in the waste management domain aims for inclusivity at stakeholder meetings, according to this female participant:

*“It is a mandate to ensure gender equality. Even at CSE [Centre for Science and Environment], whenever we do our programs, it's important for us to look at stakeholder participation... We kind of looked into diversity, be it in terms of gender, in terms of the different kinds of stakeholders.” [Female; India; RPO, CSO; Waste Management<sup>788</sup>]*

However, the level of success in bringing women to senior levels in the STEM disciplines is lacking, according to this participant:

*“STEM as you call it is [a] very critical issue in India. If you see the numbers, a lot of girls study science up to 10th grade, then the number goes down to 12th and it goes down further. So by the time th[ey] reach PhD or Postdoc or even the senior science, the principal investigator, so to say, level, the number goes down.” [Male; India; Policy body; Energy, ICT<sup>789</sup>]*

According to the same participant, the Department of Biotechnology (DBT) and the Department of Science (DST) in India have initiatives, such as the Kiran (Knowledge Involvement in Research Advancement through Nurturing) programme, which are supportive of women in science:

*“Kiran program is there... there is a full wing in DST which is trying to engage with women in science... the DST and government initiatives in science and DBT has... program[me]s where they tried to promote entrepreneurship among women...” [Male; India; Policy body; Energy, ICT<sup>790</sup>]*

Furthermore, there are initiatives in place in India to promote gender equality:

*“So there are quite a few initiative[s], but how far they are successful that is the question... Indian National science Academy, Bangalore Science, the Indian Academy of Science in Bangalore... have active engagement but still the number of women who reach the director level post is very few...” [Male; India; Policy body; Energy, ICT<sup>791</sup>]*

Another participant says they promote gender equality in training programmes at their organisation:

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<sup>787</sup> IND06

<sup>788</sup> IND04

<sup>789</sup> IND02

<sup>790</sup> IND02

<sup>791</sup> IND02

*“... when we do any training program[me]... we generally ask that, you know, send one female and one male. So that there's an equal participation and we encourage more women participation in that way...”* [Female; India; RPO, CSO; Waste Management<sup>792</sup>]

In the next section, results relating to gender equality and female participation in the workplace in Japan are discussed.

### 3.6.4.1.2 Japan

This participant from Singapore, who has worked in Japan, shares her negative experiences with men in her field:

*“I would say in Japan that if I've tried to approach male professors or Deans or Heads of Programmes, they will shun me, they won't speak to me because I'm female... Recently, someone from the United States and male, had me excluded from some conferences... I was not allowed to speak nor was I allowed to attend. I used to attend a conference called Science and Technology in Society... and then I was no longer invited when I mentioned that there were no women speakers...”* [Female; Singapore; RPO, Policy body; ICT<sup>793</sup>]

Furthermore, she says certain sectors of the Japanese ICT domain is more inward-looking and has moved away from the influence of foreign experts:

*“Let me use my experience as a member of the IT Law Association of Japan. I was a founding member and a member for many years and sometimes I was a speaker at their conferences. What I saw over the years was that they stopped inviting foreign speakers. The atmosphere changed. The ethos was quite different. Meetings were held in Japanese only. And there were no other foreign members or guests unless they were invited under the patronage of one of the members.”* [Female; Singapore; RPO, Policy body; ICT<sup>794</sup>]

This foreign researcher in Japan is conscious of being treated differently:

*“...now I'm running an underground foreigners' brainstorming group in the lab. I think the Japanese, among themselves, they talk, they go together for lunch, but as a foreigner I feel like a visitor even after five years.”* [Female; Japan; RPO; Bioeconomy<sup>795</sup>]

The same female participant says foreigners are excluded from positions in Japan:

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<sup>792</sup> IND04

<sup>793</sup> SGP02

<sup>794</sup> SGP02

<sup>795</sup> J02

*“It’s partly due to the language, but it’s also due to being foreign, because even Asian foreigners who speak fluent Japanese, don’t get positions even though they are qualified.”* [Female; Japan; RPO; Bioeconomy<sup>796</sup>]

According to this female participant, not enough is done in Japan in terms of gender equality policies:

*“I think most of the community to whom I belong is mostly a man’s world and I don’t think there are effective policies working right now. I don’t think that government policies are not enough, with respect to gender in Japan.”* [Female; Japan; RPO; ICT<sup>797</sup>]

According to this participant, the situation in Singapore is better than Japan. This participant, who has worked in both countries, gives the following example:

*“...I was at a two-day conference and there was a total of one woman speaker. She was a Singaporean tech expert and brilliant, working in an engineering company, and she was treated respectfully...”* [Female; Singapore; RPO, Policy body; ICT<sup>798</sup>]

The same participant said she is treated differently than her male counterparts in Japan and claims to work harder than they do:

*“...I’m working seven days a week doing my best, but I worked ten times harder than the male professors in Japan and was constantly denigrated and denied opportunities like grants.”* [Female; Singapore; RPO, Policy body; ICT<sup>799</sup>]

The same participant says she has been a victim of exclusion in Japan:

*“I found constant exclusion and denigration, non-recognition of my work in Japan and it continues today. I recently completed a twenty-year research project with two eminent Japanese judges, produced a 1500-page book... and I’ve been slandered and excluded in Japan. It’s simply dreadful.”* [Female; Singapore; RPO, Policy body; ICT<sup>800</sup>]

She says women are used as 'window dressing' to provide the illusion of gender equality in her field of expertise:

*“There was one woman from Japan. They just brought her in for what we call window dressing. I’m afraid I still see the window dressing in Japan definitely...”* [Female; Singapore; RPO, Policy body; ICT<sup>801</sup>]

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<sup>796</sup> J02

<sup>797</sup> J03

<sup>798</sup> SGP02

<sup>799</sup> SGP02

<sup>800</sup> SGP02

<sup>801</sup> SGP02

Another female participant attributes the problem with female participation in ICT to the absence of women in STEM disciplines:

*“...we decided to have a symposium about AI and medicine... I asked whether there were any other women who could be panellists. But sometimes it is difficult to find women among engineering communities...”* [Female; Japan; RPO; ICT<sup>802</sup>]

This male participant says there are fewer women in the STEM disciplines than the social sciences:

*“We are very familiar with social science and humanities which makes the number of women larger... but the number of women in natural science is small in Japan...”* [Male, Female; Japan; RPO, RFO; ICT<sup>803</sup>]

According to one male participant, female participation is higher in some STEM fields than others:

*“...in the whole field of AI, yes, the gender ratio of the researchers remains biased. But the bias is not so big as in the other fields of engineering such as machine engineering and electrical engineering. They are in a devastating situation of almost zero female students.”* [Male; Japan; RPO; ICT<sup>804</sup>]

Another female participant attributes the problem with female participation in ICT to the absence of women in STEM disciplines:

*“...we decided to have a symposium about AI and medicine... I asked whether there were any other women who could be panellists. But sometimes it is difficult to find women among engineering communities...”* [Female; Japan; RPO; ICT<sup>805</sup>]

According to this participant from Japan, gender equality is considered and implemented at their organisation:

*“...When we assign advisors, we very much care about gender balance. We try to include women as advisors. When we adopt a project, we try to include women PIs as many as possible.”* [Male, Female; Japan; RPO, RFO; ICT<sup>806</sup>]

Another female participant describes the situation at her consortium as a boy's club:

*“...when I look at the consortium itself, when they take pictures or I have to go to a professors' meeting, this is basically a boy's club. There's not a single woman among them.”* [Female; Japan; RPO; Bioeconomy<sup>807</sup>]

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<sup>802</sup> J03

<sup>803</sup> J01

<sup>804</sup> J04

<sup>805</sup> J03

<sup>806</sup> J01

<sup>807</sup> J02

According to the same participant, it will take time for female participation in the R&I workplace to increase:

*“...when I look at the other groups, all the assistant and associate professor[s] are men. So, it will take at least another two generations before you see more women in general...”* [Female; Japan; RPO; Bioeconomy<sup>808</sup>]

One male participant says there is increased female representation among younger generations, although they do not provide further details:

*“...in the younger generation the female ratio tends to increase in every field.”* [Male; Japan; RPO; ICT<sup>809</sup>]

According to this participant, women in Japan face challenges due to their various roles as mothers and caregivers. She says women do not receive enough support:

*“The female member of staff is pregnant and there is not an issue of whether she’s coming back or not, she’s coming back when she finds the place in the kindergarten frees up for her child... it depends on the amount of support you have from the people in your work environment... I think there are many more options available than are implemented in the field...”* [Female; Japan; RPO; Bioeconomy<sup>810</sup>]

Furthermore, the extended working hours in Japan, are not conducive to the various roles women fulfil:

*“...you can go to the lab and people are working 24/7 and no one is taking a day off in a year.”* [Female; Japan; RPO; Bioeconomy<sup>811</sup>]

According to another participant from Japan, their organisation aims to better support women in the workplace:

*“It is good and desirable for our university that the organisational systems to support female researchers are improved. Actually, the ways of using research funds have changed so as to support them. For example, the cost for baby and child day care services now can be covered by research funds.”* [Female; Japan; RPO; Energy, Waste Management, ICT, bioeconomy<sup>812</sup>]

In addition, women are granted extended maternity leave, but the participant does not discuss the impact this has on career progression:

*“At Meiji University, female staff can take child-rearing leave for consecutive three years, the maximum period stipulated in the relevant statute.”* [Female; Japan; RPO; Energy, Waste Management, ICT, bioeconomy<sup>813</sup>]

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<sup>808</sup> J02

<sup>809</sup> J04

<sup>810</sup> J02

<sup>811</sup> J02

<sup>812</sup> J05

<sup>813</sup> J05

According to this male participant, maternity leave provisions are recognised as important at their organisation, but strategies to achieve the best results are not defined:

*I think that MEXT and JST [funding agencies in Japan] and other funding agencies and the government departments noticed and recognised the situation [maternity leave provisions] and the necessity to improve them. But we and they do not know what is the most effective strategy.” [Male; Japan; RPO; ICT<sup>814</sup>]*

According to this participant, women must make more sacrifices to achieve the same success as men:

*“I think to get ahead, you have to be a man. I think the sacrifices that women here have to make are incomparably bigger than those that men make, because society functions in a way that “here is a man, he’s busy and must earn the money” ...” [Female; Japan; RPO; Bioeconomy<sup>815</sup>]*

Furthermore, she says, in her experience, the problem is specific to Japan:

*“I think it’s always institutional or country-related, the general atmosphere of the country. I have never seen so many men in one room until I came to Japan.” [Female; Japan; RPO; Bioeconomy<sup>816</sup>]*

In contrast to Japan, she says women in Europe and the United States have more support:

*“If you go to Europe, particularly Northern Europe, even the US... They [women] have two, three, four babies, while they are setting up their company. It’s the support they have in their environment.” [Female; Japan; RPO; Bioeconomy<sup>817</sup>]*

According to this participant, the situation in Japan is improving, but they do not provide further details:

*“I sometimes hear that more Japanese women are getting onto the tenure-track, but I don’t have numbers on that.” [Female; Japan; RPO; ICT<sup>818</sup>]*

One participant mentions the need for interventions, such as quotas, but says this measure is not widely supported:

*“...I attended some of the university board meetings. They organised a kind of conference... and we argued about how to improve the many aspects of the University of Tokyo. The gender bias was one of the biggest issues. After the conference, some members sent us a message that the University of Tokyo should introduce a quota (for staff recruitment), but some other members... attached strong disagreement to the message letter. They specifically said that they*

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<sup>814</sup> J04

<sup>815</sup> J02

<sup>816</sup> J02

<sup>817</sup> J02

<sup>818</sup> J03

*experienced a failure by introducing quotas, and just caused other types of discrimination...” [Male; Japan; RPO; ICT<sup>819</sup>]*

In the next section, results relating to gender equality and female participation in the R&I workplace in Singapore are discussed.

### 3.6.4.1.3 Singapore

According to this male participant from Singapore, gender balance is achieved at their organisation in the energy domain:

*“...in my area in clean energy, it’s nice. Half of the students are female in the undergraduate courses and even among the PhD students, so it happens naturally that we have about 50% of females among our staff.” [Male; Singapore; RPO; Energy<sup>820</sup>]*

However, the same participant says there are fewer women in engineering, than in science:

*“This lack of female leaders is a problem in engineering anyway. In science there are more women. Having a lot of females is unusual in engineering...” [Male; Singapore; RPO; Energy<sup>821</sup>]*

According to this female participant from Singapore, there are fewer women in the cybersecurity field, but she hopes to partner with a woman in the same field:

*“The people that I do know are male only. I do know a woman who’s really capable and I’m hoping to partner with her.” [Female; Singapore; RPO, Policy body; ICT<sup>822</sup>]*

Furthermore, she mentions the lack of female representation at senior levels in her organisation:

*“...I hope that there’s opportunity for women, but I don’t know, certainly in the think-tank in which I’m working I’m one of a few senior fellows who’s a woman. But the people above me are all male. So far, I don’t get much opportunity and we’ll see if I can get funding based on merit and productivity...” [Female; Singapore; RPO, Policy body; ICT<sup>823</sup>]*

Like a comment made by a participant from Japan, women in Singapore work harder than men, according to this male participant:

*“At the end of the day I think it’s up to the females to keep hanging in and try to compete... they have to perform. The women I know say they have to*

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<sup>819</sup> J04

<sup>820</sup> SGP01

<sup>821</sup> SGP01

<sup>822</sup> SGP02

<sup>823</sup> SGP02

*work harder than the men to achieve the same, which is probably true.”*

[Male; Singapore; RPO; Energy<sup>824</sup>]

The same participant says women struggle to return to the workplace following pregnancy, maternity leave and raising young children:

*“This again is a disadvantage for women. If they didn’t focus 100% on their career, if they even consider having a child, take a break for a year or two, they cannot be at the same level as the men [in] six or eight years...”* [Male; Singapore; RPO; Energy<sup>825</sup>]

In the next section, a summary of the findings for this chapter is provided.

### 3.6.4.2 SUMMARY OF GENDER EQUALITY AND INCLUSIVITY

In this chapter, participants provide information about gender equality and female participation in the R&I workplace, the different roles of women in R&I, current interventions and policies in place, as well as interventions and support structures needed. From the findings presented in this section, there is acceptance of the rights of women to be part of the R&I workplace.

There is concern that fewer women are present in STEM disciplines. Participants draw connections between the underrepresentation of women in STEM disciplines, as opposed to the social sciences. This raised the possibility of expanding the levels of integration and collaboration between the STEM disciplines and social sciences.

Moreover, participants discuss the various roles of women, such as mothers and caregivers, which could hold them back professionally.

The need for interventive measures, such as quotas, was only mentioned briefly.

### 3.6.5 PUBLIC ENGAGEMENT

*Public engagement* is one of the six key policy agendas that should be furthered by RRI practices. There are three key dimensions according to the European Commission's (EC) definition of public engagement. It is (1) collaborative, (2) multi-actor, and should (3) align with societal values, needs, and expectations. This means RRI should foster collaborative and multi-actor research and innovation processes where “all societal actors work together during the whole process in order to align its outcomes to the values, needs and expectations of society”.<sup>826</sup>

It is within this framework that interviews, and subsequent analyses, were conducted.

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<sup>824</sup> SGP01

<sup>825</sup> SGP01

<sup>826</sup> <https://www.rri-tools.eu/about-rri>

Of the 42 codes identified for this theme, four codes were seen most extensively: organisational norms and practices [code 2]; motives-benefits of public engagement and collaboration [code 4]; building support networks and strategic alliances [code 112]; integration of different domains and stakeholders [code 114].

Codes	Asian and Pacific States			
	India	Singapore	Japan	Total
<b>1: Public engagement</b>				
2: Organisational norms and practices	25	3	7	35
3: Lack or uncertainty of public engagement policy	8	2	1	11
4: Motives-Benefits of public engagement and collaboration	7	0	0	7
5: Risks-Disadvantages associated with public engagement and collaboration	10	1	4	15
6: Types of stakeholders for engagement	1	0	2	3
7: Government bodies, municipalities and regulatory authorities	77	21	38	136
8: Professional bodies	15	9	6	30
9: Research Funding organisations	2	0	0	2
10: Scientific community	5	0	7	12
11: Specialists-Experts	16	3	9	28
12: Civil society organisations	7	1	2	10
13: Industry and Business	3	0	0	3
14: Marketing and communication agencies- Public Relations Industry	6	7	7	20
15: Celebrities	7	3	3	13
16: Citizens or the general public	0	0	1	1
17: Others	12	0	2	14
26: Consultation tools	5	0	2	7
27: Surveys	1	0	6	7
28: Public-citizen consultations	0	0	1	1
29: Feasibility studies- working groups	1	0	3	4
30: Involvement tools	0	0	2	2
31: Open public calls and funding initiatives, etc.	6	0	2	8
32: Focus groups and discussions	1	0	1	2
33: Competitions and awards	0	0	0	0

35: Collaboration tools	3	0	0	3
36: Social networks	9	3	3	15
37: University-based start-ups	1	0	1	2
38: Applied research laboratories	0	0	2	2
39: R&I matchmaking	3	0	0	3
40: Empowerment tools	5	3	0	8
41: Participatory management-approaches	3	0	0	3
42: Campaigning-Lobbying	1	0	0	1
43: Open innovation approach- the quadruple-helix stakeholder model	2	0	0	2
107: Lack of (perceived) interest of general public	0	0	0	0
44: Other	3	0	1	4
111: Collaboration	0	0	0	0
112: Building support networks and strategic alliances	26	7	19	52
113: Actor mapping	11	5	5	21
114: Integration of different domains and stakeholders	3	0	0	3
115: RRI frameworks for new cross disciplinary research	11	1	11	23
116: Difficulties in collaboration and engagement	2	0	3	5
106: Financial constraints and considerations	4	1	5	10

The following sections provide details regarding these codes and descriptions of the findings. The sections provide information about the importance of public engagement, the motivations for and benefits of public engagement, and the need to build support networks and strategic alliances. In the summary section, the findings relating to the theme *public engagement* are brought together.

### 3.6.5.1.1 India

This section covers references from participants in India to opportunities for finding common ground, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.

In addition, references to building relationships and making connections to facilitate useful outcomes for research and innovation are also covered.

The importance of building support networks to bring stakeholders together and achieve sustainability goals is recognised by participants from India. Engagement is considered important in India, especially relating to waste and environmental issues:

*“...we found that there [was] need to involve people in more engaging matters, especially on complex and not too pleasant issues like waste management or sanitation or, environment or climate change. Those are really complex issues and people are usually overwhelmed...”* [Female; India; RPO, CSO; Waste Management, ICT<sup>827</sup>]

According to the same participant, building strategic networks is an essential component in the waste management domain:

*“With waste, definitely we realised that you can’t just step into a city and do this alone. You need a lot of public engagement and you know, partnerships.”* [Female; India; RPO, CSO; Waste Management<sup>828</sup>]

According to this participant in the waste management domain in Indian, they involve the public in their operations:

*“...a license to operate is through the people or the society in which we are engaged, and we make sure that we are engaged with the Sarpanches (head of villages) or the local people nearby our plant. We give out a lot of employment opportunities to them... So we ensure the society development along with whatever work we are doing.”* [Male; India; Industry & Business; Energy, Waste Management<sup>829</sup>]

This CSO organised a film festival, focused on environmental issues, to build networks and strategic alliances:

*“It’s like an exciting place to be to kind of meet like-minded people... schools students who are very engaged in environmental issues and want to talk to people. They don’t have any access. When they come and see a film, they get to meet these people who are behind the screens. And are difficult to access. So it was actually became a very important platform to bring people together.”* [Female; India; RPO, CSO; Waste Management, ICT<sup>830</sup>]

According to this participant, networks and alliances between Himalayan states are useful to discuss the ecosystem of the Himalayas:

*“...we will be getting about 10 people from each of the Himalayan states, like policymakers, scientists and media who are working in this. And also scholars who are working in this issue will come to Delhi. They’re kind of collaborative to see what we can do together...”* [Female; India; RPO, CSO; Waste Management, ICT<sup>831</sup>]

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<sup>827</sup> IND03

<sup>828</sup> IND04

<sup>829</sup> IND06

<sup>830</sup> IND03

<sup>831</sup> IND03

The same participant recognises the need to include business stakeholders in their ongoing engagement activities:

*“...we'll ensure that the relevant stakeholders, even the corporates for example, I'll ensure that the big corporates are dependent on the Himalayas are also engaged in it [engagement].”* [Female; India; RPO, CSO; Waste Management, ICT<sup>832</sup>]

The complex and multidisciplinary nature of environmental problems encourages multi-stakeholder involvement:

*“...we'll talk to policy makers and scientists and all the team along with policymakers, scientists and media will travel to Kulu to see some actual ground activities on what's happening in the Himalayas...”* [Female; India; RPO, CSO; Waste Management, ICT<sup>833</sup>]

According to another participant from India, RFOs are key players in building strategic alliances:

*“In terms of research... there are three areas in which our grant goes to, one would be the technical assistance, the second is capacity building of our civil society organisation partners and third is convening... So bringing different groups together, be the policy makers or other funders or group of civil society organisation, research bodies together to create better value of the work they are doing individually.”* [Male; India; RFO, CSO; Energy<sup>834</sup>]

This participant from an RPO says feedback is included in the publication and report write-up processes:

*“I think we are very open towards criticism and any kind of review that we get. So whenever for instance, and we do a publication, we circulate it to stakeholders who would directly benefit from it... very much open to ideas and opinions and if we feel this will help, we do incorporate them.”* [Female; India; RPO, CSO; Waste Management<sup>835</sup>]

Another participant from India says increased innovation and collaboration will be needed in future:

*“...we need to ask about the innovation in a larger way. And if we have common values then it will be viable for us to collaborate across the countries and continents...”* [Male; India; RPO; Bioeconomy<sup>836</sup>]

In the next section, the results of interviews with participants from Japan are discussed.

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<sup>832</sup> IND03

<sup>833</sup> IND03

<sup>834</sup> IND05

<sup>835</sup> IND04

<sup>836</sup> IND01

### 3.6.5.1.2 Japan

This section covers references from participants in Japan to opportunities for finding common ground, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.

In addition, references to building relationships and making connections to facilitate useful outcomes for research and innovation in Japan are also covered.

Participants in Japan are cognisant of the importance of building support networks to bring stakeholders together.

This participant considers the ICT domain open to engagement and collaboration:

*“To my impression, contrary to other fields, physics, mathematics, bio-tech or other science/technology fields, the IT fields engineers and scientists are more open.”* [Female; Japan; RPO; ICT<sup>837</sup>]

The same participant says her field of inquiry within the ICT domain encourages collaboration:

*“...the nature of this discipline is to involve many stakeholders... So, my own research motivation and questions direct me to do this kind of collaborative research.”* [Female; Japan; RPO; ICT<sup>838</sup>]

The increasing complexity of research and innovation, encourages inter-domain and multi-stakeholder integration between the bioeconomy and ICT domains in Japan:

*“We are still trying to create appropriate mechanisms to allow more interaction between natural and social science researchers to complete ELSI<sup>839</sup> matters.”* [Male, Female; Japan; RPO, RFO; ICT<sup>840</sup>]

According to this participant, interdisciplinary integration encourages researchers to find common interests:

*“We could learn from other disciplines and we could find not only the differences, but also the common interests among us. The main research is to find out what the social implications or the future society would be by applying AI or IoT, but a sub-theme for us is how to create and maintain this interdisciplinary research groups...”* [Female; Japan; RPO; ICT<sup>841</sup>]

Collaboration with multi-actor stakeholders is about developing a legal and ethical framework for broad-reaching areas of technology, according to the same participant:

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<sup>837</sup> J03

<sup>838</sup> J03

<sup>839</sup> Ethical, legal, and social issues.

<sup>840</sup> J01

<sup>841</sup> J03

*“...we are inviting key industry people who are actually involved in creating the AI principles within their company. We are interested in how they created these principles, why they created them, what they’ve learned and how other companies, or other industries, could learn from their experiences.”* [Female; Japan; RPO; ICT<sup>842</sup>]

The same participant says collaboration is necessary to understand the social aspects of AI application:

*“When we’re talking more on the application side, for example the service robot, the nursing robot, the disaster prevention robot, they have to talk social implications with sociologists, or the representative of the actual users.”* [Female; Japan; RPO; ICT<sup>843</sup>]

Another participant from Japan recognises the importance of collaboration between AI and ethics researchers, to discuss developing AI for the future:

*“We try to make an interaction between the AI researcher and ethics researchers. We try to make places where both types of researchers can discuss and exchange ideas to come up with for example, good ideas for developing AI in the future.”* [Male, Female; Japan; RPO, RFO; ICT<sup>844</sup>]

Engagement is necessary to allay the public's fears, according to this participant:

*“They are involved when it comes to the fear factor. My office is based in Osaka and they are so afraid that we will release (there is a hospital near here) something, so we have to do more safety work than is scientifically justifiable just to please the public.”* [Female; Japan; RPO; bioeconomy<sup>845</sup>]

In the following section, results of the interviews with participants from Singapore are discussed.

### 3.6.5.1.3 Singapore

In this section, participants from Singapore discuss opportunities for finding common ground, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.

In addition, references to building relationships and making connections to facilitate useful outcomes for research and innovation in Singapore are also covered.

According to this participant, Singapore is open to international collaborations and building networks:

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<sup>842</sup> J03

<sup>843</sup> J03

<sup>844</sup> J01

<sup>845</sup> J02

*“I would say Singapore is different because... we have international conferences with international speakers all the time. The Singapore government, and there may be other funders, maybe private sector, they do want foreign speakers, so there’s a lot of conferences in Singapore and they’re bringing people from other countries because they want to know what’s going on worldwide.” [Female; Singapore; RPO, Policy body; ICT<sup>846</sup>]*

This participant agrees. He describes how their open Intellectual Property (IP) policy encourages collaboration between RPOs and industry and business stakeholders:

*“...we have incredible freedom, I must say, in doing research contracts with companies.” [Male; Singapore; RPO; Energy<sup>847</sup>]*

The same participant says innovators with common interests often collaborate on technological developments:

*“...we have wonderful collaborations with semiconductor equipment manufacturers, and then the solar cell manufacturers, once the equipment exists, they then want to collaborate with us, because there are maybe ten manufacturers in the world who will use this new tool, this new process, this new solar cell and want to collaborate.” [Male; Singapore; RPO; Energy<sup>848</sup>]*

Furthermore, a large strategic alliance is regarded as necessary to provide solar power in South-East (SE) Asia, according to same participant:

*“...build up a solar ecosystem with companies, that there are hundreds of companies including manufacturers, project developers, so that out of Singapore we can solarise SE Asia...” [Male; Singapore; RPO; Energy<sup>849</sup>]*

Essentially, because dealing with the environment and transitioning sustainably are prolonged projects/challenges, such networks are deemed essential. Strategic networks with the public, however, are generally not referred to as key and lasting collaborative partners.

In the next section, a summary of this chapter is provided.

### 3.6.5.2 SUMMARY OF PUBLIC ENGAGEMENT

The participants in this chapter view building support networks and strategic alliances as advantageous in research and innovation.

The importance of building support networks to bring stakeholders together and achieve sustainability goals is recognised by participants from India. Engagement is considered important in India, especially relating to waste and environmental issues. Because dealing with

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<sup>846</sup> SGP02

<sup>847</sup> SGP01

<sup>848</sup> SGP01

<sup>849</sup> SGP01

the environment and transitioning sustainably were prolonged projects, such networks were deemed essential.

Furthermore, participants in Japan are cognisant of the importance of building support networks to bring stakeholders together.

Participants from Singapore discuss opportunities for finding common ground, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.

There is recognition of the need for inter-domain and multi-stakeholder integration, to comprehend and respond to some of the world's increasing technological complexity and environmental problems.

### 3.6.6 OPEN SCIENCE

*Open science* includes both the EU 'open access' pillar and 'open and transparent' process dimension. The open access pillar definition incorporates the FAIR principle (Findable, Accessible, Interoperable, Reusable).

According to this principle, the attributes of open access are (1) the easy accessibility and (2) findability of data, and (3) that data can be shared and (4) reused without difficulty. Open access is intended to encourage collaboration, to catalyse innovation, to prevent costly access to scientific research, to facilitate productive dialogue with civil society, and to improve the quality of research.<sup>850</sup>

The 'open and transparent' process dimension involves the inclusivity of all actors in the process of R&I through transparency, openness, and the provision of meaningful information at all stages of the process.

All actors, including the public, should be encouraged and enabled to engage with, discuss and scrutinise science and technology, and be empowered to make informed decisions.

Openness and transparency should develop multi-way dialogue with all relevant parties, foster accountability and public trust, and meaningfully involve people not normally part of science and technology systems, in the research and innovation process.

It is within this framework that interviews, and subsequent analyses, were conducted. Of the 10 codes identified for this theme, four were seen most extensively: *levels and limits of open access* [code 46]; *lack or uncertainty of policy* [code 50]; *risks-disadvantages associated with open data access* [code 51]; *motives-benefits of open access and data* [code 52].

Codes	Asian and Pacific States			
	India	Singapore	Japan	Total

<sup>850</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

45: Open Science				
46: Level and limits of open access	8	3	1	12
47: Data protection	1	0	1	2
48: Data accessibility	7	5	3	15
49: Organisational norms and practices	6	4	3	13
50: Lack or uncertainty of policy	6	2	7	15
51: Risks-Disadvantages associated with open data-access	15	0	5	20
52: Motives-Benefits of open access and data	8	1	2	11
76: Transparency	2	2	1	5
77: Accountability	8	0	5	13
106: Financial constraints and considerations	9	2	4	15

For this region, only *lack or uncertainty of policy* and *risks-disadvantages associated with open data access* would make it into the top four in terms of code frequency. However, to improve comparability, the top four for all regions are selected and discussed here instead.

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *open science* are brought together.

### 3.6.6.1 LEVELS AND LIMITS OF OPEN ACCESS TO DATA

In this section, the levels and limits of open access to data in the countries in this sample are discussed.

This participant says open access increases publication visibility:

*“...there is change seen in the past few years now people are more inclined to communicate because visibility of their own work sometimes helps them in getting funding.”* [Male; India; Policy body; Energy, ICT<sup>851</sup>]

Another participant considers open access beneficial for researchers as well as the public:

*“...we had a paper recently published by the IEEE [Institute of Electrical and Electronics Engineers], we made it open access, not because we are forced to do it by the institution or the public funding, but I thought that would be beneficial for all of us, for all of our research group, but also for the general public...”* [Female; Japan; RPO; ICT<sup>852</sup>]

According to this participant from India, open access is provided within their organisation:

<sup>851</sup> IND02

<sup>852</sup> J03

*“In-house if there's any report, different teams can access it, even if it's a priced publication. So there's, it's, it's like a free thing within the institution and it's not a problem...”* [Female; India; RPO, CSO; Waste Management<sup>853</sup>]

Open access is the norm, according to another participant from a CSO in India:

*“So all of our research output, be it what we do through grantee partners, which are not for profit. And even with the consulting organisation, they are all available in public domain...”* [Male; India; RFO, CSO; Energy<sup>854</sup>]

Another participant from India mentions a policy requiring the availability of raw data:

*“So that's basically the raw data that is important in their PhD thesis, they are actually available for download and use for other people...”* [Male; India; RPO; Bioeconomy<sup>855</sup>]

According to this participant from Japan, open access is voluntary:

*“We ask institutes to have a policy on open access as well as open data, but how they implement that is up to them. As the funding agency, we can't force them to do that... well we encourage them.”* [Male, Female; Japan; RPO, RFO; ICT<sup>856</sup>]

This participant from a CSO is supportive of open access, especially if it supports social improvements:

*“...wherein you feel that this will benefit and bring, bring a larger change, I think it's okay to share it for free...”* [Female; India; RPO, CSO; Waste Management<sup>857</sup>]

This participant considers it important to release meaningful primary data people can understand:

*“So the primary data should be made available... So it's good to have more information but it's also actually something that you know, is carefully done... people could interpret and understand out of it otherwise there is no value of the data.”* [Male; India; RPO; Bioeconomy<sup>858</sup>]

Ownership and funding determine the level at which open access is allowed, according to this participant:

*“We've done it, this is not new for us. For us MCMS everything we do, if it is not confidential or if it is not proprietary of the people who have funded us to do it...”* [Female; India; RPO, CSO; Waste Management, ICT<sup>859</sup>]

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<sup>853</sup> IND04

<sup>854</sup> IND05

<sup>855</sup> IND01

<sup>856</sup> J01

<sup>857</sup> IND04

<sup>858</sup> IND01

<sup>859</sup> IND03

According to this participant from India, funding agencies play an important role in determining open access requirements:

*“So, as of now the government policies does not actually say anything about the open access. And uh, but there are some good funding agencies which actually insist on open access...”* [Male; India; RPO; Bioeconomy<sup>860</sup>]

This participant says she enjoys open access due to her position:

*“It’s very important to what I’m doing now. I’m looking at current legal issues and diplomacy, so I absolutely need access. I’ve been very pleased by the access I have in my current position... being in a think tank and having the government as my client, I have excellent access...”* [Female; Singapore; RPO, Policy body; ICT<sup>861</sup>]

Participants also refer to limitations relating to open access to data. In certain instances, access must be requested, according to the same participant:

*“So beyond that, most of our research other available in public domain or even the primary research which are coming out of our funding, they are also available on request. We can’t have everything on the website but if someone is interested, they can either get in touch with us or our grantee partners or consulting partners.”* [Male; India; RFO, CSO; Energy<sup>862</sup>]

Furthermore, non-disclosure agreements are involved when government policy decision-making is concerned:

*“Again if there are any specific nondisclosure agreement, which we need to sign for some work which we are supporting to some government level policy decision-making, then maybe primary research data has to be masked to a greater extent...”* [Male; India; RFO, CSO; Energy<sup>863</sup>]

According to this participant from Japan, open access is limited based on language:

*“It’s specifically a Japanese thing and they control this by having this available only in Japanese. They will have this English web page under construction for the last eight years. This is part of the control...”* [Female; Japan; RPO; Bioeconomy<sup>864</sup>]

According to this participant from India, commercial interests and intellectual property issues have an impact on open access:

*“... when you talk about data, for example, if a private company is involved in a clinical trial or even the field trials of a GM crops. And some of it might be proprietary, so their issue comes whether data relating to a giant project can be*

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<sup>860</sup> IND01

<sup>861</sup> SGP02

<sup>862</sup> IND05

<sup>863</sup> IND05

<sup>864</sup> J02

*made public or not. Those are very tricky issues...*” [Male; India; Policy body; Energy, ICT<sup>865</sup>]

One participant from a policy body is cautious of the consequences of releasing certain information:

*“...Especially when you are writing on medical and health related issues... a lot of people believe what comes out in print... one has to be very careful about when you communicate research...”* [Male; India; Policy body; Energy, ICT<sup>866</sup>]

The same participant is concerned that data may be misleading or misinterpreted:

*“...should I communicate everything and anything that is happening without considering it's ethical implications. Suppose a study has been done in just five or 10 people. Is it good for that results of that study to be communicated to a larger audience trying to create scare or whatever could be the finding, no?”* [Male; India; Policy body; Energy, ICT<sup>867</sup>]

Furthermore, the same participant is concerned about the rise of predatory journals:

*“...there are problems with open access also in the sense that you can get published by paying and that is also given rise to a lot of so-called predatory journals... of course open access is welcome, but there are problems with that, and one has to be careful...”* [Male; India; Policy body; Energy, ICT<sup>868</sup>]

According to this participant, predatory journals are detrimental to the quality of research being published, with misuse evident from both publishers and researchers.

From the interviews with participants in this sample, it is clear there are varying views about the need for open access to science. In the next section, participants' comments about the cost of open access are discussed.

### 3.6.6.2 THE COST OF OPEN ACCESS

In this section, participants discuss the cost of open access to data.

According to this participant in the bioeconomy domain in Japan, she is not sure whether her organisation will cover the costs of open access:

*“...the publisher would charge me and I'm not sure the group would cover this...”*  
[Female; Japan; RPO; Bioeconomy<sup>869</sup>]

This participant from India suggests funding agencies make funds available for open access:

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<sup>865</sup> IND02

<sup>866</sup> IND02

<sup>867</sup> IND02

<sup>868</sup> IND02

<sup>869</sup> J02

*“...the only challenge is that there is a financial sustainability aspect of it... if the funding [from RFOs] is also coupled with... open access, it is easier for us to disseminate the money and that can be easy to pay... for open access...” [Male; India; RPO; Bioeconomy<sup>870</sup>]*

According to the same participant, funding arrangements are in place for open access:

*“...these days I am told that there are some funds available from DBT (Department of Biotechnology) and other organisations to make it into open access. And likewise also some institutional financial support available for open access.” [Male; India; RPO; Bioeconomy<sup>871</sup>]*

Another participant from India says there should be balance between providing open access and charging for access:

*“I think it's very important to put research on a public domain, but also at times with institutions, it's important to, you know, how you become kind of income generating or sustainable.” [Female; India; RPO, CSO; Waste Management<sup>872</sup>]*

One participant from Japan considers open access fees fair:

*“The cost for sharing research results as well as data openly and for no cost is too expensive, compared with the benefit of doing so. Those who want to use others' research results and data have to pay the cost to obtain them...” [Female; Japan; RPO; Energy, Waste Management, ICT, bioeconomy<sup>873</sup>]*

The prestige of journals is also an important factor when it comes to the cost of open access, according to this participant:

*“...the second thing is that the reputation of the journal. So when you look at the journal, then this also becomes an important concern.” [Male; India; RPO; Bioeconomy<sup>874</sup>]*

In the final section of this chapter, a summary of open access to data is provided.

### 3.6.6.3 SUMMARY OF OPEN SCIENCE

From the findings presented in this section, participants discuss the importance of open access, the limitations to open access to data, as well as the cost of open access.

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<sup>870</sup> IND01

<sup>871</sup> IND01

<sup>872</sup> IND04

<sup>873</sup> J05

<sup>874</sup> IND01

While participants are supportive of open access, ownership and funding play a role in the extent to which open access is allowed. Furthermore, the cost of open access is a concern for some participants.

### 3.6.7 ANTICIPATIVE, REFLECTIVE AND RESPONSIVE RRI

*Anticipative, reflective and responsive RRI* includes both the ‘anticipative and reflective’ and ‘responsive and adaptive’ process dimension definitions. For R&I to be responsible, it requires the actors involved to engage in a process of anticipating and reflecting on the future they want to create with their R&I, how that future can be achieved, and what possible impacts and unintended consequences may arise.

Responsible actors should reflect on why that future is desirable, and on the assumptions, values and purposes that underlie the tasks and objectives of trying to achieve that future. The insights generated from such anticipation and reflection guide more responsible action.

R&I must also be ‘responsive and adaptive to change’, which means that actors must include, in their process, a responsiveness to the views of the public and other stakeholders with an ability to adapt and change goals and methods, if necessary.<sup>875</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. Of the 17 codes identified for this theme, four were seen most extensively: *evaluation* [code 100]; *demand-driven research and innovation* [code 81]; *targeting critical societal challenges* [code 82]; *furthering research-developing policy or standards* [code 84].

Note that *meeting societal needs* [code 80] is an aggregation of seven of the codes listed here and therefore overcounted. Demand-driven R&I is an aggregation of three codes, including code 82 and code 84. As demand-driven R&I is reflected in the two combined codes, as well as containing its own additional coding, the three codes are treated as one section.

Codes	Asian and Pacific States			
	India	Singapore	Japan	Total
<b>88: Anticipative, reflective and responsive RRI</b>				
89: Future societal needs and challenges	3	0	3	6
90: Environmental sustainability	5	1	0	6
91: Responsive approach	4	1	0	5
92: Organisational norms and practices	2	0	1	3
93: Lack or uncertainty of anticipation policy and framework	5	0	0	5
100: Evaluation	10	0	3	13

<sup>875</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

101: Importance of feedback	2	0	0	2
103: Participation in upstream R&I	4	0	0	4
80: Meeting societal needs	61	5	15	81
81: Demand-driven research and innovation	54	5	11	70
82: Targeting critical societal challenges	30	4	6	40
83: Benefiting specific groups	6	1	0	7
84: Furthering research-developing policy or standards	11	0	3	14
85: Organisational norms and practices	2	0	0	2
86: Lack of consideration of societal benefits	0	0	3	3
87: Lack or uncertainty of policy for meeting societal needs	2	0	0	2
105: Time frames and time constraints	4	1	1	6

For Asian and Pacific States, *furthering research-developing policy or standards* has a code count that places it fourth for this country. However, to improve comparability the top four (excluding *meeting societal needs*) for all regions are selected and discussed here instead.

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *anticipative, reflective and responsive RRI* are brought together.

An important point about the participants is that many displayed difficulties with grasping an RRI conceptualisation of anticipation. With ‘anticipation’ conceived as framing future implications of their research and work, the interviewers substituted “future implications” for “anticipation” as it was felt to be clearer. However, even future implications appear to have been too abstract for people to understand with interview participants mostly failing to connect with the anticipatory concept it referred to. Consequently, it appears that the whole idea of anticipation is too difficult an idea, or is too rarely considered, for it to be articulated and elaborated upon. In the end the data that is coded for this theme contains little future perspective. It was more concerned about the current situation, particularly through a frame of quality assurance.

### 3.6.7.1 ANTICIPATIVE AND REFLECTIVE PROCESSES

This section relates to the anticipative and reflective processes when conducting R&I. Participants reflect on the future they want to create and why that future is desirable.

According to this participant in the waste management domain, their organisation anticipates the future of projects they are involved with:

*“...the theory of change becomes really very important that whatever I'll do this year, what implication it'll have three years from now or four years from now when the project will end...”* [Female; India; RPO, CSO; Waste Management<sup>876</sup>]

As mentioned in a previous chapter, the same participant says their organisation is responsive and adaptive:

*“I think we are very open towards criticism and any kind of review that we get. So whenever for instance, and we do a publication, we circulate it to stakeholders who would directly benefit from it. We write to them, you know, the findings of the report and we get reviews from them...”* [Female; India; RPO, CSO; Waste Management<sup>877</sup>]

Another participant from India says they obtain feedback from stakeholders in an effort to be responsive and adaptive:

*“...what we believe even from the regular impact assessment, which we conduct through third party where we hear about, and again, it remains anonymous, so we don't know who have given those feedback was mostly goes to the policymakers, to our grantee partners, consultants or the intended beneficiaries...”* [Male; India; RFO, CSO; Energy<sup>878</sup>]

Overall, there was little information about this theme provided by participants in this region.

### 3.6.7.2 RESPONSIVE RESEARCH AND INNOVATION

This section includes mentions of demand-driven solutions to specific societal problems as part of setting the goals and agenda for R&I. This section includes *targeting critical societal challenges* and *furthering research-developing policy or standards*.

*Targeting critical societal challenges* codes any reference to existing or imminent critical challenges R&I focuses on (can be around the UN SDGs). This can include issues of health and wellbeing, waste management, access to resources and infrastructure, and environmental protection.

*Furthering research-developing policy or standards* codes references to local policy development or support in the development of regulations/standards. Both these codes are about meeting societal needs and have little reference to future-oriented thinking.

#### 3.6.7.2.1 Addressing the needs of society

According to this participant, addressing the needs of society is part of their approach:

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<sup>876</sup> IND04

<sup>877</sup> IND04

<sup>878</sup> IND05

*“Basically, what we are conducting is trans-disciplinary research. So, each programme is mainly aiming at solving social issues...” [Male, Female; Japan; RPO, RFO; ICT<sup>879</sup>]*

The same participant says they take societal needs into account when deciding on programmes at their organisation:

*“When we are thinking about starting a programme, at first we are trying to understand what kind of issues there are in the world. To do that, we try to do that by drawing a bird’s eyes map of social issues... we try to identify what the hot issues are at the moment, from which we pick issues that should be addressed by funding.” [Male, Female; Japan; RPO, RFO; ICT<sup>880</sup>]*

This participant from Japan expressed organisational preferences for domestic issues:

*“...our funding programs are quite domestic. We are dealing with very domestic social issues...” [Male, Female; Japan; RPO, RFO; ICT<sup>881</sup>]*

In the next section, technological and commercial interests relating to participants' view of the future are discussed.

### 3.6.7.2.2 Technological and commercial interests

Technological developments and commercial interests determine participants' view of the future, especially in the ICT domain, as will become clear in this section.

Another participant from Japan deprioritises societal needs, choosing to focus more on commercial interests:

*“The demand for biopharmaceuticals is going up, the market is expanding, and to meet this demand at a sustainable cost, we must drastically increase the productivity of these systems which are used in the production of biopharmaceuticals...” [Female; Japan; RPO; Bioeconomy<sup>882</sup>]*

Furthermore, she says social needs are not a priority in her work:

*“I don’t feel a deeply philanthropic urge. Of course I don’t want to kill people with my products, but for me it’s a purely scientific challenge, which has a broadly beneficial outcome...” [Female; Japan; RPO; Bioeconomy<sup>883</sup>]*

Technologies such as AI and IoT are inherently futuristic and, according to this participant, social implications are a concern:

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<sup>879</sup> J01

<sup>880</sup> J01

<sup>881</sup> J01

<sup>882</sup> J02

<sup>883</sup> J02

*“The main research is to find out what the social implications or the future society would be by applying AI or IoT...” [Female; Japan; RPO; ICT<sup>884</sup>]*

Ethics, law, and governance are an important part of future AI considerations, according to this participant:

*“Mostly the industries are interested in promoting innovation using AI, but considering the social, legal, ethical issues, of AI, Robotics, IoT, these are both the wheels we need to focus on. I wanted to create such a kind of community to promote those kinds of AI ethics/governance in the industry...” [Female; Japan; RPO; ICT<sup>885</sup>]*

This participant, in the ICT domain, is concerned about the future of cybercrime in India:

*“...the police [in India] are woefully unprepared to deal with cybercrime and also the legislators are not generating legislation, for example, data protection and data privacy legislation is just held up and the police are not aware of what their own legislation covers. They truly need work... I'm hoping that we will preferably launch online training for the whole country possibly with the collaboration of Singapore...” [Female; Singapore; RPO, Policy body; ICT<sup>886</sup>]*

In the next section, environmental concerns relating to participants' view of the future are discussed.

### 3.6.7.2.3 Environmental concerns

In contrast to the comments by participants in the previous section, participants in this section refer to climate change and environmental concerns when reflecting on the future.

When speaking about needs of the future, and associated responses, all participants in the energy domain refer to the contexts of the specific domain.

According to this participant, concerns about climate change play an important role in defining desirable futures:

*“This is at the core of our thinking. We are renewable energy guys. We want to save the planet in a sense. We know the world has moved down the wrong energy path. It's completely unsustainable. It's all about sustainability, that's the core of our thinking, in our DNA in a sense...” [Male; Singapore; RPO; Energy<sup>887</sup>]*

Another participant from India shares a similar sentiment:

*“...we are looking at a future to 2050 horizon and looking at how to make those process carbon or net carbon zero, carbon neutral or almost carbon neutral. So*

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<sup>884</sup> J03

<sup>885</sup> J03

<sup>886</sup> SGP02

<sup>887</sup> SGP01

*that, what we were all talking about this arresting the average global temperature rise to 1.5 degree can be achieved by 2050. So many of our research work or support is something which needs to be done today...” [Male; India; RFO, CSO; Energy<sup>888</sup>]*

The same participant is concerned about the threat of environmental destruction:

*“As you can see, the temperature outside is increasing, there are more number of droughts, heavy rainfall. So those instances are more so it has a direct impact, on the society and in terms of understanding what society needs... people who are actually at the bottom of the pyramid who are impacted the most. So we also communicate, connect with them to understand the work, which we plan to do...” [Male; India; RFO, CSO; Energy<sup>889</sup>]*

Furthermore, the same participant says determining societal needs are also part of their organisation’s approach:

*“So then we engage someone... to do those kinds of surveys... to understand what the community is asking for...” [Male; India; RFO, CSO; Energy<sup>890</sup>]*

In addition, energy security is also a concern in India:

*“One is how to minimise uses of energy, how to use a cleaner fuel and also how to maximise the energy security of the country.” [Male; India; RFO, CSO; Energy<sup>891</sup>]*

The same participant speaks about providing electricity to entrepreneurs in rural areas in future:

*“...And also providing electricity for small rural entrepreneurship... But all of these enterprises require electricity and electricity is intermittent in rural areas...” [Male; India; RFO, CSO; Energy<sup>892</sup>]*

The suggestion is that these normative domain-level concerns directly influence this organisation’s research and innovation priorities. Research and innovation are driven by broader societal interests and responses to grand challenges.

### 3.6.7.3 SUMMARY OF ANTICIPATIVE, REFLECTIVE AND RESPONSIVE RRI

In this chapter, participants were asked to reflect on anticipative, reflective, and responsive RRI. Participants reflect on the future they want to create with their R&I processes, why that future is desirable and how it can be achieved.

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<sup>888</sup> IND05

<sup>889</sup> IND05

<sup>890</sup> IND05

<sup>891</sup> IND05

<sup>892</sup> IND05

Participants take climate change and environmental concerns into account when reflecting on desirable futures.

In addition, participants discuss the need for demand-driven R&I and addressing societal needs and problems when considering the future. From the participants' contributions, it is clear there is concern for future generations and conducting R&I processes that address specific societal needs in certain domains, such as the field of energy.

### 3.6.8 SCIENCE EDUCATION

According to the European Commission pillar definition, *science education* involves developing processes to spread scientific knowledge, understanding, insight and critical capacity to citizens to better equip them with the necessary skills to be part of R&I discussions. A second component of the pillar, which aims to enhance access to R&I for citizens, is to increase the number of scientific researchers and promote science as a vocation.<sup>893</sup>

Additional components of the science education pillar include the 'promotion of innovative problem-solving and critical thinking'; 'embedding social, economic and ethical principles'; 'promoting engagement and an entrepreneurial mindset'; 'empowering citizens to participate in science policy making'; 'sharing responsibility while solving social challenges'; 'facilitating a strong interdisciplinary approach, and stakeholders' involvement'.<sup>894</sup>

Codes	Asian and Pacific States			
	India	Singapore	Japan	Total
<b>Science education</b>				
18: Tools for engagement	19	3	9	31
19: Information-based tools	0	0	0	0
20: Training and workshops	5	2	2	9
21: Conferences, symposiums, talks and exhibitions	11	5	8	24
22: Research publications and policy reports	5	2	6	13
23: Information centres	0	0	0	0
24: University open days	2	0	1	3
25: Media	15	1	4	20
34: Tie-ups with local schools	2	0	1	3

<sup>893</sup> <https://www.rri-tools.eu/about-rri>

<sup>894</sup> <https://www.rri-tools.eu/science-education>

102: R&I Capacity Building	5	0	0	5
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The codes (sub-themes) used for this science education for this theme are selected because of their relevance to the concept of science education. The first sub-theme deals with *the tools of science education* [codes 18-25, 34] and the second concerns *R&I Capacity Building* [code 102].

The following sections provide details regarding these two codes and descriptions of the findings. In the summary section, the findings relating to the theme *science education* are brought together.

### 3.6.8.1 THE TOOLS OF SCIENCE EDUCATION

*The tools of science education* sub-theme combines seven categories, which were originally separate codes, before being brought together in this overarching sub-theme. The categories are as follows: information-based tools; conferences, symposiums, talks and exhibitions; training and workshops; research publications and policy reports; information centres; university open days; and media.

*Information-based tools* covers references to tools that provide information for understanding R&I in the organisation as well as its norms, procedures, and practices. This includes only one-way communication strategies and not two-way communication or engagement. There was nothing to note for this region, in this regard.

*Conferences, symposiums, talks and exhibitions* includes any reference to providing information through different presentation-focused events.

The interview participants refer to these tools being employed for myriad science education reasons. The following provide an indication as to how these tools are used for science education:

- “...even some big conference happens... general public is invited...” [Male; India; Policy body; Energy, ICT<sup>895</sup>]
- “...public lecture series...” [Male; India; Policy body; Energy, ICT<sup>896</sup>]
- “...mini festivals, conferences, seminars, discussions...” [Female; India; RPO, CSO; Waste Management<sup>897</sup>]
- “...Exhibitions...” [Female; India; RPO, CSO; Waste Management<sup>898</sup>]

<sup>895</sup> IND02

<sup>896</sup> IND02

<sup>897</sup> IND04

<sup>898</sup> IND04

- “The final stage is that we hold a symposium to present our idea to the public to get people’s opinion of the programme...” [Male, Female; Japan; RPO, RFO; ICT<sup>899</sup>]
- “...a public presentation of their work...” [Female; Japan; RPO; bioeconomy<sup>900</sup>]

Conferences and exhibitions are instruments of science education according to this participant from Singapore:

*“This runs for three days and every day there are about 300,000 people on site. These are huge events and we’re well enough established that we run the scientific conference at this huge exhibition...”* [Male; Singapore; RPO; Energy<sup>901</sup>]

Another participant from Singapore mentions a multi-stakeholder cybertechnology conference:

*“Interviewer: I don’t know the Cybertech conference. What sort of conference is it?”*

*Interviewee: It’s in a convention centre and there are sessions with panels of presenters from civil society, from private sector, from government agencies, and elsewhere...”* [Female; Singapore; RPO, Policy body; ICT<sup>902</sup>]

Public discussions are illuminating, according to this participant from Japan:

*“I do some kinds of public discussion or go to the public debates and do some kinds of talks, but their definitions of AI are various. It’s important to have various views and perspectives, but if we wanted to make it more meaningful conversations, we have to focus on what is the AI we’re talking about right now.”* [Female; Japan; RPO; ICT<sup>903</sup>]

Training and workshops provides references to setting up training sessions and/or workshops, where the aim is skills development and capacity building (as opposed to simple information sharing, as in the previous two sections).

Online training is an innovative science education skills development option:

*“I’m hoping that we will preferably launch online training for the whole country...”* [Female; Singapore; RPO, Policy body; ICT<sup>904</sup>]

Science communication training for researchers is mentioned by this participant:

*“...we collaborate with a lot of research institutes like ICSEs [International Center of Social Science and Education Research], you know to train scientists in communication. Young scientists, most of them are PhDs and early career*

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<sup>899</sup> J01

<sup>900</sup> J02

<sup>901</sup> SGP01

<sup>902</sup> SGP02

<sup>903</sup> J03

<sup>904</sup> SGP02

*scientists to communicate because communication training is necessary.*” [Male; India; Policy body; Energy, ICT<sup>905</sup>]

This participant says training is not only for science education purposes, but also to maintain the reputation of the organisation:

*“And what we also do is that we organize workshops on, with our grantee partners because it's not only us, but also our grantee partners because we are a grant making organisation so whatever our grantee partners to that also reflects somewhere or the other on us.”* [Male; India; RFO, CSO; Energy<sup>906</sup>]

*Research publications and policy reports* provides a list of tools referred to by participants for providing information such as research journals, publication, online research repositories, digital research platforms, and public databases, and policy reports. Examples include:

- *“I have ResearchGate with lists of my papers and LinkedIn, more like my professional profile. Public engagements...”* [Female; Japan; RPO; bioeconomy<sup>907</sup>]
- *“...results we released is a report...”* [Female; Japan; RPO; ICT<sup>908</sup>]
- *“...write journal papers...”* [Female; Japan; RPO; ICT<sup>909</sup>]
- *“I did a paper about facial recognition technology use by law enforcement...”* [Female; Singapore; RPO, Policy body; ICT<sup>910</sup>]
- *“RSIS [S. Rajaratnam School of International Studies], my school/think tank, definitely has a repository for all its publications...”* [Female; Singapore; RPO, Policy body; ICT<sup>911</sup>]

The same participant says publications are relevant mostly for the scientific community:

*“So scientific colleagues are informed with publications that is the norm, that we have a unique scientific knowledge or information that we can communicate as a written document...”* [Male; India; RPO; Bioeconomy<sup>912</sup>]

Another participant agrees that researchers communicate with other researchers through publications:

*“...they are communicating with their own community through scientific publications...”* [Male; India; Policy body; Energy, ICT<sup>913</sup>]

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<sup>905</sup> IND02

<sup>906</sup> IND05

<sup>907</sup> J02

<sup>908</sup> J03

<sup>909</sup> J03

<sup>910</sup> SGP02

<sup>911</sup> SGP02

<sup>912</sup> IND01

<sup>913</sup> IND02

According to this participant, their data and publications are only relevant to their stakeholders:

*“So that research we made available, it's, it's like a free document. Any ULB [Urban Local Bodies] can download it and it has over 1500-1600 downloads and, but it's very, very stakeholders specific...”* [Female; India; RPO, CSO; Waste Management<sup>914</sup>]

*Information centres* covers any reference to providing information through information centres, such as visitor centres. There was nothing to note for this region, in this regard.

*University open days* includes any reference to communication/providing information through university open days. One participant says:

*“...[On] open day, they allow everybody to walk in the campus and engage with the people working on the research. Yeah. And then they can actually kind of explain [to] the community that, what is that a rationale for their input in the research and things like that...”* [Male; India; RPO; Bioeconomy<sup>915</sup>]

Another participant speaks about access to the scientific laboratory during open days:

*“At the institutional levels, there are the kind of a basic kind of engagement like you will have an open day in a research lab or a university where people can come and visit the lab...”* [Male; India; Policy body; Energy, ICT<sup>916</sup>]

This participant from Japan said open days they have been involved with are well attended:

*“...had an Open Door at the central campus located in [anonymised location]. I was surprised and very impressed. More than 8000 members of the public attended in just one day.”* [Male; Japan; RPO; ICT<sup>917</sup>]

*Media* covers references to communication through different media, including print media, broadcast media, and online media. Examples include newspapers, brochures, films, radio, TV, websites, blogs, and social media.

This participant from India mentions science education activities involving film and radio:

*“...you can make a film and you can reach wider audience... to communicate science to people... if you're trying to do that with radio, maybe some of those programs will be put out in community radio stations also so you could reach a wider audience...”* [Male; India; Policy body; Energy, ICT<sup>918</sup>]

The same participant mentions a radio series about climate change in partnership with All India Radio:

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<sup>914</sup> IND04

<sup>915</sup> IND01

<sup>916</sup> IND02

<sup>917</sup> J04

<sup>918</sup> IND02

*“One example I gave you about the climate change. It was in collaboration with All India Radio because we have the expertise and they have the broadcasting expertise” [Male; India; Policy body; Energy, ICT<sup>919</sup>]*

As alluded to before, this participant mentions their use of a film festival to engage people on environmental issues:

*“...an exclusive film festival on environment and wildlife called CMS Vatavaran. So we use this medium of festival where everybody is in more of a high spirits and good positive energy to talk about issues that are complex and complicated yet engaging in an engaging manner...” [Female; India; RPO, CSO; Waste Management, ICT<sup>920</sup>]*

According to this participant, they published a book to encourage discussion in the waste management domain:

*“No one used to talk about de-centralised waste management before we put that book out, which talked about different, sustainable models across the country...” [Female; India; RPO, CSO; Waste Management<sup>921</sup>]*

The same participant also mentions that their articles are available online:

*“Some are, some go on print, some go on web, but I think 90% of articles go on the web and they are accessible to everyone...” [Female; India; RPO, CSO; Waste Management<sup>922</sup>]*

The same organisation makes use of print media too:

*“So most of the articles that we do generally are on web and if something has a lot of data and analysis and we feel that it would be a very good print article only then such articles go on print...” [Female; India; RPO, CSO; Waste Management<sup>923</sup>]*

In the next section, findings related to research and innovation capacity building are discussed.

### 3.6.8.2 RESEARCH AND INNOVATION CAPACITY BUILDING

This section provides references to building capacity for research and innovation as a means of improving responsibility. This can be in terms of local development, contextual development, etc.

Two participants, both from CSOs in India, discuss R&I capacity building. Empowering individuals and organisations are important, according to this participant:

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<sup>919</sup> IND02

<sup>920</sup> IND03

<sup>921</sup> IND04

<sup>922</sup> IND04

<sup>923</sup> IND04

*“So they've also empowered individuals, empowered organisations, but also without taking credit, you know, so it's more like an indirect impact wherein the work that we have done has led other institutions that were thinking about it but didn't know how to... And a push from the state has now allowed all these smaller institutions and individuals to become a part of this...”* [Female; India; RPO, CSO; Waste Management<sup>924</sup>]

Furthermore, strengthening institutions involved in their work is a priority, according to the same participant:

*“It's more about strengthening the work and strengthening different institutions that are moving around the work...”* [Female; India; RPO, CSO; Waste Management<sup>925</sup>]

According to this participant from India, their organisation allocates resources for capacity building:

*“...40% of whatever resources we have goes into two exercise[s]: one is the capacity building of the grantee partners and the other is convening...”* [Male; India; RFO, CSO; Energy<sup>926</sup>]

In the following section, a summary for this chapter is provided.

### 3.6.8.3 SUMMARY OF SCIENCE EDUCATION

There was little indication from the interviews with participants suggesting advanced stages of science education, as per the EU pillar definition.

From the interviews, it is evident that conferences and open day events in Asian and Pacific States are widely attended. Furthermore, wide-scale science education through the media is motivated by concerns with environmental destruction. In addition, according to participants, RFOs are involved in training grantees and participants from CSOs consider R&I capacity building as important.

### 3.6.9 ETHICS

As part of the European Commission's RRI agenda, ethics focuses on (1) preventing research and research practices that lack integrity, and on (2) the relationship between science and society, to ensure scientific and technological developments are ethically acceptable.

For policymakers, this definition requires that R&I policy consciously meets the ethical demands of society. For the research community, scientific processes and outcomes are to meet

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<sup>924</sup> IND04

<sup>925</sup> IND04

<sup>926</sup> IND05

the demands of research integrity and moral deliberation for both individuals and institutions. Within business and industry related research, "social actors should work together from the beginning to embed ethical considerations in their R&I processes". Finally, the ethics of RRI require citizens' involvement to realise R&I that is ethically acceptable and "aligned with society's values and demands, while minimising risks and maximising benefits".<sup>927 928</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. Of the nine codes, four were seen most extensively: *Positioning ethics – where does the responsibility lie?* [code 69]; *Organisational norms and practices* [code 72]; *Lack or uncertainty of ethical standards and policies* [code 78]; *Protection of rights* [code 79].

Codes	Asian and Pacific States			
	India	Singapore	Japan	Total
<b>68: Ethics</b>				
69: Positioning ethics- where does the responsibility lie	4	0	4	8
70: Disidentification with ethical responsibility	3	0	1	4
71: Personal responsibility and morality	1	0	0	1
72: Organisational norms and practices	11	1	4	16
73: Safety and security	6	1	2	9
74: Justice and fair dealing	0	1	1	2
75: Quality assurance and testing	2	1	2	5
78: Lack or uncertainty of ethical standards and policies	5	2	4	11
79: Protection of rights	5	5	5	15

For comparability with the other region-specific reports, these codes have been selected based on the total count. However, with a count of 9, *safety and security* [code 73] has the fourth highest count, placing *lack or uncertainty of ethical standards and policies* fifth with its count of 8.

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *ethics* are brought together.

<sup>927</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>928</sup> <https://www.rri-tools.eu/ethics>

### 3.6.9.1 ETHICAL RESPONSIBILITY

This section includes stated or implied perceptions of where ethical responsibilities are located, such as whether they are defined by or found in existing rules/standards/policies, within or beyond the organisation, at the individual, institutional, national, or international level.

In addition, this section refers to the formal and informal existence and treatment of ethics within the organisation's structure and operations.

From the interviews, it is clear there is disidentification of organisational concerns and activities related to ethics.

This participant from Singapore says the country is serious about ethics:

*“One thing I can say is they're [Singapore] very strict about our knowing what the ethics rules are and so I had to take an ethics exam required by the university and it was based in British Academic ethics, mainly. I took that exam and had to produce a certificate in order to continue my employment.”* [Female; Singapore; RPO, Policy body; ICT<sup>929</sup>]

Conversely, one participant from India says their work does not have a direct impact on people and therefore, they do not take ethical considerations into account:

*“...we are actually... a secured academic environment. So that work that we do... might not directly and immediately impact the people...”* [Male; India; RPO; Bioeconomy<sup>930</sup>]

The same participant locates ethical responsibilities outside their organisation, at the national level:

*“... we need to follow the national guidelines. So national guidelines for the medical research is basically the ICMR [Indian Council of Medical Research] guidelines for ethics, human ethics for human participants. So all the rules and regulations need to be followed...”* [Male; India; RPO; Bioeconomy<sup>931</sup>]

This participant says ethics is not important at government level in India:

*“You will be surprised about how government, at least in India does not have any ethics and research or in innovation. And even if they does, it's not known. And the research bodies in the government work in isolation. They do not have, we do not have like a common peer group or association, not of common platform where we can share or talk to each other about ethics...”* [Female; India; RPO, CSO; Waste Management, ICT<sup>932</sup>]

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<sup>929</sup> SGP02

<sup>930</sup> IND01

<sup>931</sup> IND01

<sup>932</sup> IND03

Another participant from India says ethical considerations are not a priority at their organisation:

*“But there are, what I would say, broadly accepted, you know, norms. But there's no set ethical standard, for example, when you write about say things involving women and children.”* [Male; India; Policy body; Energy, ICT<sup>933</sup>]

In contrast, this participant in the waste management domain says their organisation takes ethical considerations seriously:

*“So we are also very conscious about that on issues like sexual harassment, whether it's within the organisation or with the partners with whom we work. So there is a POSH<sup>934</sup> policy in place. We have people who are committee members which have been created. So those are all the statutory requirements are in place.”* [Female; India; RPO, CSO; Waste Management<sup>935</sup>]

Another participant says they comply to the ethical standards and regulations in their industry and that their work is of benefit to society:

*“I think that is a very strong law and regulatory... standard of performance which binds us, and we are following that even at the cost of industry's growth.”* [Male; India; Industry & Business; Energy, Waste Management<sup>936</sup>]

Certain participants, especially in the bioeconomy domain, mention the importance of ethical considerations when working with live subjects.

This participant mentions the need to obtain approval for animal testing in Japan:

*“...we are obliged to follow pharmaceutical standards, quality control, safety, repeated testing so it's more of a technical issue.”* [Female; Japan; RPO; bioeconomy<sup>937</sup>]

The same participant elaborates on the link between ethics and live subjects:

*“...unless we decide to develop a new cell line, which needs cells from an animal. In that case, we need approvals, and we must follow all the limitations on treatment of the animal, including rules on unnecessary suffering...”* [Female; Japan; RPO; bioeconomy<sup>938</sup>]

In the following section, examples of the application of ethics within participants' organisations are discussed.

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<sup>933</sup> IND02

<sup>934</sup> Prevention of Sexual Harassment (PoSH) policy for companies.

<sup>935</sup> IND04

<sup>936</sup> IND06

<sup>937</sup> J02

<sup>938</sup> J02

### 3.6.9.2 APPLICATION OF ETHICS IN ORGANISATIONS

The following two participants from India, provide accounts of sustained application of ethics at their organisations:

*“...we started an IRB which is an internal ethics review board which actually looks in reviews almost all research that we do.”* [Female; India; RPO, CSO; Waste Management, ICT<sup>939</sup>]

Another participant describes their approach to the ethics approval process:

*“...the project proposal goes through the two stages: once after the gist is approved it goes to the board for their comments... once the evaluation committee approves it, it goes to the CEO and the board. So both of them give their comments and once that is through then it goes for award.”* [Male; India; RFO, CSO; Energy<sup>940</sup>]

In Japan, ethical responsibilities apply for direct impacts and end products, according to the following participant:

*“I don’t think we have any ethics committee. We don’t work with animals or human subjects much. We don’t do clinical testing; we only do the development of a technique – it’s not the end product that matters so much to us. So we don’t have external ethics committee, but we are obliged to follow pharmaceutical standards, quality control, safety, repeated testing so it’s more of a technical issue.”* [Female; Japan; RPO; bioeconomy<sup>941</sup>]

This participant says funding organisations in Japan insist that researchers follow the ethical rules of their own institution:

*“...we have a contract with universities or institutes to which PIs belong and in that contract the receivers have to follow the ethical rules of their institution. They must follow their university’s rules. They may have to submit a proposal to their ethics committee.”* [Male, Female; Japan; RPO, RFO; ICT<sup>942</sup>]

According to this participant, also from Japan, researchers must consider the ethical and social implications of their work:

*“Since about 2010... every researcher has to write their social implications of their research... In that sense, every academic researcher should be aware of the ethical implications...”* [Female; Japan; RPO; ICT<sup>943</sup>]

Furthermore, this participant refers to annual training on ethics and responsible research:

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<sup>939</sup> IND03

<sup>940</sup> IND05

<sup>941</sup> J02

<sup>942</sup> J01

<sup>943</sup> J03

*“In addition, on the ethics, every year I am required to do some exams which is basically supposed to teach me about responsible research, not to defraud, falsify data, not make up things, about how to spend public money, about data, IP, privacy. Everyone who receives taxpayer (research) money in Japan has to do it...”*  
[Female; Japan; RPO; bioeconomy<sup>944</sup>]

According to this participant, the United Nations Sustainable Development Goals provide an opportunity for researchers to reflect on ethics:

*“...we have to be aware of what SDG goals are related to each centre’s [at the University of Tokyo] mission. That’s one opportunity for researchers to be aware of the link between their research and its social impact: the ethical issues such as gender, poverty, or other senses.”* [Female; Japan; RPO; ICT<sup>945</sup>]

This participant from India says they can walk away from projects for ethical reasons, such as societal concerns and environmental impact:

*“...if we did get funding from say the cola companies and the mining companies, we had to take a stand and say no, when we talking about the environment and particularly issues that concerned company, we know that there are certain corporates that are not following those norms.”* [Female; India; RPO, CSO; Waste Management, ICT<sup>946</sup>]

From the participants' contributions in this section, it is clear there are varying views on where the responsibility for ethical considerations lies. Certain participants mention the importance of ethical considerations when working with live subjects. Furthermore, participants are aware of ethics within the organisation’s structure and operations.

In the following section, references to protecting the rights of stakeholders, through ensuring consent, are discussed.

### 3.6.9.3 INFORMED CONSENT

Two participants from India speak about the importance of informed consent. This participant mentions informed consent as a means to protect subjects' rights:

*“...you can start the research on participants again [by] following their human ethics practice, getting the informed consent and clarity and uh, anonymity and all those things. These things are provided to them before they participate...”* [Male; India; RPO; Bioeconomy<sup>947</sup>]

Obtaining local consent is a requirement for CSOs in India, according to this participant:

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<sup>944</sup> J02

<sup>945</sup> J03

<sup>946</sup> IND03

<sup>947</sup> IND01

*“Generally, when we do the service for instance, I think if, if you're going as a researcher on the ground, you have to inform the commissioner of the city. You can't just go there just because you decided to go and do your work, you know, so you have to let the commissioner know that you're doing this work...”* [Female; India; RPO, CSO; Waste Management<sup>948</sup>]

The same participant considers obtaining this consent important:

*“...you are a civil society organisation and you have taken a lead, somewhere is fine, but when you go on the ground to do an assessment, it's important to take all the important permissions. So that becomes very important, imperative. And that said, I think ethically also that's the way to go about if you're doing any research.”* [Female; India; RPO, CSO; Waste Management<sup>949</sup>]

In the next section, a summary of the chapter is provided.

### 3.6.9.4 SUMMARY OF ETHICS

It is clear from the views expressed in this chapter that participants have different views about where ethical responsibilities lie. While some participants say ethics are taken seriously, other participants say ethics is of little or no relevance to their work.

Participants share their experience of the formal and informal existence and treatment of ethics within their organisation's structure and operations. Participants from India mention ethics committees and internal review boards, but mainly for RPOs in the bioeconomy domain and CSO participants. The rest of the interview participants were light on ethical enforcement. There was some disidentification of organisational concerns and activities from ethics.

The protection of rights was mainly about the importance of informed consent.

### 3.6.10 GOVERNANCE OF RRI

Governance of RRI is defined by the European Commission as “arrangements that lead to acceptable and desirable futures”<sup>950</sup>. To lead to successful RRI futures, such arrangements must be “robust and adaptable” to unpredictable R&I development; “familiar enough to align with existing practices in R&I”; shares “responsibility and accountability among all actors” and “provide[s] governance instruments to actually foster this shared responsibility”.<sup>951</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. The parent nodes from which the codes are derived are *accounting for local contexts* [codes 95, 96,

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<sup>948</sup> IND04

<sup>949</sup> IND04

<sup>950</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>951</sup> <https://www.rri-tools.eu/about-rri#why>

97, 98, 99]; and *conflicts and tensions* [code 109, 110]. The constituent codes for the former include:

- 96: Importance of customisation
- 97: Contextualising technology and innovation
- 98: Importance of politics
- 99: Accounting for geographic scale

*Conflicts and tensions* codes are:

- 109: Conflicts between theory and practice
- 110: Conflicts and tensions in R&I expectations

Codes	Asian and Pacific States			
	India	Singapore	Japan	Total
Governance of RRI in Asia				
94: Enablers	34	17	6	57
95: Accounting for local contexts	15	17	3	35
96: Importance of customisation	3	0	0	3
97: Contextualising technology and innovation	1	3	0	4
98: Importance of politics	4	8	1	13
99: Accounting for geographic scale	7	4	1	12
109: Conflicts between theory and practice	11	4	7	22
110: Conflicts and tensions in R&I expectations	11	2	7	20
105: Time frames and time constraints	4	1	1	6
108: Lack of (perceived) applicability of RRI	2	0	0	2

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *governance of RRI* are brought together.

### 3.6.10.1 THE INFLUENCE OF POLITICS

This section includes references to how local/international politics or internal politics in the organisation influence (R)RI practices. Participants provide examples of national politics and political arrangements are seen as actually and potentially restrictive of RRI and RRI futures.

The current political situation in India could negatively affect government partnerships and funding, according to this participant:

*“I can tell you right now, if I make a film and it's a little anti-government... the government will not like a film against it and this is becoming more and more important. So things have become little tougher now...”* [Female; India; RPO, CSO; Waste Management, ICT<sup>952</sup>]

In Japan, the competitive situation between China and the USA is described as conducive to the advocacy of ethical (and social) developments of AI, so Japan can recover against its competitors:

*“At least the Prime Minister and the central government of Japan recognise it as a good opportunity to show off their attitude to AI technologies. As you know China and the United States have big advantages in this area. Japan has lost the opportunity to join the first group of AI technologies. So, of the social issues and/or ethics the Japanese government may feel it's a good opportunity to recover...”* [Male; Japan; RPO; ICT<sup>953</sup>]

In Singapore, governance arrangements were set up for a direct relationship between the Prime Minister and research:

*“...the creation of the National Research Foundation of Singapore, directly under the Prime Minister's Office. That tells you a lot, that it's not in another ministry. So this is top-down, really driven by strong ministers and the Prime Minister even. They consider R&D as a very important part of the growth story of Singapore, and they are personally heavily involved. I find that quite amazing.”* [Male; Singapore; RPO; Energy<sup>954</sup>]

The governance arrangements, according to the same participant, favour the STEM disciplines:

*“Obviously, it needs a strong government and there must be law and order. I'm an engineer and scientist and we have world-class conditions in Singapore. If you do political sciences it might be different, but if we talk about energy science, technology, economy, jobs, clean energy, then there are no limitations, no red tape, nothing...”* [Male; Singapore; RPO; Energy<sup>955</sup>]

The same participant describes a liberal research and innovation regime in Singapore:

*“Actually, it's amazingly liberal here. We can directly negotiate with any company anywhere in the world, be it West or East or China, so we have complete freedom here. Singapore is an open trade country. It believes in free flows of goods and services and people to a certain extent, and they really let us do it.”* [Male; Singapore; RPO; Energy<sup>956</sup>]

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<sup>952</sup> IND03

<sup>953</sup> J04

<sup>954</sup> SGP01

<sup>955</sup> SGP01

<sup>956</sup> SGP01

The only limitation, according to the same participant, is the use of taxpayers' money:

*"What they clearly say is that you cannot use Singaporean taxpayers' money to subsidise a company or project in China, say. So the taxpayers' money has to be protected, which is just common sense."* [Male; Singapore; RPO; Energy<sup>957</sup>]

In the next section, conflicts and tensions related to the governance of RRI are discussed.

### 3.6.10.2 CONFLICTS AND TENSIONS

*Conflicts between theory and practice* [code 109] is the aggregated parent node for *conflicts/tensions in R&I expectations* [code 110]. It includes any reference to conflicts between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as any tensions between what is 'wanted' and what is 'needed'.

These can include conflicts of disconnects between fundamental and applied research, scientific theory and practice, research and industry/business, research and policy and regulations versus research progress. The conflicts can be because of different normative frames or different research priorities and end goals.

The conflicts identified by participants in this sample were of limited use to evaluating governance of RRI. Conflicts referred to here were (1) between organisations and their funders, and (2) how to monitor conflicting valuations and variations of output.

According to this participant, certain funders are deemed unsuitable to the RRI agenda:

*"...if we did get funding from say the cola companies and the mining companies, we had to take a stand and say no... We did not go there..."* [Female; India; RPO, CSO; Waste Management, ICT<sup>958</sup>]

This RPO/CSO participant says their organisation is unable to release key outputs into the public realm, because the funders took issue with releasing the research:

*"...we did that whole SBM (Swacch Bharrat Mission) study. It wasn't up to the mark as they would like it to be, so they haven't put it in the public domain as we wanted to put in the public domain. But because it's not funded by me, it's funded by an external source, I have to keep quiet on that..."* [Female; India; RPO, CSO; Waste Management, ICT<sup>959</sup>]

According to this participant from Japan, one concern is how to monitor output in the newly developing and complex field of AI:

*"That's very complicated and big issue. First of all [anonymised organisation] is a very big conglomerate of the institutions, consisting of almost all area of natural*

<sup>957</sup> SGP01

<sup>958</sup> IND03

<sup>959</sup> IND03

*sciences like the institutes of physics, chemistry, biology/life sciences. As the institute for information studies, our [anonymised organisation] is maybe the first or the second one. So, the [anonymised organisation] central body has not enough experience to manage Information Sciences.” [Male; Japan; RPO; ICT<sup>960</sup>]*

According to the same participant, this is because of differences in outputs between different research fields:

*“You may well know that the styles/formats of the output are different among the research fields, for example in the life sciences they have a very strong preference to the high impact journals, Nature, Science and Cell. But in Information Science, it’s much more important to publish the paper in the conference proceedings. So, these discrepancies are very strong between the [anonymised organisation] and the other institutes or the central body of [anonymised organisation] ...” [Male; Japan; RPO; ICT<sup>961</sup>]*

There are also tensions about publications in different languages, according to the same participant:

*“...the social science people (given in Japanese) usually prefer their output in the form of books, not journal papers, and writing in local languages. Of course, I understand and agree that we should also publish English papers, but many of the readers we are expecting are Japanese people, so that it is also important for us to publish papers in Japanese as well. So our research group [anonymised organisation] need always negotiating with the directors to approve of adequate output for our researchers...” [Male; Japan; RPO; ICT<sup>962</sup>]*

According to the participant, AI transcends various technical, natural, and social scientific disciplines, all of which must interact to optimise the development of AI. These interactions (with the disciplines’ differing expectations) are further complicated by the different institutional layers and hierarchies operating within and across organisations.

### 3.6.10.3 SUMMARY OF GOVERNANCE OF RRI

In this chapter, the importance of politics was evident, with the current political situation in India seemingly preventing criticism of the government, which impacts on the forms of partnerships and funding for research and innovation. According to one participant, the competitive political relationship between China and USA, in terms of R&I, is advancing RRI in Japan. In Singapore, governance arrangements were set up for a direct relationship between the Prime Minister and research and favour the STEM disciplines. According to participants, there is a liberal research and innovation regime in Singapore.

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<sup>960</sup> J04

<sup>961</sup> J04

<sup>962</sup> J04

Participants are concerned about conflicts and tensions between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as tensions between what is 'wanted' and what is 'needed'. The conflicts and tensions identified were of limited use to evaluating governance of RRI, although it was made clear that conflicts existed between organisations and their funders.

### 3.6.11 CONCLUSION

This section provides a conclusion of the findings in the Asian and Pacific States region.

As mentioned in the introduction, the RRING project acknowledges that each region of the world is advancing its own agenda on RRI.

RRING adopts an open approach to gain an understanding how each geography approaches RRI concepts and approaches. This in line with the RRING concept of bottom-up learning in RRI, rather than top-down approach or only using a European model understanding of RRI.

#### 3.6.11.1 SUMMARY OF FINDINGS FOR THE REGION

Findings are structured around seven RRI-related themes, which are inspired by the European Commission (EC) pillars and AIRR dimensions. In this report, the following key themes were investigated: *gender equality and inclusivity*, *public engagement*, *open science*, *anticipative, reflective and responsive RRI*, *science education*, *ethics*, and *the governance of RRI*, within the following four domains: energy, waste management, information and communications technology (ICT) and bioeconomy.

The aim of the structured interviews with participants was to investigate their perspectives and experiences, in line with the RRING concept of bottom-up learning in RRI, rather than top-down approach or only using European model understanding of RRI.

In the chapter about *gender equality and inclusivity*, participants provide information about gender equality and female participation in the R&I workplace, the different roles of women in R&I, current interventions and policies in place, as well as interventions and support structures needed. From the findings presented in this section, there is acceptance of the rights of women to be part of the R&I workplace. There is concern that fewer women are present in STEM disciplines. Participants draw connections between the underrepresentation of women in STEM disciplines, as opposed to the social sciences. This raised the possibility of expanding the levels of integration and collaboration between the STEM disciplines and social sciences. Moreover, participants discuss the various roles of women, such as mothers and caregivers, which could hold them back professionally.

In the following chapter, participants address *public engagement*, the sections provide information about the importance of public engagement, the motivations for and benefits of public engagement, and the need to build support networks and strategic alliances. Participants

consider public engagement necessary and beneficial. In addition, participants see support networks and strategic collaboration and alliances as advantageous. There is recognition of the need for inter-domain and multi-stakeholder integration, to comprehend and respond to some of the world's increasing technological complexity and environmental problems.

In the third chapter, findings relating to *open science* were presented. Participants discuss the importance of open access, the limitations to open access to data, as well as the cost of open access. While participants are supportive of open access, ownership and funding play a role in the extent to which open access is allowed.

In the chapter about *anticipative, reflective and responsive RRI*, participants were asked to reflect on anticipative, reflective, and responsive RRI. Participants reflect on the future they want to create with their R&I processes, why that future is desirable and how it can be achieved. Participants take climate change and environmental concerns into account when reflecting on desirable futures. In addition, participants discuss the need for demand-driven R&I and addressing societal needs and problems when considering the future. From the participants' contributions, it is clear there is concern for future generations and conducting R&I processes that address specific societal needs in certain domains, such as the field of energy.

In the fifth chapter, about *science education*, participants discuss the need for science education and the tools used to engage with their audiences. From the interviews, it is evident that conferences and open day events in Asian and Pacific States are widely attended. Furthermore, wide-scale science education through the media is motivated by concerns with environmental destruction. In addition, according to participants, RFOs are involved in training grantees and participants from CSOs consider R&I capacity building as important.

In the chapter about *ethics*, participants have different views about where ethical responsibilities lie. While some participants say ethics are taken seriously, other participants say ethics is of little or no relevance to their work. Participants share their experience of the formal and informal existence and treatment of ethics within their organisation's structure and operations. The protection of rights was mainly about the importance of informed consent.

Finally, in the chapter about *governance of RRI*, participants share their experiences relating to the influence of politics, as well as conflicts and tensions in RRI governance. According to participants, politics have a significant influence on RRI. The current political situation in India prevents criticism of the government, which impacts on the forms of partnerships and funding for research and innovation. According to one participant, the competitive political relationship between China and USA, in terms of R&I, is advancing RRI in Japan. In Singapore, governance arrangements were set up for a direct relationship between the Prime Minister and research and favour the STEM disciplines. According to participants, there is a liberal research and innovation regime in Singapore. Participants are concerned about conflicts and tensions between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as tensions between what is 'wanted' and what is 'needed'. The conflicts and tensions identified were of limited use to evaluating governance of RRI, although it was made clear that conflicts existed between organisations and their funders.

### 3.6.11.2 INTERVIEW FINDINGS

Chapter 3 presents findings from the RRING Work Package 3's Task 3.3 – specifically its global interview task – for the region of Asian and Pacific States. The aim of RRING's Task 3.3 interviews is to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data through and from researchers and innovators themselves, in Asian and Pacific States.

In total, 21 interviews were undertaken for Asian and Pacific States, covering: India (6 interviews); Singapore (2); Japan (5). We undertook a Qualitative Content Analysis approach to analysing these interview data.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions, and indeed are core to structuring the interview sections of this report. Within each of these themes, a number of prevalent sub-themes (all of which are shaping how research and innovation professionals in Asian and Pacific States are doing their work) also emerged:

- *Gender equality and inclusivity*: gender equality and diversity in the R&I workplace; the different roles of women in R&I; current interventions and policies in place; and interventions and support structures needed.
- *Public engagement*: building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: levels and limits of open access; and the cost of open access and data.
- *Anticipative, reflective and responsiveness*: reflecting on desirable RRI futures; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.
- *Ethics*: ethical responsibility; organisational norms and practices; and protection of rights.
- *Governance of RRI*: the influence of politics; and conflicts and tensions.

Taking each of these themes in turn, we now briefly reiterate salient findings that have been generated through our analysis:

#### 1. Gender equality and inclusivity (Section 3.6.4)

In this chapter, participants provide information about gender equality and female participation in the R&I workplace, the different roles of women in R&I, current interventions and policies in place, as well as interventions and support structures needed. From the findings presented in this section, there is acceptance of the rights of women to be part of the R&I workplace.

There is concern that fewer women are present in STEM disciplines. Participants draw connections between the underrepresentation of women in STEM disciplines, as opposed to

the social sciences. This raised the possibility of expanding the levels of integration and collaboration between the STEM disciplines and social sciences.

Moreover, participants discuss the various roles of women, such as mothers and caregivers, which could hold them back professionally.

The need for interventive measures, such as quotas, was only mentioned briefly.

## **2. Public engagement (Section 3.6.5)**

The participants in this chapter view building support networks and strategic alliances as advantageous in research and innovation.

The importance of building support networks to bring stakeholders together and achieve sustainability goals is recognised by participants from India. Engagement is considered important in India, especially relating to waste and environmental issues. Because dealing with the environment and transitioning sustainably were prolonged projects, such networks were deemed essential.

Furthermore, participants in Japan are cognisant of the importance of building support networks to bring stakeholders together.

Participants from Singapore discuss opportunities for finding common ground, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.

There is recognition of the need for inter-domain and multi-stakeholder integration, to comprehend and respond to some of the world's increasing technological complexity and environmental problems.

## **3. Open Science (Section 3.6.6)**

From the findings presented in this section, participants discuss the importance of open access, the limitations to open access to data, as well as the cost of open access.

While participants are supportive of open access, ownership and funding play a role in the extent to which open access is allowed. Furthermore, the cost of open access is a concern for some participants.

## **4. Anticipative, reflective and responsiveness (Section 3.6.7)**

In this chapter, participants were asked to reflect on anticipative, reflective, and responsive RRI. Participants reflect on the future they want to create with their R&I processes, why that future is desirable and how it can be achieved.

Participants take climate change and environmental concerns into account when reflecting on desirable futures.

In addition, participants discuss the need for demand-driven R&I and addressing societal needs and problems when considering the future. From the participants' contributions, it is clear there is concern for future generations and conducting R&I processes that address specific societal needs in certain domains, such as the field of energy.

### **5. Science education (Section 3.6.8)**

There was little indication from the interviews with participants suggesting advanced stages of science education, as per the EU pillar definition.

From the interviews, it is evident that conferences and open day events in Asian and Pacific States are widely attended. Furthermore, wide-scale science education through the media is motivated by concerns with environmental destruction. In addition, according to participants, RFOs are involved in training grantees and participants from CSOs consider R&I capacity building as important.

### **6. Ethics (Section 3.6.9)**

It is clear from the views expressed in this chapter that participants have different views about where ethical responsibilities lie. While some participants say ethics are taken seriously, other participants say ethics is of little or no relevance to their work.

Participants share their experience of the formal and informal existence and treatment of ethics within their organisation's structure and operations. Participants from India mention ethics committees and internal review boards, but mainly for RPOs in the bioeconomy domain and CSO participants. The rest of the interview participants were light on ethical enforcement. There was some disidentification of organisational concerns and activities from ethics.

The protection of rights was mainly about the importance of informed consent.

### **7. Governance of RRI (Section 3.6.10)**

In this chapter, the importance of politics was evident, with the current political situation in India seemingly preventing criticism of the government, which impacts on the forms of partnerships and funding for research and innovation. According to one participant, the competitive political relationship between China and USA, in terms of R&I, is advancing RRI in Japan. In Singapore, governance arrangements were set up for a direct relationship between the Prime Minister and research and favour the STEM disciplines. According to participants, there is a liberal research and innovation regime in Singapore.

Participants are concerned about conflicts and tensions between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as tensions between what is 'wanted' and what is 'needed'. The conflicts and tensions identified were of

limited use to evaluating governance of RRI, although it was made clear that conflicts existed between organisations and their funders.

### 3.6.11.3 REGION-SPECIFIC POLICIES, DRIVERS, PRACTICES AND PERSPECTIVES

#### 3.6.11.3.1 Overview

The aim was to investigate bottom-up perspectives and experiences of researchers and innovators in Asian and Pacific States. The focus here is on collecting data through and from researchers and innovators themselves (i.e. ascertaining bottom-up views). We prioritise how and why research and innovation are supplied from those who are actually supplying it.

In delivering this, it was also important that these insights are provided for other parts of the RRING project, specifically regarding: key RRI-related platforms, spaces and players operating in this region; interactions between different stakeholder types; domain-specific lessons related to Digital (ICT), Energy, Bioeconomy and Waste Management; as well as region-specific insights on what is shaping day-to-day research and innovation practice.

#### 3.6.11.3.2 Key domains

Within each of these sub-themes, accounts are provided for each of RRING four domains. Across these, we note the following:

- *Energy:*
  - Female leaders in engineering were more common than in science.
  - Public engagement utilised strategic alliances operating internationally.
  - Little to no consideration of open science in this domain.
  - Energy, alongside the climate crisis, were directly definitions of societal need.
  - Environmental destruction (linked to energy) was impetus for science education.
  - International (ethics) standards used a reference point for whether research and innovation were causing concerns for society.
  - Lacking government support, with the energy domain relying on market forces.
- *Waste management:*
  - Gender-based targets used for women in leadership (and other) roles.
  - Public engagement used to ensure local social acceptance of a particular scheme. Multi-stakeholder collaboration was essential to engagement's success.
  - Little to no consideration of open science theme in this domain.
  - Little to no consideration of anticipative, reflective and responsiveness theme in this domain.
  - Environmental destruction (linked to waste management) was impetus for science education.

- Perception that ethics policies specifically on waste management were lacking.
- Collaboration between stakeholders should not be encouraged via governance, due to different expectations on timescales for delivery across stakeholders.
- *Information and Communications Technology (ICT):*
  - Lack of women working in ICT recognised as a major concern. Problems of speaker gender balance persisting at conferences.
  - Perception that ICT is more open than other domains to engagement broad set of actors. Interdisciplinarity was central to their engagement efforts.
  - Open source-led research and innovation enhanced (perceived) credibility.
  - Technologies (connected to AI and IoT) were inherently futuristic, and were expected to help tackle societal needs, e.g. inequalities, communications.
  - Online training used to for ICT skills development initiatives. Public discussions and debate also occurred.
  - Little to no consideration of ethics theme in this domain.
  - International politics and the eagerness to be competitive (e.g. between Japan and China/USA) shaped ICT's engagement with RRI practices.
- *Bioeconomy:*
  - Low numbers of female leaders and evidence of exclusionary (male-dominated) social circles.
  - Public engagement was hampered by the public's fear of bioeconomy. Inter-domain relationships (e.g. with energy) shaped engagement approach.
  - Open access ambitions sometimes conflicted with sensitivity of data and analyses used.
  - Bioeconomy innovation able to benefit society through improving product consumption, e.g. lowering costs of pharmaceuticals.
  - Little to no consideration of science education theme in this domain.
  - Perception that ethics was more relevant when directly involving live subjects and for work with tangible impacts and end products.
  - Little to no consideration of the governance of RRI theme in this domain.

### 3.6.11.3.3 Different stakeholder categories

Key stakeholders interact within and across their research and innovation sectors in different ways, according to the RRI themes that structure our analysis and discussion:

- *Gender equality and inclusivity:* stakeholder interactions on gender equality and inclusivity tended to be driven by the Research Funding Organisations.
- *Public engagement:* open Intellectual Property policy encouraged collaboration between Research Performing Organisations and industry/business. Research Funding Organisations were key in building strategic alliances and avoiding duplication.

- *Open Science*: Research Funding Organisations shaped how/whether Research Performing Organisations and Civil Society Organisations could release data. Suggestion that funder requirements might not actually be being enforced.
- *Anticipative, reflective and responsiveness*: Feedback in and between stakeholders (e.g. via periodic impact assessments) dominated here, as part of ‘tick-box’ exercises.
- *Science education*: No relevant interview insights for this theme.
- *Ethics*: Research Funding Organisations had ethical requirements that Research Performing Organisations had to follow.
- *Governance of RRI*: Certain Research Funding Organisations deemed not sufficiently responsible to be a source of funding for Research Performing Organisations. Research Funding Organisations still shaped many rules of governance.

## 3.7 GLOBAL SURVEY RESEARCH: ASIAN AND PACIFIC STATES

### 3.7.1 INTRODUCTION

The sample size from Asian and Pacific states represented the second largest part of the complete global picture and was dominated by respondents from India, Japan and Australia. The socio-demographic measures showed the dominant age group as 39 to 48, and the gender distribution was slightly skewed toward men. More than half of the respondents indicated working in one of the four RRING key domains. Most of the respondents worked in a university or similar RPO, with the most dominant professional fields relating to social sciences.

RPOs and other academics were by far those most engaged, suggesting a disproportionately higher internal engagement in comparison with non-academic stakeholders. This is most likely due to academic collaborations and joint research projects. RRI was mostly associated with the ethical aspects of R&I, and dominant associations with the SDGs were for economic aspects of sustainable development.

There was an overall agreement on the importance of diverse and inclusive RRI dimensions, and results suggested that engaging other researchers and academics was a typical part of research processes. Outside academia, respondents similarly reached out to different stakeholders, but less frequently to policy bodies. Gender equality was ensured internally by creating equal research teams and promoting female researchers but lacked widely adopted measures to integrate gender equality on a more substantive level. This also applied to ethnic minorities, as their promotion was not as highly valued as the other diverse and inclusive RRI measures.

Respondents expressed moderate agreement towards the anticipative and reflective dimension of RRI, which translated into various practical steps. These mostly referred to relevant committees, rules, regulations, and legal obligations, but also aspects relating to research participants.

Transparency of research at all levels of R&I work was broadly ensured through one-way dissemination, presumably as it was considered a viable pathway towards open and transparent methods and processes. Researchers and innovators also shared their work both within the academic field, and with public and non-academic stakeholders. However, making research findings and data openly available to the public was widely confused with open access.

The attitudinal agreement for societal needs was the highest in comparison with other RRI dimensions. In practice, rather than empowering relevant groups of people to shape the R&I process, there seemed to be a dominant and less responsive top-down approach when selecting research topics.

### 3.7.2 OVERVIEW

This section focuses on the sample of respondents from Asian and Pacific states. Countries that were dominantly represented were India ( $n = 104$ , 32%), followed by Japan ( $n = 50$ , 16%) and Australia ( $n = 46$ , 14%). The sample size for Asian and Pacific states was  $n = 321$  (completed surveys), making up 12% of the global sample.

#### 3.7.2.1 SOCIO-DEMOGRAPHICS OF ASIAN AND PACIFIC STATES

The dominant age group was 39 to 48 ( $n = 79$ , 26%) (Figure 156)<sup>963</sup>, and the gender distribution was skewed towards men ( $n = 175$ , 56%) rather than women ( $n = 132$ , 42%) (Figure 157)<sup>964</sup>.

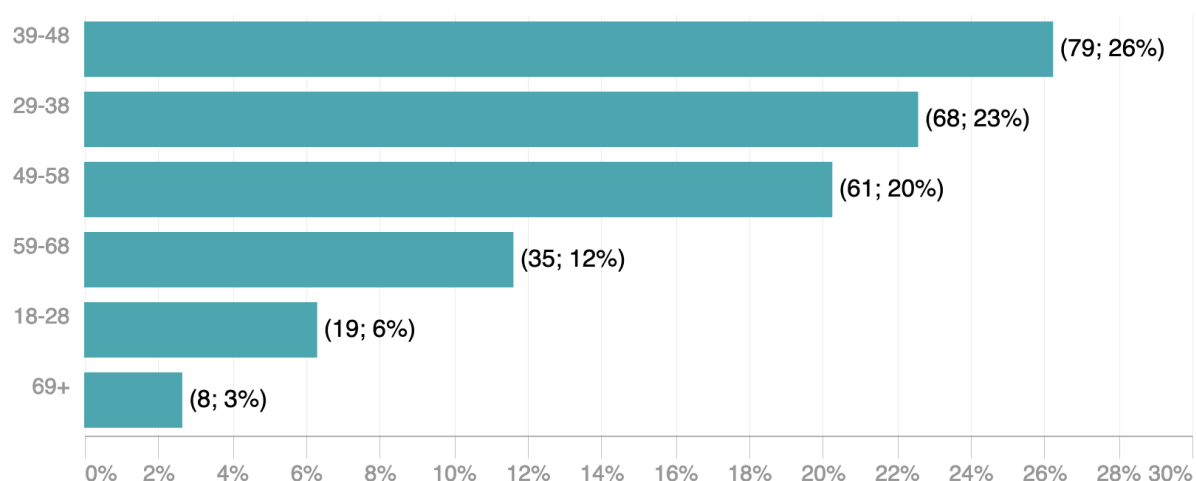


Figure 156: Asian and Pacific States - Distribution of age.

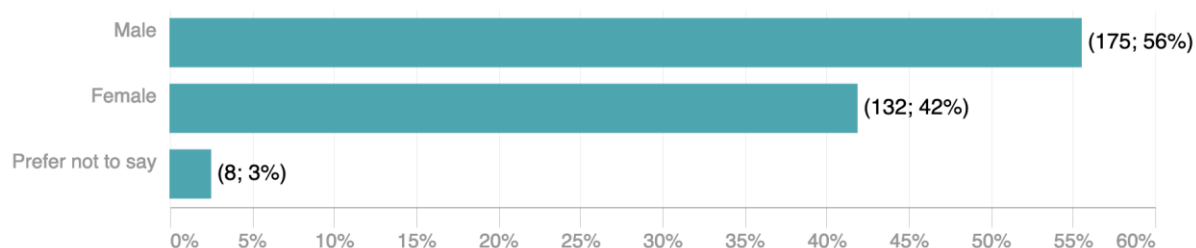


Figure 157: Asian and Pacific States - Distribution of gender.

Most participants indicated that they are not currently participating in an educational programme ( $n = 267$ , 86%) (Figure 158)<sup>965</sup>. The overall level of formal education was high. The majority held a Doctoral ( $n = 202$ , 6%) degree, while fewer respondents indicated completing a Master's degree ( $n = 72$ , 23%) or Bachelor's degree ( $n = 27$ , 9%) (Figure 159)<sup>966</sup>.

<sup>963</sup> The total number of responses:  $N = 270$

<sup>964</sup> The total number of responses:  $N = 315$

<sup>965</sup> The total number of responses:  $N = 309$

<sup>966</sup> The total number of responses:  $N = 308$

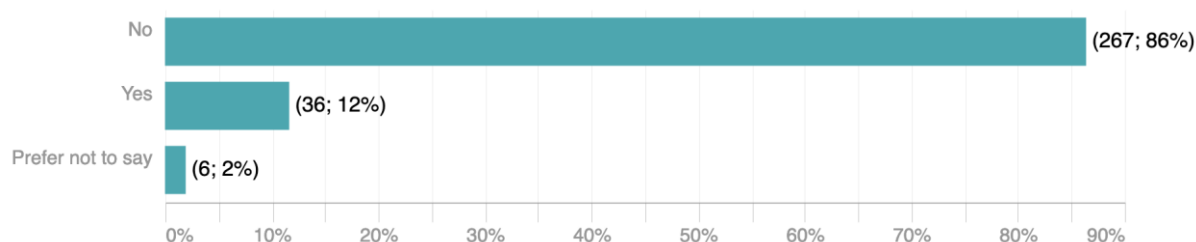


Figure 158: Asian and Pacific States - Currently studying at school, college or university.

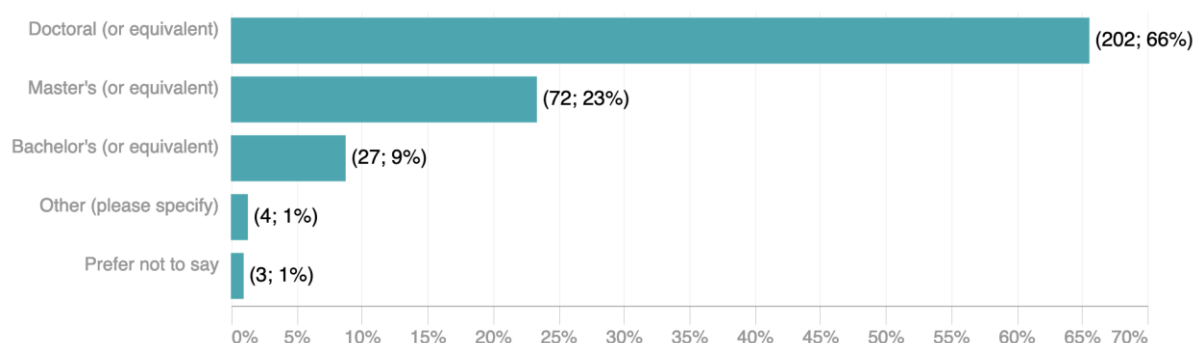


Figure 159: Asian and Pacific States - Highest level of formal education completed.

In general, the subject areas of respondents' degrees were diverse (Figure 160)<sup>967</sup>. Among the degree subject areas, '*Social sciences, journalism and information*' ( $n = 68$ , 16%) represented the largest group, followed closely by '*Natural sciences, mathematics and statistics*' ( $n = 63$ , 15%), '*Business, administration and law*' ( $n = 58$ , 13%), '*Arts and humanities*' ( $n = 50$ , 12%), '*Engineering, manufacturing and construction*' ( $n = 48$ , 11%), '*Health and welfare*' ( $n = 37$ , 9%), '*Education*' ( $n = 29$ , 7%), '*Information and Communication Technologies (ICTs)*' ( $n = 29$ , 7%), '*Other*' ( $n = 29$ , 7%), '*Agriculture, forestry, fisheries and veterinary*' ( $n = 18$ , 4%), and '*Services*' ( $n = 1$ , 0%).

<sup>967</sup> The total number of responses:  $N = 430$

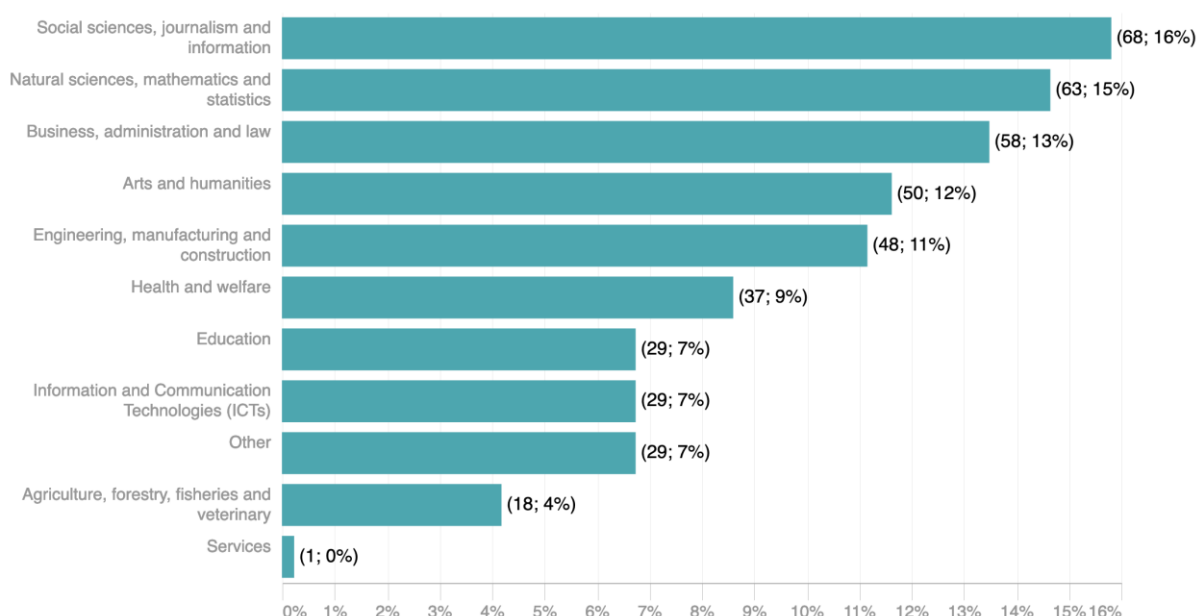


Figure 160: Asian and Pacific States - Distribution of degrees by subject area (multiple choice).

Respondents tended to have many years of professional experience, both in total ( $Mdn = 18$  years)<sup>968</sup> and after completing their doctoral degree ( $Mdn = 11$  years)<sup>969</sup> (Figure 161).

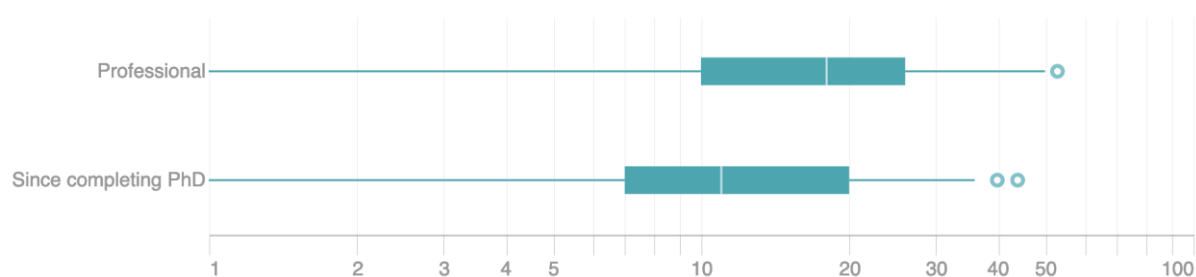


Figure 161: Asian and Pacific States - Years of experience as professional / since completing PhD (log scale).

In terms of respondents' academic fields of work, the most dominant were 'Social sciences' ( $n = 88$ , 29%) and 'Engineering and technology' ( $n = 48$ , 16%) (Figure 162)]<sup>970</sup>.

<sup>968</sup> The total number of responses:  $N = 251$

<sup>969</sup> The total number of responses:  $N = 166$

<sup>970</sup> The total number of responses:  $N = 303$

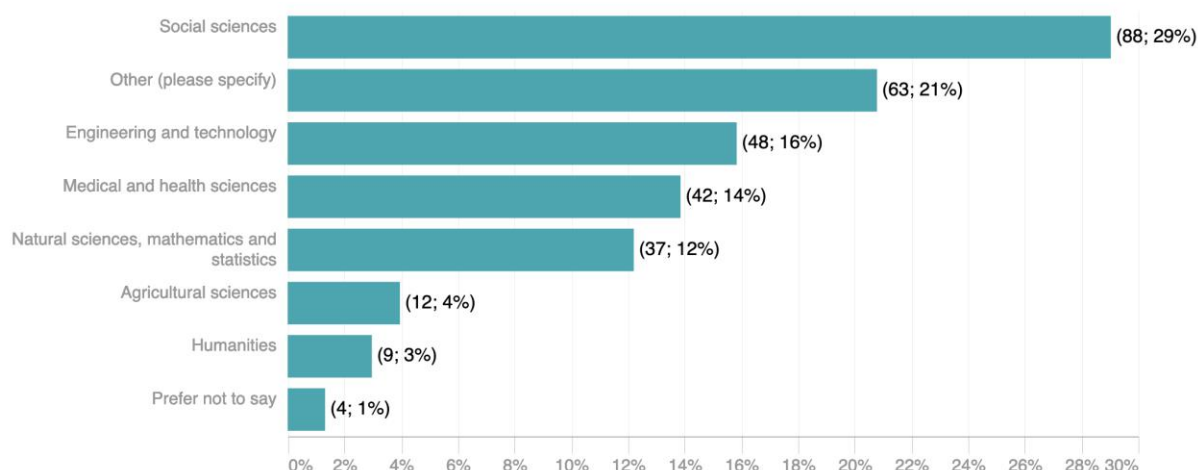


Figure 162: Asian and Pacific States - Fields or professions in which respondents work.

The most commonly reported sub-fields within these categories were ‘*Economics and business*’ ( $n = 21, 23\%$ ) (Figure 163)<sup>971</sup> and ‘*Electrical/electronic/information engineering*’ ( $n = 17, 37\%$ ) respectively (Figure 164)<sup>972</sup>.

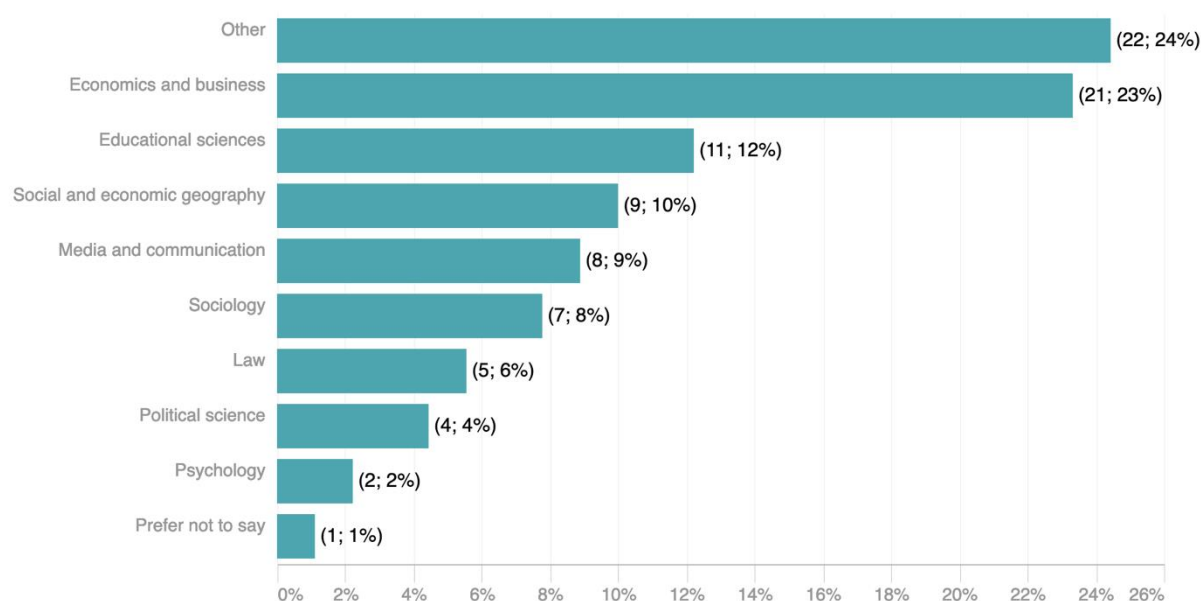


Figure 163: Asian and Pacific States - Sub-fields of social sciences.

<sup>971</sup> The total number of responses:  $N = 90$

<sup>972</sup> The total number of responses:  $N = 46$

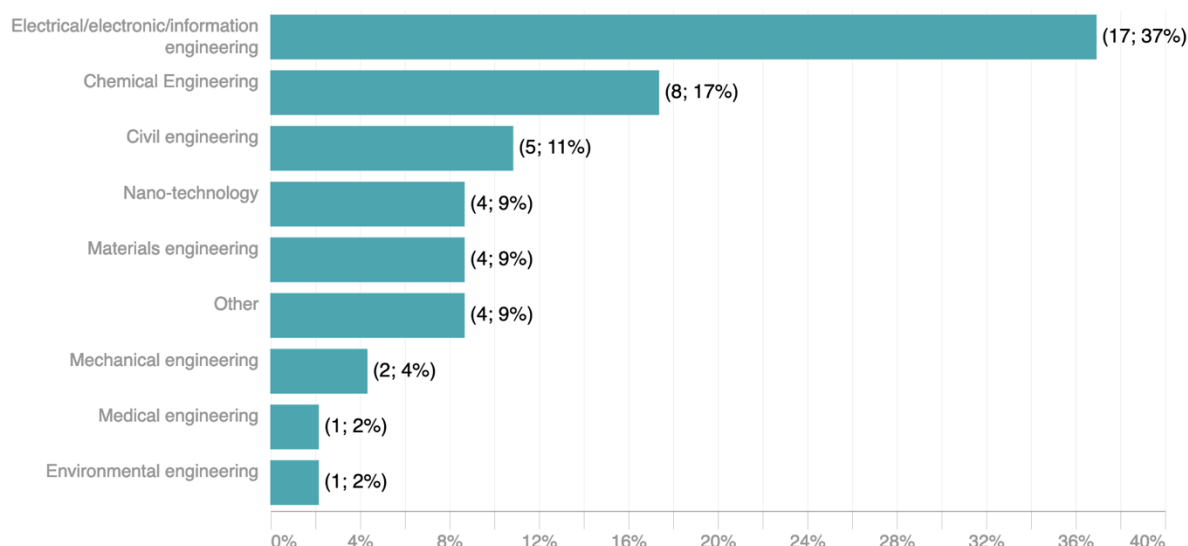


Figure 164: Asian and Pacific States - Sub-fields of engineering and technology.

The most common sub-field of ‘*Medical and health sciences*’ was ‘*Health sciences*’ ( $n = 18$ , 42%) (Figure 165)<sup>973</sup>. For ‘*Natural sciences, mathematics and statistics*’, these were ‘*Chemical sciences*’ ( $n = 12$ , 31%) and ‘*Biological sciences*’ ( $n = 10$ , 26%) (Figure 166)<sup>974</sup>.

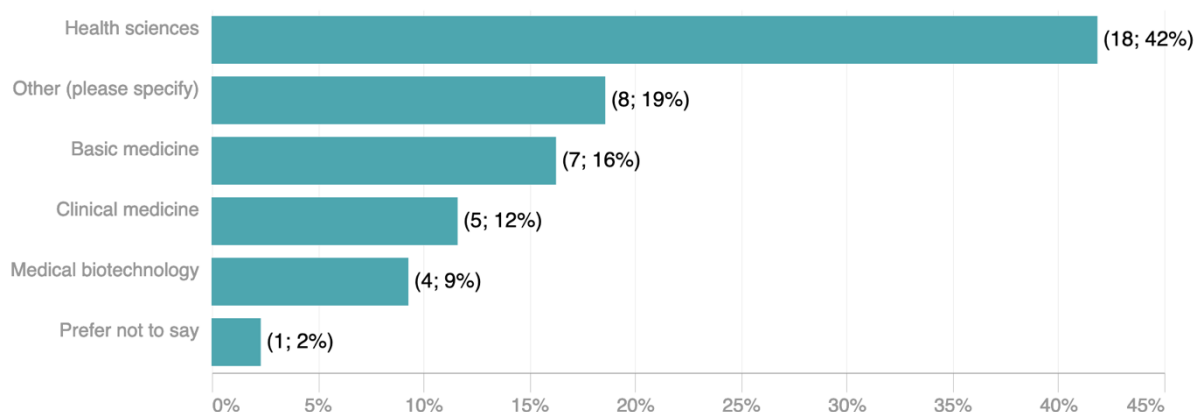


Figure 165: Asian and Pacific States - Sub-fields of medical and health sciences.

<sup>973</sup> The total number of responses:  $N = 43$

<sup>974</sup> The total number of responses:  $N = 39$

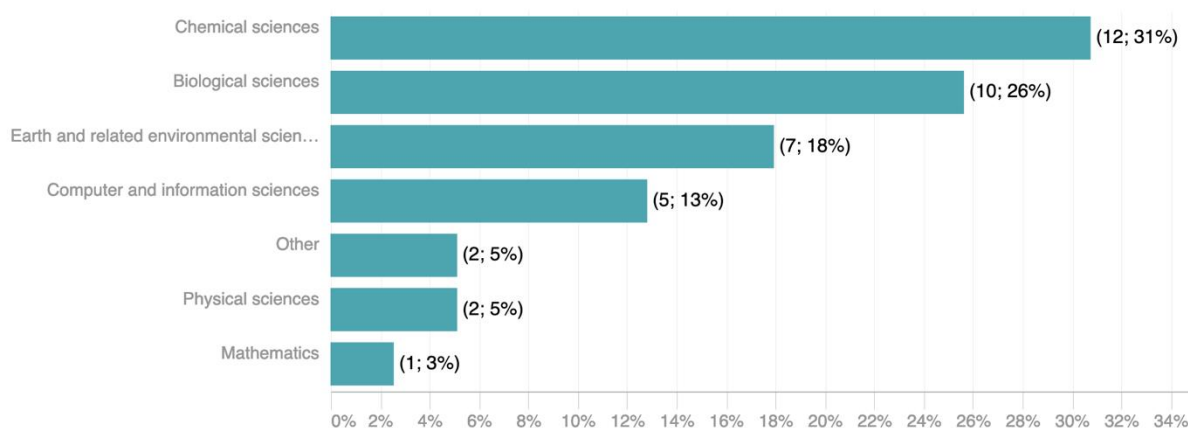


Figure 166: Asian and Pacific States - Sub-fields of natural sciences, mathematics and statistics.

Other sub-fields were ‘Agriculture, forestry, and fisheries’ ( $n = 4$ , 33%) and ‘Agricultural biotechnology’ ( $n = 3$ , 25%) within ‘Agricultural sciences’ (Figure 167)<sup>975</sup>, and ‘Philosophy, ethics and religion’ ( $n = 3$ , 33%) within ‘Humanities’ (Figure 168)<sup>976</sup>.

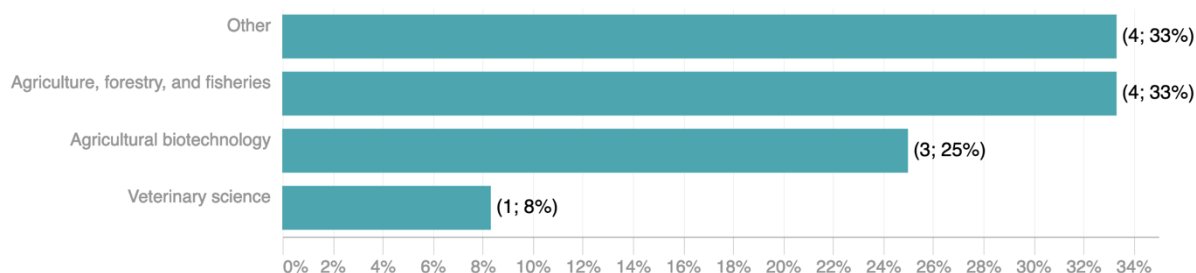


Figure 167: Asian and Pacific States - Sub-fields of agricultural sciences.

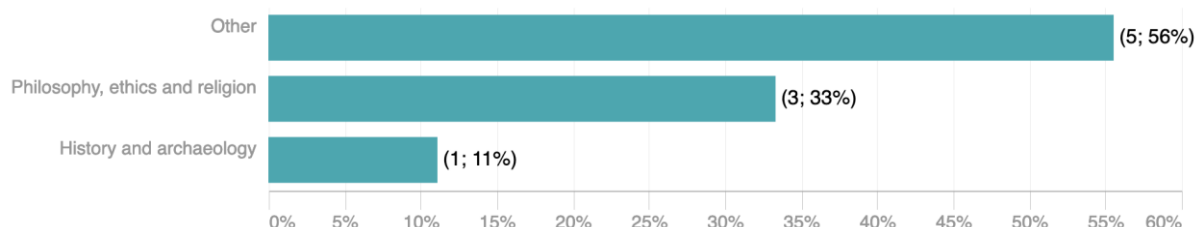


Figure 168: Asian and Pacific States - Sub-fields of humanities.

Most respondents worked full-time ( $n = 252$ , 84%) (Figure 170)<sup>977</sup> in ‘Universit[ies] or similar research performing organisation[s]’ ( $n = 180$ , 60%), followed by ‘National governmental organisation[s]’ ( $n = 55$ , 18%) (Figure 169)<sup>978</sup>.

<sup>975</sup> The total number of responses:  $N = 12$

<sup>976</sup> The total number of responses:  $N = 9$

<sup>977</sup> The total number of responses:  $N = 299$

<sup>978</sup> The total number of responses:  $N = 299$

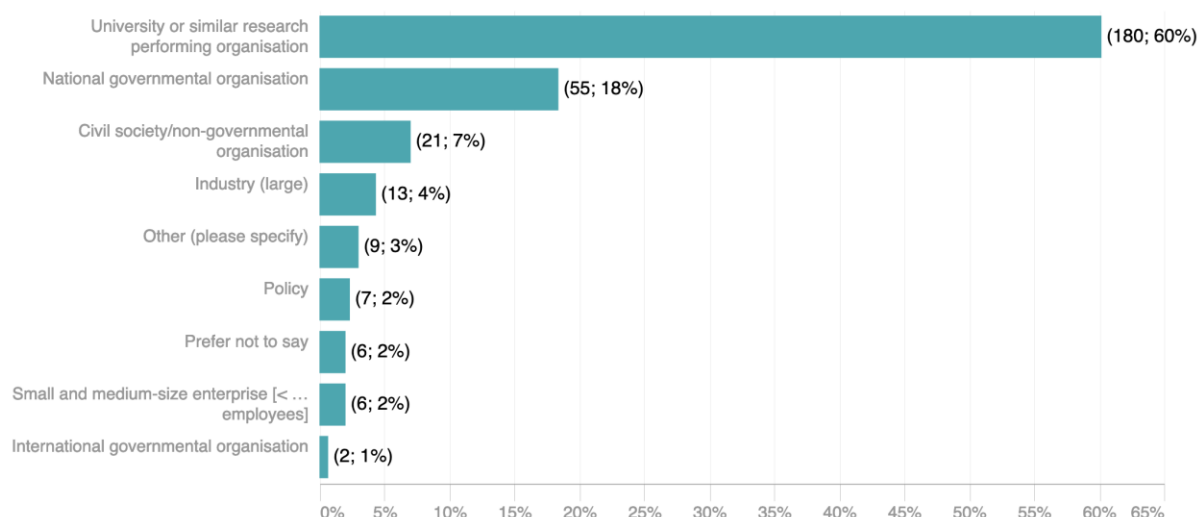


Figure 169: Asian and Pacific States - Sectors in which participants work[ed].

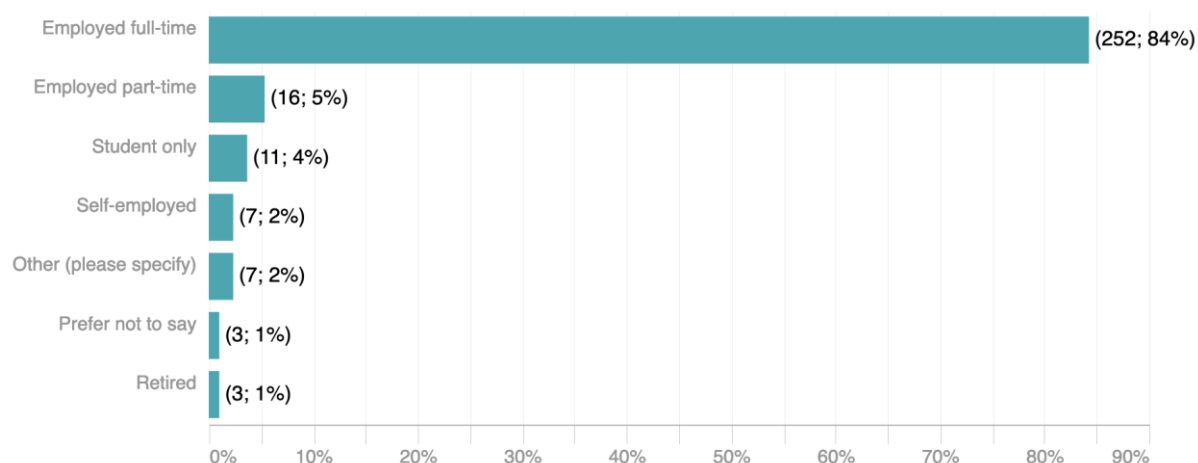


Figure 170: Asian and Pacific States - Participants' employment status.

In general, respondents spent their working hours on a diverse range of tasks. The most time was spent on 'Research and innovation work' ( $Mdn = 13$  hours)<sup>979</sup> (Figure 171). Other tasks were more equally distributed.

<sup>979</sup> The total number of responses:  $N = 262$

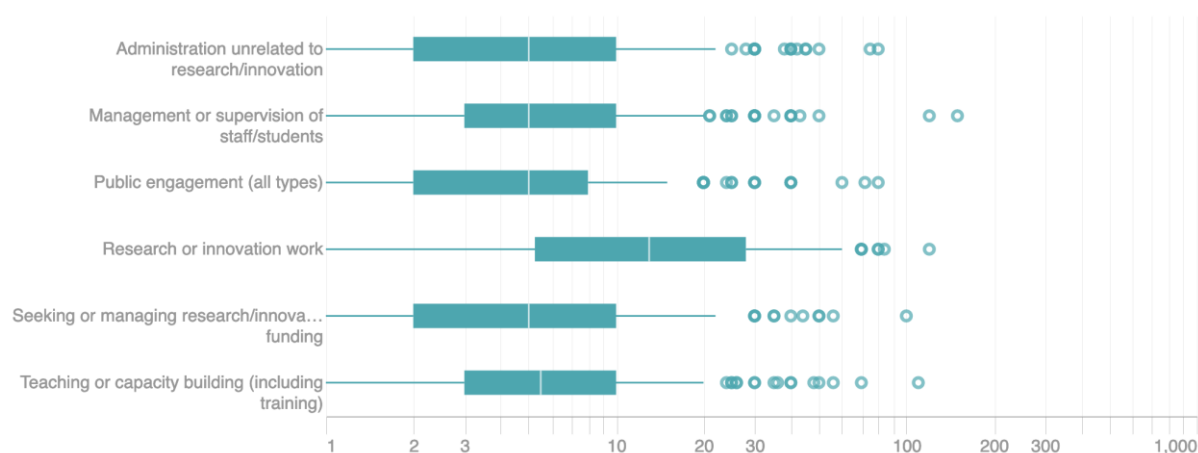


Figure 171: Asian and Pacific States - Hours spent on activities in the last 7 days (log scale).

The median number of years that respondents had worked as researchers and innovators was 12 years<sup>980</sup>. In terms of their current positions, the median number of years of respondents' work experience was 7 years<sup>981</sup> (Figure 172). Generally, respondents tended to have worked longer as a researcher and innovator than in their current role.

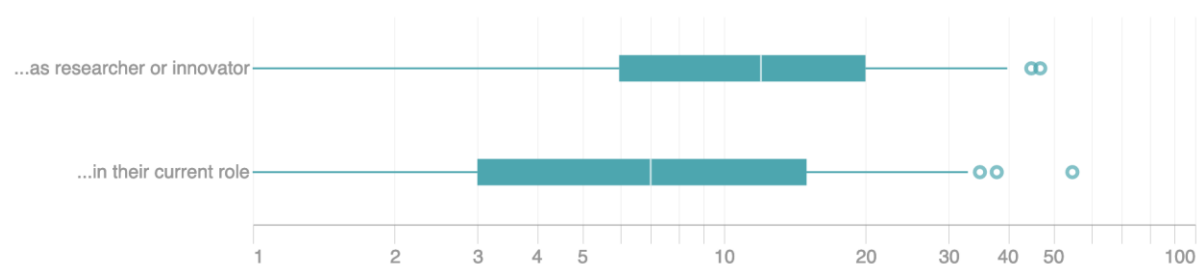


Figure 172: Asian and Pacific States - Years that respondents worked in their current role / as researcher or innovator (log scale).

From the four RRING key domains, respondents most frequently indicated working in 'Digital (ICT)' ( $n = 86$ , 27%). Less common were 'Energy' ( $n = 34$ , 11%), 'Waste Management' ( $n = 30$ , 9%) and 'Bio-economy' ( $n = 25$ , 8%) (Figure 173)<sup>982</sup>. However, almost half of respondents indicated working in 'None of these' ( $n = 146$ , 45%).

<sup>980</sup> The total number of responses:  $N = 257$

<sup>981</sup> The total number of responses:  $N = 259$

<sup>982</sup> The total number of responses:  $N = 321$

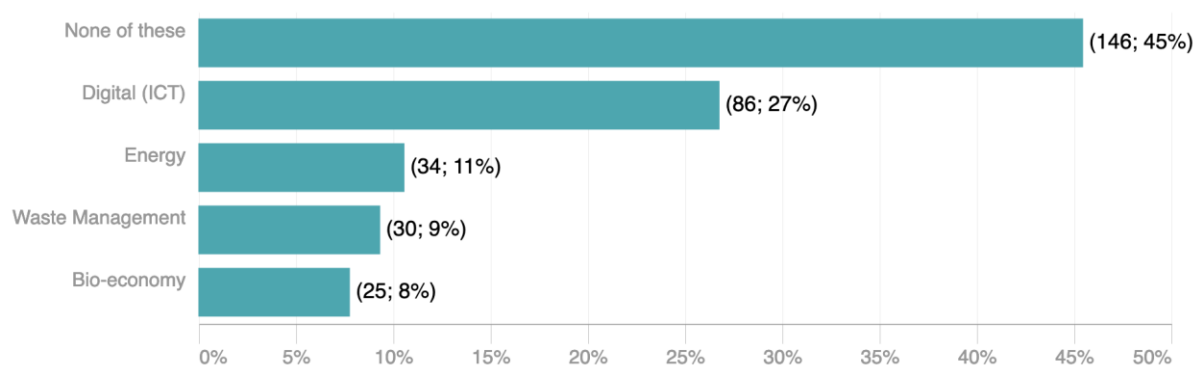


Figure 173: Asian and Pacific States - Domains relating to participants' recent work.

### 3.7.3 RESULTS BY DIMENSION OF RESPONSIBLE RESEARCH & INNOVATION

This section describes the level of engagement with the four RRI process dimensions, both on an attitudinal and practical level.

#### 3.7.3.1 RRI DIMENSION – DIVERSE AND INCLUSIVE

While there was overall agreement on an attitudinal level, there were value-action gaps for each measure. This was most apparent for the inclusion of ethnic minorities as attitude and reporting practical steps did not align. This measure also had the lowest level of total attitudinal agreement (76%, compared to 86% for gender equality, 89% for diverse perspectives and expertise, and 90% for ethics).

##### 3.7.3.1.1 Diverse and Inclusive – Diverse Perspectives

The majority of respondents agreed, but with differing levels of strength, that it is important to involve diverse stakeholders ( $n = 231$ , 89%) (Figure 174)<sup>983</sup>. A notable portion expressed the strongest level of agreement ( $n = 115$ , 44%), whereas only minor proportions disagreed ( $n = 17$ , 7%) or responded neutrally ( $n = 11$ , 4%).

<sup>983</sup> The total number of responses:  $N = 259$

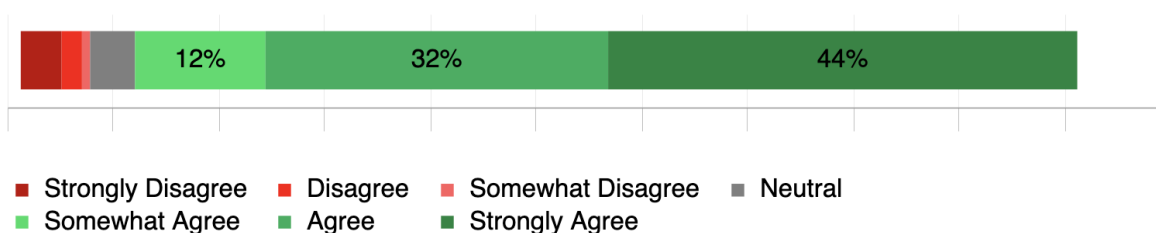


Figure 174: Asian and Pacific States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work'.

The majority of respondents ( $n = 174$ , 65%) reported taking practical steps to involve diverse stakeholders (Figure 175)<sup>984</sup>. This represents 75% of those who indicated a positive attitude towards involving diverse perspectives. There were many ( $n = 57$ , 25%) whose attitudinal agreement had not translated into practical action or who did not answer the question. A notable portion explicitly reported taking no steps ( $n = 30$ , 11%) or thought taking action did not apply to them or had no opinion ( $n = 21$ , 8%).

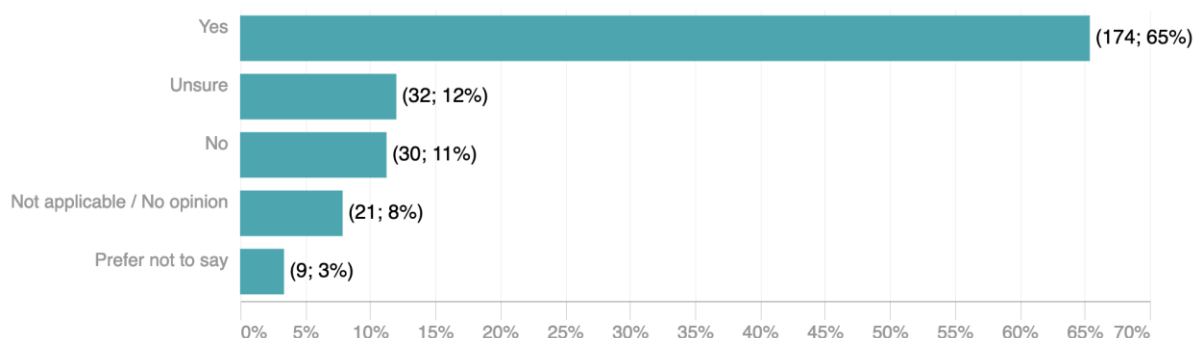


Figure 175: Asian and Pacific States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.

Respondents involved different sectors in their R&I process (Figure 176)<sup>985</sup>. Most frequently 'Universit[ies] or college[s]' ( $n = 135$ , 24%) were specified, followed by 'Government agenc[ies]' ( $n = 83$ , 15%), 'Research organisation[s]' ( $n = 83$ , 15%), and 'Non-profit organisation[s]' ( $n = 71$ , 12%).

<sup>984</sup> The total number of responses:  $N = 266$

<sup>985</sup> The total number of responses:  $N = 571$

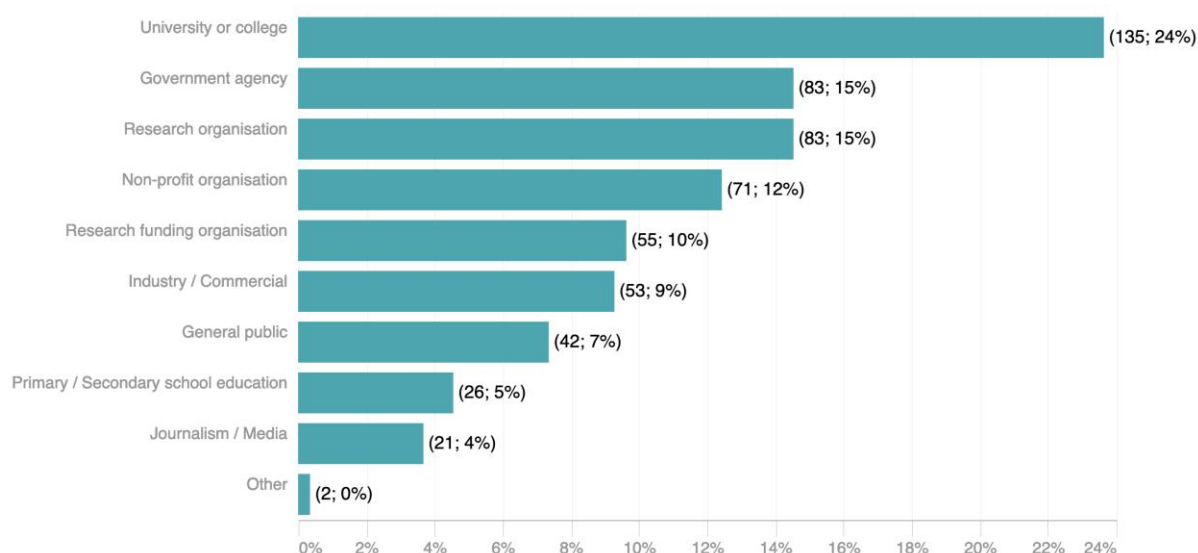


Figure 176: Asian and Pacific States - Sectors' participants involved in research and innovation practice.

In general, respondents reported similar proportions of involved stakeholders for R&I practice and dissemination (Figure 177)<sup>986</sup>. Again, the most frequently involved sectors were 'Universit[ies] or college[s]' ( $n = 125$ , 21%) and 'Government agenc[ies]' ( $n = 81$ , 14%), followed by 'Research organisation[s]' ( $n = 76$ , 13%), 'Non-profit organisation[s]' ( $n = 62$ , 11%), and 'Research funding organisation[s]' ( $n = 58$ , 10%). However, 'General public' ( $n = 55$ , 9%) was mentioned more frequently for dissemination than 'Industry / Commercial' ( $n = 49$ , 8%). Additionally, 'Journalism / Media' ( $n = 50$ , 9%) was mentioned more often, while 'Primary / Secondary school education' ( $n = 24$ , 4%) was mentioned less often.

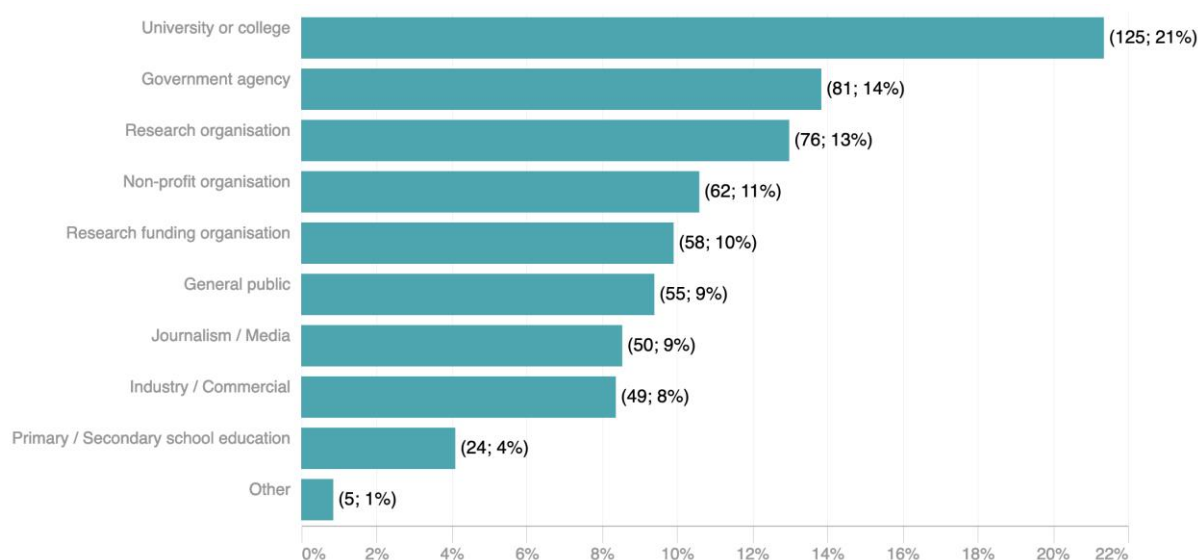


Figure 177: Asian and Pacific States - Sectors' participants involved in research and innovation dissemination.

<sup>986</sup> The total number of responses:  $N = 585$

### 3.7.3.1.2 Diverse and Inclusive – Gender Equality

There was broad agreement with the importance of promoting gender equality in R&I work (Figure 178)<sup>987</sup>. The majority of respondents ( $n = 215$ , 86%) responded positively, with half ( $n = 128$ , 51%) expressing the strongest level of agreement. A minority ( $n = 35$ , 14%) responded neutrally or disagreed that promoting gender equality was important in their work.

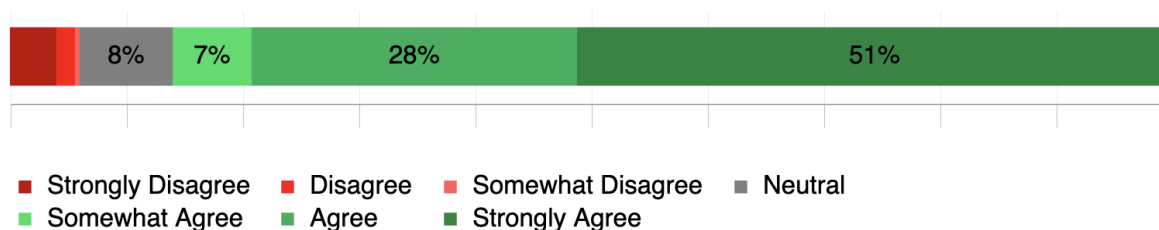


Figure 178: Asian and Pacific States - 'It is important to promote gender equality in my research and innovation work'.

Almost half of respondents ( $n = 124$ , 47%) had taken steps to promote gender equality in their work over the past 12 months (Figure 179)<sup>988</sup>. This represents 58% of those respondents who indicated a positive attitude towards gender equality. There was a proportion of those who thought it was attitudinally important ( $n = 91$ , 42%), but had not explicitly confirmed any actions. Notable portions thought taking action did not apply to them or had no opinion ( $n = 50$ , 19%), or explicitly reported taking no steps ( $n = 46$ , 17%).

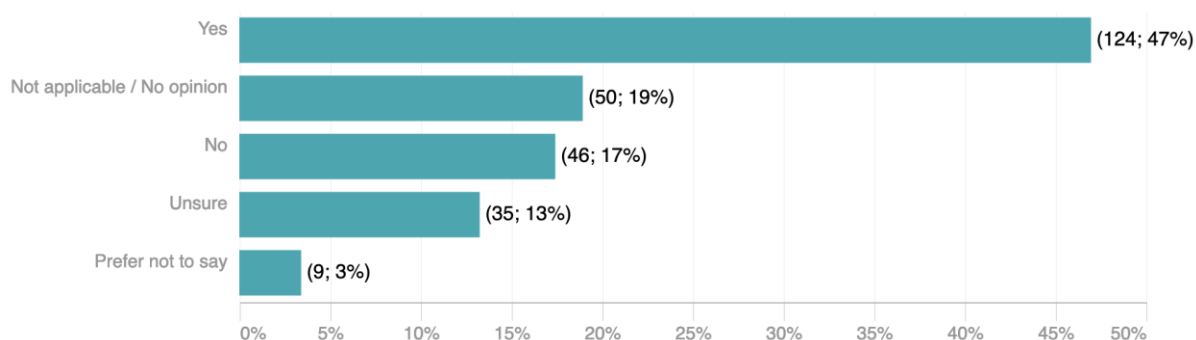


Figure 179: Asian and Pacific States - Promoted gender equality in research and innovation work in the past 12 months.

### 3.7.3.1.3 Diverse and Inclusive – Ethnic Minorities

The majority of respondents ( $n = 180$ , 76%) agreed it was important to include ethnic minorities in R&I work (Figure 180)<sup>989</sup>, however this was to a lower degree than for diverse perspectives and gender equality measures. Fewer respondents agreed at the strongest level ( $n = 85$ , 36%) when compared to the same level of agreement for the gender equality measure

<sup>987</sup> The total number of responses:  $N = 250$

<sup>988</sup> The total number of responses:  $N = 264$

<sup>989</sup> The total number of responses:  $N = 238$

(51%). A considerable proportion responded neutrally ( $n = 42$ , 18%), especially when compared to other diversity and inclusivity measures. Disagreement was expressed by few respondents ( $n = 16$ , 7%).

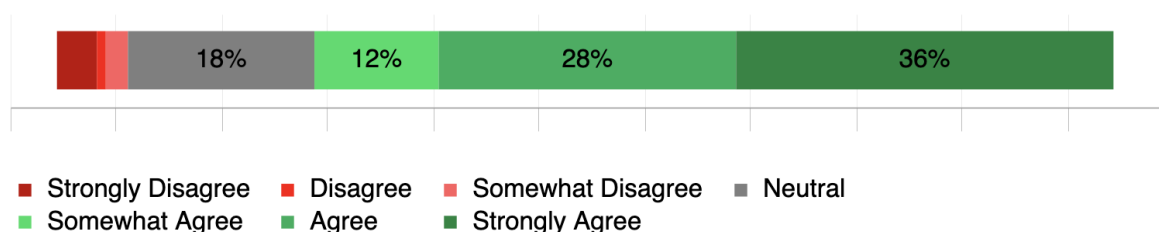


Figure 180: Asian and Pacific States - 'It is important to include ethnic minorities in my research and innovation work'.

Few respondents explicitly confirmed they had acted on including ethnic minorities ( $n = 79$ , 30%) (Figure 181)<sup>990</sup>. This represents 44% of those respondents who indicated a positive attitude towards including ethnic minorities. This was the lowest indication of practical steps in comparison with the other measures of this dimension. More than half of respondents ( $n = 101$ , 56%) thought including ethnic minorities was important, but had not explicitly taken steps to ensure this or had not answered the question. A similar proportion indicated they had not taken steps ( $n = 82$ , 31%).

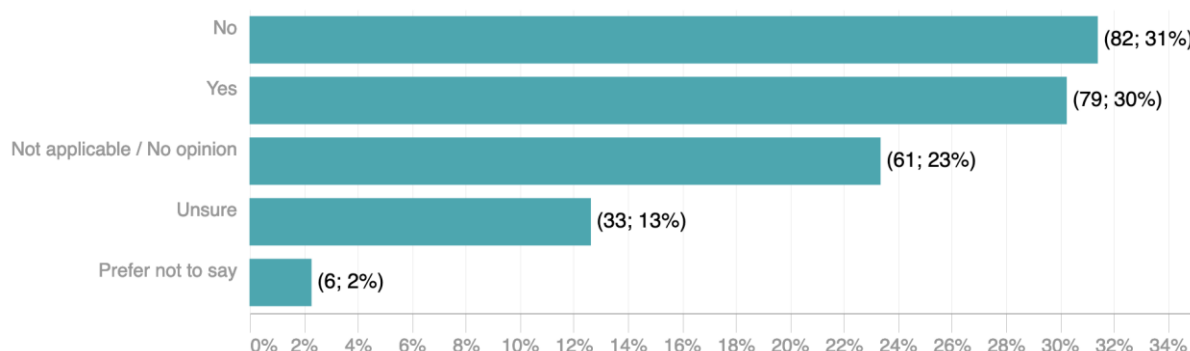


Figure 181: Asian and Pacific States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.

### 3.7.3.1.4 Diverse and Inclusive – Ethics

There was broad agreement amongst respondents regarding the importance of ethics (Figure 182)<sup>991</sup>. The majority ( $n = 215$ , 90%) responded positively and more than half of the respondents ( $n = 133$ , 56%) expressed the strongest level of agreement. A small portion of respondents ( $n = 11$ , 5%) explicitly disagreed that ensuring ethical guidelines was important in their work.

<sup>990</sup> The total number of responses:  $N = 261$

<sup>991</sup> The total number of responses:  $N = 239$

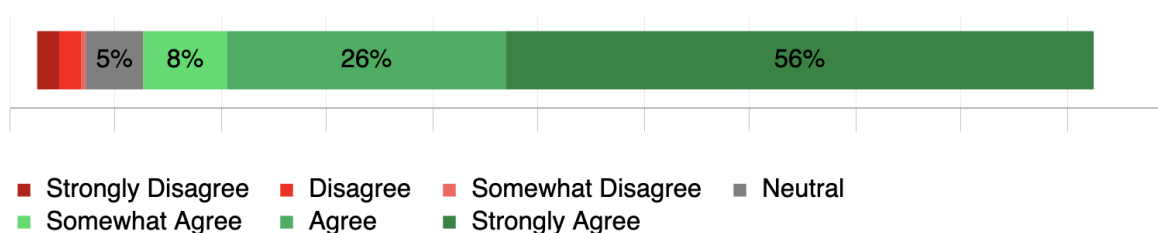


Figure 182: Asian and Pacific States - 'Ethical principles guide my research and innovation work'.

The majority of respondents ( $n = 157$ , 62%) had taken steps to be guided by ethical principles (Figure 183)<sup>992</sup>. This represents 73% of respondents who considered it important. A minority thought ethics were important ( $n = 58$ , 27%), but had not explicitly taken steps to ensure this or had not answered the question.

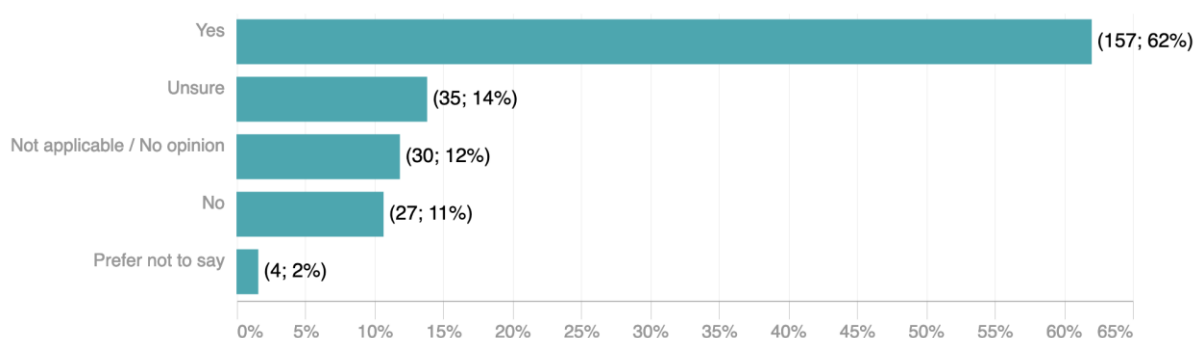


Figure 183: Asian and Pacific States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.

### 3.7.3.1.5 Further Diverse and Inclusive Agreement Statements

The previous findings on RRI measures are further explored through results on the levels of agreement towards the following statements regarding detailed perspectives on the UN SDGs (Figure 184).

Most respondents agreed that 'It is important to maintain an equal number of men and women in research and innovation teams' ( $n = 115$ , 60%)<sup>993</sup> and thought that 'It is important to take gender into account when developing [their] research and innovation work' ( $n = 128$ , 66%)<sup>994</sup>. Almost half of the respondents disagreed that 'Gender is irrelevant in [their] work' ( $n = 93$ , 47%)<sup>995</sup>.

The majority of respondents agreed that 'It is important to take ethnic diversity into account when developing [their] research and innovation work.' ( $n = 146$ , 77%)<sup>996</sup>, while almost half

<sup>992</sup> The total number of responses:  $N = 253$

<sup>993</sup> The total number of responses:  $N = 194$

<sup>994</sup> The total number of responses:  $N = 194$

<sup>995</sup> The total number of responses:  $N = 196$

<sup>996</sup> The total number of responses:  $N = 190$

of the respondents disagreed that *'Ethnic differences are irrelevant in [their] work.'* (n = 92, 48%)<sup>997</sup>.

Half of the respondents disagreed (n = 97, 49%) that *'The best time to talk to public audiences about [their] research and innovation work is at the very end of the process after all the work has been completed'*<sup>998</sup>. While the majority agreed they *'feel a professional responsibility to communicate findings from [their] research or innovation work to public audiences'* (n = 185, 94%)<sup>999</sup>.

Concerning the communication of findings to the public, the majority of respondents agreed that *'[their] organisation encourages [them] to communicate findings from [their] research or innovation work to public audiences'* (n = 163, 84%)<sup>1000</sup>. Most also disagreed that *'[their] organisation [...] discourages [them] from communicating the results of my research or innovation work to public audiences'* (n = 129, 75%)<sup>1001</sup>.

Similar portions of respondents agreed (n = 91, 46%) and disagreed (n = 87, 44%) that *'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals.'*<sup>1002</sup>

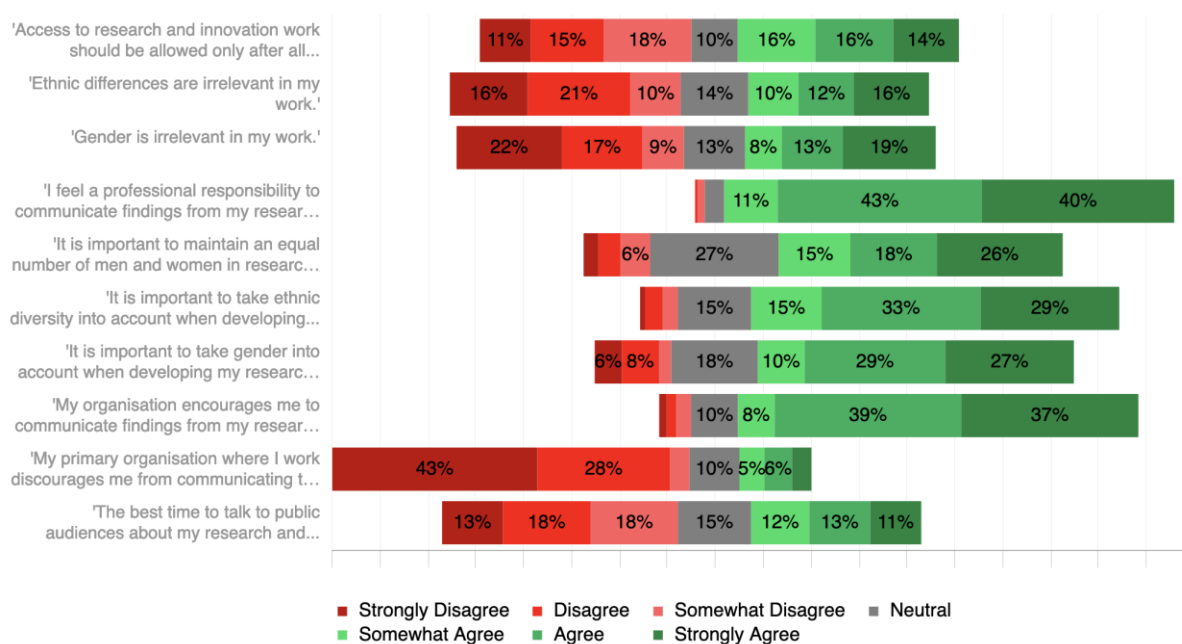


Figure 184: Asian and Pacific States - Statements related to working in research and innovation.

<sup>997</sup> The total number of responses: N = 191

<sup>998</sup> The total number of responses: N = 197

<sup>999</sup> The total number of responses: N = 197

<sup>1000</sup> The total number of responses: N = 195

<sup>1001</sup> The total number of responses: N = 173

<sup>1002</sup> The total number of responses: N = 197

### 3.7.3.2 RRI DIMENSION – ANTICIPATIVE AND REFLECTIVE

Overall, there was moderate agreement that R&I work should recognise societal concerns. This was noticeable on a moderately high attitudinal level. However, attitudinal agreement rather partly translated into practical action.

#### 3.7.3.2.1 Anticipative and Reflective – Societal Concerns

The majority of respondents agreed it was important their work did not cause concerns for society ( $n = 194$ , 78%) (Figure 185)<sup>1003</sup>. Almost half of the respondents strongly agreed with this statement ( $n = 106$ , 42%). A small but considerable portion ( $n = 35$ , 14%) explicitly disagreed, with just a few neutral responses ( $n = 21$ , 8%).

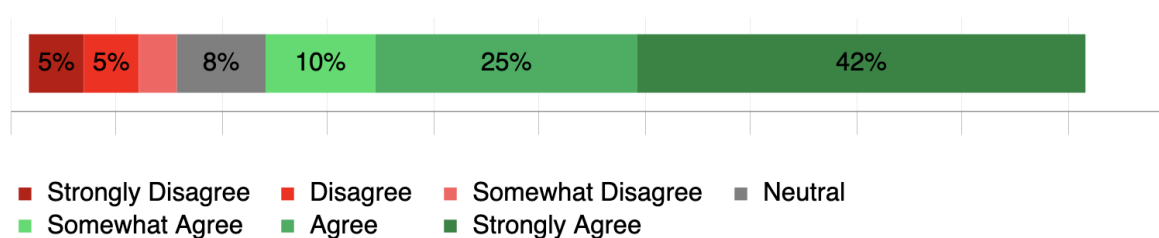


Figure 185: Asian and Pacific States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society'.

Fewer than half of the respondents confirmed they had taken steps ensuring their work did not cause concerns for society ( $n = 112$ , 42%) (Figure 186)<sup>1004</sup>. This represents 58% of those respondents who indicated a positive attitude towards societal concerns. A notable portion gave explicitly negative responses ( $n = 52$ , 20%), followed by, almost equally, 'Not applicable / No opinion' ( $n = 47$ , 18%) and 'Unsure' ( $n = 46$ , 17%). This could indicate that ensuring R&I work does not cause concerns for society is surrounded by ambiguity, particularly regarding practical steps.

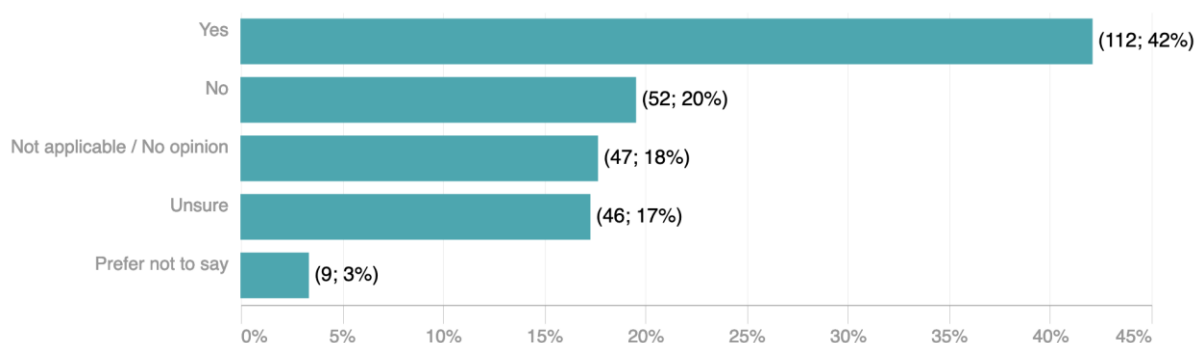


Figure 186: Asian and Pacific States - Ensured work does not cause concerns for society in the past 12 months.

<sup>1003</sup> The total number of responses:  $N = 250$

<sup>1004</sup> The total number of responses:  $N = 266$

### 3.7.3.3 RRI DIMENSION – OPEN AND TRANSPARENT

Overall, there was a level of support towards openness and transparency and public accessibility of results, although the level of accessibility was debated. This was most apparent for ensuring open data, as attitudes and reporting practical steps were low compared to other measures.

#### 3.7.3.3.1 Open and Transparent – Open and Transparent Methods and Processes

The majority of respondents ( $n = 237$ , 91%.) agreed on the importance of ensuring methods and processes were open and transparent (Figure 187)<sup>1005</sup>. Half of the respondents were in strong agreement ( $n = 133$ , 51%). A small portion disagreed ( $n = 13$ , 5%), with ‘*Strongly disagree*’ being the most frequent category ( $n = 8$ , 3%).

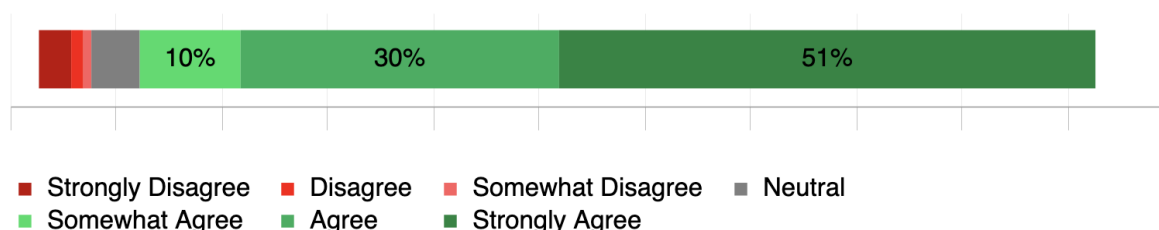
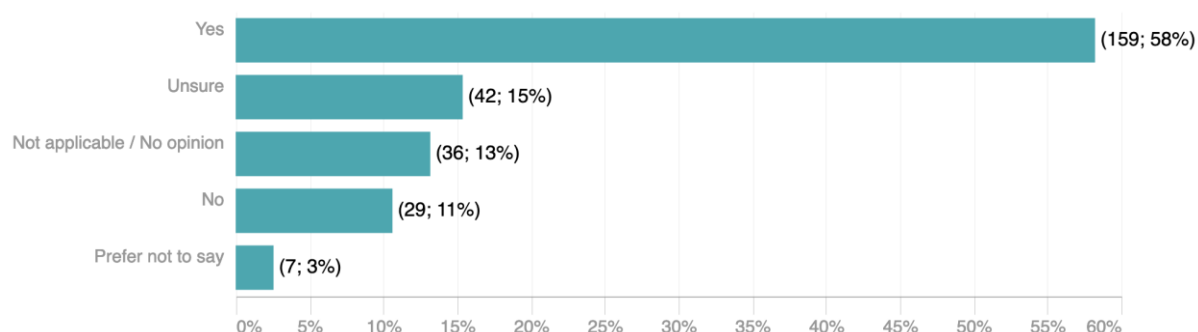


Figure 187: Asian and Pacific States - 'It is important to make my research and innovation methods/processes open and transparent'.

The majority of respondents ( $n = 159$ , 58%) reported taking practical steps to ensure R&I methods/processes are open and transparent (Figure 188)<sup>1006</sup>. This represents 67% of those respondents who indicated a positive attitude towards openness and transparency. A notable but small portion were ‘*Unsure*’ ( $n = 42$ , 15%), followed by ‘*Not applicable / No opinion*’ ( $n = 36$ , 13%), and explicitly negative responses ( $n = 29$ , 11%).



<sup>1005</sup> The total number of responses:  $N = 262$

<sup>1006</sup> The total number of responses:  $N = 273$

Figure 188: Asian and Pacific States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.

### 3.7.3.3.2 Open and Transparent – Public Accessibility

The majority of respondents ( $n = 231$ , 89%.) agreed that wide public accessibility of results was important (Figure 189)<sup>1007</sup>. More than half of respondents were in strong agreement ( $n = 142$ , 55%), while a small portion explicitly disagreed ( $n = 15$ , 6%).

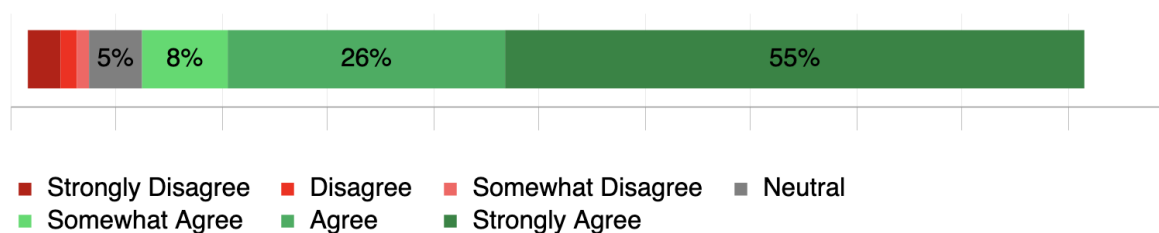


Figure 189: Asian and Pacific States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.

More than half of all respondents reported taking practical steps to make their work publicly accessible ( $n = 171$ , 64%). This represents 74% who indicated a positive attitude towards public accessibility (Figure 190)<sup>1008</sup>. A small number of respondents indicated taking no steps ( $n = 42$ , 16%).

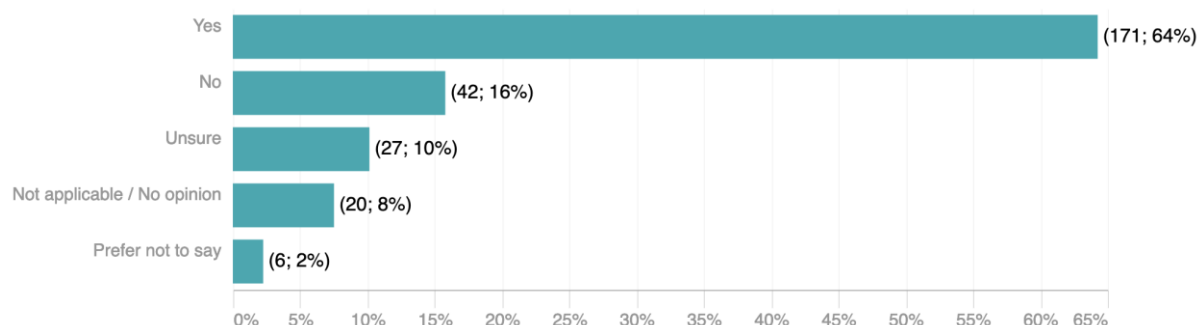


Figure 190: Asian and Pacific States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.

### 3.7.3.3.3 Open and Transparent – Open Data

The majority of respondents agreed on the importance of ensuring their research data was freely and publicly available ( $n = 196$ , 79%) (Figure 191)<sup>1009</sup>. However, this was the lowest level of general agreement for an open and transparent RRI measure. A notable number of respondents

<sup>1007</sup> The total number of responses:  $N = 259$

<sup>1008</sup> The total number of responses:  $N = 266$

<sup>1009</sup> The total number of responses:  $N = 249$

explicitly disagreed ( $n = 25$ , 10%) or responded neutrally ( $n = 28$ , 11%), indicating this issue is a prominent point of contention.

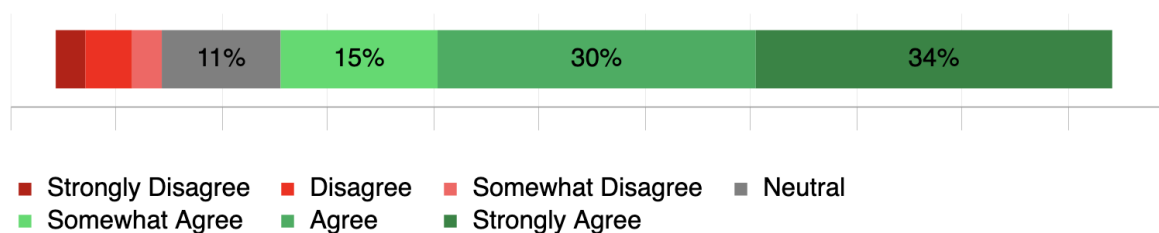


Figure 191: Asian and Pacific States - 'It is important to make data from my research and innovation activities freely available to the public'.

Fewer than half of respondents confirmed they had taken practical steps ( $n = 105$ , 40%) (Figure 192). This represents 54% who indicated a positive attitude towards the public availability of research data. A notable portion indicated taking no steps ( $n = 79$ , 30%).

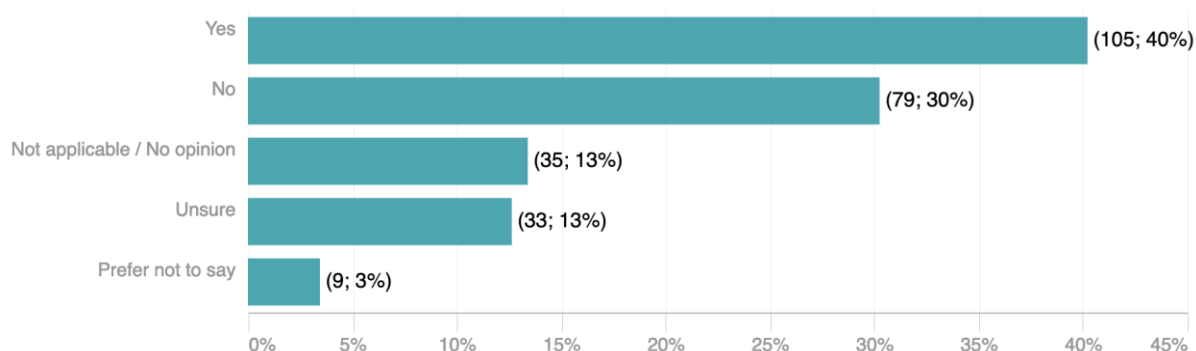


Figure 192: Asian and Pacific States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.

### 3.7.3.4 RRI DIMENSION – RESPONSIVE AND ADAPTIVE TO CHANGE

There was broad agreement regarding being responsive to societal needs. This was the case on both an attitudinal and practical level. Importantly, this measure showed the smallest value-action gap compared to other RRI measures. This indicates that in Asian and Pacific states, there are implementable steps within the R&I systems to ensure their work addresses societal needs.

#### 3.7.3.4.1 Responsive and Adaptive to Change – Societal Needs

The overwhelming majority of respondents agreed that it is important to ensure their work addressed societal needs ( $n = 244$ , 92%). More than half of the respondents agreed at the

strongest level ( $n = 137$ , 52%), few responded neutrally ( $n = 14$ , 5%), and even fewer explicitly disagreed ( $n = 7$ , 3%) (Figure 193)<sup>1010</sup>.

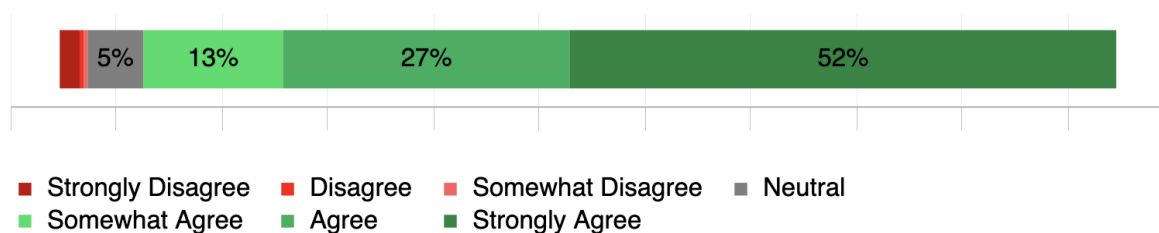


Figure 193: Asian and Pacific States - 'Research and innovation should address societal needs'.

This agreement clearly translated into practical action for the majority who confirmed taking practical steps ensuring their work addressed societal needs ( $n = 187$ , 69%) (Figure 194)<sup>1011</sup>. This accounted for 77% of respondents who agreed it was important and indicated the smallest value-action gap of all RRI measures. A minority stated they were 'Unsure' ( $n = 33$ , 12%), or had not taken any steps ( $n = 22$ , 8%).

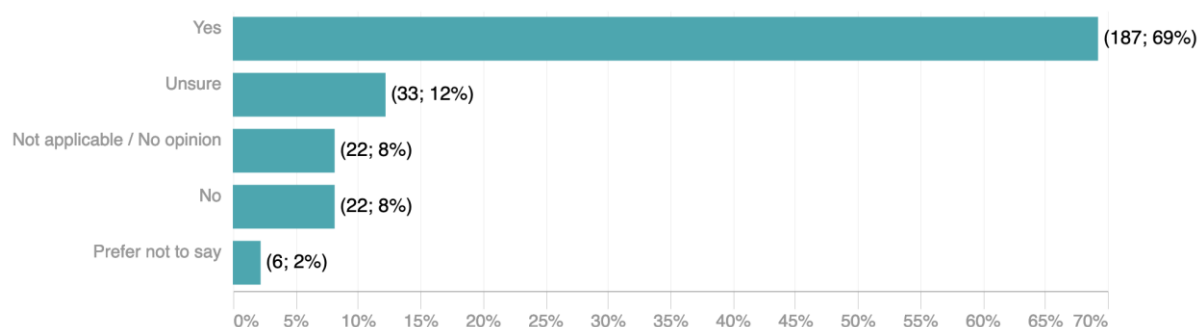


Figure 194: Asian and Pacific States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.

### 3.7.3.4.2 Regulatory Frameworks Relevant to Social Responsibility

Most respondents indicated their work was 'Always' ( $n = 36$ , 17%) guided by regulatory frameworks covering relevant aspects of social responsibility (Figure 195)<sup>1012</sup>. This was closely followed by 'Usually' ( $n = 33$ , 16%), 'Sometimes' ( $n = 32$ , 15%), 'Rarely' ( $n = 26$ , 12%), 'Frequently' ( $n = 25$ , 12%), and 'Occasionally' ( $n = 17$ , 8%).

<sup>1010</sup> The total number of responses:  $N = 265$

<sup>1011</sup> The total number of responses:  $N = 270$

<sup>1012</sup> The total number of responses:  $N = 208$

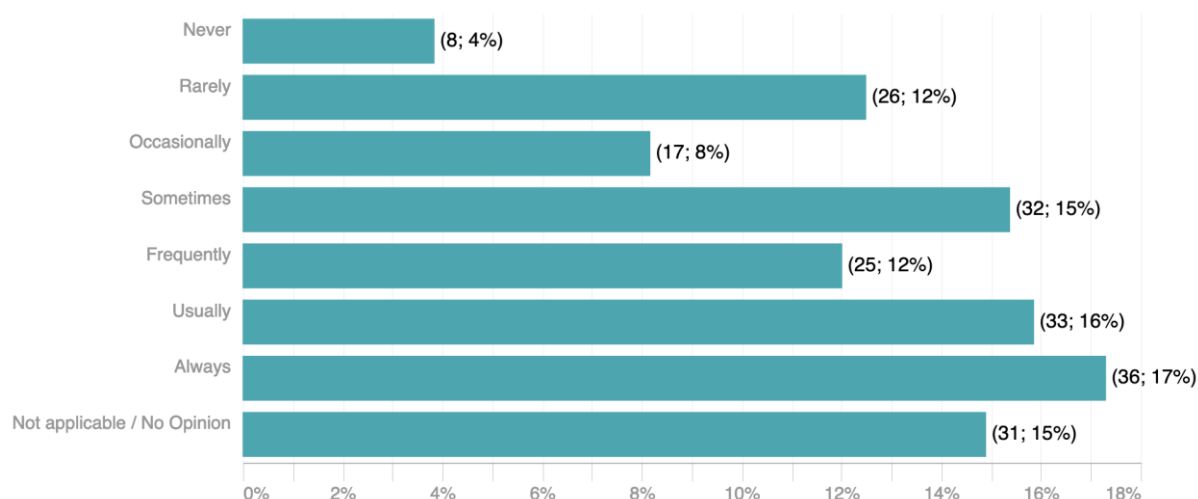


Figure 195: Asian and Pacific States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.

### 3.7.3.4.3 Crosscutting Findings

Overall, there were positive attitudes towards all RRI dimensions, although responses to one variable turned out to be comparatively negative. Agreement with the importance of including ethnic minorities, and indication of practical steps were both the lowest in comparison with the other measures of this dimension. Disagreement with the importance of research data being publicly and freely accessible was considerably higher, and the majority of respondents explicitly indicated they had not taken any steps to ensure accessibility. For all other questions regarding application of the attitudinal measures, most participants indicated that steps had been taken.

Within each RRI dimension, there were considerable discrepancies between supportive attitudes and their translation into action. This was most notable for the *‘diverse and inclusive’* and *‘open and transparent’* dimensions. In contrast, the smallest discrepancy was found for the *‘responsive and adaptive to change’* dimension.

## 3.7.4 RESULTS BY STAKEHOLDER CATEGORIES

### 3.7.4.1 STAKEHOLDER CATEGORY 1 – RESEARCH PERFORMING ORGANISATIONS / ACADEMICS / RESEARCHERS

Respondents indicated a substantial level of engagement with this category compared to others (*Mdn* = 10 h/w) (Figure 196)<sup>1013</sup>. RPOs were the stakeholder category most engaged with for over ten hours in the last seven days (*n* = 84, 36%) and it received the most *‘71+ hours’* interaction responses (*n* = 2, 1%).

<sup>1013</sup> The total number of responses: *N* = 217

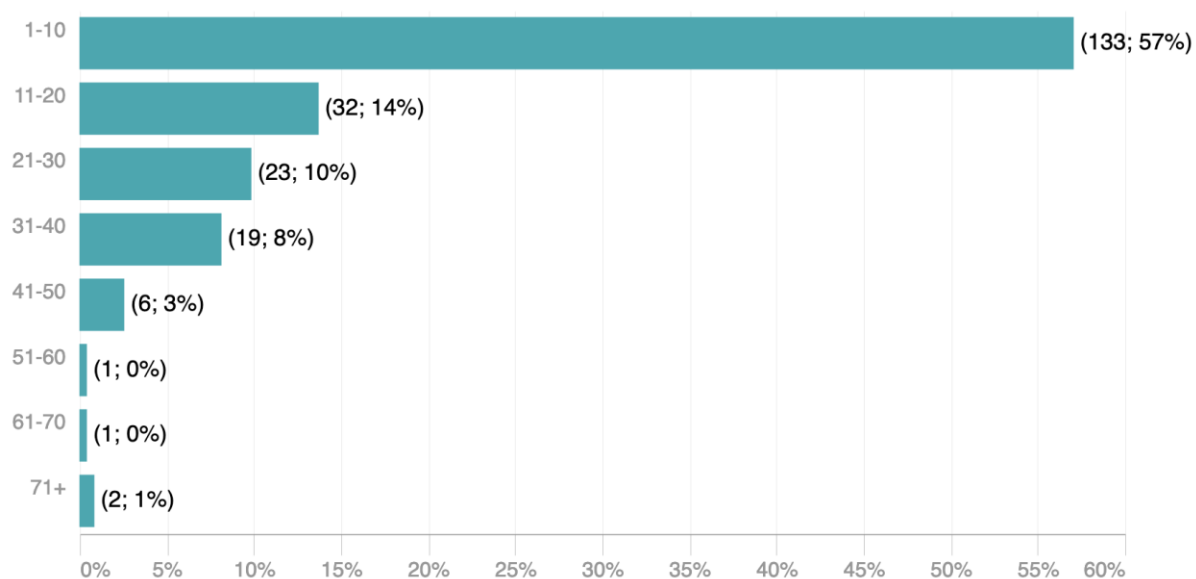


Figure 196: Asian and Pacific States - Hours interacting with research performing organisations/academics/researchers in the last 7 days.

### 3.7.4.2 STAKEHOLDER CATEGORY 2 – RESEARCH FUNDING ORGANISATIONS

Overall, engagement levels with RFOs were diverse, while the median interaction hours were similar to the other categories ( $Mdn = 3$  h/w) (Figure 197)<sup>1014</sup>. Almost half of the respondents indicated interacting with this category for less than 10 hours in the last seven days ( $n = 103$ , 45%), while few respondents ( $n = 6$ , 3%) indicated medium levels of interaction (i.e., between 11 and 20 hours in the last week). Few respondents indicated interacting with this category for more than 20 hours ( $n = 4$ , 0%), one of which even indicated spending 71+ hours ( $n = 1$ , 0%).

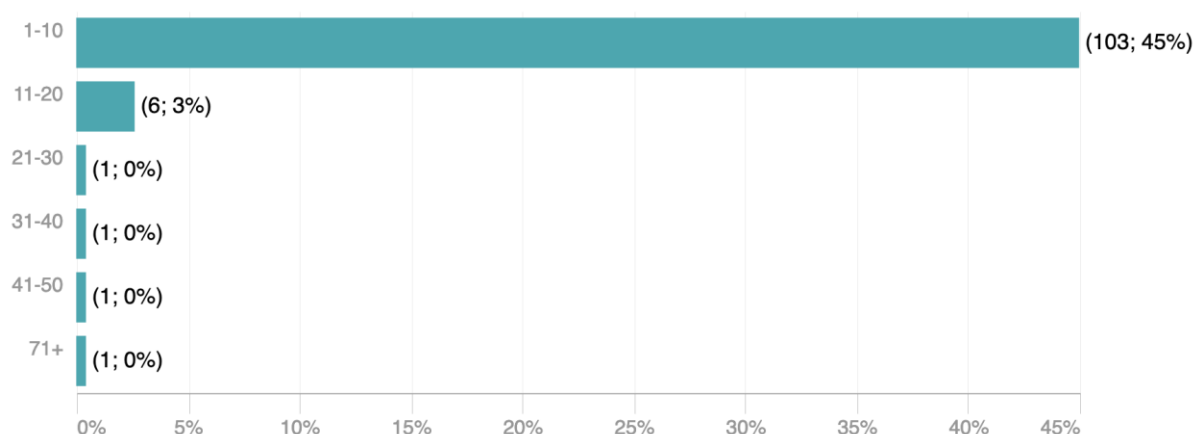


Figure 197: Asian and Pacific States - Hours interacting with research funding organisations in the last 7 days.

<sup>1014</sup> The total number of responses:  $N = 113$

### 3.7.4.3 STAKEHOLDER CATEGORY 3 – INDUSTRY / SMALL- AND MEDIUM-SIZED ENTERPRISES

The median number of hours respondents interacted with small- and medium-sized enterprises were similar to the other categories ( $Mdn = 3$  h/w), while the overall engagement levels were similar to those of RFOs (Figure 198)<sup>1015</sup>. A few respondents ( $n = 12$ , 5%) indicated a medium to high level of engagement (i.e. between 11 and 30 hours in the last week), and only one respondent ( $n = 1$ , 0%) indicated a high level of interaction (i.e. over 50 hours in the last week).

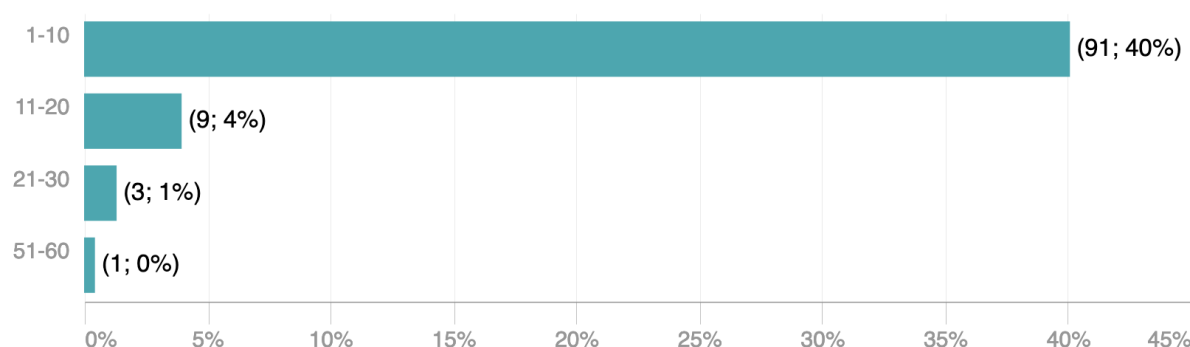


Figure 198: Asian and Pacific States - Hours interacting with industry/small- and medium-sized enterprise in the last 7 days.

### 3.7.4.4 STAKEHOLDER CATEGORY 4 – CIVIL SOCIETY / CITIZENS

Engagement levels with civil society and citizens were similar to the other categories ( $Mdn = 3$  h/w) (Figure 199)<sup>1016</sup>. Most respondents ( $n = 122$ , 53%) spent little time engaging with this category. A few respondents indicated medium to high levels of interaction time (i.e., between 11 and 50 hours in the last week) ( $n = 12$ , 5%).

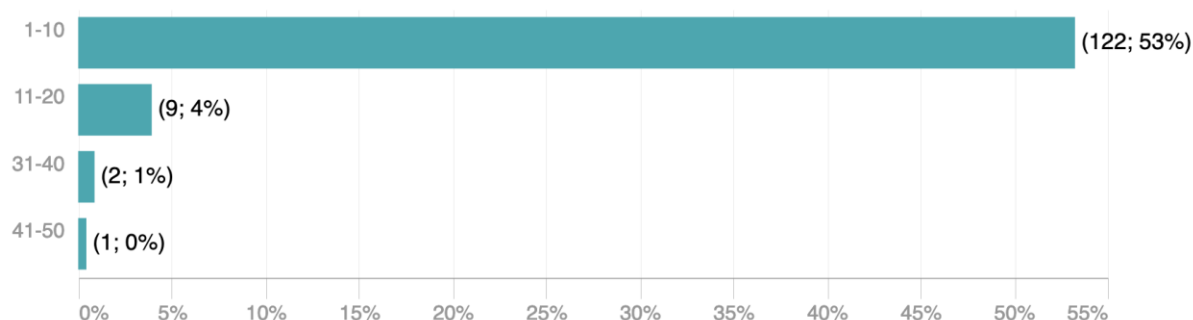


Figure 199: Asian and Pacific States - Hours interacting with civil society/citizens in the last 7 days.

<sup>1015</sup> The total number of responses.  $N = 104$

<sup>1016</sup> The total number of responses:  $N = 134$

### 3.7.4.5 STAKEHOLDER CATEGORY 5 – POLICY MAKERS

On average, policy makers were the stakeholder category which respondents tended to engage with the least ( $Mdn = 2$  h/w) (Figure 200)<sup>1017</sup>. When time was spent, many respondents ( $n = 112$ , 48%) indicated the least amount of time (i.e. between 1 and 10 hours in the last week). Few respondents had medium levels of engagement (i.e. between 11 and 20 in the last week) ( $n = 5$ , 2%) and none of the respondents spent more than 20 hours.

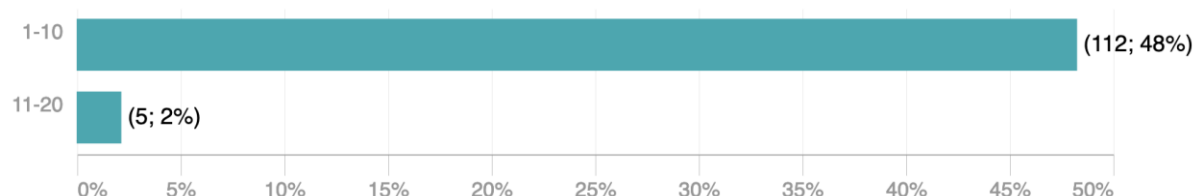


Figure 200: Asian and Pacific States - Hours interacting with policy makers in the last 7 days.

### 3.7.4.6 STAKEHOLDER CATEGORY 6 – NON-GOVERNMENTAL ORGANISATIONS

Engagement with NGOs was similar to the other categories ( $Mdn = 3$  h/w) (Figure 201)<sup>1018</sup>. Most respondents ( $n = 104$ , 45%) indicated low to medium levels of engagement (i.e., between 1 and 20 hours in the last week), and notably few respondents ( $n = 5$ , 2%) indicated higher levels (i.e. over 20 hours in the last week).

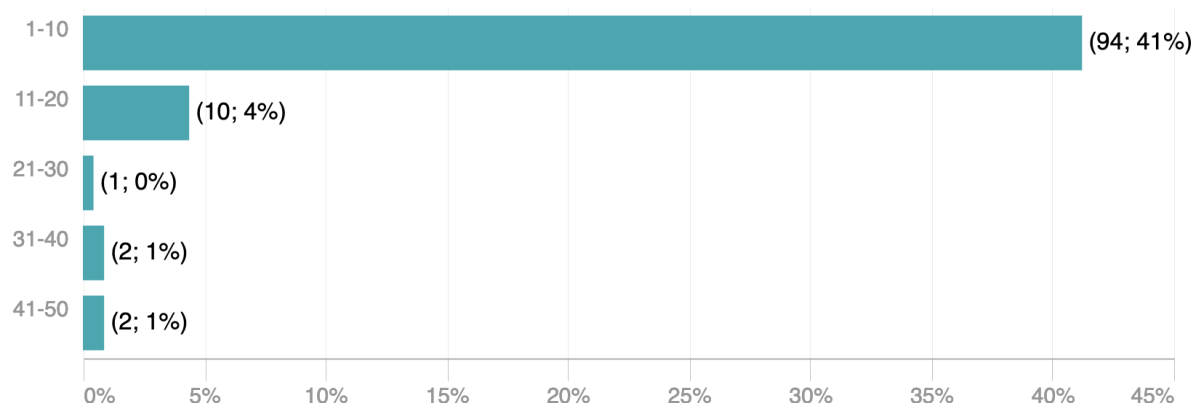


Figure 201: Asian and Pacific States - Hours interacting with NGOs/international organisations in the last 7 days.

<sup>1017</sup> The total number of responses.  $N = 117$

<sup>1018</sup> The total number of responses:  $N = 109$

### 3.7.4.7 OVERVIEW AND COMPARISON OF FINDINGS ACROSS STAKEHOLDER CATEGORIES

Participants engaged disproportionately more frequently with *RPOs, academics and researchers* ( $Mdn = 10$  h/w) (Figure 202)<sup>1019</sup>. The levels of engagement with RFOs, industry, civil society and NGOs were similar, as all had the same median weekly interaction hours ( $Mdn = 3$  h/w). Engagement with policy makers was the lowest among all categories ( $Mdn = 2$  h/w).



Figure 202: Asian and Pacific States - Hours interacting with types of people in the last 7 days (log scale).

### 3.7.5 RESULTS SPECIFIC TO THE UN SUSTAINABLE DEVELOPMENT GOALS

This section explores respondents' level of exposure, attitudes towards, and detailed perspectives about the UN SDGs.

The majority of respondents indicated they are familiar with the UN SDGs ( $n = 204$ , 85%) (Figure 203)<sup>1020</sup>. Respondents expressed being '*Moderately Familiar*' ( $n = 75$ , 31%), while there were fewer respondents who self-reported '*Somewhat Familiar*' ( $n = 48$ , 20%) and '*Extremely Familiar*' ( $n = 44$ , 18%). Fewer but equal numbers of respondents indicated being '*Slightly Familiar*' ( $n = 37$ , 15%), and '*Not at all Familiar*' ( $n = 36$ , 15%).

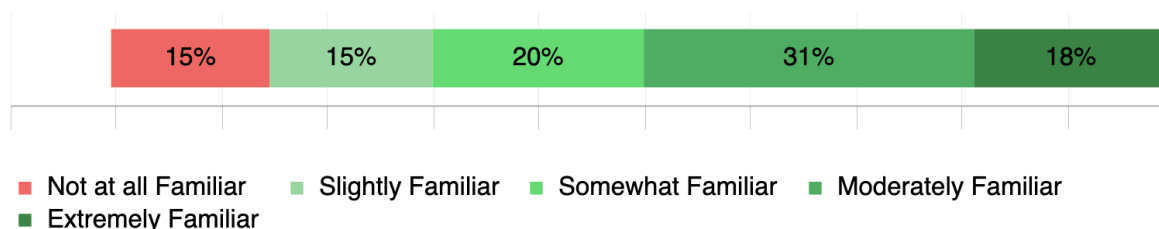


Figure 203: Asian and Pacific States - Participants' familiarity with the UN SDGs.

<sup>1019</sup> The total number of responses:  $N = 217$

<sup>1020</sup> The total number of responses:  $N = 240$

The majority of respondents ( $n = 162$ , 80%) heard or read about the UN SDGs in the last month (Figure 204)<sup>1021</sup>. Among the frequencies, '2-3 times' ( $n = 59$ , 29%) represented the largest group, followed by 'Not at all' ( $n = 33$ , 16%), 'Once per week' ( $n = 29$ , 14%), 'Once' ( $n = 29$ , 14%), '2-3 times a week' ( $n = 19$ , 9%), 'Daily' ( $n = 14$ , 7%), '4-6 times per week' ( $n = 12$ , 6%), and 'Unsure' ( $n = 7$ , 3%).

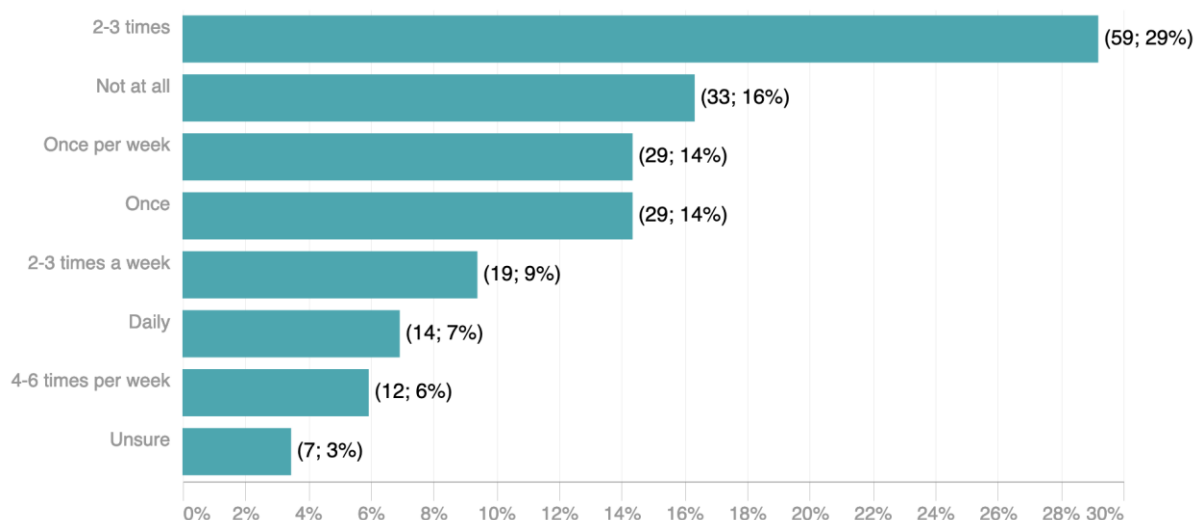


Figure 204: Asian and Pacific States - Heard or read about the UN Sustainable Development Goals in the last 30 days.

The majority of respondents ( $n = 161$ , 80%) thought about the UN SDGs in the last month (Figure 205)<sup>1022</sup>. Among the frequencies, '2-3 times' ( $n = 49$ , 24%) represented the largest group, followed by 'Not at all' ( $n = 35$ , 17%), 'Once per week' ( $n = 29$ , 14%), 'Once' ( $n = 29$ , 14%), '2-3 times a week' ( $n = 24$ , 12%), 'Daily' ( $n = 17$ , 8%), '4-6 times per week' ( $n = 13$ , 6%), and 'Unsure' ( $n = 6$ , 3%).

<sup>1021</sup> The total number of responses:  $N = 202$

<sup>1022</sup> The total number of responses:  $N = 202$

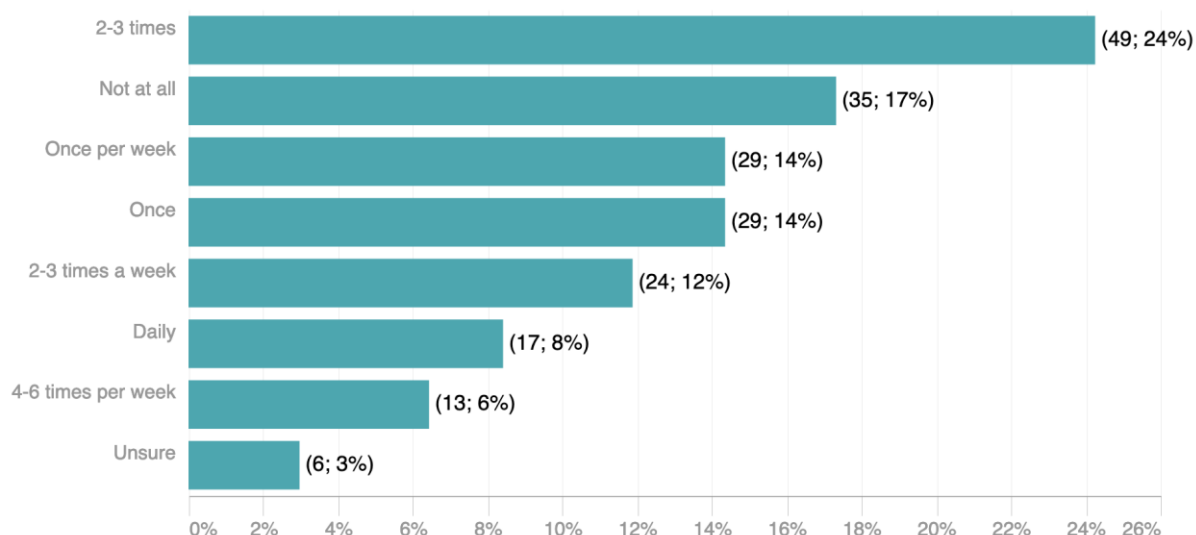


Figure 205: Asian and Pacific States - Thought about the UN Sustainable Development Goals in the last 30 days.

Respondents held mostly positive attitudes about the UN SDGs (Figure 206). Respondents most frequently perceived them as *‘Important’* ( $n = 188, 93\%$ )<sup>1023</sup>, *‘Beneficial’* ( $n = 183, 92\%$ )<sup>1024</sup>, *‘Essential’* ( $n = 181, 90\%$ )<sup>1025</sup>, *‘Relevant’* ( $n = 180, 90\%$ )<sup>1026</sup>, *‘Valuable’* ( $n = 178, 90\%$ )<sup>1027</sup>, and *‘Useful’* ( $n = 178, 89\%$ )<sup>1028</sup>. Negative associations were low overall.

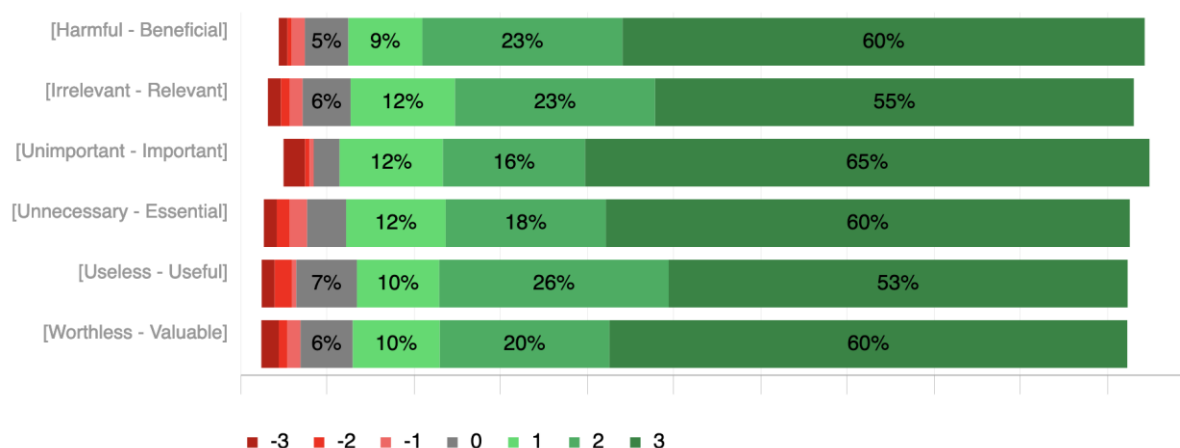


Figure 206: Asian and Pacific States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

Similarly, respondents held mostly positive attitudes about the UN SDGs related to their work (Figure 207). Respondents most frequently perceived the UN SDGs as *‘Important’* ( $n = 169,$

<sup>1023</sup> The total number of responses:  $N = 201$

<sup>1024</sup> The total number of responses:  $N = 199$

<sup>1025</sup> The total number of responses:  $N = 200$

<sup>1026</sup> The total number of responses:  $N = 199$

<sup>1027</sup> The total number of responses:  $N = 199$

<sup>1028</sup> The total number of responses:  $N = 200$

86%)<sup>1029</sup>, ‘Valuable’ ( $n = 167$ , 85%)<sup>1030</sup>, ‘Relevant’ ( $n = 166$ , 84%)<sup>1031</sup>, ‘Beneficial’ ( $n = 166$ , 83%)<sup>1032</sup>, ‘Useful’ ( $n = 162$ , 82%)<sup>1033</sup>, and ‘Essential’ ( $n = 160$ , 81%)<sup>1034</sup>. However, some respondents perceived the UN SDGs as ‘Irrelevant’ ( $n = 16$ , 8%) and ‘Useless’ ( $n = 15$ , 7%). More respondents gave neutral responses related to thoughts for their work compared to their general thoughts.

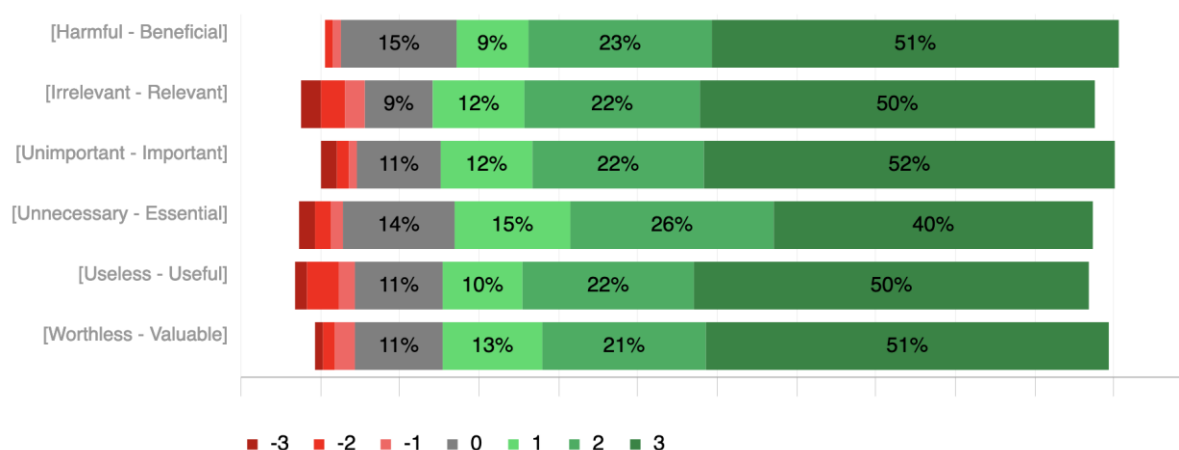


Figure 207: Asian and Pacific States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

Most respondents held positive perceptions on the UN SDGs (Figure 208). Most agreed with the statement ‘The UN Sustainable Development Goals should be a priority for my professional field.’ ( $n = 156$ , 82%)<sup>1035</sup>, followed by ‘The UN Sustainable Development Goals are a priority for me.’ ( $n = 139$ , 73%)<sup>1036</sup>. Results were varied but still positive for ‘I follow stories in the news about the UN Sustainable Development Goals.’ ( $n = 126$ , 66%)<sup>1037</sup> and ‘The UN Sustainable Development Goals represent legally binding international treaties to protect the environment.’ ( $n = 105$ , 58%)<sup>1038</sup>, although they are not actually legally binding. A large portion disagreed with the statement ‘The UN Sustainable Development Goals are focussed only on long-term financial development.’ ( $n = 86$ , 46%)<sup>1039</sup>.

<sup>1029</sup> The total number of responses:  $N = 199$

<sup>1030</sup> The total number of responses:  $N = 199$

<sup>1031</sup> The total number of responses:  $N = 199$

<sup>1032</sup> The total number of responses:  $N = 199$

<sup>1033</sup> The total number of responses:  $N = 199$

<sup>1034</sup> The total number of responses:  $N = 199$

<sup>1035</sup> The total number of responses:  $N = 190$

<sup>1036</sup> The total number of responses:  $N = 190$

<sup>1037</sup> The total number of responses:  $N = 192$

<sup>1038</sup> The total number of responses:  $N = 181$

<sup>1039</sup> The total number of responses:  $N = 185$

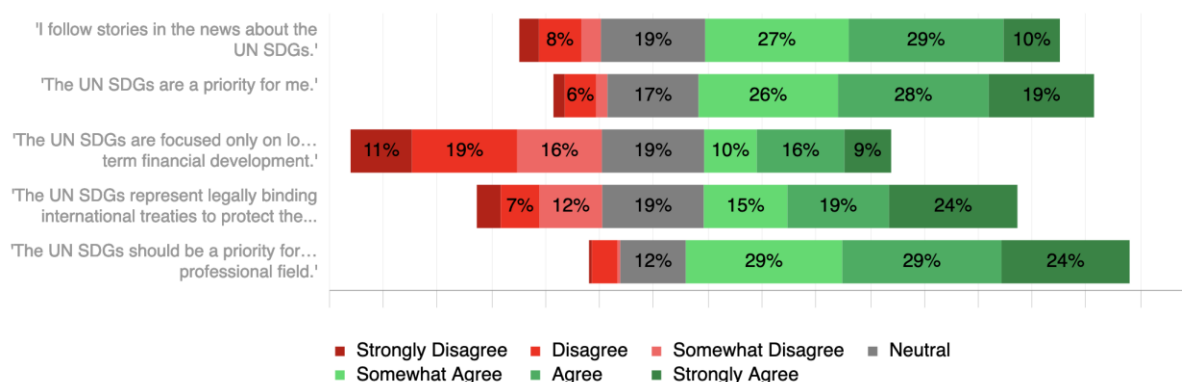


Figure 208: Asian and Pacific States - Detailed perspective on UN SDGs.

## 3.7.6 OPEN-ENDED CONTENT ANALYSIS RESULTS

This section sets out results of the content analysis conducted on the qualitative data obtained through the RRING Research and Innovation Global Survey.

### 3.7.6.1 DIVERSE PERSPECTIVES

This section explores the range of responses given to the question *'Please list the steps you have taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning your research and innovation work.'*

A moderate portion of respondents indicated they had reached out to diverse stakeholders ( $n = 37$ , 28%), with more indicating this engagement in a *'general'* way ( $n = 33$ , 25%). Only a few respondents specified the steps they had actually taken ( $n = 4$ , 3%) (Figure 209)<sup>1040</sup>. Respondents referred to having engaged industry and business ( $n = 15$ , 11%), and policy bodies and policy makers ( $n = 12$ , 9%) most commonly. Civil society organisations (CSOs) were mentioned less often ( $n = 8$ , 6%). This category included entities separated either from the state or the market that have a declared social mandate, such as NGOs.

A large proportion of respondents indicated contributing *'In-reach to other disciplines, researchers, academics, experts or students'* ( $n = 41$ , 31%), which meant respondents had included diverse perspectives from within their academic or professional environment. Another notable proportion indicated involvement in *'Meetings, workshops, focus groups and Consultations'* ( $n = 37$ , 28%).

A small number of respondents indicated taking *'Steps for building collaboration/teams/consortia with no connection to diversity per se'* ( $n = 9$ , 7%), or referred to *'General dissemination/broadcasting/dissemination of information about the*

<sup>1040</sup> The total number of responses:  $N = 258$

*research/innovation work*' ( $n = 10$ , 7%). This category was assigned when respondents indicated one-way dissemination, rather than including external views.

A notable proportion ( $n = 33$ , 25%) gave a '*Non-specific, vague, platitude or virtue signalling response*'.

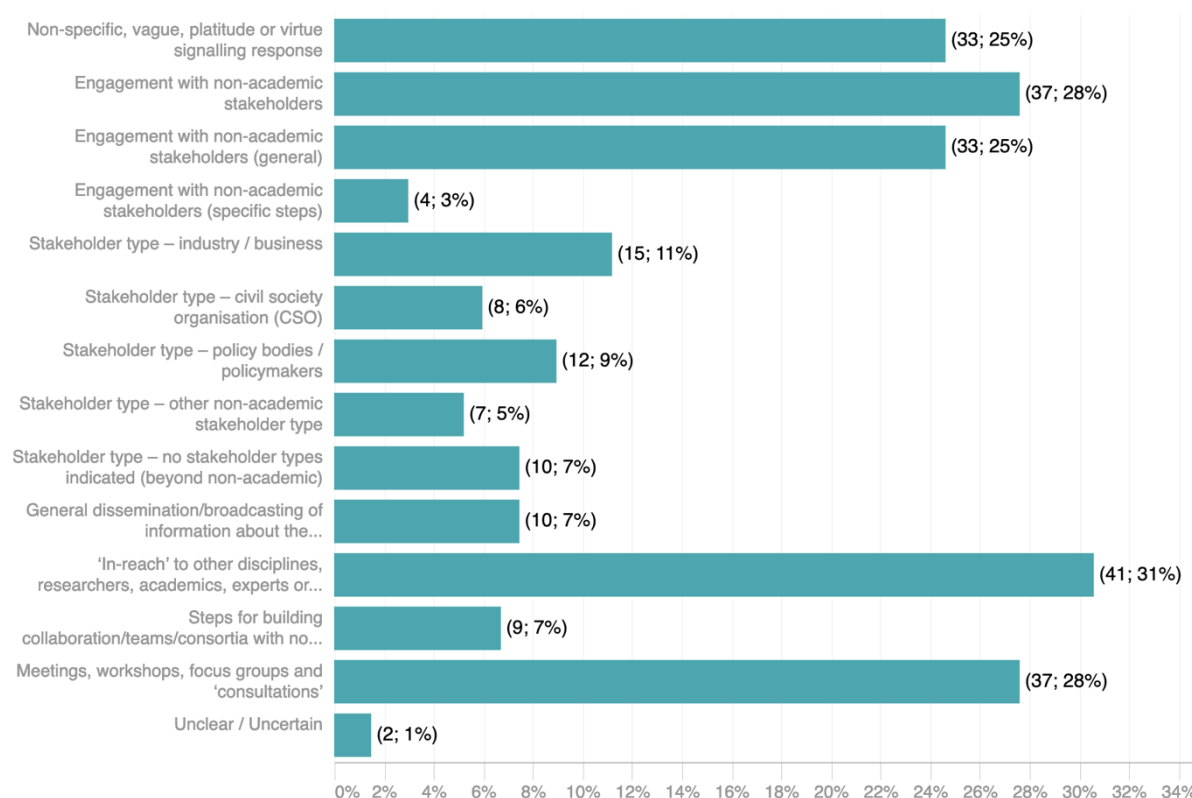


Figure 209: Asian and Pacific States - Steps taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning research and innovation work.

### 3.7.6.2 GENDER EQUALITY

This section explored the range of responses given to the question '*Please list the steps you have taken to promote gender equality in your research and innovation work.*'.

A majority of respondents ( $n = 79$ , 81%) indicated they had promoted gender equality. More respondents referred to taking '*specific steps*' ( $n = 51$ , 52%), over a smaller proportion promoting gender equality in a '*general*' way ( $n = 29$ , 30%) (Figure 210)<sup>1041</sup>.

The most common steps were '*Fostering gender equality in research/innovation teams/workforce*' ( $n = 19$ , 19%), '*Promotion/mentorship of female researchers*' ( $n = 16$ , 16%), and '*Integrating gender as a substantive dimension/focus of R&I content/practice*' ( $n = 15$ , 15%). Few respondents indicated '*Integrating gender equality in research participant selection*' ( $n = 8$ , 8%), or '*Promoting gender equality through delivering or attending training*'

<sup>1041</sup> The total number of responses:  $N = 283$

( $n = 7$ , 7%). Only one respondent ( $n = 1$ , 1%) mentioned ‘*Participation in or engagement with equality committees*’. Many respondents indicated steps that could not be easily categorised ( $n = 22$ , 22%).

A small number of respondents gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 15$ , 15%). This indicated they had promoted or supported gender equality without mentioning the steps they had taken.

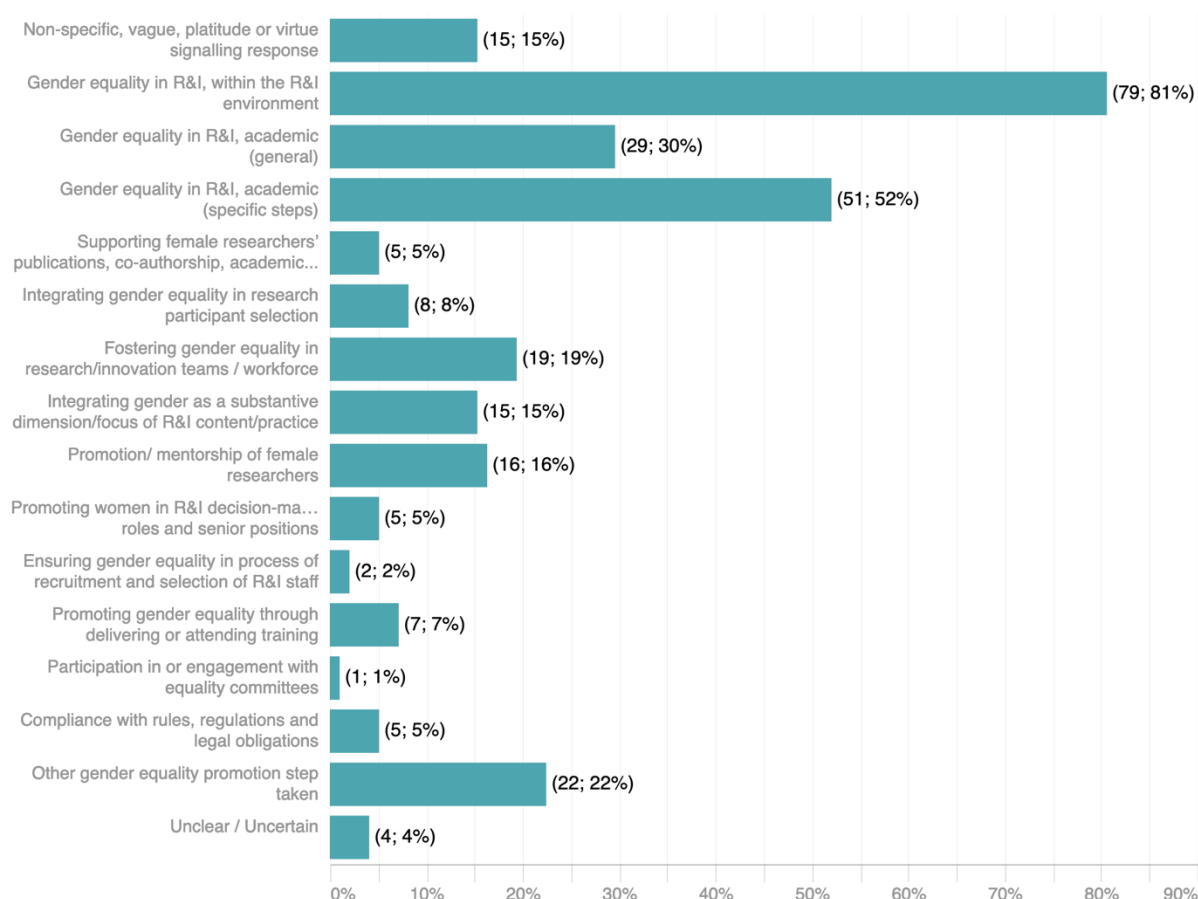


Figure 210: Asian and Pacific States - Steps taken to promote gender equality in research and innovation work.

### 3.7.6.3 ETHNIC MINORITIES

This section explored the range of responses given to the question ‘*Please list the steps you have taken to include ethnic minorities in your research and innovation work.*’.

The majority of respondents ( $n = 48$ , 76%) indicated they had promoted diversity of ethnic minorities, with similar proportions indicating ‘*general*’ views ( $n = 25$ , 40%), over ‘*specific steps*’ ( $n = 23$ , 37%) (Figure 211)<sup>1042</sup>. The most common steps were ‘*Integrating race/ethnicity as a substantive dimension/focus of R&I content/practice*’ ( $n = 17$ , 27%), ‘*Integrating*

<sup>1042</sup> The total number of responses:  $N = 178$

*racial/ethnic equality in research participant selection*’ ( $n = 13$ , 21%), and *‘Fostering racial/ethnic equality in research/innovation teams/workforce’* ( $n = 11$ , 17%). Few respondents indicated *‘Other racial/ethnic equality promotion step[s] taken’* ( $n = 7$ , 11%), and almost none of the respondents were *‘Downplaying, minimising and excusing ethnic diversity issues in R&I’* ( $n = 2$ , 3%).

A minority ( $n = 12$ , 19%) provided *‘Non-specific, vague, platitude or virtue signalling response[s]’*. This indicated they generally supported equality of ethnic minorities without listing practical steps.

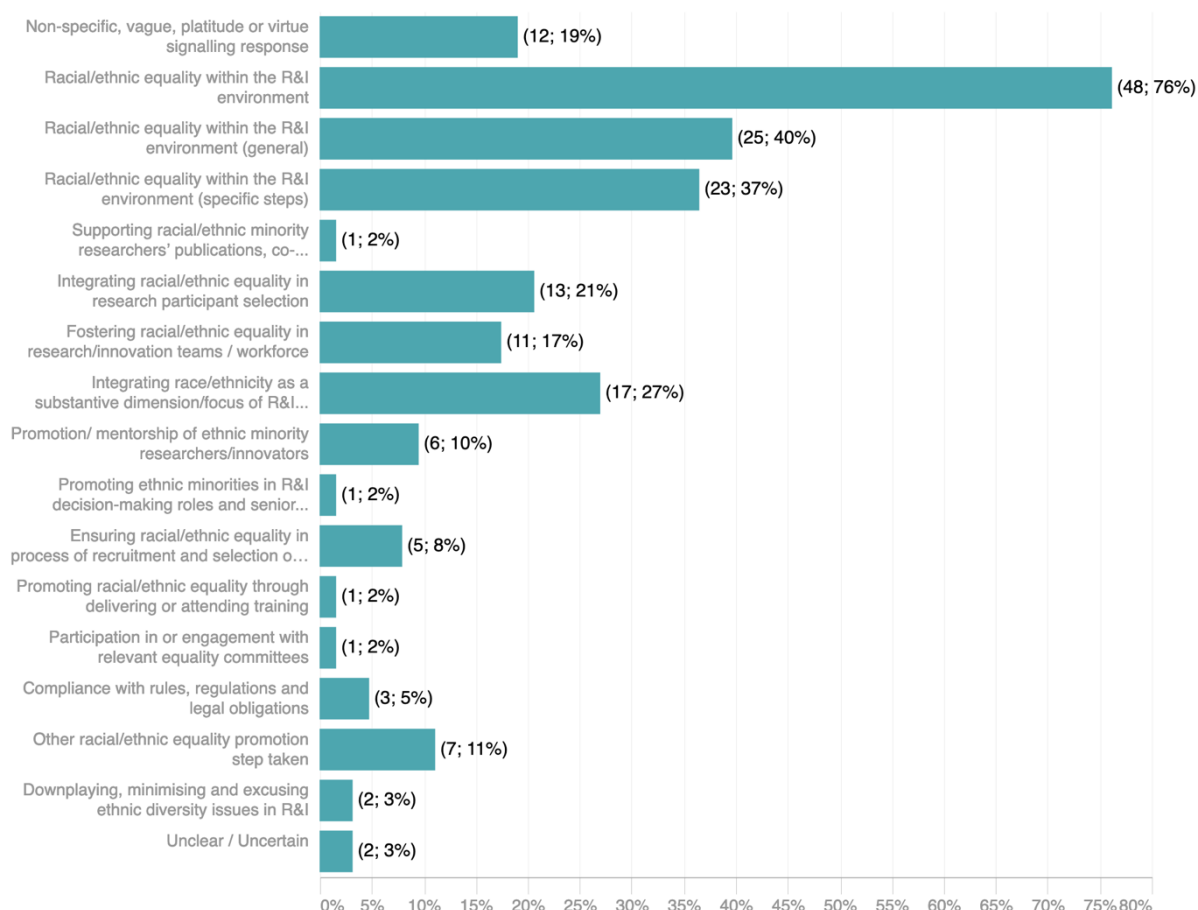


Figure 211: Asian and Pacific States - Steps taken to include ethnic minorities in research and innovation work.

### 3.7.6.4 ETHICS OF RESEARCH

This section explored the range of responses given to the question *‘What steps, if any, have you taken to ensure ethical principles guide your research and innovation work?’*.

Many respondents ( $n = 85$ , 75%) indicated they ‘*Integrat[ed] ethics in [their] R&I work*’, although most provided ‘*general*’ responses ( $n = 64$ , 57%) rather than ‘*specific steps*’ ( $n = 20$ , 18%) (Figure 212)<sup>1043</sup>.

The most common way respondents ensured ethical working practices were through ‘*Participation in or engagement with ethics committees*’ ( $n = 45$ , 40%). Fewer respondents indicated ‘*Compliance with rules, regulations, and legal obligations*’ ( $n = 13$ , 12%). This meant respondents either contributed to or sought advice from ethical committees, while complying with internal rules and legal obligations. Other steps were ‘*Ensuring informed consent with participants*’ ( $n = 8$ , 7%) and ‘*Integrating ethics through respecting intellectual property rights and academic referencing*’ ( $n = 7$ , 6%). The least common steps were ‘*Integrating ethics through shared ownership of the research/research outputs*’ and ‘*Reporting of unethical conduct*’ ( $n = 1$ , 1% for both).

A considerable proportion of respondents ( $n = 28$ , 25%) indicated a general commitment to ethical principles but did not mention any steps, providing a ‘*Non-specific, vague, platitude or virtue signalling response*’.

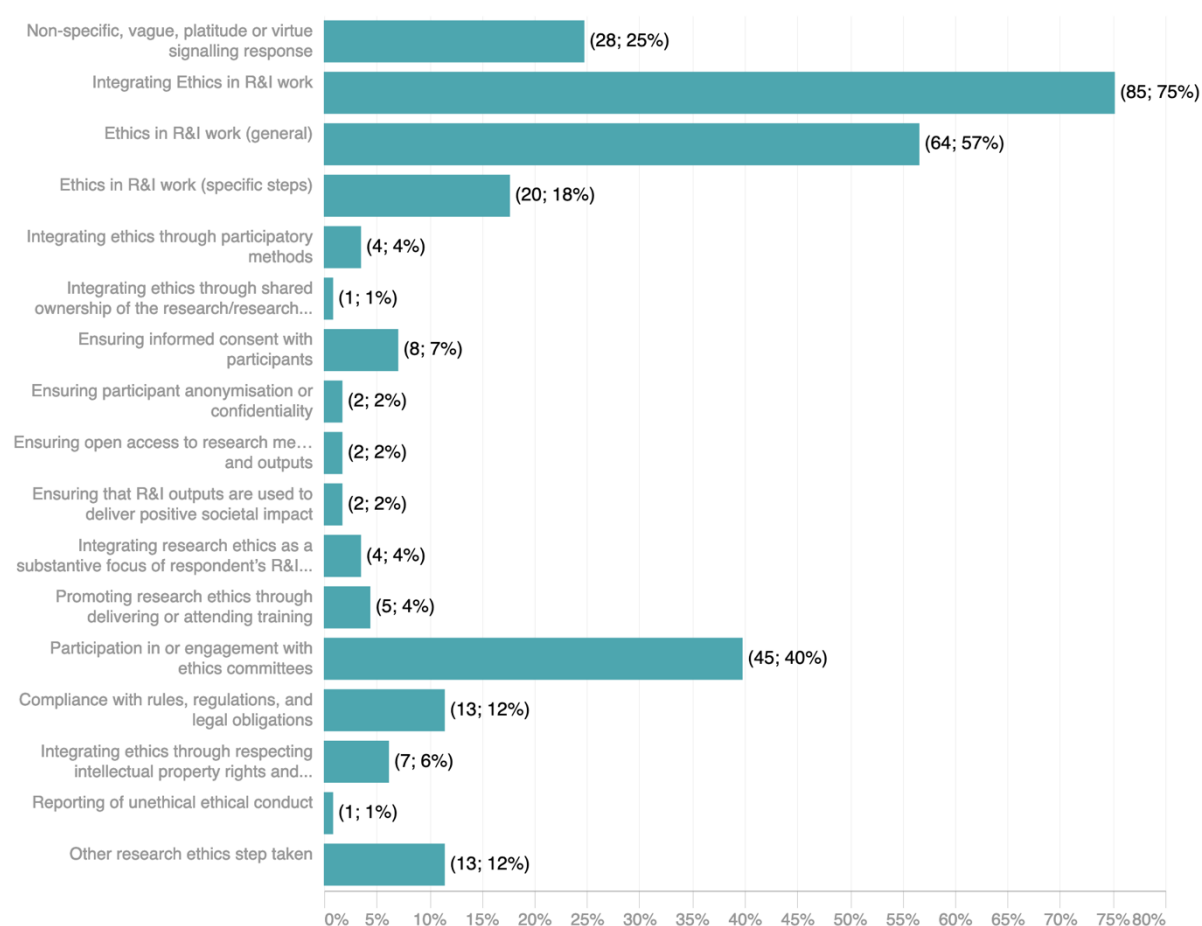


Figure 212: Asian and Pacific States - Steps taken to ensure that ethical principles guide research and innovation work.

<sup>1043</sup> The total number of responses:  $N = 304$

### 3.7.6.5 TRANSPARENCY

This section explored the range of responses given to the question ‘*What steps have you taken to ensure your research and innovation methods/processes are open and transparent?*’.

Half of respondents indicated they carried out ‘*One way dissemination with no reference to research methods/processes*’ ( $n = 67$ , 50%) without specifying how they ensured transparency (Figure 213)<sup>1044</sup>. The same number of respondents ( $n = 67$ , 50%) indicated having taken ‘*Pathways to open and transparent R&I methods and outputs*’. Fewer respondents provided ‘*general*’ steps ( $n = 25$ , 19%), in comparison with those who indicated having taken ‘*specific steps*’ ( $n = 43$ , 32%).

In terms of practical steps, most ‘*Document[ed]/report[ed] research and decision-making processes*’ ( $n = 33$ , 25%) in at least a semi-public form that allowed for scrutiny of methods and decision-making. More respondents indicated ‘*Seeking upstream academic/researcher feedback on research ideas or plans*’ ( $n = 11$ , 8%), than ‘*Seeking upstream feedback on research ideas/plans from non-academics/non-researchers*’ ( $n = 7$ , 5%). ‘*Participation in or engagement with relevant committees*’ and ‘*Seeking approval for methods/processes in research applications*’ were the least frequently taken steps ( $n = 4$ , 3% for both).

Only a few respondents provided answers coded as a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 15$ , 11%).

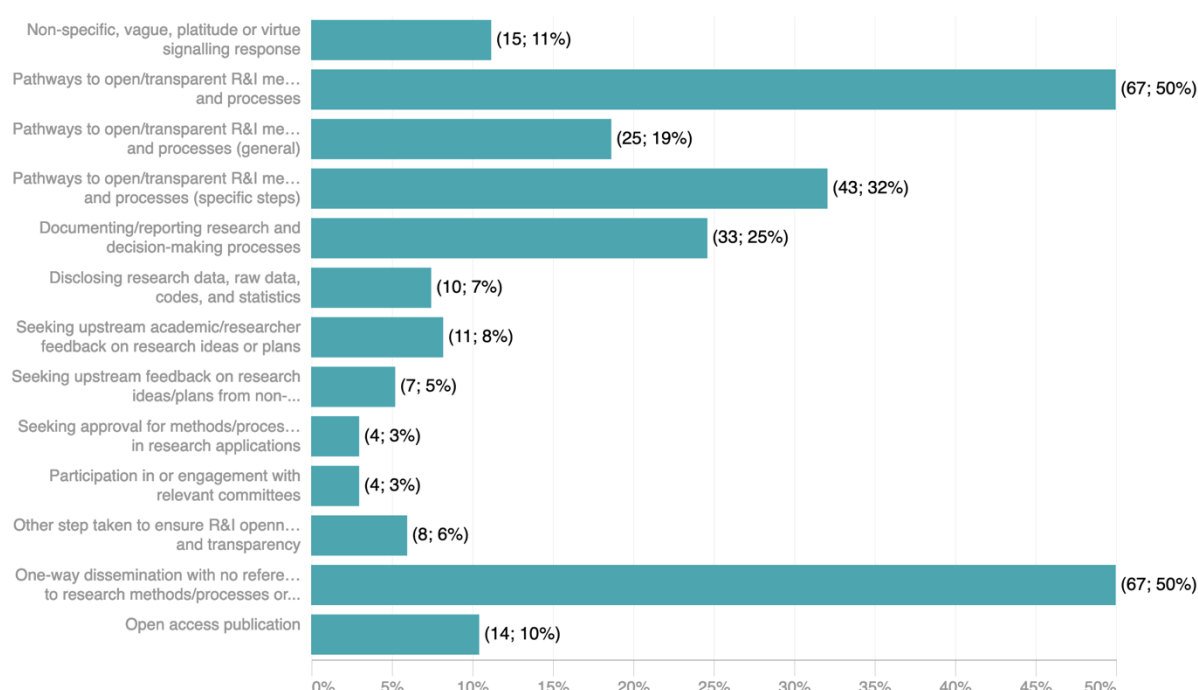


Figure 213: Asian and Pacific States - Steps taken to ensure research and innovation methods/processes are open and transparent.

<sup>1044</sup> The total number of responses:  $N = 308$

### 3.7.6.6 PUBLIC ACCESSIBILITY

This section explored the range of responses given to the question *‘What steps, if any, have you taken to make the results of your research and innovation work accessible to as wide a public as possible?’*.

A considerable proportion of respondents described steps on *‘Sharing R&I work within professional R&I stakeholder environments’* ( $n = 64$ , 43%). This indicated they had not made their research results available to the general, non-academic public (Figure 214)<sup>1045</sup>.

However, most respondents ( $n = 94$ , 64%) indicated they had shared their findings with the public. More respondents ( $n = 85$ , 57%) reported taking *‘specific steps’* towards public accessibility of R&I results, compared to a small proportion who referred to a *‘general’* compliance ( $n = 12$ , 8%).

The most common steps were *‘Personally publishing/disseminating R&I outputs to the public outside of scholarly publishing’* ( $n = 27$ , 18%) and *‘Open access scholarly publishing’* ( $n = 26$ , 18%). This was followed by *‘Engaging with non-academic/public stakeholders through outreach activities after research is completed’* ( $n = 21$ , 14%). The least common steps were *‘Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research’* ( $n = 3$ , 2%) and *‘Efforts to facilitate public understanding of R&I results’* ( $n = 2$ , 1%).

A few respondents provided answers which were coded as a *‘Non-specific, vague, platitude or virtue signalling response’* ( $n = 6$ , 4%).

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<sup>1045</sup> The total number of responses:  $N = 380$

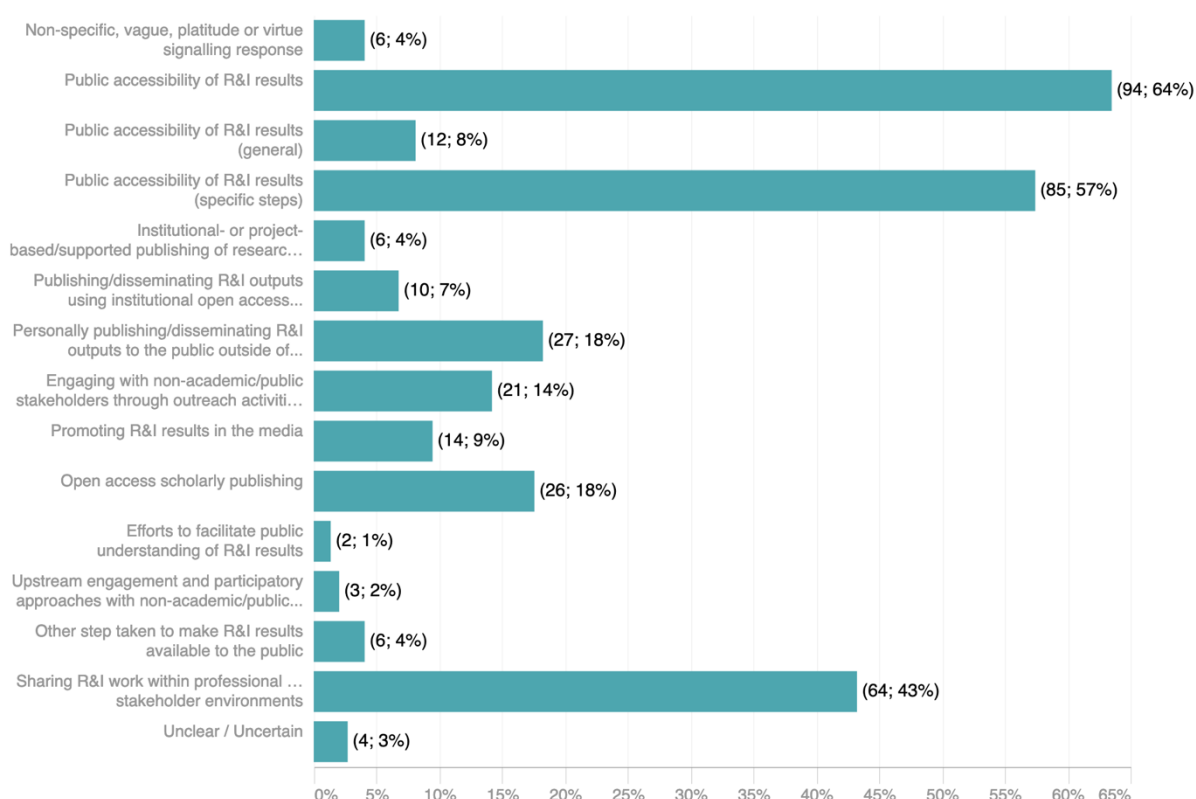


Figure 214: Asian and Pacific States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.

### 3.7.6.7 OPEN DATA

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to make the data from your research and innovation activities freely available to the public?*’.

Relative to the other categories, more than half of respondents were ‘*Confusing open access to research findings and open data*’ in their responses ( $n = 44$ , 52%). They had described making their research findings or outputs freely available, but not the data used to generate them (Figure 215)<sup>1046</sup>.

Few respondents indicated ‘*Public availability of R&I data*’ ( $n = 18$ , 21%). A higher proportion gave ‘*general*’ information ( $n = 10$ , 12%) as opposed to having listed ‘*specific steps*’ ( $n = 8$ , 9%). Most commonly, respondents indicated ‘*Publishing data in public repositories*’ ( $n = 5$ , 6%). Respondents also indicated steps that could not be easily categorised ( $n = 12$ , 14%).

A considerable proportion of respondents ( $n = 22$ , 26%) gave a ‘*Non-specific, vague, platitude or virtue signalling response*’. This applied to responses indicating respondents had made their data or generic ‘*work*’ freely available, without specifically indicating how.

<sup>1046</sup> The total number of responses:  $N = 125$

Few respondents negated the necessity for open access. This was categorised as ‘*Resisting/delimiting open data or supporting closed data*’ ( $n = 2$ , 2%).

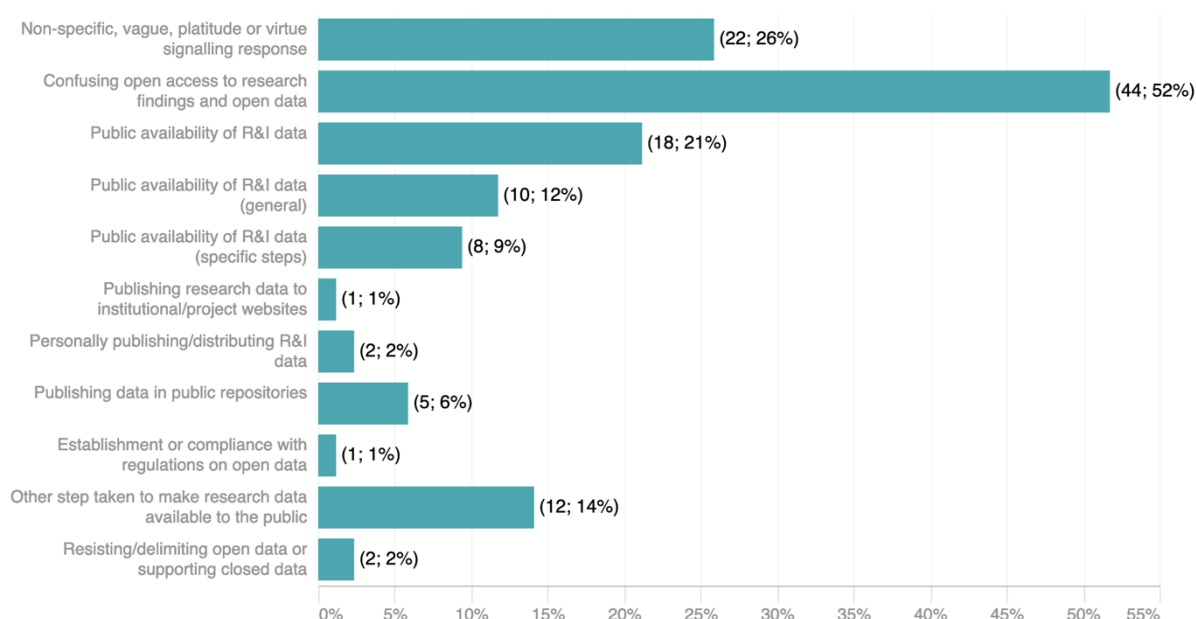


Figure 215: Asian and Pacific States - Steps taken to make the data from research and innovation activities freely available to the public.

### 3.7.6.8 SOCIETAL NEEDS

This section explored the range of responses given to the question ‘*What steps have you taken to ensure your research and innovation work addresses societal needs?*’.

A large proportion of respondents ( $n = 129$ , 89%) indicated they had taken steps toward ‘*Addressing societal needs in R&I work*’ (Figure 216)<sup>1047</sup>. More gave ‘*general*’ information ( $n = 83$ , 57%), as opposed to listing ‘*specific steps*’ ( $n = 49$ , 34%).

The most common specific step was ‘*Selection of research topic/problem defined by researchers’ perceptions of societal needs*’ ( $n = 74$ , 51%). Other steps were less common, such as ‘*Societal issues as a substantive dimension in R&I content/focus*’ ( $n = 18$ , 12%) and ‘*Communicating R&I work/activities to public/non-academic stakeholders*’ ( $n = 14$ , 10%). Few respondents indicated their research design or methodological approach were informed by societal needs, which was coded as ‘*Participatory process: research design/approach defined by societal needs*’ ( $n = 4$ , 3%). The least common step was ‘*Compliance with institutional/funding requirements*’ ( $n = 1$ , 1%), indicating few respondents ensured their work addressed societal needs because of bureaucratic requirements.

Few respondents ( $n = 14$ , 10%) gave a ‘*Non-specific, vague, platitude or virtue signalling response*’.

<sup>1047</sup> The total number of responses:  $N = 423$

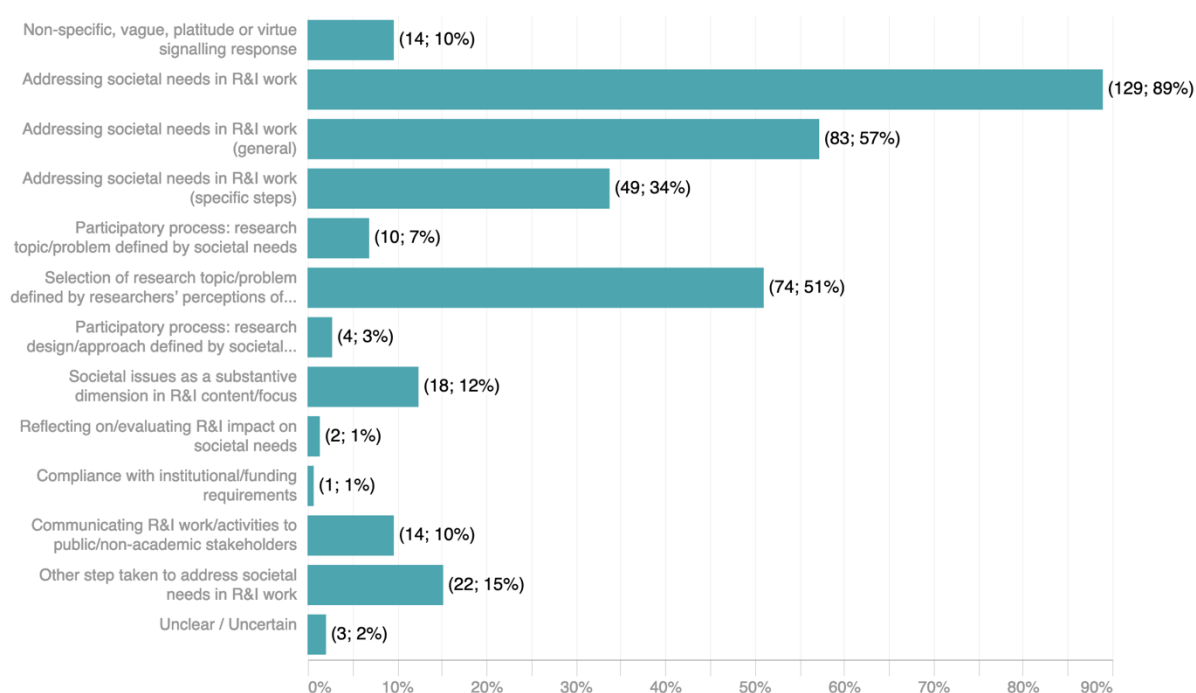


Figure 216: Asian and Pacific States - Steps taken to ensure research and innovation work addresses societal needs.

### 3.7.6.9 SOCIETAL CONCERNS

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to ensure that the way you do your work does not cause concerns for society?*’.

A large proportion of respondents ( $n = 79$ , 83%) indicated ‘*Addressing societal concerns about implementation of R&I work*’, meaning they were taking measures to ensure their work did not cause concerns for society, or integrating societal views and perspectives (Figure 217)<sup>1048</sup>. More provided ‘*general*’ answers ( $n = 45$ , 47%), as opposed to listing ‘*specific steps*’ ( $n = 34$ , 36%). The most common practical steps included ‘*Participation in or engagement with relevant committees*’ ( $n = 17$ , 18%), and ‘*Compliance with rules, regulations or legal obligations*’ ( $n = 14$ , 15%). Fewer respondents indicated ‘*Seeking upstream feedback from non-R&I stakeholders on R&I ideas/plans*’ ( $n = 12$ , 13%), and ‘*Ensuring integrity in R&I processes involving human participants*’ ( $n = 11$ , 12%).

A few respondents ( $n = 15$ , 16%) reported addressing societal concerns in a ‘*Non-specific, vague, platitude or virtue signalling*’ way.

<sup>1048</sup> The total number of responses:  $N = 281$

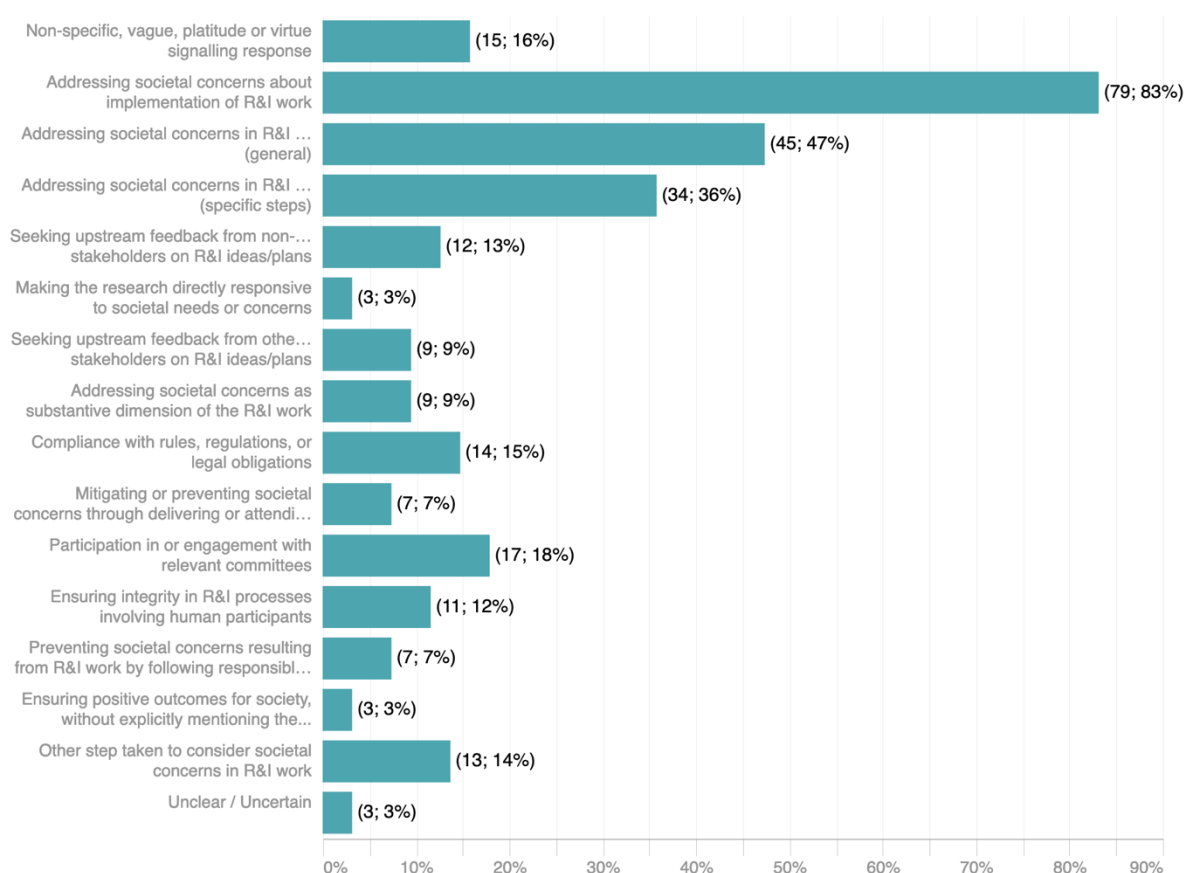


Figure 217: Asian and Pacific States - Steps taken to ensure that the way work is done does not cause concerns for society.

### 3.7.6.10 ASSOCIATIONS WITH RRI

This section explored the range of responses given to the question “*What comes to mind when you think of ‘responsible research and innovation’?*”.

The majority of respondents referred to ‘*Ideas, practices or policies associated with RRI*’ ( $n = 87, 61\%$ ) (Figure 218)<sup>1049</sup>. The most common associations with RRI were in a societal context. Many respondents associated it with ‘*Aligning research and innovation with societal benefits*’ ( $n = 47, 33\%$ ). This was applied to responses suggesting R&I needs to be socially relevant, create value for society, generate knowledge relevant to society, or contribute to a greater societal benefit. The next most common associations were ‘*Do no harm to people/society/participants with R&I*’ ( $n = 14, 10\%$ ) and ‘*Ensuring norms/practices evincing research integrity and high professional standards*’ ( $n = 10, 7\%$ ). Other common associations were ‘*Integrating/anticipating public perspectives in research and innovation*’ ( $n = 9, 6\%$ ) and ‘*Protecting the environment, preventing negative impacts of research and innovation on the environment*’ ( $n = 8, 6\%$ ). Fewer respondents associated RRI with ethics and integrity, as only a small number indicated ‘*Ensuring ethical procedures and approvals are completed in R&I*

<sup>1049</sup> The total number of responses:  $N = 278$

work’ ( $n = 8$ , 6%) and ‘*Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty*’ ( $n = 8$ , 6%).

A notable proportion gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 50$ , 35%). This applied to responses effectively repeating the term ‘*responsible research and innovation*’ in different ways. This was through use of abstract terms that were not linked to a sense of responsibility or included generic mentions of research standards and societal issues without referring to ‘*responsibility*’ as such.

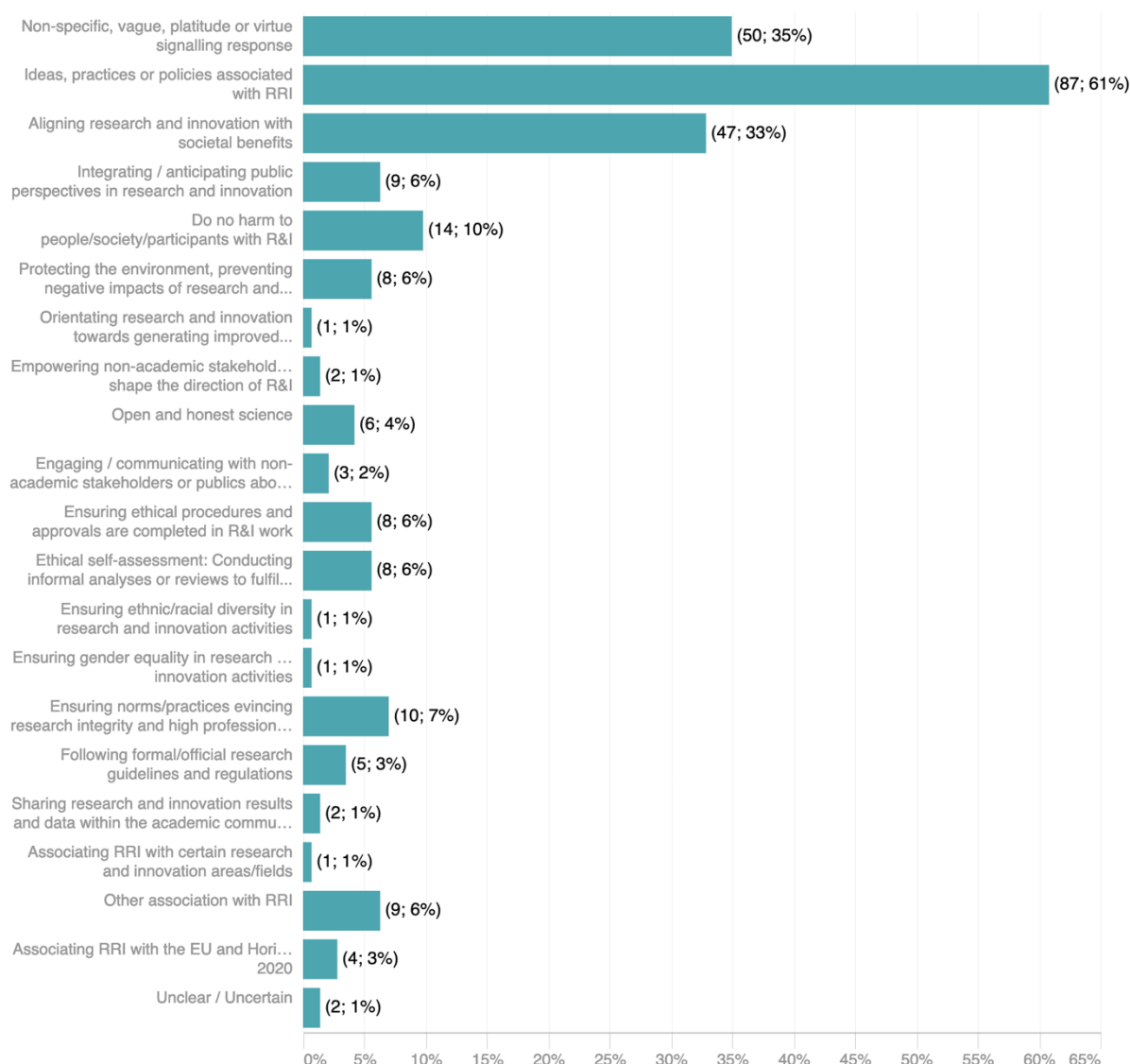


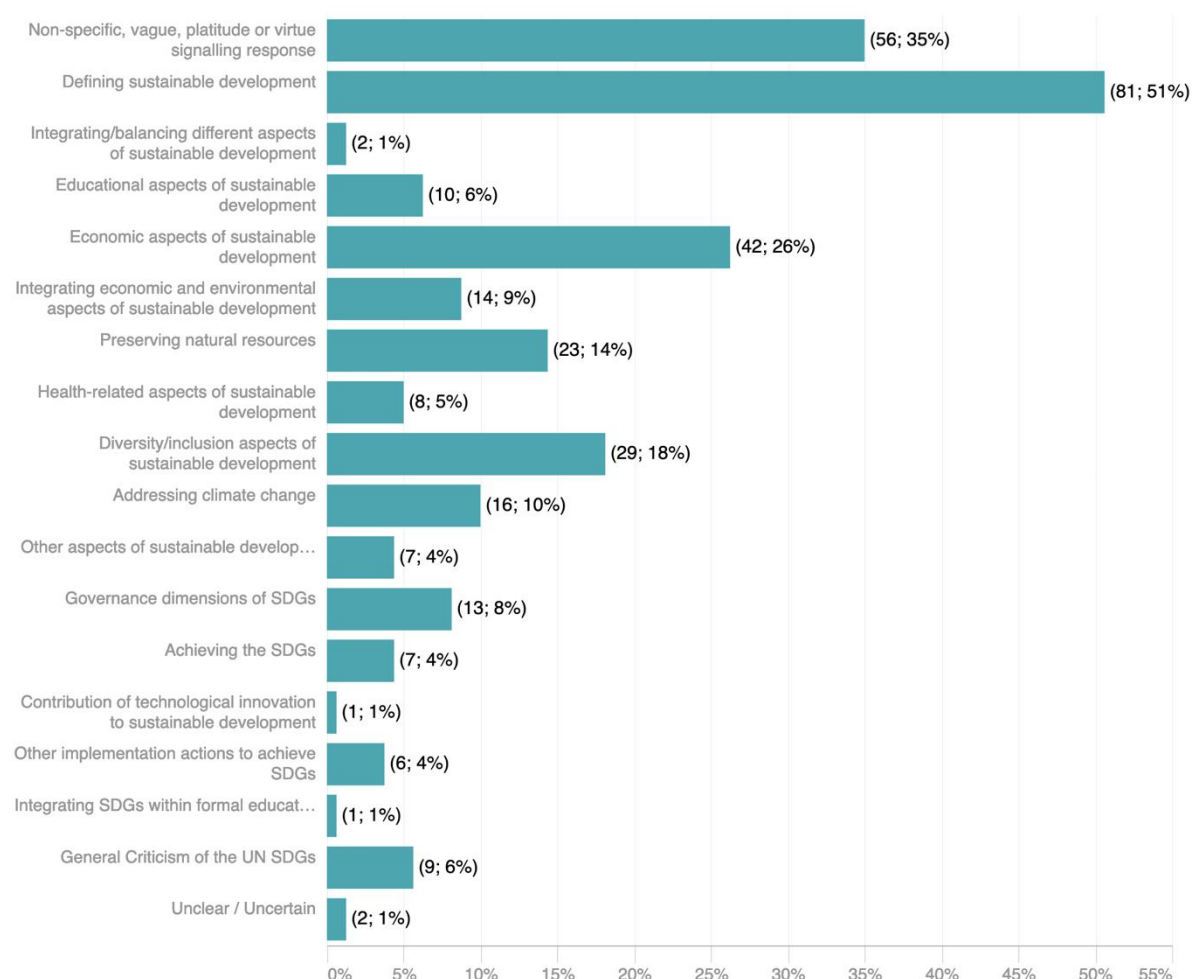
Figure 218: Asian and Pacific States - What comes to mind when you think of ‘responsible research and innovation’?

### 3.7.6.11 ASSOCIATIONS WITH UN SDGS

This section explored the range of responses given to the question ‘*What comes to mind when you think of the UN Sustainable Development Goals?*’.

More than half of respondents more specifically ‘*Defin[ed] sustainable development*’ ( $n = 81$ , 51%), as entailing social, economic, and environmental aspects, such as associations with health, natural resources, and climate change (Figure 219)<sup>1050</sup>. ‘*Economic aspects of sustainable development*’ were indicated by the most respondents ( $n = 42$ , 26%). Less indicated ‘*Diversity/inclusion aspects of sustainable development*’ ( $n = 29$ , 18%), followed by ‘*Preserving natural resources*’ ( $n = 23$ , 14%). Many respondents referred to ‘*Governance dimensions of SDGs*’ ( $n = 13$ , 8%), and therefore did not actually define them. This was applied when respondents mentioned international and/or national governance issues or drivers related to sustainable development or the UN SDGs. This included national, multi-national or global geopolitical dynamics, transnational collaboration, as well as challenges or shared targets at this level. Few respondents referred to ‘*Achieving the SDGs*’ in terms of specific implementation steps for successful delivery ( $n = 7$ , 4%).

A notable proportion responded in ways that were ‘*Non-specific, vague, platitude or virtue signalling response[s]*’ ( $n = 56$ , 35%). Respondents may have indicated they had heard of the UN SDGs, or referred to sustainability in general, but did not give any further relevant details.



<sup>1050</sup> The total number of responses:  $N = 327$

Figure 219: Asian and Pacific States - What comes to mind when you think of the UN Sustainable Development Goals?

### 3.7.7 SUMMARY OF FINDINGS

Socio-demographic results from the Asian and Pacific regions revealed the sample's gender distribution was slightly skewed towards men, with most working in a '*University or similar research performing organisation*' within the fields of '*Social sciences*'.

Results by dimension of Responsible Research & Innovation (RRI) showed overall agreement on an attitudinal level, with value-action gaps for all measures. The gap was strongest for the inclusion of ethnic minorities, which displayed the lowest level of total agreement on an attitudinal level. The results showed a considerable disagreement with the importance of publicly and freely accessible research data, which further translated into a lack of practical steps. For all other questions regarding practical actions, most respondents indicated steps had been taken. However, within each RRI dimension, there were considerable discrepancies between supportive attitudes and the behavioural components (i.e., putting their attitude into practice). This was most notable for both the 'diverse and inclusive' and 'open and transparent' dimensions. The closest alignment was for the 'responsive and adaptive' dimension.

Results by stakeholder categories indicated disproportionately higher engagement with research performing stakeholders, such as RPOs, academics and researchers. This is most likely due to academic collaborations and joint research projects. Levels of engagement were similar for all other categories, although among these, policy makers were interacted with least frequently.

Measuring diverse perspectives, as part of RRI, related to researchers and innovators reaching out beyond academia to diverse stakeholders. Results for '*Diverse Perspectives*' showed that respondents most commonly connected with industry and business, and policy bodies and policy makers. The most frequently reported practical steps for reaching out were through '*Meetings, workshops, focus groups and "consultations"*'. Engagement with civil society organisations (CSOs) scored lowest, although respondents indicated weekly interaction with this stakeholder category. Many respondents indicated they diversified their perspectives by approaching other researchers, academics and experts, which suggests this is a common practice of many research processes.

Measures relating to '*Gender Equality*' identified a shift towards monitoring equality within research teams and promoting female researchers. These steps were taken rather than, for example, providing gender training or engaging in equality committees. Results showed its perceived importance as respondents mentioned specific steps, such as ensuring equality within research teams, promoting equality through training, or integrating it as a substantive focus of R&I practice. A similar trend emerged in the '*Ethnic Minorities*' results, as promoting researchers from ethnic minorities was considerably lower than for the gender equality measures. However, integrating ethnicity as a substantive dimension of R&I work was still the

most frequently indicated step. The overall low response rate for steps towards including ethnic minorities suggests this aspect of RRI is not yet widely implemented in respondents' R&I work.

Results for *'Ethics of Research'* indicated respondents had adopted practical steps to ensure the integration of ethical principles. The specific steps described indicated normative approaches widely embedded in RPOs through ethics committees, as well as rules, regulations, and legal obligations. Ensuring informed consent with participants, and respecting intellectual property rights, were also frequently reported.

The measures applied to identify 'openness and transparency' revealed respondents generally shared perspectives related to conventional research processes. Results for *'Transparency'* indicated that a high number of respondents assumed one-way dissemination as a viable pathway for open and transparent methods and processes. As a pathway, many respondents reported to document and report their research and decision-making processes.

Results for *'Public Accessibility'* showed that most respondents were personally publishing or disseminating their R&I outputs to the public, or referred to open access publishing, or were engaging with public stakeholders through outreach activities beyond open publishing. Respondents who only indicated publications were not included in the data, although it was frequently mentioned. This suggests most respondents from Asian and Pacific states associate dissemination and outreach activities with public accessibility. This trend became clearer when looking at the respondents' comprehension of making data publicly available. Results for *'Open Data'* revealed that respondents confused open data with open access by describing processes of making their research findings or outputs freely available. This could imply ensuring open access is the predominant step respondents associated with research findings and open data, and that this RRI measure is not considered a normative approach to research and innovation.

Addressing societal needs in R&I seemed to be predominantly related to finding a relevant research and innovation topic, rather than empowering relevant groups of people to decide how the process is shaped. However, results for *'Societal Needs'* showed that most respondents selected research topics based on their own perceptions of societal needs. Considerably fewer respondents indicated public or non-academic engagement and consultation processes to define their research and innovation focus. This could imply top-down thinking. Focussing on the 'anticipative and reflective' dimension of R&I processes, results for *'Societal Concerns'* showed respondents mentioned diverse aspects with equal distributions. The categories reflected associations with societal concerns, such as participating or engaging with relevant committees, which were referred to most often. Also mentioned were compliance with rules, regulations, and legal obligations, engagement and consultation activities, or treatment of human research participants.

Identifying common associations with responsible research and innovation and the global blueprint on sustainable development showed respondents were familiar with some of these concepts' main ideas. Most respondents associated RRI with a general idea of doing no harm to society and protecting the environment. Results from *'Associations with RRI'* showed that

many respondents referred to ethics and research integrity. There were two distinct ethics categories in the data set, one relating to content on ensuring ethical procedures and the other on ethical self-assessment processes. Additionally, there was an ethical dimension regarding practices towards research integrity. All these categories received similar proportions, and suggest a trend towards ethical perceptions in R&I.

Results from *'Associations with UN SDGs'* showed most respondents related sustainable development to economic aspects, basic human needs, the improvement of living standards, or poverty reduction. Governance dimensions were not as frequently mentioned, suggesting respondents were not necessarily familiar with the idea underlying the UN SDGs to build relationships, collaborations and addressing geopolitical dynamics on national, multinational and global levels.

## 3.8 GLOBAL INTERVIEW RESEARCH: EUROPEAN AND NORTH AMERICAN STATES

### 3.8.1 EXECUTIVE SUMMARY

The aim was to investigate bottom-up perspectives and experiences of researchers and innovators in North America and Europe. The focus here is on collecting data through and from researchers and innovators themselves (i.e. ascertaining bottom-up views). We prioritise how and why research and innovation is supplied from those who are actually supplying it.

In delivering this, it was also important that these insights are provided for other parts of the RRING project, specifically regarding key RRI-related platforms, spaces and players operating in this region; interactions between different stakeholder types; domain-specific lessons related to Digital (ICT), Energy, Bioeconomy and Waste Management; as well as region-specific insights on what is shaping day-to-day research and innovation practice.

In attaining such insights and achieving this research aim, data from 29 structured interviews were analysed for North America and Europe, covering: Israel (5 interviews); UK (8); Italy (5); USA (5); Serbia (6). We undertook a Qualitative Content Analysis approach to analysing these interview data, which relied on utilising code counts to identify the most prevalent sub-themes for further deeper qualitative interrogation (and thus ultimately what was included in this report). The analysis was undertaken by a team of coders, with inter-coder reliability ensured through Inter-coder reliability was measured using Krippendorff's Alpha tests.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions, and indeed are core to structuring the interview sections of this report. Within each of these themes, a number of prevalent sub-themes (all of which are shaping how research and innovation professionals in North America and Europe are doing their work) also emerged:

- *Gender equality and inclusivity*: gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; and lack or uncertainty of policy.
- *Public engagement*: organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: evaluation; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.

- *Ethics*: positioning ethics – where does the responsibility lie?; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: accounting for local contexts; and conflicts and tensions.

## 3.8.2 INTRODUCTION

This Chapter 3 presents findings from the RRING Work Package 3's Task 3.3 – specifically its global interview task – for North America and Europe. The aim of RRING's Task 3.3 interviews is to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data through and from researchers and innovators themselves, in North America and Europe.

This Chapter is structured as followed:

- We begin by giving headline details of methods adopted, including what country selection procedures, interview participant sampling targets, participant demographics, and analyses undertaken (Section 3.8.1). Note that in-depth information on the methodological approach undertaken for all Task 3.3's global interviews, across all the UNESCO regions we are reporting, can be found in the overarching report.
- The core of the report is then structured around our seven RRI-related themes, which are inspired by the EC pillars and AIRR dimension (sections 3.8.4 - 3.8.10). Within these sections, we begin each by briefly detailing the code counts for all codes deemed to be part of that respective theme, as part of setting the scene for the sub-themes that are subsequently discussed. Furthermore, following this discussion of the most prevalent sub-themes, each theme-focused section then discusses what is unique for each domain (energy, waste management, bioeconomy, ICT) and for each stakeholder type (Research Performing Organisations, Research Funding Organisations, Industry and Business, Civil Society Organisations, Policy Bodies), in North America and Europe. Each theme section finishes with a summary.
- The contents of these chapters feeds into a dedicated conclusions section that summarises the key findings from the Task 3.3 interviews for North America and Europe (Section 3.8.11.1).

## 3.8.3 METHODS

### 3.8.3.1 DATA COLLECTION

Structured interviewing was selected as the method for RRING's Task 3.3 qualitative study of state-of-the-art research and innovation practices globally. Interviews were selected to provide in-depth perceptions, information and opinions of on-the-ground experiences concerning opportunities and bottlenecks in RRI in each of the five world-regions (Arab World; Asia; Europe and North America; Latin America and the Caribbean; Sub-Saharan Africa). A

structured approach was taken to ensure consistency in lines of questioning (including allowable follow-up questions) across the regions, which was deemed especially important given the range of interviewer experiences. The structured interviews ultimately provided more reliable, focused, and uniform data coverage across domains and stakeholder-types in each country and region.

The structured interview format consisted of questions on eight RRI themes and specific interview guidelines were provided to interviewers on how the interview was to be conducted. Interviews were conducted either face-to-face or through telephone/skype calls to facilitate participation. Further details of the data collection methods, guidelines and procedures used are provided in the overarching report.

In each region, country selection was done on a multi-based criterion. Four countries were to be studied from Sub-Saharan Africa. One high and one low ranked country was to be selected based on GDP (per capita in USD) and GERD (Gross Expenditure on Research and Development). Only countries with a Travel Advisory Level of 1 & 2 were selected. In case no partner was available in the primary selected country, partner availability was determined for the alternate country from the list in each category, until coverage was established. Based on this criteria, the following three countries were selected:

1. Botswana: GDP= 6954.17; GERD= 0.50 (2013)
2. Malawi: GDP= 300.31; GERD= 0.03 (2018)
3. South Africa: GDP= 5280; GERD= 0.8 (2016)

In Sub-Saharan Africa, UNESCO recommended excluding Central African Countries because of their political instability and lack of a consolidated R&D system. For the high GDP category, the primary selection was for Gabon. However, since no partner was available in the country, this was later replaced with Botswana, where local contacts were available. No country was selected for the Low GERD category, since no partners were available in either the primary selection (Madagascar) or the alternative country (Sierra Leone).

### 3.8.3.2 SAMPLING

The selection of participants from each country was based on key selection considerations, including:

- Number of interviews: A minimum of five interviews were to be conducted per country.
- Gender: A 50-50 target split between males and females and/or other gender identities was recommended for interview participant selection, with an acceptable minimum of 40% representation of females and/or other gender identities.

- Domains: Interview participation of respondents from at least one of each domain category in the country sample was set as a target (ICT/digital; energy; waste management; bioeconomy).
- Stakeholder types: At least one of each stakeholder type was to be included in the interview sample (Research organisation; Research funding organisation; Industry and business; Civil society organisation; Policy body).
- Relevance of their professional work to the RRING project's RRI interests: Interview participants were to be selected based on their profiles indicating the presence of any publicly visible RRI-like activities undertaken to ensure that their work complemented the innovation/research approaches that RRING would find useful to investigate.

Interviews were designed and undertaken in accordance with ethical guidelines from the Global Sustainability Institute's (GSI) Departmental Research Ethics Panel, under the terms of Anglia Ruskin University's (ARU) Research Ethics Policy (Dated 8 September 2016, Version 1.7), as well as the Social Research Ethics Committee (SREC) under the terms of University College Cork. Once interviews were conducted, partners/sub-contractors were asked to submit audio-recordings, signed consent forms, transcripts (both in English, anonymised and non-anonymised, and local language), post-interview emails with transcriptions as attachments for participants to review, and proof of participants' background profiles demonstrating their suitability for participation and fieldnotes. Partners/sub-contractors were also requested to provide a statement of performance against the selection criteria, with justifications if targets were not met across the sample.

Following the set criteria for interview participation and data collection, a total 29 structured interviews were analysed for the North America and Europe, covering: Israel (5 interviews); UK (8); Italy (5); USA (5); Serbia (6). We undertook a Qualitative Content Analysis approach to analysing these interview data – details of the data and the specific North America and Europe sample are provided in Table 12.

Table 12: List of interview details and participant demographics per country

European & North American Country	Interview code	Interview duration	Domain				Stakeholder type					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT<sup>1051</sup></i>	<i>Bioeconomy</i>	<i>RPO<sup>1052</sup></i>	<i>RFO<sup>1053</sup></i>	<i>Industry &amp; Business</i>	<i>CSO<sup>1054</sup></i>	<i>Policy body</i>	Male	Female
UK	GB01	0:58:50				1			1			1	
	GB02	0:58:57				1	1						1
	GB03	0:51:28			1				1				1
	GB04	0:35:57	1					1			1	1	
	GB05	1:17:06				1	1					1	
	GB06	0:49:27				1	1						1
	GB07	1:15:27	1	1			1					1	
	GB08	0:44:33	1							1		1	
Italy	I01	0:24:27			1						1	1	
	I02	0:48:34	1		1				1			1	
	I03	0:58:40	1		1				1			1	
	I04	0:55:26			1	1			1				1

<sup>1051</sup> Information and Communications Technology<sup>1052</sup> Research Performing Organisation<sup>1053</sup> Research Funding Organisation<sup>1054</sup> Civil Society Organisation

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European & North American Country	Interview code	Interview duration	Domain				Stakeholder type					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT<sup>1051</sup></i>	<i>Bioeconomy</i>	<i>RPO<sup>1052</sup></i>	<i>RFO<sup>1053</sup></i>	<i>Industry &amp; Business</i>	<i>CSO<sup>1054</sup></i>	<i>Policy body</i>	Male	Female
	I05	1:09:20		1			1				1	1	
USA	USA01	0:32:56	1				1					1	
	USA02	0:48:57				1	1						1
	USA03	0:17:51	1				1					1	
	USA04	0:50:17				1	1						1
	USA05	0:26:52				1		1				1	
Serbia	SRB01	0:22:12	1				1					1	
	SRB02	0:29:19			1					1			1
	SRB03	0:31:58			1					1		1	
	SRB04	0:34:39				1			1				1
	SRB05	0:17:53		1		1	1						1
	SRB06	0:37:15				1	1					1	
Israel	IL01	0:51:30		1			1					1	
	IL02	0:56:41			1		1						1
	IL03	0:51:42	1	1		1	1						1
	IL04	1:03:56	1		1		1					1	
	IL05	0:43:13	1	1			1						1

### 3.8.3.3 DATA ANALYSIS

Qualitative Content Analysis was used as the primary data analysis method. This was achieved through coding and analysis of interviews in five phases:

1. In the first phase, 30 interviews (**26.5%** of the sample spanning all RRING regions) were inductively coded using NVivo 12 (a type of CAQDAS- Computer Aided Qualitative Data Analysis Software), with an inductive line-by-line open coding approach. The 30 interviews were selected to ensure a good distribution of countries (and UNESCO regions). Within each country, at least one interview from each gender was also included for this inductive coding phase. Following these country and gender considerations, selection was then based on distribution of domains and stakeholder types. Coding was done for the respondents' social construction of (responsible) research and innovation practices and accounted for both cross-cutting (i.e. across all the interview questions and all the geographies/domains/etc.) themes (e.g. enablers, constraints, conflicts, etc.), as well as context- and question section-specific subject matter based on the structured interview-based themes (e.g. public engagement, open access and open data, etc.). Various cycles of review and revision led to the development of a codebook containing 117 codes under 12 categories. This was used in the next phase for coder training.
2. The codebook was used by a team of coders to deductively code the remaining 94 interviews (again, this was for all of RRING's UNESCO regions). For this, the coders were provided extensive training in two practice rounds: (1) a full-day training workshop, in which the coders familiarised themselves with the codebook, practiced coding a pre-prepared transcript extract, and discussed their coding for greater inter-coder reliability; and (2) in the second practice round, each of the four coders was given a separate second practice transcript to be coded independently. Coding was then compared with the lead coder through dedicated virtual meetings with each coder, and inter-coder reliability was determined, and agreement reached. This process led to further revisions of the codebook based on mutual discussions and inter-coder agreements.
3. In the next stage, interview transcripts were distributed among the coders for coding deductively, using the revised codebook. During this stage, coders were expected to flag any critical new codes and reach a satisfactory inter-coder agreement. Coding for the interview section on 'Responsibility' was carried out inductively for all interviews, due to the degree of variance in responses and because of how it sat distinctly away from the RRI and AIRR structure of this report's themes. This was a result of the open-ended nature of the question on responsibility and how different participants understood responsibility very differently, based on their subjective interpretation of the term.
4. Inter-coder reliability was measured using Krippendorff's Alpha. On average, coders achieved a Krippendorff's Alpha value of 0.95, and a reliability of over 0.8 for 89% of variables.

5. Within each theme identified, as a first step code counting was done for each domain and stakeholder type in each region, as well separate counts for each country, to get a sense of what is in the data. After this, further in-depth qualitative interrogation of the coded data was then undertaken to interpret the patterns found in the selected codes (i.e. identified sub-themes).

The presentation of the qualitative data in this chapter uses example quotes for evidence and clarity. The quote blocks are often quite large so as to maintain the integrity of the original coding and to, critically, ensure richness and depth to the handover of data from this Task 3.3 to the rest of the RRING project, as well as be of use to other readers who may be interested to know more about our source data, and thus the claims we subsequently make based on these.

We now discuss the most prevalent codes (i.e. identified sub-themes) for each of our seven RRI themes, beginning with details on the code counting outcomes for each theme, which in turn lead to the sub-themes themselves that we present within the rest of this chapter.

### 3.8.4 GENDER EQUALITY AND INCLUSIVITY

*Gender equality and inclusivity* is one of the key RRI policy priorities highlighted by the European Commission. It is defined as being “about promoting gender balanced teams, ensuring gender balance in decision-making bodies, and considering always the gender dimension in research and innovation (R&I) to improve the quality and social relevance of the results”.<sup>1055</sup>

Inclusivity is understood as promoting people in research and innovation who are underrepresented (this includes women, economic minorities, etc.). Inclusivity deals with people who are included/excluded from the research and innovation process, whether intentionally or not.

There are also “process dimensions” to achieving these outcomes, whereby establishing a ‘diverse and inclusive’ R&I process, requires that all actors and publics involved in and affected by R&I work together and are included early in research and innovation practice, deliberation, and decision-making, to yield more useful and higher quality knowledge.<sup>1056</sup> “Voices across a diversity of communities should be involved in research, from its beginnings to its commercialisation”, ensuring all points of view are accounted for, and generating higher quality science through different perspectives and expertise.<sup>1057</sup>

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<sup>1055</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>1057</sup> <https://www.rri-tools.eu/documents/10184/16301/RRI+Tools.+A+practical+guide+to+Responsible+Research+and+Innovation.+Key+Lessons+from+RRI+Tools>

The interviews and analyses were conducted with these definitions in mind, Of the 14 codes identified, four codes were seen most extensively: gender equality [code 56]; organisational norms and practices [code 55]; discrimination and lack of diversity [code 65]; lack or uncertainty of policy [code 66].

Codes	Europe & North America					
	Israel	UK	Italy	USA	Serbia	Total
<b>53: Gender equality and inclusivity</b>						
54: Contextual understanding of diversity and inclusion-societal and cultural norms	3	1	3	3	2	12
55: Organisational norms and practices	0	6	3	5	1	15
56: Gender equality	7	15	7	8	3	40
57: Ethnic and religious diversity	2	3	0	2	2	9
58: Country-based representation	0	2	0	1	0	3
59: Disability	4	0	0	0	0	4
60: Academic diversity	1	3	0	1	1	6
61: Age diversity	0	0	0	0	0	0
62: Socio-economic diversity and inclusion	1	1	0	3	0	5
63: Motives-Benefits of diversity and inclusion	2	4	2	9	2	19
64: Risks-Disadvantages associated with diversity and inclusion	0	3	0	0	0	3
65: Discrimination and lack of diversity	2	11	2	6	0	21
66: Lack or uncertainty of policy	2	2	1	3	2	10
67: Discrimination- a non-issue	1	3	4	2	5	15

The following sections provide details from the participants' interviews and descriptions of the findings. The sections provide information about gender equality and female participation in the R&I workplace, the different roles of women in R&I, current interventions and policies in place, as well as interventions and support structures needed.

In the summary section, the findings relating to the theme *gender equality and inclusivity* are brought together.

### 3.8.4.1 GENDER EQUALITY AND FEMALE PARTICIPATION IN THE R&I WORKPLACE

In the framework of this report, *gender equality* includes any references to gender and inclusion in the R&I workplace. This includes references to the need or methods employed for improving gender equality, inclusion, reducing the gender gap (such as a gap in salary, recruitment,

promotion, participation, scientific and research domains, etc.) and providing relevant support structures.

While there is acceptance of gender equality and the rights of women to be part of the R&I workplace, there is division about how gender inclusion is framed, the means to increase the presence of women, and whether intervention and support structures are necessary. Although there are references to socio-economic and ethnic minorities, other forms of inclusivity and diversity largely go unmentioned by participants.

In this section, the results relating to female participation in the R&I workplace are discussed.

In this sample, there is a propensity to discuss gender equality in reference to female participation in the workplace, seen among the participants from Serbia. In commenting on gender participation, one participant said the movement towards equality is a recent development, driven by forces outside the country:

*"...I've noticed some tendencies in international projects or other international institutions... that gender of researchers... is considered to be one of the relevant factors."* [Male; Serbia; RPO; Energy<sup>1058</sup>]

Another participant says Europe is catching up with Serbia's long post-Soviet history of gender equality:

*"Gender equality is something that... Europe started relatively recently... I don't know ten, twenty years ago..."* [Male; Serbia; RPO; Bioeconomy<sup>1059</sup>]

For this participant, women have long been part of the Serbian workforce and earn the same salaries as their male counterparts:

*"...for me it was normal for Mom to go to work... and for Mom to have the same salary as men in the same profession..."* [Male; Serbia; RPO; Bioeconomy<sup>1060</sup>]

According to another participant, gender equality is the norm and employees are judged according to their performance and not their gender:

*"In the group where I work more than 80% are ladies...so when it comes to gender equality, I don't see that we have some big problem that we are supposed to solve."* [Male; Serbia; RPO; Bioeconomy<sup>1061</sup>]

In contrast, a male participant from Israel says the following about gender equality at their institute:

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<sup>1058</sup>1058 SRB01

<sup>1059</sup> SRB06

<sup>1060</sup> SRB06

<sup>1061</sup> SRB06

*“The [their institute] doesn’t even get close to thinking in these terms. There was an improvement [of female representation], and in recent years... It not something that is cared about enough...” [Male; Israel; RPO; Energy, ICT<sup>1062</sup>]*

One female participant from Israel shares a different experience. She says there are too many women and too few men in the workplace:

*“We have more women than men... reverse inequality...” [Female; Israel; RPO; Energy, Waste Management, Bioeconomy<sup>1063</sup>]*

In the same vein, one male participant agrees that other fields are dominated by women:

*“I was at a conference two weeks ago... Talking about human nutrition... 80% of the audience were women.” [Male; UK; RPO; Bioeconomy<sup>1064</sup>]*

According to the following participant, female representation at higher levels in organisations is lacking. She comments on the lack of diversity at management level:

*“But traditionally, if you look at the top levels of companies, it's largely white male in the biotech space and especially agricultural biotechnology...and I think that can be a problem in how they approach things.” [Female; USA; RPO; Bioeconomy<sup>1065</sup>]*

Another female participant from Italy agrees:

*“... I have to say that more you grow in terms of level, fewer ladies are there...” [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1066</sup>]*

In the following section, female participation the STEM disciplines is discussed.

### 3.8.4.1.1 Female participation in STEM disciplines

In the various domains addressed in this report, it is apparent that there are varying views on gender equality and female participation in the workplace. Participants particularly refer to the absence of women in the STEM disciplines.

According to this female participant in the bioeconomy domain, there is a need for more female representation in STEM disciplines to broaden research and industry perspectives:

*“...women scientists are particularly in minority in the field of science and engineering...we need...women scientists who bring in the perspective of women in society, in the field of research, who can represent the ideals, the requirements, the*

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<sup>1062</sup> IL04

<sup>1063</sup> IL03

<sup>1064</sup> GB05

<sup>1065</sup> USA02

<sup>1066</sup> I04

*desires, the need of this half of the population...*” [Female; USA; RPO; Bioeconomy<sup>1067</sup>]

However, while more women are needed, she says female participation in this domain is improving:

*“For instance, if you are a woman, for conferences... we make sure that we have gender balance in a line-up of speakers, and make sure that women scientists are invited... I think that's becoming more and more a norm and a standard practice...”* [Female; USA; RPO; Bioeconomy<sup>1068</sup>]

Male participants in the energy field say this domain is dominated by men, especially in STEM and construction. One participant describes female participation in the energy domain as improving, while still largely male dominated:

*“My field is way too male dominated but that's changing, and it's better than it was and still not good enough.”* [Male; USA; RPO; Energy<sup>1069</sup>]

The same participant says the overrepresentation of white males in this domain and its engineering disciplines as a deterrent for women:

*“...having a lot of white males in the sector, the energy sector, the engineering discipline... does not look inviting to female candidates.”* [Male; USA; RPO; Energy<sup>1070</sup>]

Another male participant notes a long-standing, generational lack of gender diversity in the STEM disciplines:

*“There's a big imbalance. I guess these things are past-dependent and it takes a long time for people to get to the top. So, the balance of people at the top now reflects the balance of people going into the profession 30 or 40 years ago.”* [Male; UK; RFO, Policy body; Energy<sup>1071</sup>]

A female participant in the bioeconomy domain agrees generational legacies are responsible for the current gender inequalities:

*“...I think the younger generation that are coming through now, the under 40s, there's a good likelihood that they will be different from the older group that's currently there...”* [Female; UK; RPO; Bioeconomy<sup>1072</sup>]

However, female participation is increasing among younger groups in the energy domain:

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<sup>1067</sup> USA04

<sup>1068</sup> USA04

<sup>1069</sup> USA01

<sup>1070</sup> USA03

<sup>1071</sup> GB04

<sup>1072</sup> GB02

*“...I see that in the youth groups of the builder[']s association there are many more women... there is a slow movement...”* [Male; Italy; Industry & Business; Energy, ICT<sup>1073</sup>]

One male participant from Italy expresses concern about the underrepresentation of women in ICT:

*“Certainly, gender issues are important, especially in sectors like ours. There has been a study in the United Kingdom... Only 1% of workers are not men...”* [Male; Italy; Industry & Business; Energy, ICT<sup>1074</sup>]

A female participant says she is aware of the gender imbalance in ICT, as compared to other industries she is involved in, like bioeconomy:

*“We have a project on bioeconomy where ladies are well represented and we have other projects in ICT where ladies are absolutely in minority...”* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1075</sup>]

One participant in the field of bioeconomy disagrees and says their PhD cohort is approximately 15% women and not enough is done to reduce inequality in research and tertiary education:

*“I think it's a super important topic, and I think... Despite trying, not that much progress has been made...”* [Female; UK; RPO; Bioeconomy<sup>1076</sup>]

A male participant from Italy says the physical nature of work in waste management deters female participation:

*...it is a job that tends to be male but not by our will, but... because it is a physically laborious job...”* [Male; Italy; RPO, Policy body; Waste Management<sup>1077</sup>]

According to the same participant, it is acceptable for women to choose to not participate in certain work situations:

*“...although there is a good percentage of female operators in the collection of waste... it is a job that tends to be male... because it is a physically laborious job.”* [Male; Italy; RPO, Policy body; Waste Management<sup>1078</sup>]

In the next section, the various roles of women are discussed.

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<sup>1073</sup> I03

<sup>1074</sup> I03

<sup>1075</sup> I04

<sup>1076</sup> GB06

<sup>1077</sup> I05

<sup>1078</sup> I05

### 3.8.4.1.2 The different roles of women

Several participants commented on the influence of the different roles women fulfil, such as being mothers and caregivers, in addition to their work.

According to the participants, this as a key area to consider, as it may be challenging for women to return to the workplace following pregnancy, maternity leave and raising young children.

A female participant from the UK says:

*"Cause clearly quite obviously females do need to take breaks for different reasons and then having more opportunities to come back again when you've had to take one of those breaks."* [Female; UK; RPO; Bioeconomy<sup>1079</sup>]

A male participant from Israel says women must often choose between their career and their role as a mother and caregiver:

*"I don't know how you [referring to the two female interviewers] do it, maybe your husbands can do it... But if not, the fallback position is for it to be the woman..."* [Male; Israel; RPO; Waste Management<sup>1080</sup>]

The same participant shares their experience of the complexities of considering and recruiting female applicants who are mothers and caregivers:

*"...a woman... was talking about a technician that I needed to employ... And she said, 'I don't want this technician to start telling me she has to go home and look after her children, when she's supposed to be measuring my samples. And I'm paying for her to measure those' ... that's the reality of what you're trying to deal with..."* [Male; Israel; RPO; Waste Management<sup>1081</sup>]

Furthermore, this participant says women must balance publication numbers and their traditional roles:

*"...What do you do when you are about to interview somebody at the level [age] of 35 or 40 and you have a woman who has 50% less publications because she's looking after her mother or her children. What do you do? Do you employ her?"* [Male; Israel; RPO; Waste Management<sup>1082</sup>]

In the next section, participants discuss the current inventions and policies in place to promote gender equality and inclusivity, both at regional and organisational level.

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<sup>1079</sup> GB02

<sup>1080</sup> IL01

<sup>1081</sup> IL01

<sup>1082</sup> IL01

### 3.8.4.2 INTERVENTIONS AND POLICIES

This section covers any explicit or implicit mention of policies, formal and informal rules, norms, codes, guidelines, values, procedures, and the specific models or frameworks used for diversity and inclusion within the participants' organisation(s).

In this section, current interventions and policies in place are discussed. In the following section, participants' views on interventions and support structures required for women in R&I are discussed.

In addition to the uncertainty of policy, the participants have different views regarding interventions that should be implemented and whether interventions should be implemented at all.

#### 3.8.4.2.1 Policy uncertainty

Participants are largely unaware of overarching policies to promote gender equality and inclusivity in the workplace:

*“Interviewer: Are there at this point any EU policies and regulations that affect promoting diversity in your field?”*

*Interviewee: I'm sure that they are but I don't know what they are.”* [Male; UK; Industry & Business; Bioeconomy<sup>1083</sup>]

And:

*“Interviewer: What government policies and regulations affects promoting diversity and gender equality in your field?”*

*Interviewee: Yeah, I can't think of any. The universities have a mandate for diversity, but some universities take them more... That mandate more seriously than others. So I can't think of any in the US anyway.”* [Female; USA; RPO; Bioeconomy<sup>1084</sup>]

Some participants are not aware of government policy relating to diversity:

*“The government regulations mostly don't affect diversity in that field.”* [Male; USA; RPO; Energy<sup>1085</sup>]

And:

*“...there is no legislative obligation at least for what concerns our specific sector in this sense...”* [Male; Italy; Industry & Business; Energy, ICT<sup>1086</sup>]

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<sup>1083</sup> GB01

<sup>1084</sup> USA02

<sup>1085</sup> USA03

<sup>1086</sup> I03

According to this participant, they are unaware of current interventions and policies in place, such as quotas:

*“...I don't think we have anything that resembles a positive discrimination or a quota system.”* [Male; UK; RPO; Bioeconomy<sup>1087</sup>]

UK and US participants commented on the existence of rules, policies or norms that are aimed at increasing gender equality and diversity, but a level of uncertainty remains about the specifics and details. Two male participants say the following:

*“I think there's a requirement for us... to think about whether that project will have any effect on diversity or gender. So I think that's a helpful requirement.”* [Male; UK; RFO, Policy body; Energy<sup>1088</sup>]

And:

*“I don't know what the actual policies are but obviously or institutionally there's also a strong expectation that hiring, promotion and participation must be as diverse as possible. My institution is very strong on... Its identity also is very strongly focused on socio-economic diversity.”* [Male; USA; RPO; Energy<sup>1089</sup>]

This industry body participant says industries must answer to European Union legislation to maintain standards in recruitment and remuneration:

*“Europe is doing a lot... These factors push more and more to ensure that companies respect this balance both for remuneration and participation in occupational activities within companies.”* [Male; Italy; Industry & Business; Energy, ICT<sup>1090</sup>]

Another participant says gender equality is not regulated by the government, but rather in-house:

*“...we had to do an equality diversity and inclusion statement... And I think we were looking for something that would be manageable ... So, those, I guess, are not really governmental regulations...”* [Female; UK; RPO; Bioeconomy]

### 3.8.4.2.2 Gender equality in funding applications

In this sub-section, gender equality and inclusivity requirements in funding applications are discussed. This participant from a US RPO reflects on RFOs' role in promoting gender inclusivity:

*“Really, many of the funding organisations promote, for instance, a lot of applications for women and minority. For instance, sometimes, there are also*

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<sup>1087</sup> GB05

<sup>1088</sup> GB04

<sup>1089</sup> USA01

<sup>1090</sup> I03

*funding that are exclusive for women and minorities. I believe, really, governmental organisations, funding organisations, and even institutions are actually doing great in promoting applications and inclusion of women and minority...”* [Female; USA; RPO; Bioeconomy<sup>1091</sup>]

According to one participant from the UK, diversity and gender considerations are part of funding application processes:

*“I think there's a requirement for us whenever we're starting up any kind of big new project. One of the things that you have to think about is whether that project will have any effect on diversity or gender. So I think that's a helpful requirement.”* [Male; UK; RFO, Policy body; Energy<sup>1092</sup>]

This participant from Israel agrees funding is linked to gender participation:

*“For grant proposals, you to show that you have women researchers.”* [Female; Israel; RPO; ICT<sup>1093</sup>]

A participant in the Serbian RPO community is aware of gender inclusivity in international funding bodies:

*“I've noticed some tendencies in international projects, like the Horizon [2020 funding programme], or other international institutions, to push for that gender of researchers where it is considered to be one of the relevant factors.”* [Male; Serbia; RPO; Energy<sup>1094</sup>]

This participant from the US says women and minorities often benefit from RFO funding decisions:

*“In my field also normally, any research proposal... if it's coming from women or minority, it's actually regarded positively. Sometimes... if an application is... towards a borderline for funding, but it came from women or minority, they actually get funded.”* [Female; USA; RPO; Bioeconomy<sup>1095</sup>]

In the following section, participants speak about the current interventions in place.

### 3.8.4.2.3 Current interventions in place

In this sub-section, participants mention the current interventions in place at their organisations to promote gender equality and inclusivity.

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<sup>1091</sup> USA04

<sup>1092</sup> GB04

<sup>1093</sup> IL02

<sup>1094</sup> SRB01

<sup>1095</sup> USA04

One male participant's organisation has measures in place, to stop unconscious bias in the recruitment process:

*"When we're shortlisting candidates... you're shortlisting on the basis of the qualifications and expertise... You have no information as to what their gender is... You're blind to whether you're selecting a man or a woman."* [Male; UK; RPO; Bioeconomy<sup>1096</sup>]

Furthermore, training in unconscious bias is also provided:

*"And we have a lot of training on bias, unconscious bias... because it's something that everybody does... So I think the institute has got some procedures in place to try and make the whole process more equitable... It's a work in progress..."* [Male; UK; RPO; Bioeconomy<sup>1097</sup>]

One female participant from the same sample refers to training in unconscious bias. However, she does not provide details about the type of training:

*"Well, we have mandatory training every year, and refresher training and all new employees get the training straightaway... to ensure a diverse work force."* [Female; UK; RPO; Bioeconomy<sup>1098</sup>]

Furthermore, she mentions recent improvements in diversity because of her organisation's broader recruitment advertising:

*"I have to say that our institute, five or six years ago, was not particularly diverse... our HR department identified that all our job adverts were only going to one particular local town/city and now they've changed that... and that's greatly helped to improve the diversity..."* [Female; UK; RPO; Bioeconomy<sup>1099</sup>]

One female participant from the UK says female participation and diversity in her organisation is tracked:

*"We track the diversity in our team, for example, and we track... We make efforts to try to increase the number of women working in the engineering..."* [Female; UK; Industry & Business; ICT<sup>1100</sup>]

One female participant says women are favoured in recruitment when it is difficult to decide between applicants:

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<sup>1096</sup> GB05

<sup>1097</sup> GB05

<sup>1098</sup> GB02

<sup>1099</sup> GB02

<sup>1100</sup> GB03

*“...if we have two candidates who are exactly the same we count how many were women and usually they are underrepresented, and we kind of favour the women.”*

[Female; Israel; RPO; ICT<sup>1101</sup>]

Furthermore, according to one participant in the ICT domain, large businesses must disclose gender pay-gaps:

*“For example, in the UK, we have to disclose our gender pay gaps, which we have done last year and this year... we follow all of that type of regulation when needed.”* [Female; UK; Industry & Business; ICT<sup>1102</sup>]

However, this participant says the need to report on the gender-pay gap does not apply non-governmental organisations (NGOs) that can be categorised as small and medium enterprises (SMEs):

*“We've been having a bit of a debate internally about whether we should be reporting on the gender pay gap... We've got about 200 staff, so we're a large SME but nonetheless gender pay gap reporting doesn't apply....”* [Male; UK; CSO; Energy<sup>1103</sup>]

According to one Serbian participant, a gender-inclusive strategy in calls to participate in conferences forms part of one CSOs approach:

*“There will always, always be greater privileges for the female speaker who applies to the open call for lecturers, than for the male ones.”* [Female; Serbia; CSO; ICT<sup>1104</sup>]

In line with the previous section about the different roles of women, this participant says her company started an empowerment project to assist women in the advancement of their careers:<sup>1105</sup>

*“We have a project in our company, called Ladies First that talks about empowering ladies...”* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1106</sup>]

This project is geared towards managing a work-life balance:

*“...we need to enable these people to work properly through a net of help that can put them in the same position of the other players (men)...”* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1107</sup>]

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<sup>1101</sup> IL02

<sup>1102</sup> GB03

<sup>1103</sup> GB08

<sup>1104</sup> SRB02

<sup>1105</sup> <https://ladiesfirst.fvaweb.eu/>

<sup>1106</sup> IO4

<sup>1107</sup> IO4

This female participant from Israel identified an imbalance of women recommended for awards and is trying to change that:

*“I’m on the board of an association for medical informatics. We saw that they’re [women] not being recommended for awards... So I said “okay, from that point on I’m always recommending one male and one female...” [Female; Israel; RPO; ICT<sup>1108</sup>]*

This female participant speaks about the requirements to obtain accreditation from inclusivity charters such as Athena SWAN [Scientific Women's Academic Network] in the UK:

*“I mean, within the university... Each department applies to the Athena SWAN programme<sup>1109</sup> and develops an action plan around that, that’s specific for that department and their particular balance...” [Female; UK; RPO; Bioeconomy<sup>1110</sup>]*

One participant refers to the American Association of the Advancement of Science's (AAAS)<sup>1111</sup> IF/THEN programme.<sup>1112</sup> This programme encourages girls into STEM disciplines by bringing together female role models in these disciplines:<sup>1113</sup>

*“...AAAS is establishing such a programme for women through IF/THEN programme which inspires women, top of their field, to come in and become a role model for middle schoolers. I think that’s a great programme, and we need programs like that, fellowships like that, that provide this opportunity for women and other minorities...” [Female; USA; RPO; Bioeconomy<sup>1114</sup>]*

The underrepresentation of women in the STEM disciplines is a recurring theme throughout this section. One participant says she raises awareness to counteract gender biases and misconceptions towards STEM:

*“...I’ve done some student-facing outreach before, so primarily around encouraging females into STEM subjects...” [Female; UK; RPO; Bioeconomy<sup>1115</sup>]*

From the interviews conducted, it is clear there is uncertainty surrounding broader gender equality policies. Participants have varying accounts of current interventions and policies in place to support gender equality. In the next section, the need for further interventions and support structures for women are discussed.

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<sup>1108</sup> IL02

<sup>1109</sup> (Scientific Women's Academic Network) is a charter established and managed by the UK Equality Challenge Unit (now part of Advance HE)

<sup>1110</sup> GB06

<sup>1111</sup> <https://www.aaas.org/>

<sup>1112</sup> <https://ifthen.aaas.org/>

<sup>1113</sup> *ibid*

<sup>1114</sup> USA04

<sup>1115</sup> GB06

### 3.8.4.2.4 Interventions and support structures required

In addition to the current policies and interventive measures in place, certain participants say further interventions and support structures are necessary.

One male participant supports increased intervention:

*“I really think affirmative action is something which a lot of people don't like, but I think needs to be done... So there needs to be some way of sort of boosting the numbers of women...”* [Male; UK; RPO; Energy, Waste Management<sup>1116</sup>]

The same participant elaborates further:

*“...I would like to see more people across the board, I would like to see more sort of 50-50 representation...”* [Male; UK; RPO; Energy, Waste Management<sup>1117</sup>]

A female participant suggests the use of informal workplace quotas to ensure gender balance:

*“We always try... to promote diversity ... that we had a good percentage of under-represented minorities and women...”* [Female; USA; RPO; Bioeconomy<sup>1118</sup>]

While it is not necessary an intervention required, this participant recognises her position as a role model in motivating women to pursue science, technology, engineering, and mathematics (STEM) disciplines:

*“One thing we are lacking though is to really make sure that women or other minority become a good role model for future women and minorities who wanna enter this field... How do we attract and motivate them to become a scientist or engineer is a question...”* [Female; USA; RPO; Bioeconomy<sup>1119</sup>]

In line with the various roles women fulfil and the need for support structures, this participant is in favour of creating supportive environments for working mothers:

*“I think it is more a question of creating supportive environments... It is a question of flexibility...”* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1120</sup>]

In the following section, a summary of the results relating to gender equality and inclusivity is provided.

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<sup>1116</sup> GB07

<sup>1117</sup> GB07

<sup>1118</sup> USA02

<sup>1119</sup> USA04

<sup>1120</sup> IO4

### 3.8.4.3 SUMMARY OF GENDER EQUALITY AND INCLUSIVITY

From the findings presented in this section, there is acceptance of the rights of women to be part of the R&I workplace. From the interviews, some participants state that female participation rates have improved in some fields, while others disagree.

However, especially in relation to the domains of energy and bioeconomy, there is concern that fewer women are present in STEM disciplines. Participants draw connections between the underrepresentation of women in STEM disciplines and their underrepresentation in domains dependent on those disciplines. According to participants, gender imbalances in STEM disciplines would require reconfiguration to meet the RRI goals as outlined in this project.

Moreover, participants say women are held back professionally by their different roles as mothers and caregivers. Finally, participants recognise generational legacies in terms of gender imbalances and say gender equality will be achieved, through attrition, over time.

Furthermore, on the one hand, there is uncertainty on the part of participants regarding interventions promoting female participation and leadership. On the other hand, there is support for direct intervention in the case of bias towards women with various roles, such as motherhood, for example.

In the interest of being comprehensive, it is necessary to note that other types of diversity and inclusivity, such as racial, sexual and economic, are not comprehensively discussed by the participants in this sample. Further research would be required to ascertain the views and current situation of participants in R&I in this region.

### 3.8.5 PUBLIC ENGAGEMENT

*Public engagement* is one of the key policy agendas that should be furthered by RRI practices. There are three key dimensions according to the European Commission's (EC) definition of public engagement. It is (1) collaborative, (2) multi-actor, and should (3) align with societal values, needs, and expectations. This means RRI should foster collaborative and multi-actor research and innovation processes where “all societal actors work together during the whole process in order to align its outcomes to the values, needs and expectations of society”.<sup>1121</sup>

It is within this framework that interviews, and subsequent analyses, were conducted.

Of the 42 codes identified for this theme, four were seen most extensively: organisational norms and practices [code 2]; motives-benefits of public engagement and collaboration [code 4]; building support networks and strategic alliances [code 112]; integration of different domains and stakeholders [code 114].

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<sup>1121</sup> <https://www.rri-tools.eu/about-rri>

Codes	Europe & North America					Total
	Israel	UK	Italy	USA	Serbia	
1: Public engagement	7	44	17	30	18	116
2: Organisational norms and practices	2	15	4	17	6	44
3: Lack or uncertainty of public engagement policy	1	5	2	5	4	17
4: Motives-Benefits of public engagement and collaboration	4	26	11	9	8	58
5: Risks-Disadvantages associated with public engagement and collaboration	1	2	1	6	0	10
6: Types of stakeholders for engagement	25	81	43	38	43	230
7: Government bodies, municipalities, and regulatory authorities	4	15	9	7	9	44
8: Professional bodies	2	2	5	2	3	14
9: Research Funding organisations	2	8	4	3	1	18
10: Scientific community	5	15	8	4	9	41
11: Specialists-Experts	1	3	1	4	4	13
12: Civil society organisations	1	10	5	4	3	23
13: Industry and Business	10	18	11	3	4	46
14: Marketing and communication agencies- Public Relations Industry	0	2	1	0	3	6
15: Celebrities	0	0	0	0	0	0
16: Citizens or the general public	0	10	1	7	3	21
17: Others	1	1	1	7	5	15
26: Consultation tools	2	5	3	1	0	11
27: Surveys	2	2	1	1	0	6
28: Public-citizen consultations	0	4	0	3	1	8
29: Feasibility studies- working groups	0	0	2	0	0	2
30: Involvement tools	1	4	5	7	2	19
31: Open public calls and funding initiatives, etc	0	0	0	0	1	1
32: Focus groups and discussions	1	3	5	7	1	17

33: Competitions and awards	0	0	0	0	0	0
35: Collaboration tools	4	1	1	1	1	8
36: Social networks	1	0	1	0	1	3
37: University-based start-ups	2	0	0	0	0	2
38: Applied research laboratories	1	1	0	1	0	3
39: R&I matchmaking	0	0	0	0	0	0
40: Empowerment tools	0	4	5	3	0	12
41: Participatory management-approaches	0	1	0	3	0	4
42: Campaigning-Lobbying	0	3	2	0	0	5
43: Open innovation approach- the quadruple-helix stakeholder model	0	0	3	0	0	3
107: Lack of (perceived) interest of general public	1	0	1	1	2	5
44: Other	0	0	0	1	0	1
111: Collaboration	19	32	25	16	14	106
112: Building support networks and strategic alliances	7	16	12	7	9	51
113: Actor mapping	0	4	1	1	0	6
114: Integration of different domains and stakeholders	7	2	10	3	2	24
115: RRI frameworks for new cross-disciplinary research	0	1	0	2	0	3
116: Difficulties in collaboration and engagement	5	7	3	4	3	22
106: Financial constraints and considerations	9	9	1	15	5	39

The following sections provide details regarding these codes and descriptions of the findings. The sections provide information about the importance of public engagement, the motivations for and benefits of public engagement, and the need to build support networks and strategic alliances. In the summary section, the findings relating to the theme *public engagement* are brought together.

### 3.8.5.1 THE IMPORTANCE OF PUBLIC ENGAGEMENT

Before discussing the motivations for and benefits of public engagement, participants comment on the importance of public engagement. According to this participant in the bioeconomy domain, public engagement is critically important:

*"Really, alongside my research program really is studying the ethical and societal implication of my work...but also really understanding and innovating new ways of engaging the public, and making sure that these two activities inform each other by talking to people, by understanding their concerns, by understanding where the field goes, and how our future will transform by applying these technologies in humans..."* [Female; USA; RPO; Bioeconomy<sup>1122</sup>]

Another participant from the US highlights the says public engagement is important to gain a local community's trust:

*"Especially a sensitive community, it's important to work with people in that community. Like we funded a project on African-American churches...before they started that work and got to know them and helped to build some trust before going into a community to study a community."* [Female; USA; RPO; Bioeconomy<sup>1123</sup>]

However, the following participant says public engagement is not a priority at their university:

*"...from the organisational or institution's point of view, if you are a scientist, specifically if you're a young scientist, in a lot of ways, you don't get much credit for activities that perform for engaging public, or engaging outside organisation in your research..."* [Female; USA; RPO; Bioeconomy<sup>1124</sup>]

The same participant says funding and publications are more valuable than public engagement:

*"If the organisations can develop these rules and policies that include public engagement activity in the evaluation processes, they give it credit as much as they give credit to publication to grant funding, that will really, really promote and motivate scientists to actually engage the public more."* [Female; USA; RPO; Bioeconomy<sup>1125</sup>]

In the following section, participants discuss the motivations for and benefits of public engagement.

### 3.8.5.2 MOTIVATIONS FOR AND BENEFITS OF PUBLIC ENGAGEMENT

This section includes references to the motivation behind and benefits derived from public engagement and collaboration, according to the participants in this sample.

These include increased understanding, developing trust and alleviating public concerns, increasing awareness, developing credibility and legitimacy, and improving R&I outcomes.

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<sup>1122</sup> USA04

<sup>1123</sup> USA02

<sup>1124</sup> USA04

<sup>1125</sup> USA04

### 3.8.5.2.1 Increased understanding

Participants describe benefits of and motivations for collaborative activities. One participant says collaboration increases understanding on various levels:

*“I would like the consequences of my work to be a better understanding, wider understanding, raising the awareness of people, children and their teachers in general about the importance of dealing with entrepreneurship and responsible entrepreneurship in every sense...”* [Female; Serbia; Industry & Business; Bioeconomy<sup>1126</sup>]

Another participant agrees that the public should be involved in conversations:

*“By providing them some pictures of what is happening today, and how it will shape our future, in an engaging manner, I wanna bring the public to the table for the conversation. I think that's one of the ways that I'm trying to do this.”* [Female; USA; RPO; Bioeconomy<sup>1127</sup>]

The participant from an Italian RPO and policy body says they want to explain their work to the public to increase understanding:

*“So explaining our reasons is fundamental... We believe in a project and we want to explain where we intend to go... Communication cannot be avoided...”* [Male; Italy; RPO, Policy body; Waste Management<sup>1128</sup>]

Furthermore, this participant says public engagement offers valuable insights, not only to the public, but also to the organisation:

*“...all of this required quite a lot of re-thinking within the institute of how we would go about, not just communicating, but actually almost our philosophy of how we work in this space...”* [Male; UK; RPO; Bioeconomy<sup>1129</sup>]

Another participant from the UK has the following to say about public engagement and its benefits:

*“I think we'll get a much better understanding of how society generally is thinking, and we can prepare better for how society is going to react to what we're doing...”* [Male; UK; Industry & Business; Bioeconomy<sup>1130</sup>]

In the next section, participants, especially from business and industry, speak about the advantages of public engagement for business development.

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<sup>1126</sup> SRB04

<sup>1127</sup> USA04

<sup>1128</sup> IO5

<sup>1129</sup> GB05

<sup>1130</sup> GB01

### 3.8.5.2.2 Benefits for business

From the participants' comments below, the reasons for undertaking public engagement seem to be less about alignment with society's values and more about the benefits for the organisation. This participant says public engagement can improve the social acceptance and marketability of products:

*"...what kind of things that people are saying about this kind of technology and this kind of product, and then trying to understand how is that going to affect our ability to market it to get societal acceptance for it..."* [Male; UK; Industry & Business; Bioeconomy<sup>1131</sup>]

The same participant says public engagement assists in anticipating future regulations:

*"So attitudes to genetic engineering, attitudes to genome.... And then understanding that kind of general attitudes to technology you can start to make predictions for where regulation is going..."* [Male; UK; Industry & Business; Bioeconomy<sup>1132</sup>]

Another participant sees public engagement as a means to obtain acceptability from potential customers:

*"More generally, if the technology that we are using to develop that product is it broadly acceptable to other people in the value chain, if the customers or the farmers are going to accept it..."* [Male; UK; Industry & Business; Bioeconomy<sup>1133</sup>]

For this participant from the business and industry domain, public engagement is about their products and the needs of future customers:

*"At the most basic level you talk to the people who are going to be your customers to make sure that you are developing the right kind of product."* [Male; UK; Industry & Business; Bioeconomy<sup>1134</sup>]

In the next section, participants discuss the funding and policy requirements around public engagement.

### 3.8.5.2.3 Funding and policy requirements

In this section, participants detail that public engagement is a requirement from funding organisations in certain cases. According to this participant from the UK, public engagement is driven by grant and funding requirements:

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<sup>1131</sup> GB01

<sup>1132</sup> GB01

<sup>1133</sup> GB01

<sup>1134</sup> GB01

*“...if you want to get funding for certain projects ... you'll only get it in the context of something that's affecting a community or an industry or a group of companies or whatever. You've got... to be able to show that your activity would have impact upon individuals or other institutions...”* [Male; UK; RPO; Energy, Waste Management<sup>1135</sup>]

Another participant from the US provides an example of a funded project where involving members of the public was a requirement:

*“So those would-be members of the public and focusing on involving them in every step of the process of translation.”* [Male; USA; RFO; Bioeconomy<sup>1136</sup>]

One participant highlights the role of deliverables for RPOs receiving funding:

*“...We have some rules and processes governing the types of deliverables we can commit to and the types of rules that affect the sponsor's benefits...”* [Male; USA; RPO; Energy<sup>1137</sup>]

According to this participant, the relationship between funding bodies and RPOs in the UK encourages public engagement:

*“...the Welsh government level here is that if you want to get funding for certain projects, certain research projects off the ground, you'll only get it in the context of something that's affecting a community or an industry or a group of companies...”* [Male; UK; RPO; Energy, Waste Management<sup>1138</sup>]

A participant from the UK speaks about public consultation in policy development:

*“...there's a practice of consultation, which is quite standard, so that encourages people who are developing policy to go out and consult widely. I don't think there are any restrictions that affect our ability to do that.”* [Male; UK; RFO, Policy body; Energy<sup>1139</sup>]

The same participant mentions the UK's Civil Service Code and the need to preserve the public's trust:

*“Those [Civil Service Code] are very general standards of behaviour and they're aimed at maintaining public trust in the Civil Service...”* [Male; UK; RFO, Policy body; Energy<sup>1140</sup>]

In the next section, participants discuss how public engagement can be used to alleviate public concerns.

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<sup>1135</sup> GB07

<sup>1136</sup> USA05

<sup>1137</sup> USA03

<sup>1138</sup> GB07

<sup>1139</sup> GB04

<sup>1140</sup> GB04

### 3.8.5.2.4 Alleviating public concerns

According to participants in this section, alleviating the public's concerns is a major benefit of engaging with the public. This participant finds public participation and engagement in waste management R&I encouraging:

*"...I think there's definitely a trend over 10 or 15 years to show much more that your work has some practical nature... you need also to show that it affects and impacts upon people's lives in some way. And I think certainly that's one of the very exciting things that I find with the work I do on waste... it's always a very lively debate to be involved with..."* [Male; UK; RPO; Energy, Waste Management<sup>1141</sup>]

Another participant from the UK says public engagement is important for social responsibility on the part of organisations:

*"...a lot of it is about motives... trying to humanise the organisation make it... show that's what we're trying to do is solve some really important problems but in a way that it is acceptable to put to most of the rest of society..."* [Male; UK; Industry & Business; Bioeconomy<sup>1142</sup>]

According to this participant, two-way engagement between research organisations and the public could be more effective in alleviating the public's concerns:

*"I'd be interested in knowing what... "Do you have any concerns and if you have concerns, what are they? And then if you have got concerns, then maybe we can collectively work out how could we do something to address your concerns." "* [Male; UK; RPO; Bioeconomy<sup>1143</sup>]

One participant from the UK refers to including citizens in their processes:

*"...to feed back to those communities the actual finished articles, the finished published material... And so I've had some very good feedback from individuals saying, "Thank you. You took us seriously"..."* [Male; UK; RPO; Energy, Waste Management<sup>1144</sup>]

Another participant says while public engagement is difficult in some cases, reassuring the public is beneficial:

*"So you can't make everybody feel happy all of the time, but there's a scale of how you can maybe respond to give them some comfort and reassurance that they've been... Their concerns have been listened to."* [Male; UK; RPO; Bioeconomy<sup>1145</sup>]

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<sup>1141</sup> GB07

<sup>1142</sup> GB01

<sup>1143</sup> GB05

<sup>1144</sup> GB07

<sup>1145</sup> GB05

The same participant says public engagement is about making people feel heard:

*“... it goes from a situation where the people might have been feeling quite negative towards our activity, to being much more positive because they understood... Their concerns had been listened to.”* [Male; UK; RPO; Bioeconomy<sup>1146</sup>]

Another participant suggests collaboration to align with the needs of the public:

*“We have a new PhD program... and we're actually gonna be taking the students... to meet with farmers and NGOs, representatives from those districts to discuss the challenges that farmers face with regard to energy and water and how a [project] biotechnology might play a role in that”* [Female; USA; RPO; Bioeconomy<sup>1147</sup>]

Participants in the next section discuss how public engagement is useful to improve R&I.

### 3.8.5.2.5 Improved research and innovation

Another participant says engagement with the public leads to improved research and innovation:

*“...those norms and practices which are informed by theory and empirical work are that research and innovation are more effective when stakeholders and potentially interested members of the public and the public voice, in general, are participating in research and innovation.”* [Male; USA; RPO; Energy<sup>1148</sup>]

The same participant provides one of the strongest indications of having an approach in place that is genuinely geared towards aligning with the needs, values, and expectations of society:

*“...the whole idea behind our agenda is to figure out how to design science and technology institutions, program[me]s, policies, etcetera, so that they do a better job meeting societal needs. So it's at the essence of our work, philosophically and methodologically, that translates into a commitment to believing that the ways to improve or enhance public value of the work is to understand fully the capabilities and needs of those whose problems are out there, trying to be solved, rather than assuming that we can figure out what those are, to begin with.”* [Male; USA; RPO; Energy<sup>1149</sup>]

In addition, he says collaboration between different parties leads to increased insight:

*“It also means thinking about knowledge and knowledge creation differently, not simply as a scientist does X and delivers Y, but recognising that it's a subtle*

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<sup>1146</sup> GB05

<sup>1147</sup> USA02

<sup>1148</sup> USA01

<sup>1149</sup> USA01

*process that can involve many different parties, that there's different kinds of knowledge...*” [Male; USA; RPO; Energy<sup>1150</sup>]

According to this participant, public engagement is important in RPOs to show their impact on society and communities:

*“...I think there's been, for some time now, some very strong pressures on academics to show that their work has both drawn on communities and works with communities and impacts upon communities and their perceptions and future activities.”* [Male; UK; RPO; Energy, Waste Management<sup>1151</sup>]

### 3.8.5.3 BUILDING SUPPORT NETWORKS AND STRATEGIC ALLIANCES

This section covers references to opportunities for finding common ground, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.

In addition, references to building relationships and making connections to facilitate useful outcomes for research and innovation also covered.

The importance of actively building support networks to bring stakeholders together and broaden access to research is recognised by participants.

A Serbian participant says the following about building support networks and strategic alliances:

*“...we adopted... an open community for open people, and, I think, that somehow people get that, when they come to one of our events, that they can, like, always propose something, comment... there is always some exchange that happens...”* [Female; Serbia; CSO; ICT<sup>1152</sup>]

In addition, another participant from Serbia says collaborations extend beyond finances:

*“We collaborate, yes, successfully and those are long-term collaborations... even sometimes when they are not financially supported, we work together here on that volunteer...”* [Female; Serbia; RPO; Waste Management, Bioeconomy<sup>1153</sup>]

This participant shares a similar sentiment:

*“I like these large collaborations, so I even have them without funding...Some approach me, and others, I hear about them. Sometimes I hear about them from*

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<sup>1150</sup> USA01

<sup>1151</sup> GB07

<sup>1152</sup> SRB02

<sup>1153</sup> SRB05

*the research authority. I ask a question of the psychologist, and they'll tell me that so and so is trying to research the same question.*” [Female; Israel; RPO; ICT<sup>1154</sup>]

One participant provides an account of the reciprocal benefits of collaboration between scientists:

*“...we will do something for them, they will do something for us, and then we collaborate either on the idea of publishing scientific papers together, or applying for some international or local projects, or simply because we like to collaborate...”* [Male; Serbia; RPO; Bioeconomy<sup>1155</sup>]

The same participant says the resultant network extends across multiple institutions and countries:

*“...we have a great collaboration with a ... big number of institutions from the country and abroad...and then we all feel great satisfaction with what we do. And it's pleasant, it's fun...”* [Male; Serbia; RPO; Bioeconomy<sup>1156</sup>]

Furthermore, he says multi- and interdisciplinary collaboration is beneficial for problem-solving:

*“...it is useful to us to collaborate with researchers... we have the same... challenges in front of us, and then we try to find a way... And what is great when you work with these multidisciplinary and interdisciplinary teams is that we observe the same thing in a completely different way.”* [Male; Serbia; RPO; Bioeconomy<sup>1157</sup>]

In addition, this participant says collaboration is key to being involved in global research and innovation:

*“...we collaborate with the industry, as well, and I have this dream of making a collaboration with the world industry...”* [Male; Serbia; RPO; Bioeconomy<sup>1158</sup>]

From the interviews conducted, forming strategic industry alliances in R&I is necessary:

*“It is unusual for academia to have access to the type of facilities and infrastructure that we have, so they will develop things and we will help test them or create proof of concept for some of the things that they come up with...”* [Female; UK; Industry & Business; ICT<sup>1159</sup>]

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<sup>1154</sup> IL02

<sup>1155</sup> SRB06

<sup>1156</sup> SRB06

<sup>1157</sup> SRB06

<sup>1158</sup> SRB06

<sup>1159</sup> GB03

According to the same participant, strategic alliances influence industry standards:

*“...if something that is developed in academia is validated by us, it has the potential to become the industry standard...”* [Female; UK; Industry & Business; ICT<sup>1160</sup>]

In addition, there are other benefits of collaboration, such as gaining knowledge and insight:

*“...it's also about getting knowledge of the third party as well. We might not have the knowledge to develop that new method but working with them allows us to do it...”* [Male; UK; Industry & Business; Bioeconomy<sup>1161</sup>]

A participant from a Serbian RPO says collaboration and support networks are necessary to lighten the workload:

*“So, we work a lot on what my colleagues from IMGGI [Institute of Molecular Genetics and Genetic Engineering] call outsourcing. We cannot do all on our own.”* [Male; Serbia; RPO; Bioeconomy<sup>1162</sup>]

According to this participant, research requires collaboration:

*“...cooperation with other groups is actually encouraged. All the work for all the degrees I have was done in cooperation with other groups.”* [Female; Israel; RPO; Energy, Waste Management<sup>1163</sup>]

A participant from Italy says the following about involving stakeholders:

*“...we involve stakeholders from the planning to the design and then to the implementation and then even to the follow-up, in every phase.”* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1164</sup>]

Furthermore, sharing expertise is also useful on an international level:

*“...a large part of that is sharing expertise in areas where the UK has been able to make some progress, then sharing that expertise with other governments, other countries' experts so that it can inform their decision-making...”* [Male; UK; RFO, Policy body; Energy<sup>1165</sup>]

According to this participant from the UK, the European Commission plays a key role in expanding collaboration:

*“Until recently, every sector has looked at itself and at its own interests without seeking a more systemic approach... However, the policy lines of Horizon 2020 and, even more, of the Horizon Europe tend to widen and transversal actions... This will also make more interesting and useful the involvement of external subjects*

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<sup>1160</sup> GB03

<sup>1161</sup> GB01

<sup>1162</sup> SRB06

<sup>1163</sup> IL05

<sup>1164</sup> I04

<sup>1165</sup> GB04

*and online structures, which would allow the creation of more extensive ecosystems and could support the contact and connections with other subjects."* [Male; Italy; Industry & Business; Energy, ICT<sup>1166</sup>]

According to another participant from the UK, the integration of different stakeholders is driven by funded networks to bring industry and academia together:

*"So I think most of the engagement that we do tends to be with industry... there are funded networks in biotechnology where the government was trying to just bring together people from industry and people from academia, so that we would better understand what their research problems are, and they would better understand the kinds of tools that we have, and then, hopefully, come together and meet in the middle..."* [Female; UK; RPO; Bioeconomy<sup>1167</sup>]

One participant says collaboration is important for validation from various stakeholders:

*"...I think that is extremely helpful to get... trusted 3<sup>rd</sup> party validation for your claims or your products or processes rather than making them yourself..."* [Male; UK; Industry & Business; Bioeconomy<sup>1168</sup>]

This participant mentions collaboration with government agencies:

*"...we try to work with government agencies as institutions that have a responsibility to provide public value for their work. So we work with them in trying to get our ideas into play and to understand how we can help them do their jobs more effectively and so on."* [Male; USA; RPO; Energy<sup>1169</sup>]

From participants' contributions in this section, it is evident that building support networks and strategic alliances between various organisations is necessary and beneficial. In the next section, a summary of this chapter is provided.

### 3.8.5.4 SUMMARY OF PUBLIC ENGAGEMENT

From the findings presented in this section, participants consider public engagement necessary and beneficial. In addition, participants see support networks and strategic collaboration and alliances as advantageous.

Participants describe different motivations for and benefits of collaborative activities, including the building of trust and confidence over time, strengthening the social acceptability of products, assisting in the anticipation of future regulations, and alleviating concerns of the public.

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<sup>1166</sup> I03

<sup>1167</sup> GB06

<sup>1168</sup> GB01

<sup>1169</sup> USA01

In some cases, public engagement is a requirement of funding agencies, which provides motivation for ensuring community impact. One participant says funding awarded and publications are afforded more importance than public engagement when faculties and researchers are evaluated. They suggest that if public engagement is prioritised in evaluation processes in the university system, it would also be prioritised at the organisational level.

Furthermore, the benefits of public engagement sometimes accrue to the participant's organisation, rather than to other stakeholders, especially in the business and industry domain.

The motivations for strategic alliances and collaboration include opening up access to specialist knowledge and other useful resources.

### 3.8.6 OPEN SCIENCE

*Open science* includes both the EU 'open access' pillar and 'open and transparent' process dimension. The open access pillar definition incorporates the FAIR (Findable, Accessible, Interoperable, Reusable) principle.

According to this principle, the attributes of open access are (1) the easy accessibility and (2) findability of data, and (3) that data can be shared and (4) reused without difficulty. Open access is intended to encourage collaboration, to catalyse innovation, to prevent costly access to scientific research, to facilitate productive dialogue with civil society, and to improve the quality of research.<sup>1170</sup>

The 'open and transparent' process dimension involves the inclusivity of all actors in the process of R&I through transparency, openness, and the provision of meaningful information at all stages of the process.

All actors, including the public, should be encouraged and enabled to engage with, discuss and scrutinise science and technology, and be empowered to make informed decisions.

Openness and transparency should develop multi-way dialogue with all relevant parties, foster accountability and public trust, and meaningfully involve people not normally part of science and technology systems, in the research and innovation process.

It is within this framework that interviews, and subsequent analyses, were conducted. Of the 10 codes identified for this theme, three were seen most extensively: levels and limits of open access [code 46]; risks-disadvantages associated with open data access [code 51]; motives-benefits of open access and data [code 52].

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<sup>1170</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

Codes	Europe & North America					
	Israel	UK	Italy	USA	Serbia	Total
45: Open Science						
46: Level and limits of open access	3	14	11	7	4	39
47: Data protection	2	6	7	4	1	20
48: Data accessibility	3	7	5	6	6	27
49: Organisational norms and practices	1	11	1	8	7	28
50: Lack or uncertainty of policy	3	6	2	3	4	18
51: Risks-Disadvantages associated with open data-access	9	14	5	6	6	40
52: Motives-Benefits of open access and data	6	11	10	11	8	46
76: Transparency	0	6	2	6	5	19
77: Accountability	1	3	0	2	0	6
106: Financial constraints and considerations	9	9	1	15	5	39

The following sections provide details regarding these codes and descriptions of the findings. In the sections, participants make the case for open access to data, open access requirements by funders, as well as the risks and costs of open access. In the summary section, the findings relating to the theme *open science* are brought together.

### 3.8.6.1 THE CASE FOR OPEN ACCESS TO DATA

Any reference to the benefits or motivations of open access to data are covered in this section. This includes improved quality of research and research outputs, improved visibility, status of the research and citations, and allowing for corrective measures, for example.

This participant recognises that open access to data and science is important to advance research:

*"...In the field of scientific research, open access is absolutely fundamental for the growth of the community and is fundamental for everything."* [Male; Italy; RPO, Policy body; Waste Management<sup>1171</sup>]

This participant from Serbia agrees that access to research leads to better research outputs in future:

<sup>1171</sup> I05

*"I look on my work as a kind of consequence of the research that have been done before in Serbia, and I see the importance of publishing every document of my predecessors, and, with that in mind, I try to store what I have that is good and interesting somewhere, so that the majority of people that are coming could be better equipped with those research tools etc., and with those possibilities to integrate various techniques and various tools to simply make better results..."*  
[Male; Serbia; RPO; Energy<sup>1172</sup>]

Another participant from Serbia sees open access to science as a benefit for humankind:

*"I think that everything should be available because science is for the benefit of mankind..."*[Female; Serbia; RPO; Waste Management, Bioeconomy<sup>1173</sup>]

At an organisational level, this participant says open access to their data is beneficial to their cause:

*"In working communication our mission is to diffuse the knowledge, to communicate as much as we can, so basically it is our mission that pushes us in that sense..."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1174</sup>]

This participant from the UK makes the case that taxpayers have a right to access information:

*"...And in fact it's paid for by the taxpayer, you can't just sit on it and say, "This is mine, you can't have it."..."* [Male; UK; RPO; Bioeconomy<sup>1175</sup>]

In addition, a participant from the US agrees that taxpayers have a right to access publicly funded research:

*"...we're funded by the government; we're using the public's money and certainly the public needs to have access to the research that they're funding..."* [Male; USA; RFO; Bioeconomy<sup>1176</sup>]

Another participant says the benefits of open access outweigh the need for confidentiality:

*"...our association has been changing its internal policies towards greater sharing and free access to the results of our activities... which allows to grow the visibility, contacts and authority of the organisation..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1177</sup>]

One participant says open access publishing is becoming the norm:

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<sup>1172</sup> SRB01

<sup>1173</sup> SRB05

<sup>1174</sup> I04

<sup>1175</sup> GB05

<sup>1176</sup> USA05

<sup>1177</sup> I02

*"...when I look at the journals I publish in, I see a lot more articles are open access, so I think it's becoming a norm in a way..."* [Female; USA; RPO; Bioeconomy<sup>1178</sup>]

The same participant says open access increases publication visibility and citation frequency:

*"I've noticed that my articles that I publish open access get more attention, get more citations...I think people are starting to realise that the dissemination part is important and having it open access is an important part of that dissemination..."* [Female; USA; RPO; Bioeconomy<sup>1179</sup>]

Another benefit is that data can be checked more rigorously:

*"I think it would produce perhaps much more rigorous data checking for researchers and a research team, which has gotta be a good thing..."* [Male; UK; RPO; Energy, Waste Management<sup>1180</sup>]

Furthermore, greater access can avoid duplication:

*"...I believe that research data should also be open to avoid duplication and to help other researchers to accelerate their evolution..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1181</sup>]

According to this participant, another benefit of making data accessible is increasing transparency:

*"...I completely support it [open access]. I think it's very important and essential for transparency."* [Male; USA; RFO; Bioeconomy<sup>1182</sup>]

Finally, open access improves the quality of R&I, according to this participant in the ICT domain:

*"...this type of open access to software helps the software become better and it helps look at things...security issues or flaws or just bugs in the code... So we provide a completely free access for that kind of thing..."* [Female; UK; Industry & Business; ICT<sup>1183</sup>]

In the next section, open access requirements by funding organisation are discussed.

### 3.8.6.2 OPEN ACCESS REQUIREMENTS BY FUNDERS

In this section, open access requirements by funding organisations are discussed. According to participants, funders play a key role in establishing the extent to which open access is allowed.

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<sup>1178</sup> USA02

<sup>1179</sup> USA02

<sup>1180</sup> GB07

<sup>1181</sup> IO3

<sup>1182</sup> USA05

<sup>1183</sup> GB03

This participant says funders require open access, despite potential problems:

*"My projects mean that I have to put my data out there within three months of generating it... And so that's caused quite a few problems for the community that I work on, but now they understand that that's a condition of my funding sponsor..."* [Female; UK; RPO; Bioeconomy<sup>1184</sup>]

Another participant working in business and industry, shares a similar experience:

*"...when it comes to European funding, the funding comes with a number of conditions. One of them is that they'd like to see things become open access and become published and publicly used as quickly as possible..."* [Female; UK; Industry & Business; ICT<sup>1185</sup>]

This participant from the US says government-funded projects must be made public:

*"If you are funded by certain government agencies, I think NIH [National Institutes of Health] is a big one, you have to publish open access..."* [Female; USA; RPO; Bioeconomy<sup>1186</sup>]

Another participant from the UK agrees:

*"...the rules and norms around the Horizon 2020 project or... around anything that's funded that's part of the government delivery program needs to be put in the public..."* [Male; UK; CSO; Energy<sup>1187</sup>]

Providing open and transparent access is key for an EU player to provide open science, according to this participant:

*"...we actually are now members of ELIXIR, which is the data for life project of the European Union... Wouldn't have been allowed in on that project... unless we were totally open and fair..."* [Female; UK; RPO; Bioeconomy<sup>1188</sup>]

While these participants describe the need for, benefits of and motivations for of open access, other participants are concerned about protecting commercial interests and intellectual property as well as other dangers of open access to data, such as the risk of misconstruing or misusing data and national security concerns. In the next sections, the limitations for open access are discussed.

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<sup>1184</sup> GB02

<sup>1185</sup> GB03

<sup>1186</sup> USA02

<sup>1187</sup> GB08

<sup>1188</sup> GB02

### 3.8.6.3 THE RISK OF OPEN ACCESS

This section includes references to the negative consequences and disadvantages of open access to data. This relates to but is not limited to: intellectual property (IP) rights, patents, commercially sensitive data, competitive advantage, data distortion, financial concerns, data overload, misuse or shortcomings and negative perceptions about open access.

Participants, especially those in business and industry, are concerned about issues relating to the protection of competitiveness, IP, and patents.

Another concern mentioned by participants is the potential misrepresentation and misuse of data.

#### 3.8.6.3.1 Protecting commercial interests and intellectual property

From the interviews in this sample, the main limits to the release of data are commercial- and competition-based. According to the participants, commercialisation and intellectual property rights are prioritised over open access. Participants mention tensions between data sharing and protecting commercial interests.

This participant from the UK speaks about the tension between open access and protecting commercial interests and intellectual property:

*"We know that sometimes the conflict, the tension between protecting our IP and protecting our knowledge and our know-how is a conflict against the us wanting to be more open and wanting to collaborate with academia and wanting to share what we do with other institutions..."* [Female; UK; Industry & Business; ICT<sup>1189</sup>]

One participant, who works in business and industry, says there should be balance between open access and protecting commercial interests:

*"...it is essential to increase the culture of open science and open innovation, and define good practices that allow us to understand how to properly manage the balance between data sharing and confidentiality and protection of industrial secrets..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1190</sup>]

Another participant agrees:

*"...the majority of the data should be open, but... if you want to generate new business opportunities they should be under some IPR [intellectual property rights] or patent protection..."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1191</sup>]

This participant says open access to research results does not always have to be allowed, especially when there is a need to protect commercial interests:

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<sup>1189</sup> GB03

<sup>1190</sup> I02

<sup>1191</sup> I04

*"...if you go in a proprietary direction, then the result of the research can be published according to the constraints of IPR. I don't think that there is the obligation of the public dissemination of the research results always and in any case..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1192</sup>]

Another participant in the bioeconomy domain says researchers and innovators in this domain especially face challenges in terms of intellectual property and patents:

*"But I know some innovators in biotechnology really have problems... for a variety of reasons. Confidential business information if they're developing a product that might be used in industry. Or intellectual property if they have patents or they don't have a patent yet."* [Female; USA; RPO; Bioeconomy<sup>1193</sup>]

One participant from a research organisation addresses the implications for open science when funders are private or public organisations:

*"...if your research is funded by industry, then industry invariably does not want to see you disclose your data because they want to assess it for IP potential and file patents..."* [Male; UK; RPO; Bioeconomy<sup>1194</sup>]

When funders put open access requirements in place it can complicate interactions between researchers and companies:

*"Well, it's complicated in a way, because it means that it's essentially from the beginning, it's a conflict for us. We want to protect our IP..."* [Female; UK; Industry & Business; ICT<sup>1195</sup>]

The same participant says this can lead to problems with obtaining patents and intellectual property:

*"...and that [publishing quickly] presents a lot of problems for a private company like us, because obviously, we want to retain the ownership of the IP. And so, that is an issue..."* [Female; UK; Industry & Business; ICT<sup>1196</sup>]

Because it takes time to obtain a patent:

*"...have to first protect all of IP with patents, and that takes a while..."* [Female; UK; Industry & Business; ICT<sup>1197</sup>].

Loss of commercial opportunities, intellectual property, and competitiveness informs this participant's attitude towards open access:

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<sup>1192</sup> IO3

<sup>1193</sup> USA02

<sup>1194</sup> GB05

<sup>1195</sup> GB03

<sup>1196</sup> GB03

<sup>1197</sup> GB03

*"...if you are working with companies and they are investing their own money, in that case of course even the results should be somehow protected because otherwise they do the work and someone else takes the benefit..."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1198</sup>]

According to this participant, open access requirements can lead to complications for companies entering into research collaborations:

*"When we come into a project, we have to bring some of our knowledge and some of our IP already, so there's a lot of negotiations that happen with the consortium itself as to what we are bringing, what we are allowed to share with them, and what we are not."* [Female; UK; Industry & Business; ICT<sup>1199</sup>]

In addition, this participant says investors see data as a competitive edge:

*"...as research must also be a tool to create value for those who invest into research on innovative products that cannot be "given away" (used by others for business) to the market."* [Male; Italy; Industry & Business; Energy, ICT<sup>1200</sup>]

Finally, this participant differentiates between company data, which should be protected, and university data, that should be open access:

*"A company that is investing should be in the position to protect its data. This is not the case of the university or other players, even if they could be industrial spin-offs from universities and this is absolutely encouraged by the European Commission..."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1201</sup>]

In addition to protecting commercial interests and intellectual property, participants also speak about the dangers of open access in the following section.

### 3.8.6.3.2 Misuse of data and national security concerns

According to the participant's contributions in this section, there are dangers to making data open access. These include misconstruing or misusing data, national security concerns and causing unnecessary public panic.

This participant says data can be misconstrued or can create panic if released:

*"...we need to be consulted before anybody in the group decides to make a statement about the nature of the analysis that's there... a potential concern there for a local community to be put under undue worry or concern and we have to act appropriately to avoid that..."* [Male; UK; RPO; Energy, Waste Management<sup>1202</sup>]

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<sup>1198</sup> I04

<sup>1199</sup> GB03

<sup>1200</sup> I03

<sup>1201</sup> I04

<sup>1202</sup> GB07

Furthermore, the threat of misrepresentation or misinterpretation of data is a key concern. The same participant says:

*"...It's a real worry that the way that the information that they are involved in producing... doesn't become a panic for the local community. If it's not warranted..."* [Male; UK; RPO; Energy, Waste Management<sup>1203</sup>]

This participant speaks about public reaction to biotechnology innovation:

*"...I think they're [innovators in biotechnology] very afraid... of public backlash against some of the technology early, and that that might stall the research... So the openness during the research process, I think is... For biotech people is more difficult..."* [Female; USA; RPO; Bioeconomy<sup>1204</sup>]

Another participant from the UK is concerned about the misrepresentation of data in this domain:

*"There's a suspicion that by making data open we open ourselves up to problems. People who would like to act maliciously against us by making all our documents available perhaps give them an opportunity to do that...it was always going to be pros and cons about open data..."* [Male; UK; Industry & Business; Bioeconomy<sup>1205</sup>]

The same participant is concerned about the misuse of data by competitors:

*"Often we think well if we simply make all of our data available we are in context, but people can analyse those data in a way that would make us look bad...there is always ways to analysing data to come up with a conclusion that you want."* [Male; UK; Industry & Business; Bioeconomy<sup>1206</sup>]

This participant from the UK agrees:

*"...if you make available all type of information, specifically within the field of gene editing and gene drives, to the public, you will basically make the information of that available to "bad guys"..."* [Female; USA; RPO; Bioeconomy<sup>1207</sup>]

One participant from the US cites national security concerns in certain cases:

*"...Of course, there are some sort of information, like for instance, the sequence of a really highly pathogenic virus...you don't wanna really make it available public..."* [Female; USA; RPO; Bioeconomy<sup>1208</sup>]

Sharing this data could lead to misuse, according to the same participant:

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<sup>1203</sup> GB07

<sup>1204</sup> USA02

<sup>1205</sup> GB01

<sup>1206</sup> GB01

<sup>1207</sup> USA04

<sup>1208</sup> USA04

*"...a lot of research within gene drives or gene editing of viruses, they can make them potentially more pathogenic, are very much regarded as highly sensitive type of research, so people are very careful about how much information they need to share, so that they don't promote misuse of that..."* [Female; USA; RPO; Bioeconomy<sup>1209</sup>]

However, national security concerns do not apply to all instances:

*"...everything that I... We generate in the lab can be open access. For some other labs that work on really topics of national security interests, of course, they have limitation to make it available publicly..."* [Female; USA; RPO; Bioeconomy<sup>1210</sup>]

In the energy domain, one participant is concerned about wilful misrepresentation of data if the research is politically sensitive or contested:

*"...on one level, you do want data to be available so others can understand the basis for conclusions that are being derived, especially if they have any implications for action for public. On the other hand, you might justifiably be concerned about the misuse of that data, the selective use of it, the use of it for political reasons."* [Male; USA; RPO; Energy<sup>1211</sup>]

In addition to the concerns mentioned in the previous two sections, there are also other limitations to open access data. In the following section, the cost implications of open access are discussed.

#### 3.8.6.4 THE COST OF OPEN ACCESS

Over and above the need to protect commercial interests and intellectual property and the threat of data being misconstrued or misused, the cost of open access to data is a concern raised by participants in this section.

According to participants, open access to data can be expensive, depending on the prestige of the publications, as mentioned by this participant:

*"Unless you publish in a not-so-great open access journal, it's gonna cost you money..."* [Female; USA; RPO; Bioeconomy<sup>1212</sup>]

This participant from a research performing organisation says not all universities have the resources to pay open access fees:

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<sup>1209</sup> USA04

<sup>1210</sup> USA04

<sup>1211</sup> USA01

<sup>1212</sup> USA02

*"...if there are resources available to pay the open access fees, that would make a difference. Some universities have that kind of money, some don't..."* [Male; USA; RPO; Energy<sup>1213</sup>]

In addition, the same participant says they weigh up the cost of open access against the impact of the research:

*"...If it's high impact work, I want people to read it. If not, then I probably won't pay the open access fee..."* [Male; USA; RPO; Energy<sup>1214</sup>]

Another participant, also from a research organisation, says their organisation pays to provide instant open access of their publications:

*"And that's using the whatever the gold standard open access, so we would pay for all our publications to be open access immediately..."* [Male; UK; RPO; Bioeconomy<sup>1215</sup>]

This participant from Serbia says their research organisation is committed to open access, despite the costs:

*"Whenever we can pay the open access to be as visible as possible or send the works to as many congresses as possible, and presentations in order to make them visible..."* [Female; Serbia; RPO; Waste Management, Bioeconomy<sup>1216</sup>]

From the interviews with participants in this sample, it is clear there are varying views about the need for open access to science. In the next section, the summary for this chapter is provided.

### 3.8.6.5 SUMMARY OF OPEN SCIENCE

From the findings presented in this section, participants identify tensions between data sharing and protecting commercial interests.

According to certain participants, open access threatens competitiveness or property rights, which is a prominent concern of participants in business and industry. Other concerns include the dangers of misrepresentation and misinterpretation of the data, national security, and the cost of providing open access to data.

Furthermore, according to participants, ownership and funding play a key role in the extent to which open access is allowed. From interviews with the participants, the motives and benefits of providing open access to data involve improving the quality of research and research outputs

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<sup>1213</sup> USA03

<sup>1214</sup> USA03

<sup>1215</sup> GB05

<sup>1216</sup> SRB05

as well as improving the status and visibility of the research. Furthermore, commitments to funders are a motivation for open access publication.

Participants also refer to the need to make publicly funded research available to taxpayers.

### 3.8.7 ANTICIPATIVE, REFLECTIVE AND RESPONSIVE RRI

*Anticipative, reflective and responsive RRI* includes both the ‘anticipative and reflective’ and ‘responsive and adaptive’ process dimension definitions. For R&I to be responsible, it requires the actors involved to engage in a process of anticipating and reflecting on the future they want to create with their R&I, how that future can be achieved, and what possible impacts and unintended consequences may arise.

Responsible actors should reflect on why that future is desirable, and on the assumptions, values and purposes that underlie the tasks and objectives of trying to achieve that future. The insights generated from such anticipation and reflection guide more responsible action.

R&I must also be ‘responsive and adaptive to change’, which means that actors must include, in their process, a responsiveness to the views of the public and other stakeholders with an ability to adapt and change goals and methods, if necessary.<sup>1217</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. Of the 17 codes identified for this theme, four were seen most extensively: evaluation [code 100]; demand-driven research and innovation [code 81]; targeting critical societal challenges [code 82]; furthering research-developing policy or standards [code 84].

Note that meeting societal needs [code 80] is an aggregation of seven of the codes listed here and therefore overcounted. Demand-driven R&I is an aggregation of three codes, including code 82 and code 84. As demand-driven R&I is reflected in the two combined codes, as well as containing its own additional coding, the three codes are treated as one section.

Codes	Europe & North America					
	Israel	UK	Italy	USA	Serbia	Total
88: Anticipative, reflective and responsive RRI						
89: Future societal needs and challenges	2	7	2	6	5	22
90: Environmental sustainability	2	5	4	1	1	13
91: Responsive approach	7	12	5	5	1	30
92: Organisational norms and practices	0	4	1	2	2	9
93: Lack or uncertainty of anticipation policy and framework	1	0	0	3	6	10
100: Evaluation	3	19	11	6	3	42

<sup>1217</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

101: Importance of feedback	0	3	1	1	1	6
103: Participation in upstream R&I	0	1	2	4	2	9
80: Meeting societal needs	17	43	15	36	36	147
81: Demand-driven research and innovation	16	38	13	30	28	125
82: Targeting critical societal challenges	10	25	3	16	17	71
83: Benefiting specific groups	0	8	1	1	4	14
84: Furthering research-developing policy or standards	5	8	6	6	6	31
85: Organisational norms and practices	1	2	1	4	2	10
86: Lack of consideration of societal benefits	0	4	0	0	3	7
87: Lack or uncertainty of policy for meeting societal needs	0	0	1	2	3	6
105: Time frames and time constraints	1	11	3	1	1	17

The following sections provide details regarding these codes and descriptions of the findings. In this chapter, participants address the need for anticipative and reflective processes and responsive research and innovation. In the summary section, the findings relating to the theme *anticipative, reflective and responsive RRI* are brought together.

### 3.8.7.1 ANTICIPATIVE AND REFLECTIVE PROCESSES

This section relates to the anticipative and reflective processes when conducting R&I. Participants reflect on the future they want to create and why that future is desirable.

In the first section, participants reflect on technological developments and commercial interests as desirable in future R&I processes. In the second section, certain participants reflect on climate change and environmental concerns in future R&I.

#### 3.8.7.1.1 Technological developments and commercial interests

As will become clear in this section, technological developments and commercial interests determine participants' view of the future, especially in the industry and business domain.

One participant in the bioeconomy domain reflects on their research and how their technology will be used in future:

*"We talk about really the implication of this technology in the future... By actively collaborating with bioethicists, I'm really ensuring that I include these aspects in my research..."* [Female; USA; RPO; Bioeconomy<sup>1218</sup>]

Another participant in the business sector speaks about anticipating developments and technological advances:

<sup>1218</sup> USA04

*"What we do look at, we do look at things as, for example, where technology is moving, and whether we can influence where it's going... In our work, we try to pre-empt where things are going, in as much as we can, we try to lead where technology is going..."* [Female; UK; Industry & Business; ICT<sup>1219</sup>]

Another participant says they consider the possibilities of scaling up the implementation of their technology:

*"We've done research on the performance of those improved insulation technologies and how well they work, and what changes to the supply chain we might need to take to... to ensure that those technologies can be rolled out a large scale..."* [Male; UK; CSO; Energy<sup>1220</sup>]

The same participant recognises that their organisation plays a role in determining the future:

*"...we know that we are quite influential as an organisation, so the area where we choose to go and where our support goes, it potentially will define where the industry in general, goes..."* [Female; UK; Industry & Business; ICT<sup>1221</sup>]

In addition, this participant says they view the future in terms of commercial interests:

*"I think we're following mostly commercial interests and our own strategy for where we think things are going..."* [Female; UK; Industry & Business; ICT<sup>1222</sup>]

Like the previous participant, their future priority is commercialisation:

*"This allows us to refine the coherence between our study and research initiatives and the growing needs of public opinion which is our market..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1223</sup>]

Furthermore, efficiency in production and price reduction underly the future they want to achieve:

*"We studied supply chain innovation by identifying, even at the enterprise level, which are the most advanced fronts where technology and business models evolution is observed, and how this will impact on private or public clients. The produced advantages are described, how the market will change and how what we do today could be made, perhaps, even simpler and easier, to do in the future, even less expensive for the State and citizens thanks to innovation..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1224</sup>]

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<sup>1219</sup> GB03

<sup>1220</sup> GB08

<sup>1221</sup> GB03

<sup>1222</sup> GB03

<sup>1223</sup> I03

<sup>1224</sup> I03

Additionally, this participant refers to activities to evaluate the future development of technology:

*"We carry out so-called foresight activities, to analyse and evaluate the future developments of the technologies and innovations on which partners of our Association are active and the related social and economic impacts..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1225</sup>]

The same participant says they engage with their network about the future:

*"We regularly discuss with members of our Association and, as far as possible, with our network, to define and evaluate the objectives and the action plan of the Association in the future..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1226</sup>]

In addition, for this participant, public acceptability of a product is an important concern when thinking about the future:

*"...I think it is more trying to digest what people have said about early research into gene editing and how do they are reacting into that. So we can get an indication of how they might react to specific applications to the product we are developing..."* [Male; UK; Industry & Business; Bioeconomy<sup>1227</sup>]

From the comments in this section, it seems considerations are less about responsiveness and adaptability and more about marketing and future business success.

### 3.8.7.1.2 Environmental considerations

In contrast to the comments by participants in the previous section, participants in this section refer to climate change and environmental concerns when reflecting on the future.

According to this participant, concerns about climate change and the threat of environmental destruction to play an important role in defining desirable futures:

*"I'm consciously aware of the fact that global emissions are nowhere close to being in line with what we need to meet the internationally agreed targets for avoiding dangerous climate change. We're massively off track. So, everything I do is to do with thinking about how to bend that trajectory and get us on track, and that has implications for decades and centuries into the future..."* [Male; USA; RFO; Bioeconomy<sup>1228</sup>]

Another participant shares the sentiment:

*"The increased urbanisation, the challenge on CO<sub>2</sub> emissions, energy efficiency, mobility, aging are all issues that are seen as one of the keystones in the*

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<sup>1225</sup> I02

<sup>1226</sup> I02

<sup>1227</sup> GB01

<sup>1228</sup> USA05

*construction and planning of sustainable growth and sustainable regeneration..."*

[Male; Italy; Industry & Business; Energy, ICT<sup>1229</sup>]

According to this participant from the UK, emission targets are central to the future of R&I:

*"...in England, we have, clearly we have the 2050 80% carbon target at the moment. And we have a clean growth strategy that sets out some broad directions as to how the government wants to take that forward..."* [Male; UK; CSO; Energy<sup>1230</sup>]

One participant from Israel says their work is aimed at conserving the environment for future generations:

*"Regarding my work with water, my research is intended to find better solutions to improve the environment, and not to cause any harm..."* [Female; Israel; RPO; Energy, Waste Management<sup>1231</sup>]

### 3.8.7.2 RESPONSIVE RESEARCH AND INNOVATION

This section includes mentions of demand-driven solutions to specific societal problems as part of setting the goals and agenda for R&I.

This section includes *targeting critical societal challenges* and *furthering research-developing policy or standards*.

*Targeting critical societal challenges* codes any reference to existing or imminent critical challenges R&I focuses on (can be around the UN SDGs). This can include issues of health and wellbeing, waste management, access to resources and infrastructure, and environmental protection.

*Furthering research-developing policy or standards* codes references to local policy development or support in the development of regulations/standards. Both these codes are about meeting societal needs and have little reference to future-oriented thinking.

#### 3.8.7.2.1 Addressing the needs of society

In this sample, societal needs are framed by the language of the domain and the intersection between domains and policies.

This participant says they consider societal needs through their personal motives and individual concerns:

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<sup>1229</sup> I03

<sup>1230</sup> GB08

<sup>1231</sup> IL05

*"There are a couple of things, one is I try to think about what the concerns of society in the first place and do work that's relevant to it, that's just a personal mission. I wanna make sure the work is relevant and useful..."* [Male; USA; RPO; Energy<sup>1232</sup>]

Furthermore, the same participant is driven by doing work that is beneficial to society:

*"...For me, at a personal level, it's my personal passion. So whether the government funds it or not, I'm doing work that I think is important and relevant to society..."* [Male; USA; RPO; Energy<sup>1233</sup>]

This participant considers societal needs in her work in the bioeconomy domain:

*"Are there any toxicity associated with these? Is there any immune response? So kind of like make it safer for public application..."* [Female; USA; RPO; Bioeconomy<sup>1234</sup>]

Another participant in business mentions society's quality of life and safety implications:

*"...on building innovation and on how innovative and regenerated buildings can impact on the quality of life and occupants' safety..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1235</sup>]

Another participant says future generations should benefit from their work:

*"I would say, there is a... This consensus in the field among scientists, and also I would say among funding organisation that really we need to make sure that the science that benefits public health can help improve the treatment of many diseases move forward, and we do not deprive the future generation from the benefits of many new discoveries that can happen by performing scientific research..."* [Female; USA; RPO; Bioeconomy<sup>1236</sup>]

According to this participant, funding agencies play a role in whether societal elements and specific desirable futures are targeted:

*"...there is a section on a grant review form which talks about this or which asks through your opinion on whether there are economic and societal impacts You can also try to make an argument that it will make the UK a world leader... area of research that it is that you're doing. And then there's usually a document that gets appended, that talks about the steps that you will take during the grant to ensure that the research that you're doing does have the impact that you have identified that it should have..."* [Female; UK; RPO; Bioeconomy<sup>1237</sup>]

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<sup>1232</sup> USA03

<sup>1233</sup> USA03

<sup>1234</sup> USA04

<sup>1235</sup> I03

<sup>1236</sup> USA04

<sup>1237</sup> GB06

In the next section, the influence of various domains and policies on determining societal needs is discussed.

### 3.8.7.2.2 Domains and policies

Societal needs to be considered in working towards desirable futures is influenced by the domain within which they occur and the policies that govern them.

This is clear in this participant's comments about the need to manage waste in future:

*"...there's a societal need, a very strong societal need, which is to effectively and safely manage waste... And actually I've got tons of evidence that shows that's not happening..."* [Male; UK; RPO; Energy, Waste Management<sup>1238</sup>]

The same participant says their research can feed into future policy advice:

*"...what I've been involved with most recently in terms of influencing policy, is a group called CERIG... the Circular Economy Research [and Innovation] Group. And so everybody who's in academia, is getting together... to discuss their work and research and how it can feed into policy advice..."* [Male; UK; RPO; Energy, Waste Management<sup>1239</sup>]

Another participant from the UK says they consider the direction of policy and research developments:

*"As an organisation and we have a policy team, which is what I work in, where we seek to understand the direction government is going in in terms of decarbonisation and other policies that are relevant for us. We try and we monitored the development of other relevant research developments. We have systems in place to try and keep track of what's going on and what's going on in sort of the research community..."* [Male; UK; CSO; Energy<sup>1240</sup>]

The same participant highlights an approach to achieve desirable futures by influencing policy makers:

*"We seek to feed into the policy making process, so that we work with governments, to use our insights and to try and inform the direction of future government policies..."* [Male; UK; CSO; Energy<sup>1241</sup>]

One participant in the ICT sector says their organisation analyses societal needs to guide policy implementation:

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<sup>1238</sup> GB07

<sup>1239</sup> GB07

<sup>1240</sup> GB08

<sup>1241</sup> GB08

*"The analysis of the demand, both through the institutions that represent the public and through the monitoring of the demand expressed by public interest, guides the policies implementation..."* [Male; Italy; Policy body; ICT<sup>1242</sup>]

A participant from Serbia speaks about their role in influencing policy:

*"I work on modelling of the national energy systems for the sake of setting the energy policies, and, in that sense, I have in my hands a tool that can enable the decision makers to perceive different variations..."* [Male; Serbia; RPO; Energy<sup>1243</sup>]

In the domain of bioeconomy, environmental policies are important, according to this participant:

*"...we try to follow local as well as foreign legislation, and not only legislation, but also directions, Kyoto protocol, Paris agreement, Stockholm convention, United Nations goals when it comes to sustainable development, and for our research not to go against the world but in accordance with some world trends. So we don't have a feeling of inferiority that our research is of less quality than the research of our colleagues abroad..."* [Female; Serbia; Industry & Business; Bioeconomy<sup>1244</sup>]

### 3.8.7.3 SUMMARY OF ANTICIPATIVE, REFLECTIVE AND RESPONSIVE RRI

In this chapter, participants were asked to reflect on anticipative, reflective and responsive RRI. Participants reflect on the future they want to create with their R&I processes, why that future is desirable and how it can be achieved.

Participants, especially in the business and industry domain, place commercial interests high on their agenda for the future. They also mention harnessing technological developments to reach future goals. Participants' considerations are less about responsiveness and adaptability and more about marketing and future business success.

To a lesser extent, participants take climate change and environmental concerns into account when reflecting on desirable futures.

Furthermore, participants discuss the need for demand-driven R&I and addressing societal needs and problems when considering the future. From the participants' contributions, it is clear there is concern for future generations and conducting R&I processes that address specific societal needs in certain domains.

Participants also mention the importance of R&I in influencing future policies.

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<sup>1242</sup> IO1

<sup>1243</sup> SRB01

<sup>1244</sup> SRB04

### 3.8.8 SCIENCE EDUCATION

According to the European Commission pillar definition, *science education* involves developing processes to spread scientific knowledge, understanding, insight and critical capacity to citizens to better equip them with the necessary skills to be part of R&I discussions. A second component of the pillar, which aims to enhance access to R&I for citizens, is to increase the number of scientific researchers and promote science as a vocation.<sup>1245</sup>

Additional components of the science education pillar include the 'promotion of innovative problem-solving and critical thinking'; 'embedding social, economic and ethical principles'; 'promoting engagement and an entrepreneurial mindset'; 'empowering citizens to participate in science policy making'; 'sharing responsibility while solving social challenges'; 'facilitating a strong interdisciplinary approach, and stakeholders' involvement'.<sup>1246</sup>

Codes	Europe & North America					
	Israel	UK	Italy	USA	Serbia	Total
Science education						
18: Tools for engagement	6	14	12	14	3	49
19: Information-based tools	0	0	0	2	0	2
20: Training and workshops	3	1	0	5	1	10
21: Conferences, symposiums, talks and exhibitions	2	7	3	3	7	22
22: Research publications and policy reports	5	10	4	1	3	23
23: Information centres	0	0	0	2	0	2
24: University open days	0	1	0	0	0	1
25: Media	1	6	4	7	2	20
34: Tie-ups with local schools	0	1	0	0	0	1
102: R&I Capacity Building	0	0	2	0	1	3

The codes (sub-themes) used for this science education for this theme are selected because of their relevance to the concept of science education. The first sub-theme deals with *the tools of science education* [codes 18-25, 34] and the second concerns *R&I Capacity Building* [code 102].

<sup>1245</sup> <https://www.rri-tools.eu/about-rri>

<sup>1246</sup> <https://www.rri-tools.eu/science-education>

The following sections provide details regarding these two codes and descriptions of the findings. In the summary section, the findings relating to the theme *science education* are brought together.

### 3.8.8.1 THE TOOLS OF SCIENCE EDUCATION

*The tools of science education* sub-theme combines seven categories, which were originally separate codes, before being brought together in this overarching sub-theme. The categories are as follows: information-based tools; conferences, symposiums, talks and exhibitions; training and workshops; research publications and policy reports; information centres; university open days; and media.

*Information-based tools* covers references to tools that provide information for understanding research and innovation in the organisation as well as the related norms, procedures, and practices. This includes only one-way communication strategies and not two-way communication or engagement. Whilst there are (e.g. two raw coded extracts originally assigned to the USA), there are no insightful extracts for this particular sub-theme, thereby indicating a perceived lack of use of such tools.

*Conferences, symposiums, talks and exhibitions* includes any reference to providing information through different presentation-focused events. Such events were frequently included in interview participant accounts, across all the North American and European countries, thereby strongly indicating a perceived norm for participating in such events (as both presenters and attendees).

From the interviews with participants, it is unclear exactly *how* these events directly contribute to science education. It seems enough to the participants that these events are happening at all, as opposed to them giving any real deeper consideration of the events' effects (observed or otherwise). In response to common interview questions on science education activities, the responses are brief and generic, and centred around statements focused on evidencing that they had, for example, organised an event:

- *"We regularly organise dissemination events and dialogue initiatives..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1247</sup>]
- *"...we organise a stakeholder event which brings together about 100 people from the UK interested in the improvements of wheat and to hear about the findings that we've made in the project..."* [Female; UK; RPO; Bioeconomy<sup>1248</sup>]
- *"...participating in fairs or in conferences, for example, when there's an innovation fair and one of our projects has a booth, we provide some*

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<sup>1247</sup> I02

<sup>1248</sup> GB02

*materials for that kind of thing..."* [Female; UK; Industry & Business; ICT<sup>1249</sup>]

- *"I give speeches and that kind of thing..."* [Male; USA; RPO; Energy<sup>1250</sup>]
- *"...we organise an event called the technology breakfast..."* [Female; Serbia; CSO; ICT<sup>1251</sup>]

As such, this implies a potential (unspoken) linearity within their assumptions, given that organising a conference, symposium, talk or exhibition is enough to ensure participants leave the event 'educated' about scientific research. A small number of participants refer to the experiential (learning) objectives and processes associated with engaging in these events, such as:

- *"Our main idea is always to present a challenge and to provide different perspectives particularly through a number of presentations by different stakeholders who give their points of view..."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1252</sup>]
- *"exchange information more indirectly by giving a talk and people ask questions afterwards or you have a discussion about it..."* [Male; UK; Industry & Business; Bioeconomy<sup>1253</sup>]
- *"By providing them some pictures of what is happening today, and how it will shape our future, in an engaging manner, I wanna bring the public to the table for the conversation."* [Female; USA; RPO; Bioeconomy<sup>1254</sup>]

Certain participants answer the science education question with reference to educating other (or themselves being educated) colleagues and collaborators within the research system. Herein, ideas of science education implicitly shift from 'the public' being the target audience, to other professional stakeholders. Examples include: *"...research centres that we involve through conferences..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1255</sup>]; colleagues within one's own *"...scientific circles..."* [Male; UK; Industry & Business; Bioeconomy<sup>1256</sup>] that are in part sustained through attending these sorts of events; institutions organising *"...conferences where we invite lecturers from other institutions..."* [Male; Serbia; RPO; Energy<sup>1257</sup>]; and,

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<sup>1249</sup> GB03

<sup>1250</sup> USA03

<sup>1251</sup> SRB02

<sup>1252</sup> I04

<sup>1253</sup> GB01

<sup>1254</sup> USA04

<sup>1255</sup> I03

<sup>1256</sup> GB01

<sup>1257</sup> SRB01

using “...conference organisation...” [Female; Israel; RPO; ICT<sup>1258</sup>] as a basis for enhancing existing and developing new research collaborations.

Relatedly, one participant makes the explicit distinction between organising a conference for business and industry, versus other audiences, and thus labels her conference as “...a commercial event...” [Female; Serbia; CSO; ICT<sup>1259</sup>].

*Training and workshop* refers to setting up training sessions and/or workshops, where the aim is skills development and capacity building, as opposed to information sharing, as discussed above.

Apart from references to training researchers for research, the use of training in science education is absent from all interviews. There are, however, brief discussions around the use of interactive workshops (e.g. in contrast to conferences etc.) as a primary methods for engaging citizens (‘the public’) and additional external stakeholders:

*“We’ve also recently hosted public engagement or stakeholder engagement more on gene drives here at [anonymous university]. So a variety of workshops...”* [Female; USA; RPO; Bioeconomy<sup>1260</sup>]

The impact of such events is deemed to be maximised by including the target stakeholder (in terms of science education objectives) as formal workshop co-hosts, as one participant does with the “...British Embassy...” [Female; USA; RPO; Bioeconomy<sup>1261</sup>].

*Research publications and policy reports* provides a list of tools participants used for providing information such as research journals, publications, online research repositories, digital research platforms, and public databases, and policy reports.

This sub-theme is discussed across all five countries’ interviews. However, little detail emerges, with research publications and/or policy reports instead receiving passing mentions as part of longer lists of activities that are perceived as relevant to science education:

- “...scientific publications...” [Female; Serbia; RPO; Waste Management, Bioeconomy<sup>1262</sup>]
- “...writing scientific papers...” [Male; Serbia; RPO; Bioeconomy<sup>1263</sup>]
- “...we publish a lot; our staff publishes a lot...” [Female; UK; Industry & Business; ICT<sup>1264</sup>]

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<sup>1258</sup> IL02

<sup>1259</sup> SRB02

<sup>1260</sup> USA02

<sup>1261</sup> USA02

<sup>1262</sup> SRB05

<sup>1263</sup> SRB06

<sup>1264</sup> GB03

- *"...together we write reports and occasionally papers..."* [Male; Serbia; RPO; Energy<sup>1265</sup>]
- *"...we have developed various articles and reports..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1266</sup>]

The fact that these publications and reports receive passing mentions, reiterates the indications (as per e.g. science education and public engagement sections' findings) that participants felt the one-way, passive transfer of knowledge, is sufficient to enable 'education' and 'learning'. Discussions around publications and reports is always about the production of these, and not their actual use and interpretation. This position therefore leads to hopes and assertions from participants about the likely impact of their publications/reports, for example:

*"...I led a group of nine fellows in writing a paper which summarises a two-year work on defining...the definition of a system... So, these are contributions that are universal, and I hope that they will have an impact..."* [Male; Israel; RPO; Energy, ICT<sup>1267</sup>]

*Information centres* covers any reference to providing information through centres, like visitor centres. There are no formal information centres (e.g. visitor centres) mentioned across the interviews; instead, only discussion of information provision via research centres. However, one participant discusses her experience in working with museums:

*"...used to work with the science museums on public engagement in the museum context, both for nanotechnology and for synthetic biology. So we have partnerships with some museums in that area as well..."* [Female; USA; RPO; Bioeconomy<sup>1268</sup>]

The nature, form, and extent of her partnerships with museums were not detailed.

*University open days* includes any reference to communication/providing information through open days. Such open days are not discussed in across the Israeli, Italian, USA, and Serbian interviews. Nevertheless, one UK participant refers to open days:

*"We also hold... an annual engagement day with anybody who's interested in wheat and that rotates around the different institutes and about 100 people come to that event and they come and see the experiments, hear about the experiments, see the experiments, the facilities, come and ask questions..."* [Female; UK; RPO; Bioeconomy<sup>1269</sup>]

There is no discussion regarding how successful these engagement days are, other than implying that there is enough interest due to it being repeated annually. It was also unclear as

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<sup>1265</sup> SRB01

<sup>1266</sup> I02

<sup>1267</sup> IL04

<sup>1268</sup> USA02

<sup>1269</sup> GB02

to which stakeholder types are engaged and thereby ultimately included within the ‘anybody who’s interested’ label.

*Media* covers references to communication through different media, including print media, broadcast media, and online media. Examples include newspapers, brochures, films, radio, TV, websites, blogs, and social media.

Although not a prevalent sub-theme, these media are raised in the interviews across all five countries. Moreover, it is clear that a diverse range of media are used and there was no standardised approach, such as: “...flyers and videos...” [Female; UK; RPO; Bioeconomy<sup>1270</sup>]; “...documentaries...” [Male; USA; RPO; Energy<sup>1271</sup>]; “...videos...” [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1272</sup>]; “...press releases...” [Female; UK; Industry & Business; ICT<sup>1273</sup>]; “...mailing list...” [Male; UK; RPO; Energy, Waste Management<sup>1274</sup>]; “...movies...” and “...documentary film...” [Female; USA; RPO; Bioeconomy<sup>1275</sup>]; and, a “...centre’s website...” [Female; USA; RPO; Bioeconomy<sup>1276</sup>].

Traditional, mainstream (e.g. print) media receives little discussion, although it is clear that dissemination via such channels is helpful in getting one’s ‘work out there’, and thus potentially to new audiences who would not have otherwise engaged:

*“I think that sometimes the media enables our work getting out there. Whether you’re quoted in the media, and then it links to your article... It gets the work out there to more people, I think, who might be interested...”* [Female; USA; RPO; Bioeconomy<sup>1277</sup>]

In contrast to traditional, mainstream media, the rise of social media is noted as making educational and knowledge transfer activities “easier” [Male; Italy; Industry & Business; Energy, ICT<sup>1278</sup>]. The following participant notes how social media enables them to identify new contacts, attend new conference sessions, and ultimately learn more from other researchers:

*“I’d say it’s them, people, like I said, that we hook up on Facebook literally by accident, like heyyy, look how interesting this is, somebody is going to present something for five minutes, I will come in the morning, for instance...”* [Female; Serbia; CSO; ICT<sup>1279</sup>]

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<sup>1270</sup> GB06

<sup>1271</sup> USA03

<sup>1272</sup> I04

<sup>1273</sup> GB03

<sup>1274</sup> GB07

<sup>1275</sup> USA04

<sup>1276</sup> USA02

<sup>1277</sup> USA02

<sup>1278</sup> I03

<sup>1279</sup> SRB02

Similarly, another participant explains how social media is enabling new, larger audiences to be reached, based on new forms of (virtual) interactions:

*"But in terms of communicating the science and implication of the science, we have used a lot of social media and reached out to people, express opinion, shared news and recent articles through our social media platform."* [Female; USA; RPO; Bioeconomy<sup>1280</sup>]

But discussion of using social media – in particular in *"start[ing] social media campaigns"* [Male; UK; RPO; Bioeconomy<sup>1281</sup>] – raises the issue of expertise and the need for relevant competencies:

*"You don't want people who are not necessarily experts talking to the media. We have a more 21st century policy on how do we interact on social media or on Twitter or something like that as well..."* [Male; UK; RPO; Bioeconomy<sup>1282</sup>]

Across these forms of media utilised for science education purposes, the participants' accounts are generic, with a lack of specificity throughout. As such, the topic of tailoring media content receives little attention. However, there are instances where participants acknowledge that their target stakeholders have a divergent set of needs. For example, one participant acknowledges that users of their online and telephone advice services would inevitably have different advice needs:

*"...we deliver the Home Energy Scotland service... if you are a person living in Scotland, and you think your energy bills are too high, or you want advice from getting an e-vehicle, or an electric vehicle, or a ground source heat pump... and you will end up speaking to an advisor through the program that we manage..."* [Male; UK; CSO; Energy<sup>1283</sup>]

It is therefore surprising that – despite a heterogeneity to needs being highlighted – homogeneous approaches are employed to the use of media in science education initiatives.

In the following section, R&I capacity building, as a means of improving responsibility, is discussed.

### 3.8.8.2 R&I CAPACITY BUILDING

This section provides references to building capacity for research and innovation as a means of improving responsibility. This can be in terms of local development, contextual development, etc.

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<sup>1280</sup> USA04

<sup>1281</sup> GB05

<sup>1282</sup> GB05

<sup>1283</sup> GB08

Only one participant comments on R&I capacity building and appears to favour and locate capacity building in opposition to stronger regulations:

*"Other types of activities, like awareness raising, training, capacity building, should be strengthened rather than the regulations and laws..."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1284</sup>]

In the following section, a summary of this chapter is provided.

### 3.8.8.3 SUMMARY OF SCIENCE EDUCATION

The interviews are sparse in detail and richness regarding science education, as per the EU pillar definition. Such events were frequently included in interview participant accounts, across all the North American and European countries, thereby strongly indicating a perceived norm for participating in such events.

From the interviews with participants, it is unclear exactly *how* these events directly contribute to science education. It seems enough to the participants that these events are happening at all, as opposed to them giving any real deeper consideration of the events' effects (observed or otherwise).

Capacity building is mentioned by only one participant, leading to little insight into building capacity for research and innovation as a means of improving responsibility.

### 3.8.9 ETHICS

As part of the European Commission's RRI agenda, ethics focuses on (1) preventing research and research practices that lack integrity, and on (2) the relationship between science and society, to ensure scientific and technological developments are ethically acceptable.

For policymakers, this definition requires that R&I policy consciously meets the ethical demands of society. For the research community, scientific processes and outcomes are to meet the demands of research integrity and moral deliberation for both individuals and institutions. Within business and industry related research, "social actors should work together from the beginning to embed ethical considerations in their R&I processes". Finally, the ethics of RRI require citizens' involvement to realise R&I that is ethically acceptable and "aligned with society's values and demands, while minimising risks and maximising benefits".<sup>1285 1286</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. Of the nine codes, four were seen most extensively: Positioning ethics – where does the responsibility

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<sup>1284</sup> I04

<sup>1285</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>1286</sup> <https://www.rri-tools.eu/ethics>

lie? [code 69]; Organisational norms and practices [code 72]; Lack or uncertainty of ethical standards and policies [code 78]; Protection of rights [code 79].

Codes	Europe & North America					
	Israel	UK	Italy	USA	Serbia	Total
68: Ethics						
69: Positioning ethics- where does the responsibility lie?	7	18	5	10	4	44
70: Disidentification with ethical responsibility	6	7	1	1	1	16
71: Personal responsibility and morality	0	5	2	8	3	18
72: Organisational norms and practices	0	14	2	8	4	28
73: Safety and security	7	13	5	8	3	36
74: Justice and fair dealing	1	1	2	4	1	9
75: Quality assurance and testing	2	3	2	1	0	8
78: Lack or uncertainty of ethical standards and policies	1	10	1	4	5	21
79: Protection of rights	1	12	5	9	2	29

For comparability with the other region-specific reports, these codes have been selected based on the total count. However, with a count of 29, *safety and security* [code 73] has the third highest count, placing *lack or uncertainty of ethical standards and policies* fifth with its count of 20.

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *ethics* are brought together.

### 3.8.9.1 ETHICAL RESPONSIBILITY

This section includes stated or implied perceptions of where ethical responsibilities are located, such as whether they are defined by or found in existing rules/standards/policies, within or beyond the organisation, at the individual, institutional, national, or international level.

#### 3.8.9.1.1 Who is responsible for ethical considerations?

According to the following participants, ethical considerations and responsibility are determined by organisational, institutional, national and EU restrictions and requirements:

*"There is a code that we apply at the European level. We are officially registered as an organisation also in relations with Parliament. We respect the rules imposed*

*by the European Commission and by the Parliament."* [Male; Italy; Industry & Business; Energy, ICT<sup>1287</sup>]

This participant says there are different restrictions and requirements to adhere to:

*"What is difficult to understand is that you need to stick to your national regulation but also to the European regulation. Usually what is best is to state [stick] to the strictest, so you are sure that you are not creating problems in another country."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1288</sup>]

This participant says the Civil Service code is the starting point for ethics in the UK government:

*"I mentioned the Civil Service Code. I think that's the starting point for understanding what is ethical behaviour within government..."* [Male; UK; RFO, Policy body; Energy<sup>1289</sup>]

Another participant refers to the confusion over where the responsibility for ethics is located:

*"...it was very hard for the people...to identify who was the regulatory or who would be the competent authority that could give you ethical approval. I mean, they went to the NHS [National Health Service] because there was a trial going to be run in the hospital at Southampton and the NHS said, "Well, no, we don't think it's us. It should be the Health and Safety Executive," and the Health and Safety Executive said, "No, it should be the Food Standards Agency," and the Food Standards Agency said, "No, we think it's the NHS.""* [Male; UK; RPO; Bioeconomy<sup>1290</sup>]

Similarly, this participant from the US express uncertainty over ethics laws or regulation:

*"At a State University, there's a ton of state regulations and policies that affect your work as well. It's not necessarily for ethical or responsibility, but... Well, I guess it is. In financial areas, so they make sure that you're spending the money like you are supposed to, and that there's not fraud..."* [Female; USA; RPO; Bioeconomy<sup>1291</sup>]

This participant says they incorporate existing standards and regulations into their organisation's approach to ethics:

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<sup>1287</sup> I03

<sup>1288</sup> I04

<sup>1289</sup> GB04

<sup>1290</sup> GB05

<sup>1291</sup> USA02

*"...we have the IRB<sup>1292</sup> protocols that help ensure their rights and our obligations to the research subjects."* [Female; USA; RPO; Bioeconomy<sup>1293</sup>]

Furthermore:

*"...the research ethics guidelines from NIH<sup>1294</sup> are the ones that are generally used by our institutional review board in academe."* [Female; USA; RPO; Bioeconomy<sup>1295</sup>]

According to this participant, ethics is part of the bureaucratic process at their organisation:

*"Interviewer: What government or institutional policies and regulations affect how you address ethics in your work?"*

*Interviewee: We have an ethics code that we subscribe to each time, even at the administrative level..."* [Male; Italy; RPO, Policy body; Waste Management<sup>1296</sup>]

In this instance, the company's researchers are responsible for ethics:

*"...we rely heavily on the moral compass of our researchers... people can use their judgment to decide the type of work that they want to support or not and the type of work that they want to do or not, a lot of potential ethical issues are just... They just never come up because they don't pass that first barrier..."* [Female; UK; Industry & Business; ICT<sup>1297</sup>]

A participant from the UK says they work closely with universities, who take care of ethical considerations:

*"When we work in partnerships. Particularly on research, we tend to work with universities, and they have quite strong ethical processes of their own and so we go along with those..."* [Male; UK; CSO; Energy<sup>1298</sup>]

Certain participants consider ethics an issue of personal responsibility, morality, and the way a person is raised:

*"There are no norms that are regulating everything, the norms cannot regulate everything. It also has to do with thinking and trying to always respect the people."*

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<sup>1292</sup> "[Institutional review boards \(IRBs\)](#) or equivalent bodies provide a core protection for human participants in biomedical and behavioural research in the United States and > 80 other countries around the world. IRBs are charged with providing an independent evaluation that proposed research is ethically acceptable, checking clinical investigators' potential biases, and evaluating compliance with regulations and laws designed to protect human subjects".

<sup>1293</sup> USA02

<sup>1294</sup> National Institutes of Health (NIH), which is an important U.S. health agency for medical research.

<sup>1295</sup> USA02

<sup>1296</sup> I05

<sup>1297</sup> GB03

<sup>1298</sup> GB08

*It is a little bit beyond the norms, it is more a kind of ethical behaviour that you should undertake."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1299</sup>]

And:

*"I guess I'd say we don't do anything formal besides trying to be good people."* [Male; USA; RPO; Energy<sup>1300</sup>]

Two Serbian participants say ethics reside in a person's education and upbringing:

*"I solely and responsibly claim that the only, only, model that takes us into a maximally fair and correct high ethical relationship, and this really high ethical relationship both inside and outside my team is a personal ethical framework that man gets from his education, upbringing or home."* [Female; Serbia; Industry & Business; Bioeconomy<sup>1301</sup>]

And:

*"...we have high ethical norms that we bring from home. So, when we choose collaborators...to have some ethical, social values, that they learned from Mom and Dad..."* [Male; Serbia; RPO; Bioeconomy<sup>1302</sup>]

According to the following participant, they do not have to consider ethical responsibilities:

*"We don't normally have to deal with ethical issues because we just deal in technology that it's quite... and it's not going to reach end users through us... so we very rarely, if at all, have to think about any ethical implications or any regulation or policy..."* [Female; UK; Industry & Business; ICT<sup>1303</sup>]

In addition, another participant says ethical considerations are not a priority at their organisation:

*"...for us here at the institute to do any experiments including our GM experiments we don't need to get ethical approval."* [Male; UK; RPO; Bioeconomy<sup>1304</sup>]

The same participant says there is a lack of ethical considerations at their organisation:

*"There's just a complete void in lots and lots of activities that we do, where people just don't even think about the ethical questions..."* [Male; UK; RPO; Bioeconomy<sup>1305</sup>]

This participant says their environmental research falls outside ethical boundaries:

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<sup>1299</sup> I04

<sup>1300</sup> USA01

<sup>1301</sup> SRB04

<sup>1302</sup> SRB06

<sup>1303</sup> GB03

<sup>1304</sup> GB05

<sup>1305</sup> GB05

*"If you were doing environmental research, I can barely think of any situation in which you would think what you were doing was causing concerns for society."*

[Male; Israel; RPO; Waste Management<sup>1306</sup>]

In the same vein, this participant from Israel says they are absolved of ethical responsibilities because they consider their work of benefit to society:

*"It would not be possible for us to cause damage. On the contrary, we are trying to improve the existing solutions so that they reduce the amount of pollution and become economically viable. [Our goal] is to improve the environment for the benefit of society."* [Female; Israel; RPO; Energy, Waste Management<sup>1307</sup>]

From the participants' contributions in this section, it is clear there are varying views on where the responsibility for ethical considerations lies. According to some participants, ethics are a matter of responsibility, morality, and upbringing. According to other participants in this section, ethical responsibilities are determined by organisations and institutions, at national and EU level.

### 3.8.9.2 THE PROTECTION OF RIGHTS

This section includes references to protecting the rights of all stakeholders, through ensuring consent and confidentiality, protection from liabilities, and avoiding conflicts of interest.

#### 3.8.9.2.1 Informed consent

An example from a participant from Italy demonstrates the practicalities to ensure that research subjects are protected:

*"Sometimes we have to work with kids. For instance, we are now shooting some videos with minors. The first rule is: everything that is produced will not have any problem with the people."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1308</sup>]

This includes obtaining informed consent:

*"You ask them the permission to use the images and you should be very specific telling them and making them sign in what context you will use the videos and what will be the format of the video."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1309</sup>]

Another participant from the US speaks about the importance of informed consent:

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<sup>1306</sup> IL01

<sup>1307</sup> IL05

<sup>1308</sup> I04

<sup>1309</sup> I04

*"...you have to make sure that they understand what their rights are and that they can back out at any time..." [Female; USA; RPO; Bioeconomy<sup>1310</sup>]*

Part of this consent process is subject to rules set by social media giant, Facebook:

*"...when you are using images of minors and when you are promoting something that is relevant for the public, in this case, you need to associate an ID of someone that is responsible for the specific content. This is a new rule in Facebook, and I agree that this type of rules should be reinforced, particularly within the social media..." [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1311</sup>]*

Data protection over the use of images is also a concern, according to this participant:

*"The other area we are very conscious of and are reminded a lot is about taking images of people... We had an open weekend last summer, again, most of the images of children are taken rear-view and not face photographs..." [Female; UK; RPO; Bioeconomy<sup>1312</sup>]*

Likewise, another participant mentions informed consent:

*"...we're not splitting the atom here, it's not completely novel, it needs to be addressed and the volunteers absolutely need to have informed consent, to give consent..." [Male; UK; RPO; Bioeconomy<sup>1313</sup>]*

This participant speaks about the importance of obtaining societal consent for aspects of genetic research:

*"...and you will need to have very, very clear societal consent for you trying to do it, otherwise you're just going to bring down like a rain of fire on your head from lots and lots of people..." [Male; UK; RPO; Bioeconomy<sup>1314</sup>]*

Another participant speaks about protecting anonymity, like in cases of chain referral and snowball sampling:

*"You talk to one person who is a very good contact, has very good contacts in the industry. You say, 'Oh I need to...Who would you recommend?'... we have to identify who we think are the top 10, top 20, 30 maybe, people and we kind of have to approach them individually and not indicate to other people that we're approaching them in order to maintain that level of anonymity..." [Male; UK; RPO; Energy, Waste Management<sup>1315</sup>]*

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<sup>1310</sup> USA02

<sup>1311</sup> I04

<sup>1312</sup> GB02

<sup>1313</sup> GB05

<sup>1314</sup> GB05

<sup>1315</sup> GB07

The same participant says participants in studies should be informed how their information and contributions are used:

*"So I think there are potentially very unspoken rules and modes of operation in interviews where you want to secure the trust of people...you want to stay in contact with them and you want to give them updates of how their comments have appeared in... Have been cited directly, for example, in papers..."* [Male; UK; RPO; Energy, Waste Management<sup>1316</sup>]

Internal review boards are part of the process of protecting participant rights in the US system, according to this participant:

*"Whenever you're working with people, you have to go and get IRB approval for human subjects research. When you're interviewing them, or when you're doing surveys, or even, sometimes, for bringing them together for a focus group, for example..."* [Female; USA; RPO; Bioeconomy<sup>1317</sup>]

In the next section, participants' comments on ethical conflicts, such as requirements by funders and working with live subjects, are discussed.

### 3.8.9.2.2 Ethical conflicts

Ethical considerations and practices applied by this participant's organisation suggest ethical practices and strategies are a response to funding arrangements:

*"...it was decided that the institute would be stopping at about no more than 20% of its total research budget, coming in from solely industry-funded projects... because we want to be seen here at this institute to be an unbiased voice."* [Female; UK; RPO; Bioeconomy<sup>1318</sup>]

The same participant says they can walk away from projects for ethical reasons:

*"Sometimes we decide not to do a project, we just decide not to do it when we've found out what the sponsor wants. If it's coming from industry, we just walk away from it for ethical reasons."* [Female; UK; RPO; Bioeconomy<sup>1319</sup>]

This participant says they determine their own ethical considerations:

*"Regarding to scientific research and University, I decide from time to time if this project it is interesting for me. For example, I would never be a consultant of a waste incineration even if they paid me."* [Male; Italy; RPO, Policy body; Waste Management<sup>1320</sup>]

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<sup>1316</sup> GB07

<sup>1317</sup> USA02

<sup>1318</sup> GB02

<sup>1319</sup> GB02

<sup>1320</sup> IO5

Certain participants, especially in the bioeconomy domain, mention the importance of ethical considerations when working with live subjects.

The following participant from Israel considers ethics as relevant when working with live subjects:

*"So there are some processes internally to make sure I'm not harming the subjects of the work."* [Male; USA; RPO; Energy<sup>1321</sup>]

One participant from Serbia also links ethics with live subjects:

*"So ethics is the second thing, and so if you want to do some analysis, I don't know, experiments on human material or animal material there has to exist the ethics committee which approves what you do."* [Male; Serbia; RPO; Bioeconomy<sup>1322</sup>]

The same participant elaborates on the process at their university:

*"At the [anonymised university] it is clearly defined what is allowed, and what is not. Maybe I already answered that question...so, if you want to work with, let's say, some human material or material which is...well yes human material or with animals it is necessary to get the permit from the ethical committee of the institution that this is in accordance with the ethics..."* [Male; Serbia; RPO; Bioeconomy<sup>1323</sup>]

According to this participant, protecting the rights of animals is a concern:

*"...one thing I can think about is that we are all actively encouraged to minimise our use of experimental animals. And so whenever we put in a grant application we have to indicate what species we will be using, and if we do put down a mammal species, we then have to indicate in great detail why we want to use a mammal in our experimentation. For us it's usually raising antibodies against specific proteins of interest. But others, it may well be involving actually experimental mammals..."* [Female; UK; RPO; Bioeconomy<sup>1324</sup>]

### 3.8.9.3 SUMMARY OF ETHICS

It is clear from the views expressed in this chapter that participants have different views about where ethical responsibilities lie. As a result, there is a tendency towards ethics becoming an issue of personal responsibility and morality.

Where there is an awareness of ethics as part of broader arrangements such as policy and regulation, there is confusion about contradictions and tensions between organisational,

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<sup>1321</sup> USA03

<sup>1322</sup> SRB06

<sup>1323</sup> SRB06

<sup>1324</sup> GB02

national, and EU restrictions and guidelines. Much of the organisational ethics that exist stem from incorporating existing standards and regulations into the organisation.

Furthermore, some participants say ethics is of little or no relevance to their work.

The protection of rights was mainly about the importance of informed consent, possible ethical conflicts and the ethical considerations when working with live subjects.

### 3.8.10 GOVERNANCE OF RESPONSIBLE RESEARCH AND INNOVATION (RRI)

Governance of RRI is defined by the European Commission as "arrangements that lead to acceptable and desirable futures"<sup>1325</sup>. To lead to successful RRI futures, such arrangements must be "robust and adaptable" to unpredictable R&I development; "familiar enough to align with existing practices in R&I"; shares "responsibility and accountability among all actors" and "provide[s] governance instruments to actually foster this shared responsibility".<sup>1326</sup>

It is within this framework that interviews, and subsequent analyses, were conducted. The parent nodes from which the codes are derived are *accounting for local contexts* [codes 95, 96, 97, 98, 99]; and *conflicts and tensions* [code 109, 110]. The constituent codes for the former include:

- 96: Importance of customisation
- 97: Contextualising technology and innovation
- 98: Importance of politics
- 99: Accounting for geographic scale

*Conflicts and tensions* codes are:

- 109: Conflicts between theory and practice
- 110: Conflicts and tensions in R&I expectations

Codes	Europe & North America					
	Israel	UK	Italy	USA	Serbia	Total
Governance of RRI in Europe & North America						
94: Enablers	10	43	27	14	13	107
95: Accounting for local contexts	7	24	13	6	7	57
96: Importance of customisation	0	3	0	1	0	4
97: Contextualising technology and innovation	1	1	2	1	1	6
98: Importance of politics	6	3	4	2	3	18

<sup>1325</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>1326</sup> <https://www.rri-tools.eu/about-rri#why>

99: Accounting for geographic scale	0	14	5	2	3	24
109: Conflicts between theory and practice	10	30	10	13	3	66
110: Conflicts and tensions in R&I expectations	10	30	10	13	3	66
105: Time frames and time constraints	1	11	3	1	1	17
108: Lack of (perceived) applicability of RRI	0	2	0	0	1	3

The following sections provide details regarding these codes and descriptions of the findings. In the summary section, the findings relating to the theme *governance of RRI* are brought together.

### 3.8.10.1 THE INFLUENCE OF POLITICS

This section includes references to how local/international politics or internal politics in the organisation influence (R)RI practices. Participants provide examples of national politics and political arrangements are seen as actually and potentially restrictive of RRI and RRI futures.

According to a participant from Serbia, politics influence governance arrangements that could facilitate RRI:

*"Our activities are especially, let's say have been under the spotlight in the past five years. Now, in the last five years you know yourself who is in power, and so we didn't want to collaborate with them at all..."* [Female; Serbia; CSO; ICT<sup>1327</sup>]

In waste management, the UK policy landscape with Brexit on the horizon, offers uncertainty regarding the future of RRI. In addition, the policies that are applied and envisaged, invoke different responses from different stakeholders. The incinerator policy is met with negative reactions by the public, according to this participant:

*"...in terms of the public influence what we were finding, what I've found with the case studies that I've done with particular communities... So that policy because it's so contentious, because the health risk perceptions are very strong, people feel very, very, emotive about the possibility of having an incinerator on their doorstep..."* [Male; UK; RPO; Energy, Waste Management<sup>1328</sup>]

In addition, the same participant says the policy is also met with concern from industry:

*"...the vast majority who are saying, "Gosh, this is gonna cost us a lot of money, this is gonna cost time and effort and it's gonna...With Brexit happening as well, it's gonna make the industry really volatile..."* [Male; UK; RPO; Energy, Waste Management<sup>1329</sup>]

<sup>1327</sup> SRB02

<sup>1328</sup> GB07

<sup>1329</sup> GB07

According to this participant, the politicisation of science in the US is a potential obstacle to facilitative governance arrangements in RRI:

*"I think there is significant deeper problems here around the use of science and knowledge in society, and the connections between science and politics that have to be considered in answering a question like this..."* [Male; USA; RPO; Energy<sup>1330</sup>]

The same participant explains the need for balance between making data available in the public interest and the possible misuse of data for political reasons:

*"...on one level, you do want data to be available so others can understand the basis for conclusions that are being derived, especially if they have any implications for action for public. On the other hand, you might justifiably be concerned about the misuse of that data, the selective use of it, the use of it for political reasons..."* [Male; USA; RPO; Energy<sup>1331</sup>]

One participant from Italy raises concerns about how continuity is threatened by the transitory nature of political arrangements:

*"The relationship with many people does not arise in the political sphere, but from collaboration for years in university scientific research projects, and then also in the political world in a context in which it is not necessary to start from scratch because mutual skills and networks are known. An open question is: if the mandate of a politician expires and he is not a candidate for a further mandate or is not re-elected, what will happen to these ongoing European projects?"* [Male; Italy; RPO, Policy body; Waste Management<sup>1332</sup>]

The same participant is concerned about the consequences of changes in the political environment:

*"...it becomes a problem to ensure continuity. And what will happen to this work that we are carrying out? When the guide changes and there is no interest in European projects, how can these projects be carried out?"* [Male; Italy; RPO, Policy body; Waste Management<sup>1333</sup>]

According to a participant in the waste management domain in Israel, the political atmosphere in Israel is seen as deprioritising certain RRI considerations, such as ethics:

*"...But unfortunately, the ethos in this country led by our esteemed leader, who doesn't seem to think that ethics is necessarily the top of his list of priorities, and it get filtered down..."* [Male; Israel; RPO; Waste Management<sup>1334</sup>]

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<sup>1330</sup> USA01

<sup>1331</sup> USA01

<sup>1332</sup> I05

<sup>1333</sup> I05

<sup>1334</sup> IL01

Furthermore, the same participant says the role of politics is critical in whether their research is implemented:

*"Once you finished all about, it became a political decision about whether to go ahead or not. And in fact, the political decision at this point has not been to go ahead, because it's too expensive, and for other reasons had nothing to do with the content [of the project] ..."* [Male; Israel; RPO; Waste Management<sup>1335</sup>]

They also identify multi-national political concerns in their region:

*"...partially to do with our relations with Jordan and the Palestinians or whatever it was. And partly the Dead Sea works, which is a major foreign currency, and has a lot of say, of what was done to the Dead Sea, whether they're right or not another matter..."* [Male; Israel; RPO; Waste Management]<sup>1336</sup>

From the participants' contributions in this section, it is evident that politics play a role in the governance of RRI in this region. In the next section, the impact of policies and regulation on the governance of RRI is discussed.

### 3.8.10.2 IMPACT OF POLICIES AND REGULATION

In this section, participants highlight how policies, on local, national, and international level are applied and how policies and regulation influence governance of RRI.

This participant points to the European Commission's promotion of RRI inclusivity and political engagement:

*"The Commission is very active on stakeholders' involvement, also for the purpose to acquire know-how for collecting ideas and contents to establish political priorities..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1337</sup>]

According to the same participant, one of the platforms mentioned can facilitate regional dialogue on RRI matters:

*"...there is a whole policy at European level that has had an impact also at the national level with the creation of national clusters that have also, in some cases, branches at the regional level... in some regions, this dialogue is quite well structured, therefore, offering other opportunities for the dialogue between regional entities and stakeholders on research priority themes for that territory..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1338</sup>]

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<sup>1335</sup> IL01

<sup>1336</sup> IL01

<sup>1337</sup> I03

<sup>1338</sup> I03

Another participant from Italy gives credit to the EU directions and how they are adopted into national law:

*"The success results waste in Albano is in the fact that there are European regulations that are adopted with National law that impose obligations and deadlines on which we move..."* [Male; Italy; RPO, Policy body; Waste Management<sup>1339</sup>]

Another participant from Serbia credits international governance arrangements:

*"...we try to follow local as well as foreign legislation, and not only legislation, but also directions, Kyoto protocol, Paris agreement, Stockholm convention, United Nations goals when it comes to sustainable development, and for our research not to go against the world but in accordance with some world trends..."* [Male; Serbia; RPO; Bioeconomy<sup>1340</sup>]

On the other hand, this participant from Italy says European policy is restricted as it translates into national fields:

*"All the rules and standards in the environmental, safety, structural, energy, recycling, and re-use, circular economy, building stability fields are born first at a European or international level and then descend at the national level into the regulation of tenders, contracts. Then, by us, it is to implement what is done and defined at European level, and it always has some slowdowns also due to the difficulty of public structures to implement innovations and correctly apply them..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1341</sup>]

The same participant comments on overregulation in Italy:

*"...hyper-regulation contributes to creating this distance between our national growth rate and those of other countries. The distance is not justified by the industrial dimension we have, but it is weighed down by this system that slows down the ability to produce wealth at a national level..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1342</sup>]

This overregulation impacts their ability to produce RRI:

*"...we are not very able to produce innovation from the regulatory point of view. For us who are very regulated, perhaps, greater European obligation would help to simplify things at our place, this is my personal opinion..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1343</sup>]

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<sup>1339</sup> I05

<sup>1340</sup> SRB06

<sup>1341</sup> I03

<sup>1342</sup> I03

<sup>1343</sup> I03

Similar concerns are expressed by another business and industry representative from Italy:

*"...often regulations and legislations are something preventing these people to work, or to better perform their work. So organising events around how is the best way to improve the regulation and legislations is always motivating and interesting for them..."* [Female; Italy; Industry & Business; ICT, Bioeconomy<sup>1344</sup>]

This participant from the UK also raises concerns about the strict regulation of the bioeconomy domain:

*"...regulation is often so that it will make you not choose that method, and you choose one that's more conventional... you get your actual product it gets to the market quicker and there's nothing much regulation... pick the best methods for innovation for the kind of product that we want to produce..."* [Male; UK; Industry & Business; Bioeconomy<sup>1345</sup>]

According to the same participant, regulatory conflicts between NGOs and businesses in the bioeconomy domain, have led to changing relationships between regulatory bodies and the businesses:

*"...we are not allowed to talk directly to the regulatory authorities and it's becoming increasingly difficult to have any contact with them at all. For example, we often published, joint publications with staff from European regulatory authorities. Now is their policy not to do that because they received complaints from NGOs that the authorities are getting too close to the industry..."* [Male; UK; Industry & Business; Bioeconomy<sup>1346</sup>]

This participant from Italy says integration is needed across different levels:

*"There are European directives and, therefore, in the field of procurement and regulations, there are European ones. Then, the national discretion ensures that the differences between countries are still quite relevant. So, I think we still need more integration. Then, especially all systems, all the control mechanisms are very different between countries..."* [Male; Italy; Industry & Business; Energy, ICT<sup>1347</sup>]

According to one participant in Israel, the regulatory relationship between ICT systems and the health domains they intersect with, causes confusion for research organisations:

*"The hardest for us are policies and regulations about safety of patients... so the regulation about this is changing all the time and there are regulations about medical devices and decision support systems are not regulated in the same way and it's not really clear who will be regulating it..."* [Female; Israel; RPO; ICT<sup>1348</sup>]

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<sup>1344</sup> I04

<sup>1345</sup> GB01

<sup>1346</sup> GB01

<sup>1347</sup> I03

<sup>1348</sup> IL02

One business and industry participant from the UK says their products are targeted towards markets that are less regulated, because of overregulation in the EU:

*"...there is a tendency now not to develop products that are specific for the EU, we develop for other parts of the world...somewhere that it's more open and receptive to the sort of products we are trying to sell..."* [Male; UK; Industry & Business; Bioeconomy<sup>1349</sup>]

Another participant in the bioeconomy domain agrees to circumventing the European market because of overregulation:

*"...because I'm using GM, it makes it very difficult for that dream to be realised, at least in Europe, because that technology is not accepted in Europe by our regulators...I have to go and ultimately have to manifest my technology, commercialise my technology in North or South America..."* [Male; UK; RPO; Bioeconomy<sup>1350</sup>]

Furthermore, the participant comments on the lengthy approval process for GM in the UK:

*"So that's [approval process] quite a long-winded process compared to, for example, if it was in the US, I would just make an application online for a permit, and three weeks later, I would be given a permit. There'd be no public consultation or anything like that..."* [Male; UK; RPO; Bioeconomy<sup>1351</sup>]

The same participant says they purposely carry out their trials outside the EU:

*"I have one other project where I've deliberately not attempted to do the GM field trialling in the UK, I have deliberately put that GM field trialling of wheat into Brazil because I think it's a much greater chance that we'll be able to get a lot of high quality data sets there and at a fraction of the hassle that we would have had trying to do those trials in the UK..."* [Female; UK; RPO; Bioeconomy<sup>1352</sup>]

In addition, they describe how the restrictions slow down the advancement of research and innovation:

*"...in many respects for completion and commercialisation, it's going to take longer, because if you are left with other deliverable routes..."* [Female; UK; RPO; Bioeconomy<sup>1353</sup>]

Another participant makes a similar statement about regulatory restrictions:

*"...if I only thought of having a strategy where I wanted to deliver a GM solution to disease control, well, at the moment, the government and the EU government*

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<sup>1349</sup> GB01

<sup>1350</sup> GB05

<sup>1351</sup> GB05

<sup>1352</sup> GB02

<sup>1353</sup> GB02

*would turn around and say, "No, you can't commercialise that in Europe or in the UK." So some countries would say yes, and others would not..."* [Female; UK; RPO; Bioeconomy<sup>1354</sup>]

In the next section, conflicts and tensions in the priorities of RRI stakeholders are discussed.

### 3.8.10.3 CONFLICTS AND TENSIONS

*Conflicts between theory and practice* [code 109] is the aggregated parent node for *conflicts/tensions in R&I expectations* [code 110]. It includes references to conflicts between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as tensions between what is 'wanted' and what is 'needed'.

According to a participant from the US, there is conflict between university priorities and societal needs:

*"Universities are becoming more like businesses, where the primary objective is not as much about the mission of education of the next generation of scholars and practitioners, or it's not even so much about meeting societal needs anymore, it's more about how much money your particular unit can bring in."* [Female; USA; RPO; Bioeconomy<sup>1355</sup>]

Another participant from Israel agrees that university priorities and societal needs are not balanced:

*"...the rules of academia are not the rules of what society needs..."* [Male; Israel; RPO; Waste Management<sup>1356</sup>]

The same participant elaborates:

*"The rules of academia is getting your papers published in the highest impact journals. The rules of society trying to solve societal problems. And because of the mismatch of the two, if I spend my time trying to solve society's problems, I would not be doing my job as an academic..."* [Male; Israel; RPO; Waste Management<sup>1357</sup>]

In addition, the participant says the close relationship between universities and business and industry often runs counter to achieving RRI in the bioeconomy domain:

*"...on the biotech innovation space at universities, academics are often working with industry partners..."* [Female; USA; RPO; Bioeconomy<sup>1358</sup>]

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<sup>1354</sup> GB02

<sup>1355</sup> USA02

<sup>1356</sup> IL01

<sup>1357</sup> IL01

<sup>1358</sup> USA02

This limits engagement with other stakeholders to develop an understanding that is essential for the future of RRI:

*"...generally you see people in academe working with industry for the most part, and they generally do not engage other stakeholders in the design of the technology or in the experiments, necessarily, or the... As the experiments turn into potential products, I don't see them necessarily engaging the community..."* [Female; USA; RPO; Bioeconomy<sup>1359</sup>]

According to this participant, problems arise between individual and entrepreneurial interests and research interests:

*"Working with them, with companies, sometimes their strategic plan is not aligned with the call, with expertise that we need for the call [grant], but they know that we could be funded so sometimes they try to bring into the front some topics that are within their strategy and that's always a problem for us..."* [Female; Israel; RPO; ICT<sup>1360</sup>]

This participant says academic researchers are more restricted, because of funding requirements, than people working for a company:

*"From previous experience at [anonymised university], we followed the guidance from the funders in that we always had to provide impact statement just to apply for the funding... But now, working for a private company, we are not chasing the funding... we are normally doing it because we believe that the collaboration will result in something valuable to us..."* [Female; UK; Industry & Business; ICT<sup>1361</sup>]

Finally, one participant says diversity of thought is absent in R&I, especially in economics:

*"...the main kind of diversity that we really need is diversity of thought. And economics is an area where I think that is desperately lacking. There's a mono-culture of people that think the same way, which has been promoted within the academic departments of the universities and that's incredibly damaging..."* [Male; UK; RFO, Policy body; Energy<sup>1362</sup>]

From this chapter it is evident there are barriers to the governance of RRI, from policy and regulatory restrictions to the influence of politics. Furthermore, there are tensions between different stakeholders as to what is needed and what is wanted in RRI. In the following section, a summary of this chapter is provided.

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<sup>1359</sup> USA02

<sup>1360</sup> IL02

<sup>1361</sup> GB03

<sup>1362</sup> GB04

#### 3.8.10.4 SUMMARY OF GOVERNANCE OF RRI

According to participants, politics have a significant influence on RRI. Participants provide examples of national politics and political arrangements are seen as actually and potentially restrictive of RRI and RRI futures. In addition, policies and regulations also impact the governance of RRI, according to the participants in this sample.

Furthermore, participants are concerned about conflicts and tensions between the motivations and priorities of scientific research and innovation and those of different stakeholders, such as tensions between what is 'wanted' and what is 'needed'. Participants mention the relationship between business and industry and RRI, including the fact that universities are run like businesses and often do not align with the needs of society.

#### 3.8.11 CONCLUSION

This section provides a conclusion of the findings in the Europe and North America region.

As mentioned in the introduction, the RRING project acknowledges that each region of the world is advancing its own agenda on RRI.

RRING adopts an open approach to gain an understanding how each geography approaches RRI concepts and approaches. This in line with the RRING concept of bottom-up learning in RRI, rather than top-down approach or only using European model understanding of RRI.

##### 3.8.11.1 SUMMARY OF FINDINGS FOR THE REGION

Findings are structured around seven RRI-related themes, which are inspired by the European Commission (EC) pillars and AIRR dimensions. In this report, the following key themes were investigated: *gender equality and inclusivity*, *public engagement*, *open science*, *anticipative, reflective and responsive RRI*, *science education*, *ethics*, and the *governance of RRI*, within the following four domains: energy, waste management, information and communications technology (ICT) and bioeconomy.

The aim of the structured interviews with participants was to investigate their perspectives and experiences, in line with the RRING concept of bottom-up learning in RRI, rather than top-down approach or only using European model understanding of RRI.

In the chapter about *gender equality and inclusivity*, participants provide information about gender equality and female participation in the R&I workplace, the different roles of women in R&I, current interventions and policies in place, as well as interventions and support structures needed. From the findings presented in this section, there is acceptance of the rights of women to be part of the R&I workplace. From the interviews, some participants state that female participation rates have improved in some fields, while others disagree. However, especially in relation to the domains of energy and bioeconomy, there is concern that fewer women are present in STEM disciplines. Participants draw connections between the

underrepresentation of women in STEM disciplines and their underrepresentation in domains dependent on those disciplines. According to participants, gender imbalances in STEM disciplines would require reconfiguration to meet the RRI goals as outlined in this project. Moreover, participants say women are held back professionally by their different roles as mothers and caregivers. Finally, participants recognise generational legacies in terms of gender imbalances and say gender equality will be achieved, through attrition, over time. Furthermore, on the one hand, there is uncertainty on the part of participants regarding interventions promoting female participation and leadership. On the other hand, there is support for direct intervention in the case of bias towards women with various roles, such as motherhood, for example.

In the following chapter, participants address *public engagement*, the sections provide information about the importance of public engagement, the motivations for and benefits of public engagement, and the need to build support networks and strategic alliances. participants consider public engagement necessary and beneficial. In addition, participants see support networks and strategic collaboration and alliances as advantageous. Participants describe different motivations for and benefits of collaborative activities, including the building of trust and confidence over time, strengthening the social acceptability of products, assisting in the anticipation of future regulations, and alleviating concerns of the public. In some cases, public engagement is a requirement of funding agencies, which provides motivation for ensuring community impact. One participant says funding awarded and publications are afforded more importance than public engagement when faculties and researchers are evaluated. They suggest that if public engagement is prioritised in evaluation processes in the university system, it would also be prioritised at the organisational level. Furthermore, the benefits of public engagement sometimes accrue to the participant's organisation, rather than to other stakeholders, especially in the business and industry domain. The motivations for strategic alliances and collaboration include opening up access to specialist knowledge and other useful resources.

In the third chapter, findings relating to *open science* were presented. Participants make the case for open access to data, open access requirements by funders, as well as the risks and costs of open access. From the findings presented in this section, participants identify tensions between data sharing and protecting commercial interests. According to certain participants, open access threatens competitiveness or property rights, which is a prominent concern for participants in business and industry. Other concerns include the dangers of misrepresentation and misinterpretation of the data, national security, and the cost of open access to data. Furthermore, according to participants, ownership and funding play a key role in the extent to which open access is allowed. From interviews with the participants, the motives and benefits of providing open access to data involve improving the quality of research and research outputs as well as improving the status and visibility of the research. Furthermore, commitments to funders are a motivation for open access publication. Participants also refer to the need to make publicly funded research available to taxpayers.

In the chapter about *anticipative, reflective and responsive RRI*, participants address the need for anticipative and reflective processes and responsive research and innovation. Participants reflect on the future they want to create with their R&I processes. In the business and industry domain especially, participants place commercial interests high on their agenda for the future. They also mention harnessing technological developments to reach future goals. Participants' considerations are less about responsiveness and adaptability and more about marketing and future business success. To a lesser extent, participants take climate change and environmental concerns into account when reflecting on desirable futures. Furthermore, participants discuss the need for demand-driven R&I and addressing societal needs and problems when considering the future. From the participants' contributions, it is clear there is concern for future generations and conducting R&I processes that address specific societal needs in certain domains. Participants also mention the importance of R&I in influencing future policies.

In the fifth chapter, about *science education*, participants discuss the need for science education and the tools used to engage with their audiences. The interviews are sparse in detail and richness regarding science education, as per the EU pillar definition. Such events were frequently included in interview participant accounts, across all the North American and European countries, thereby strongly indicating a perceived norm for participating in such events. From the interviews with participants, it is unclear exactly *how* these events directly contribute to science education. It seems enough to the participants that these events are happening at all, as opposed to them giving any real deeper consideration of the events' effects (observed or otherwise). Capacity building is mentioned by only one participant, leading to little insight into building capacity for research and innovation as a means of improving responsibility.

In the chapter about *ethics*, participants comment on where ethical responsibility lies, as well as the protection of rights. It is clear from the views expressed in this chapter that participants have different views about where ethical responsibilities lie. As a result, there is a tendency towards ethics becoming an issue of personal responsibility and morality. Where there is an awareness of ethics as part of broader arrangements such as policy and regulation, there is confusion about contradictions and tensions between organisational, national, and EU restrictions and guidelines. Much of the organisational ethics that exist stem from incorporating existing standards and regulations into the organisation. Furthermore, some participants say ethics is of little or no relevance to their work. The protection of rights was mainly about the importance of informed consent, possible ethical conflicts and the ethical considerations when working with live subjects.

Finally, in the chapter about *governance of RRI*, participants share their experiences relating to the influence of politics, the impact of policies and regulation, as well as conflicts and tensions in RRI governance. According to participants, politics have a significant influence on RRI. Participants provide examples of national politics and political arrangements are seen as actually and potentially restrictive of RRI and RRI futures. In addition, policies and regulations also impact the governance of RRI, according to the participants in this sample. Furthermore, participants are concerned about conflicts and tensions between the motivations and priorities

of scientific research and innovation and those of different stakeholders, such as tensions between what is 'wanted' and what is 'needed'. Participants mention the relationship between business and industry and RRI, including the fact that universities are run like businesses and often do not align with the needs of society.

### 3.8.11.2 INTERVIEW FINDINGS

Chapter 3 presents findings from the RRING Work Package 3's Task 3.3 – specifically its global interview task – for the region of North America and Europe. The aim of RRING's Task 3.3 interviews is to investigate bottom-up perspectives and experiences of researchers and innovators. The focus here is on collecting data through and from researchers and innovators themselves, in North America and Europe.

In total, 29 interviews were undertaken for North America and Europe, covering: Israel (5 interviews); UK (8); Italy (5); USA (5); Serbia (6). We undertook a Qualitative Content Analysis approach to analysing these interview data.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions, and indeed are core to structuring the interview sections of this report. Within each of these themes, a number of prevalent sub-themes (all of which are shaping how research and innovation professionals in North America and Europe are doing their work) also emerged:

- *Gender equality and inclusivity*: gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; and lack or uncertainty of policy.
- *Public engagement*: organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open science*: levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: evaluation; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.
- *Ethics*: positioning ethics – where does the responsibility lie?; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: accounting for local contexts; and conflicts and tensions.

## 3.9 GLOBAL SURVEY RESEARCH: EUROPEAN AND NORTH AMERICAN STATES

### 3.9.1 INTRODUCTION

The sample size from European and North American states represented only a part of the complete global picture and was largely dominated by respondents from Great Britain, Germany, the United States of America and Lithuania. The socio-demographic measures showed the dominant age group as 39 to 48, and the gender distribution was slightly skewed toward women. More than half of the respondents indicated working in one of the four RRING key domains. Most of the respondents worked in a university or similar RPO, with the most dominant professional fields relating to natural sciences, mathematics and statistics, and social sciences, journalism and information.

RPOs and other academics were by far those most engaged, suggesting a disproportionately higher internal engagement in comparison with non-academic stakeholders. This is most likely due to academic collaborations and joint research projects. RRI was mostly associated with aligning R&I with societal benefits, and dominant associations with the SDGs were for economic aspects of sustainable development.

There was an overall agreement on the importance of diverse and inclusive RRI dimensions, and results suggested that engaging other researchers and academics was a typical part of research processes. Outside academia, respondents most frequently reached out to government agencies and non-profit organisations. Gender equality was ensured internally within research teams, and by making the topic a substantive dimension of R&I work but lacked widely adopted measures to integrate gender equality on a more substantive level. This also applied to ethnic minorities, as their promotion was not as highly valued as the other diverse and inclusive RRI measures.

Respondents expressed broad agreement towards the anticipative and reflective dimension of RRI, which translated into various practical steps. These mostly referred to rules, regulations, and legal obligations, but also aspects relating to the treatment of human research participants.

Transparency of research at all levels of R&I work was broadly ensured through one-way dissemination, presumably as it was considered a viable pathway towards open and transparent methods and processes. Researchers and innovators also shared their work both within the academic field, and with public and non-academic stakeholders. However, making research findings and data openly available to the public was widely confused with open access.

The attitudinal agreement for openness and transparency was the highest in comparison with other RRI dimensions. In practice, however, this only translated to public accessibility of R&I.

### 3.9.2 OVERVIEW

This section focuses on the sample of respondents from European and North American States. It was represented by a majority of respondents from Great Britain ( $n = 230$ , 13%), Germany ( $n = 193$ , 11%) and the USA ( $n = 169$ , 10%). The sample size for European and North American States was  $N = 1728$  (completed surveys), making up 63% of the global sample.

#### 3.9.2.1 SOCIO-DEMOGRAPHICS OF EUROPEAN AND NORTH AMERICAN STATES

The dominant age group was 39 to 48 ( $n = 470$ , 29%) (Figure 220)<sup>1363</sup>, and the gender distribution was slightly skewed towards women ( $n = 893$ , 52%) rather than men ( $n = 766$ , 45%) (Figure 221)<sup>1364</sup>.

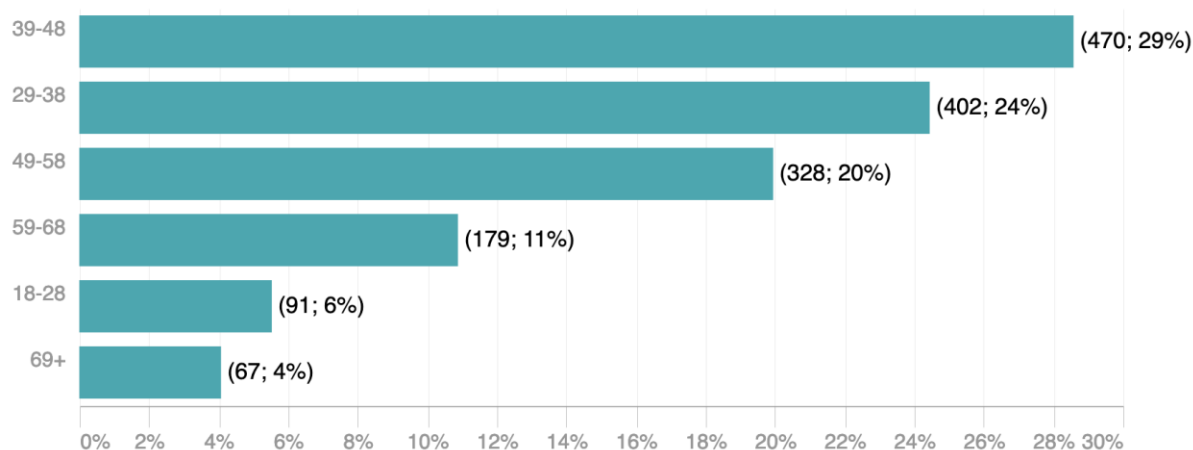


Figure 220: European and North American States - Distribution of age.

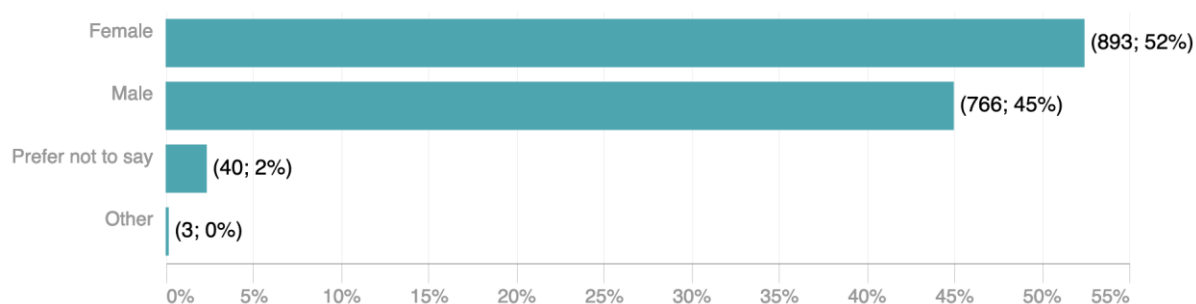


Figure 221: European and North American States - Distribution of gender.

<sup>1363</sup> The total number of responses:  $N = 1537$

<sup>1364</sup> The total number of responses:  $N = 1702$

Most respondents indicated that they are not currently participating in an educational programme ( $n = 1429$ , 85%) (Figure 222)<sup>1365</sup>. The overall level of formal education was high. Most held a *Doctoral* degree ( $n = 1028$ , 61%) or *Master's* degree ( $n = 494$ , 30%), while fewer respondents reported completing a *Bachelor's* degree ( $n = 87$ , 5%) (Figure 223)<sup>1366</sup>.

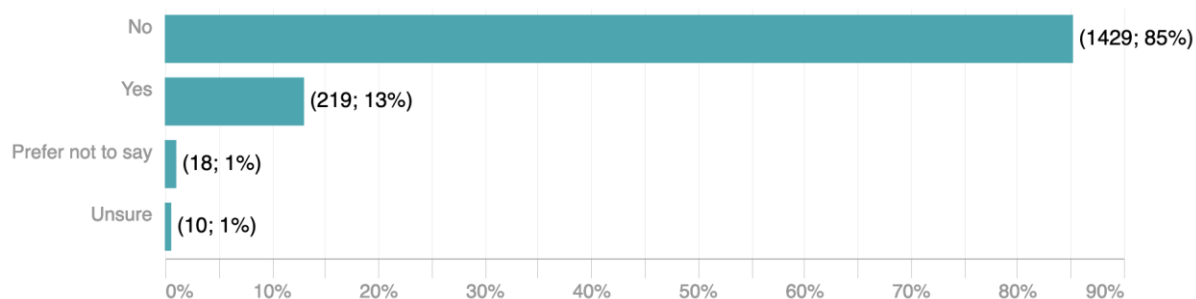


Figure 222: European and North American States - Currently studying at school, college, or university.

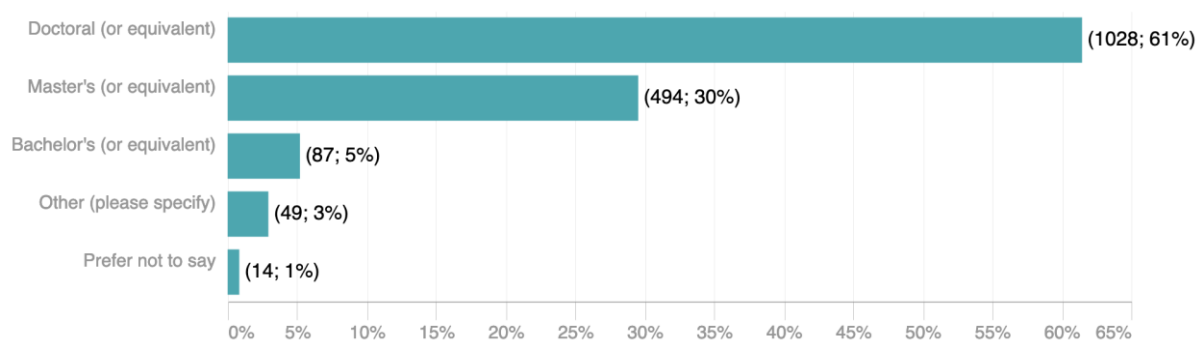


Figure 223: European and North American States - Highest level of formal education completed.

In general, the subject areas of respondents' degrees were diverse (Figure 224)<sup>1367</sup>. Among the degree subject areas, '*Natural sciences, mathematics and statistics*' ( $n = 552$ , 25%) represented the largest group, followed by '*Social sciences, journalism and information*' ( $n = 408$ , 18%), '*Engineering, manufacturing and construction*' ( $n = 238$ , 11%), '*Business, administration and law*' ( $n = 226$ , 10%), '*Arts and humanities*' ( $n = 222$ , 10%), '*Health and welfare*' ( $n = 161$ , 7%), '*Education*' ( $n = 127$ , 6%), '*Other*' ( $n = 111$ , 5%), '*Information and communication Technology*' ( $n = 104$ , 5%), '*Agriculture, forestry, fisheries and veterinary*' ( $n = 66$ , 3%), and '*Services*' ( $n = 7$ , < 1%).

<sup>1365</sup> The total number of responses:  $N = 1676$

<sup>1366</sup> The total number of responses:  $N = 1672$

<sup>1367</sup> The total number of responses:  $N = 2222$

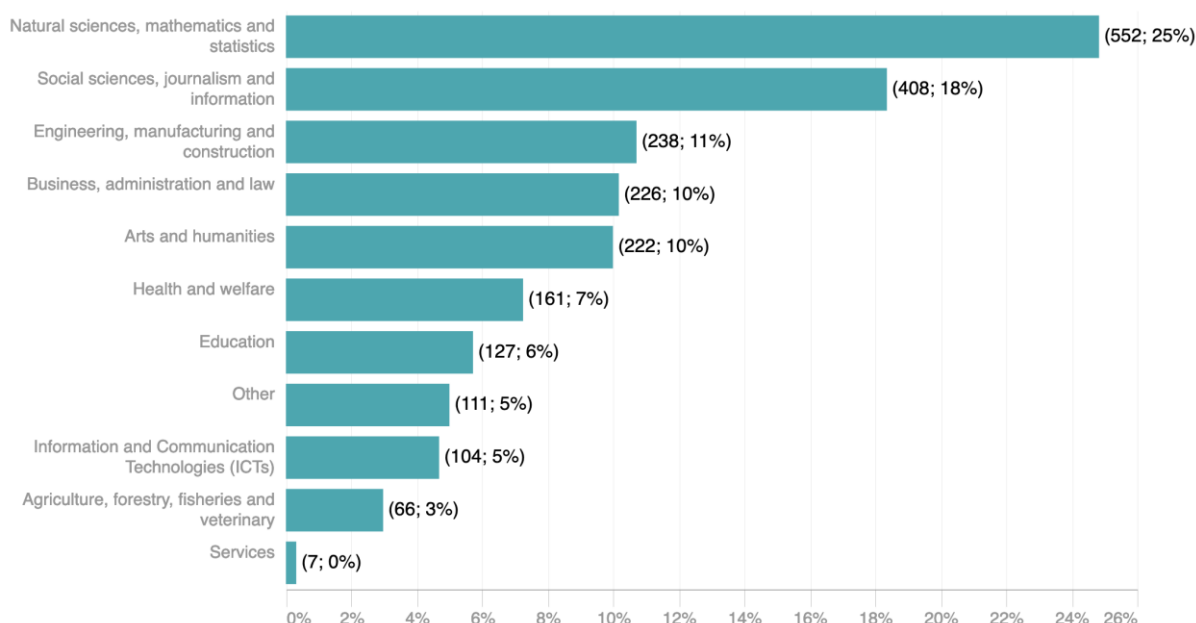


Figure 224: European and North American States - Distribution of degrees by subject area (multiple choice).

Respondents tended to have many years of professional experience, both in total ( $Mdn = 20$  years)<sup>1368</sup> and after completing their doctoral degree ( $Mdn = 12$  years) (Figure 225)<sup>1369</sup>.

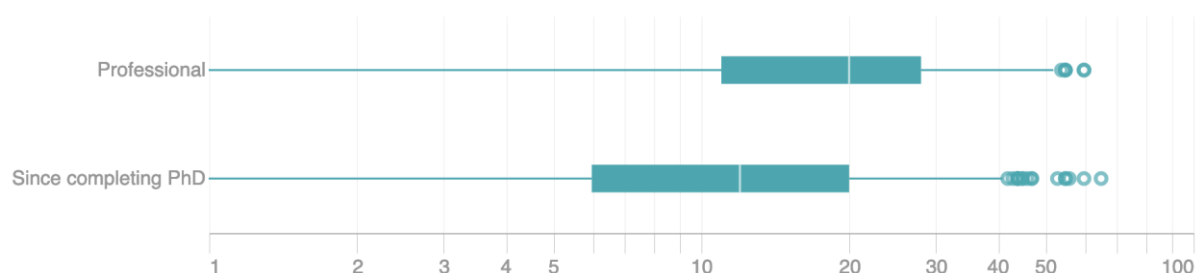


Figure 225: European and North American States - Years of experience as professional/since completing PhD (log scale).

<sup>1368</sup> The total number of responses:  $N = 1356$

<sup>1369</sup> The total number of responses:  $N = 908$

In terms of respondents' academic fields of work, the most dominant were '*Social sciences*' ( $n = 416$ , 25%) and '*Natural sciences, mathematics and statistics*' ( $n = 375$ , 23%) (Figure 226)<sup>1370</sup>.

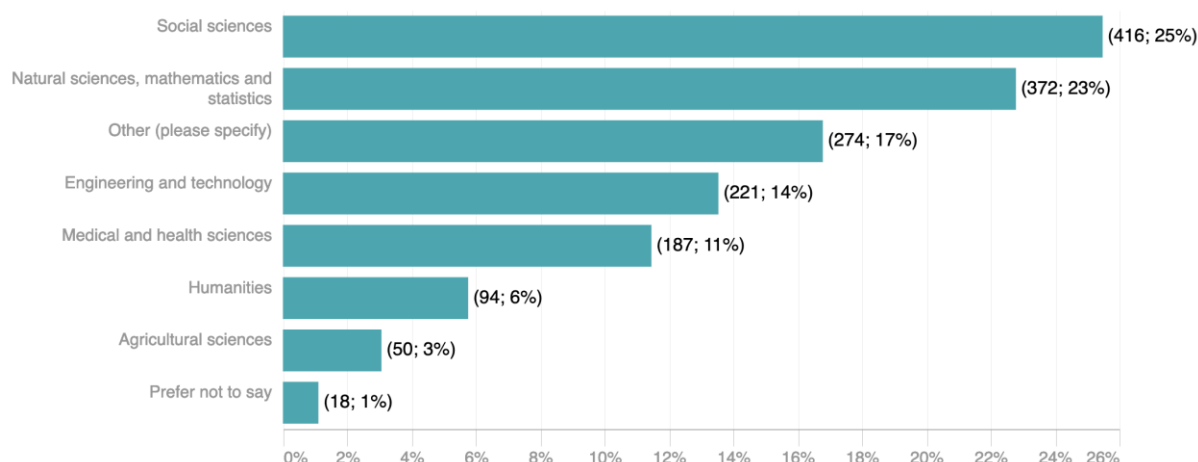


Figure 226: European and North American States - Fields or professions in which respondents work.

The most common sub-fields of '*Social sciences*' were '*Economics and business*' ( $n = 121$ , 29%), and '*Other*' ( $n = 65$ , 15%) (Figure 227)<sup>1371</sup>. The most reported sub-fields within '*Natural sciences, mathematics and statistics*' were '*Biological sciences*' ( $n = 128$ , 34%) (Figure 228)<sup>1372</sup>.

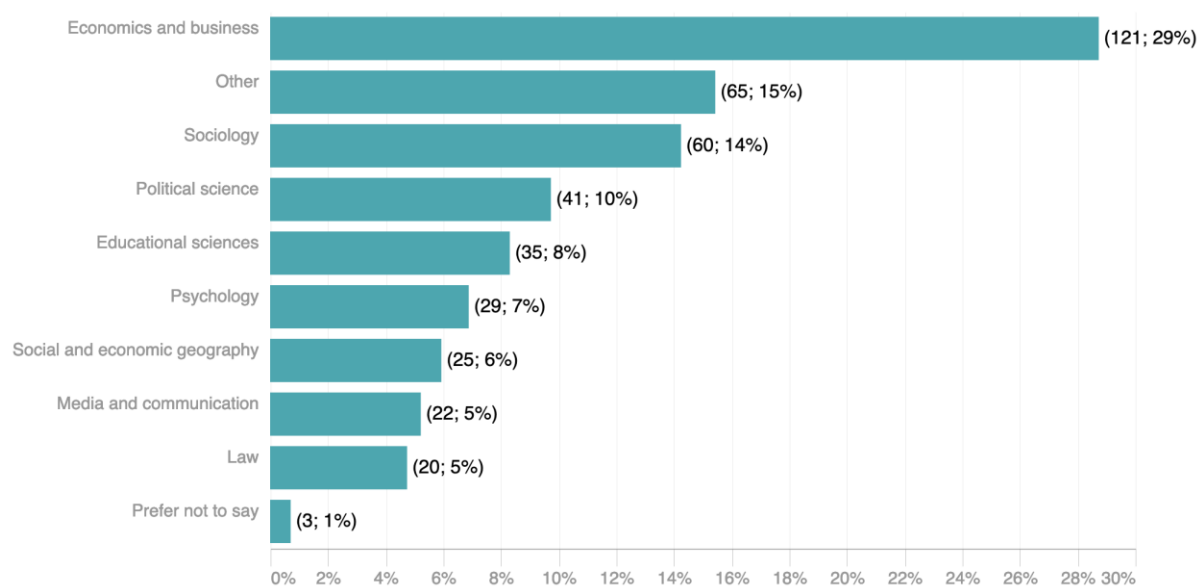


Figure 227: European and North American States - Sub-fields of social sciences.

<sup>1370</sup> The total number of responses:  $N = 1632$

<sup>1371</sup> The total number of responses:  $N = 421$

<sup>1372</sup> The total number of responses:  $N = 379$

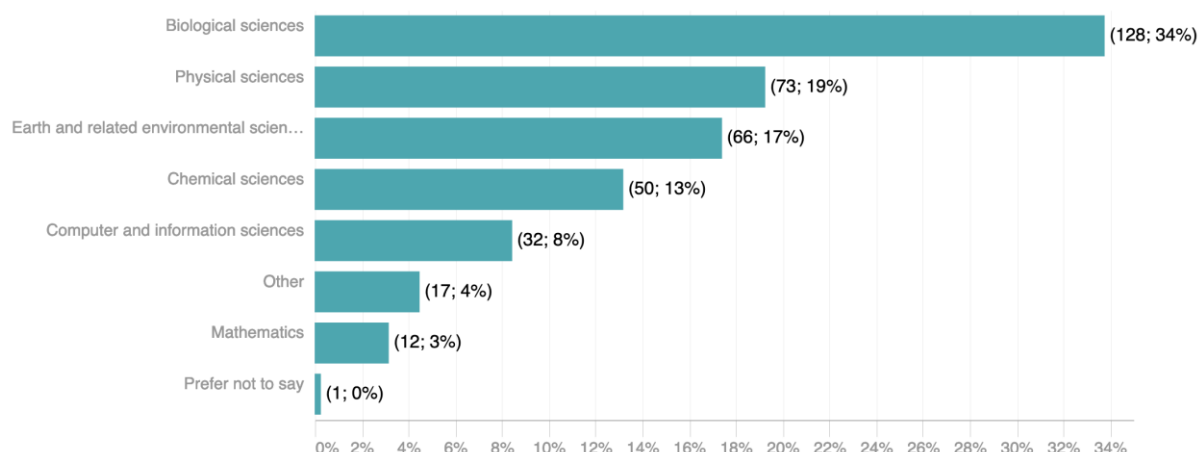


Figure 228: European and North American States - Sub-fields of natural sciences.

For ‘*Medical and health sciences*’, the most frequently reported category was ‘*Health sciences*’ ( $n = 69, 37\%$ ) (Figure 229)<sup>1373</sup>.

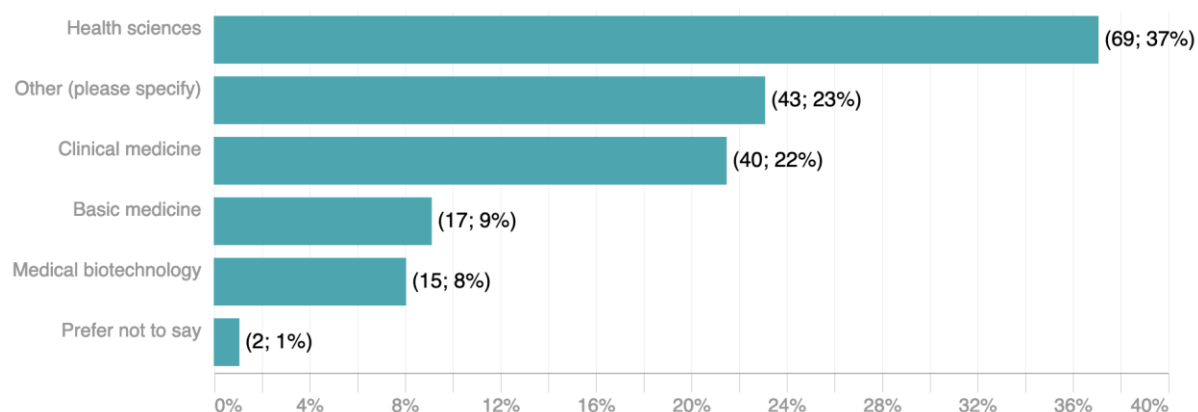


Figure 229: European and North American States - Sub-fields of medical and health sciences.

Other sub-fields were ‘*Electrical/electronic/information engineering*’ ( $n = 75, 33\%$ ) within ‘*Engineering and technology*’ (Figure 230)<sup>1374</sup>, and ‘*Agriculture, forestry, and fisheries*’ ( $n = 23, 45\%$ ) within ‘*Agricultural sciences*’ (Figure 231)<sup>1375</sup>.

<sup>1373</sup> The total number of responses:  $N = 186$

<sup>1374</sup> The total number of responses:  $N = 226$

<sup>1375</sup> The total number of responses:  $N = 51$

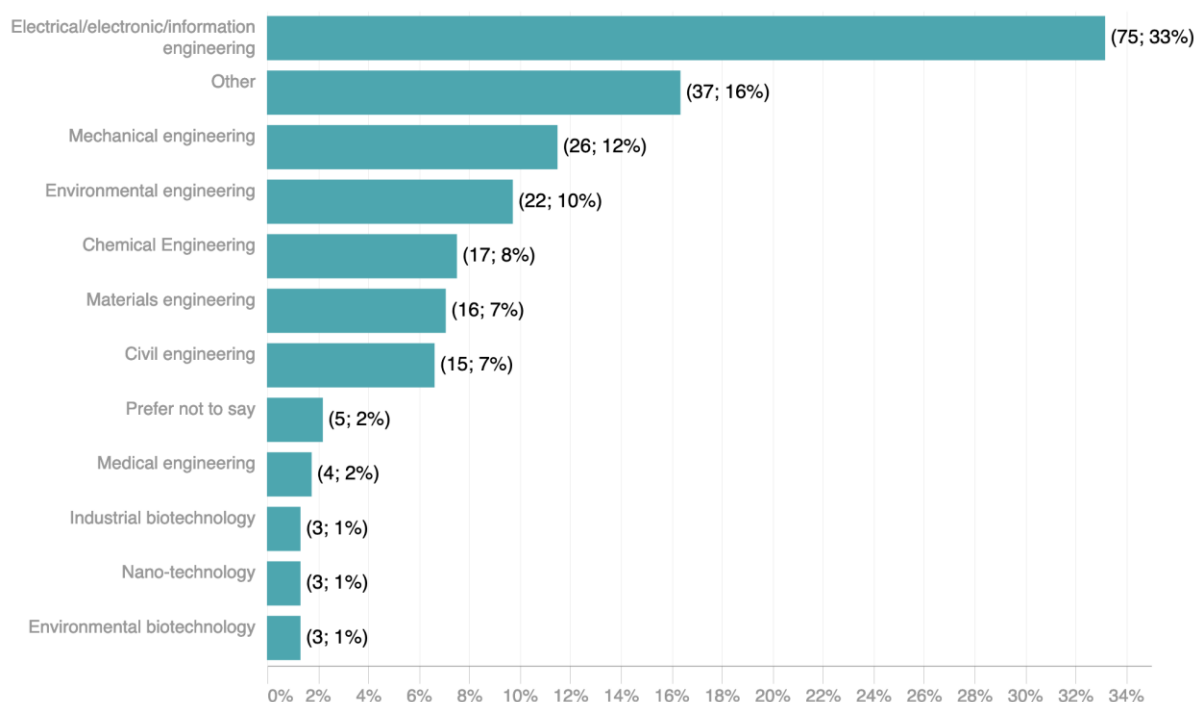


Figure 230: European and North American States - Sub-fields of engineering and technology.

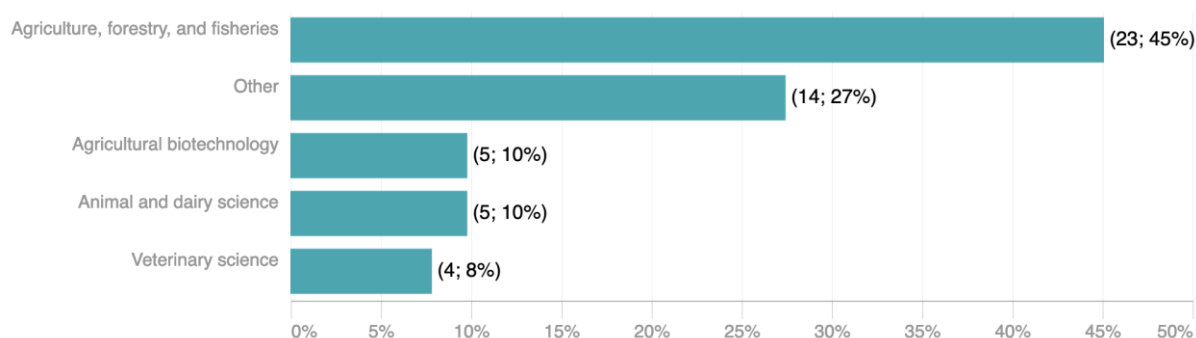


Figure 231: European and North American States - Sub-fields of agricultural sciences.

For 'Humanities', these were 'Philosophy, ethics and religion' ( $n = 26, 27\%$ ), and 'Other' ( $n = 20, 20\%$ ) (Figure 232)<sup>1376</sup>.

<sup>1376</sup> The total number of responses:  $N = 98$

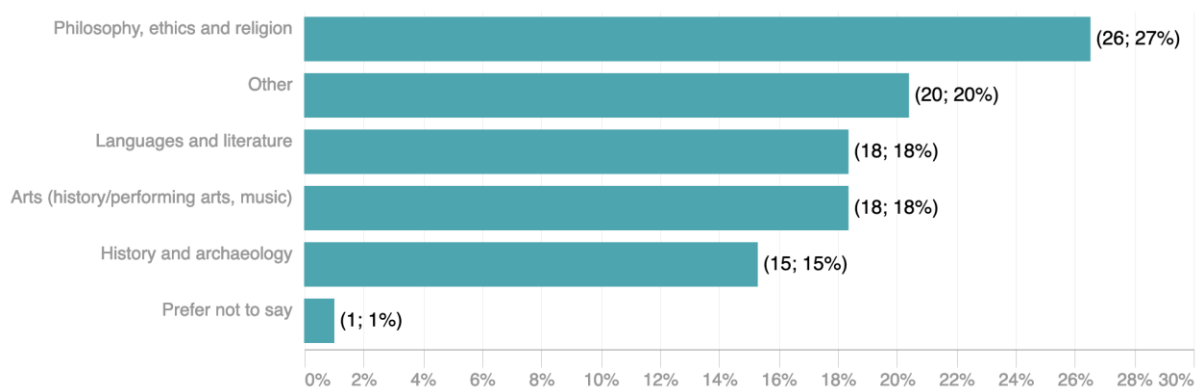


Figure 232: European and North American States - Sub-fields of humanities.

Most respondents worked full-time ( $n = 1283$ , 79%) (Figure 234)<sup>1377</sup> in ‘Universit[ies] or similar research performing organisation[s]’ ( $n = 1146$ , 71%), ‘National governmental organisation[s]’ ( $n = 168$ , 10%), or ‘Other’ ( $n = 86$ , 5%) (Figure 233)<sup>1378</sup>.

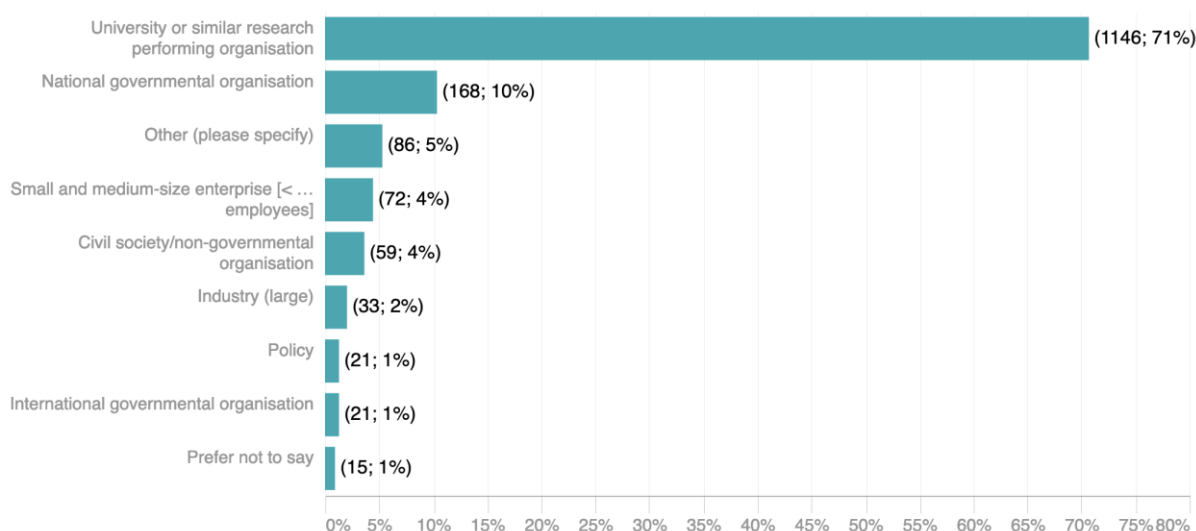


Figure 233: European and North American States - Sectors in which participants work[ed].

<sup>1377</sup> The total number of responses:  $N = 1621$

<sup>1378</sup> The total number of responses:  $N = 1621$

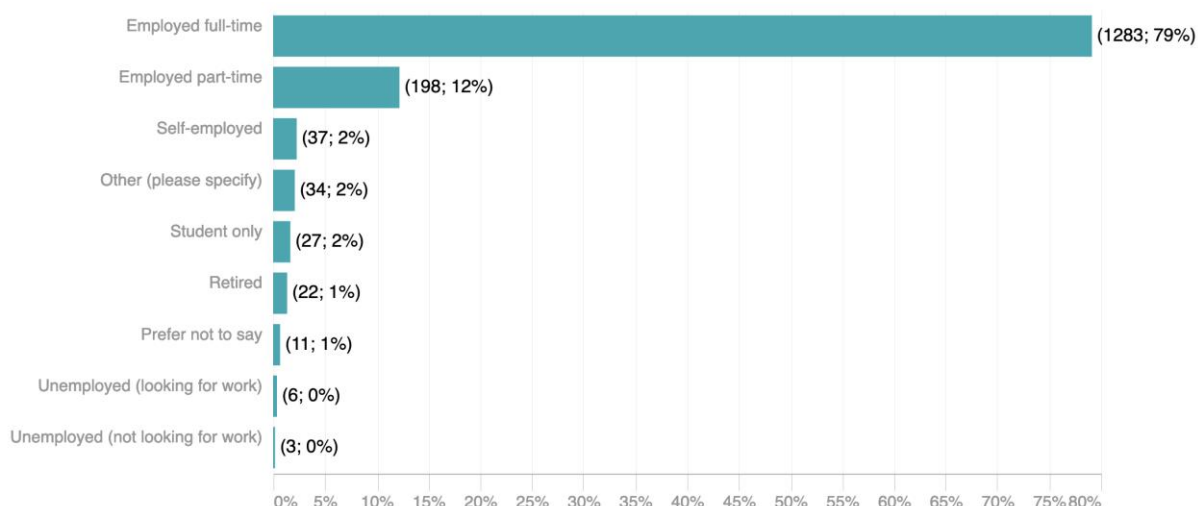


Figure 234: European and North American States - Participants' employment status.

In general, respondents spent their working hours on a diverse range of tasks. The most time was spent on 'Research and innovation work' (Mdn = 16 hours)<sup>1379</sup> and 'Teaching or capacity building (including training)' (Mdn = 6 hours) (Figure 235)<sup>1380</sup>.

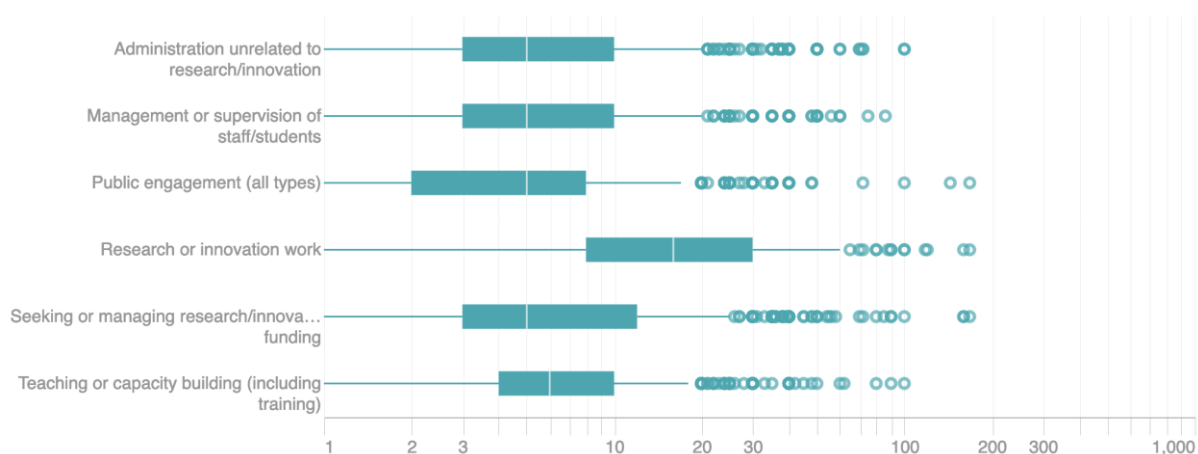


Figure 235: European and North American States - Hours spent on activities in the last 7 days (log scale).

The median number of years that respondents had worked as researchers and innovators was 12 years<sup>1381</sup>. In terms of their current positions, the median number of years of respondents' work experience was 5 years (Figure 236)<sup>1382</sup>. Generally, respondents tended to have worked longer as a researcher and innovator than in their current role.

<sup>1379</sup> The total number of responses:  $N = 1296$

<sup>1380</sup> The total number of responses:  $N = 931$

<sup>1381</sup> The total number of responses:  $N = 1329$

<sup>1382</sup> The total number of responses:  $N = 1314$

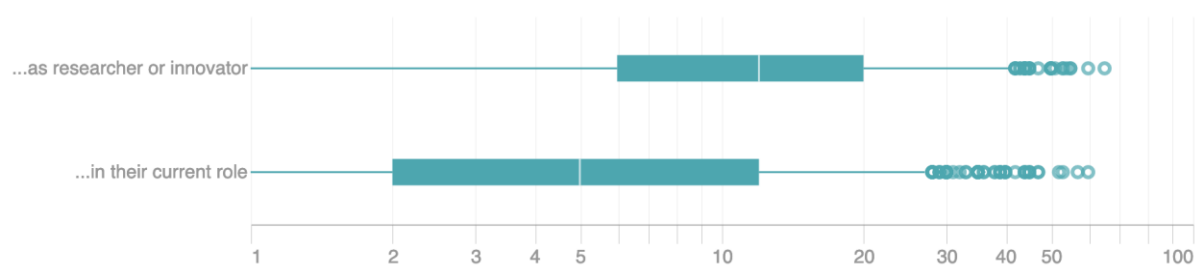


Figure 236: European and North American States - Years that respondents worked in their current role/as researcher or innovator (log scale).

From the four RRING key domains, respondents most frequently indicated working in none of these, with ‘*Digital (ICT)*’ ( $n = 431$ , 24%) ranking second. Less common were ‘*Bio-economy*’ ( $n = 203$ , 11%), and ‘*Waste Management*’ ( $n = 130$ , 7%) (Figure 237)<sup>1383</sup>.

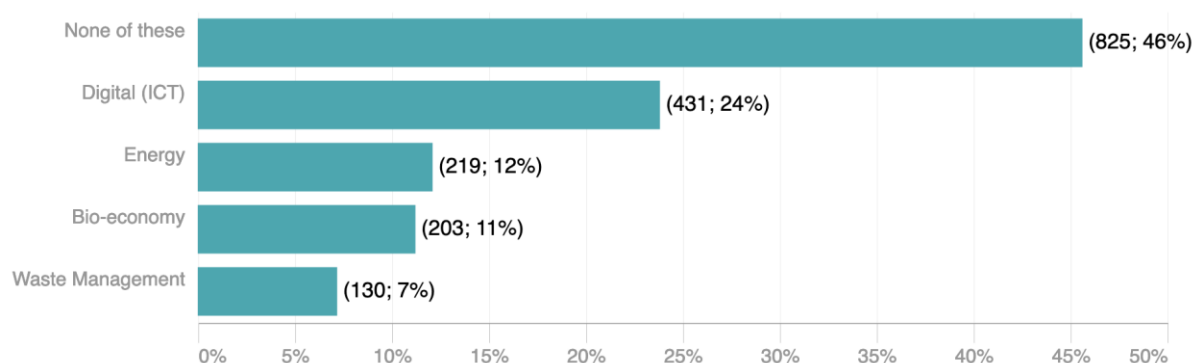


Figure 237: European and North American States - Domains relating to participants' recent work.

### 3.9.3 RESULTS BY DIMENSION OF RESPONSIBLE RESEARCH & INNOVATION

This section describes the level of engagement with the four RRI process dimensions, both on an attitudinal and practical level.

#### 3.9.3.1 RRI DIMENSION – DIVERSE AND INCLUSIVE

While there was overall agreement on an attitudinal level, there were value-action gaps for each measure. This was most apparent for the inclusion of ethnic minorities as attitude and reporting practical steps did not align. This measure also had the lowest level of total attitudinal agreement, similar to the ethics dimension (71%, compared to 79% for gender equality, and 88% for diverse perspectives and expertise).

<sup>1383</sup> The total number of responses:  $N = 1808$

### 3.9.3.1.1 Diverse and Inclusive – Diverse Perspectives

The majority of respondents agreed, but with differing levels of strength, that it is important to involve diverse stakeholders ( $n = 1209$ , 88%) (Figure 238)<sup>1384</sup>. A notable portion expressed the strongest level of agreement ( $n = 562$ , 41%), whereas only minor proportions disagreed ( $n = 66$ , 5%) or responded neutrally ( $n = 94$ , 7%).

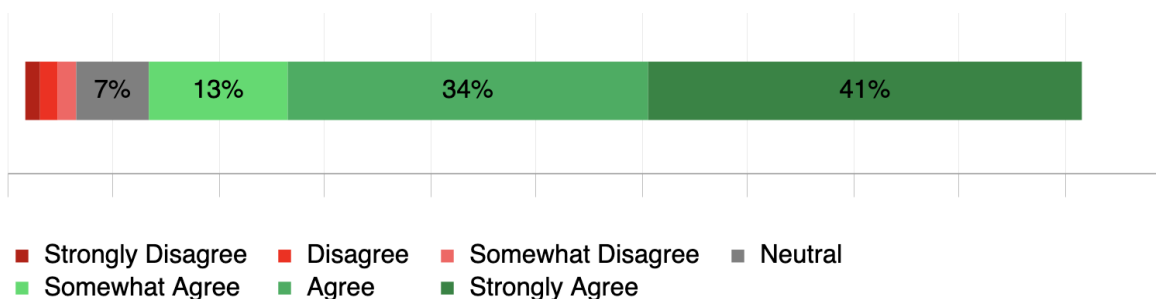


Figure 238: European and North American States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work.'

Just under two thirds ( $n = 895$ , 63%) reported taking practical steps to involve diverse stakeholders (Figure 239)<sup>1385</sup>. This represents 74% of those who indicated a positive attitude towards involving diverse perspectives. There were many ( $n = 314$ , 26%) whose attitudinal agreement had not translated into practical action or who did not answer the question. A notable portion explicitly reported taking no steps ( $n = 192$ , 13%) or thought taking action did not apply to them or had no opinion ( $n = 170$ , 12%).

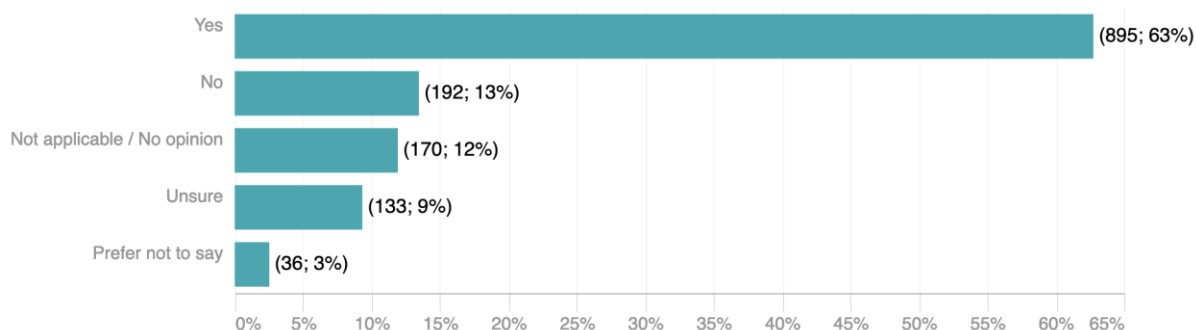


Figure 239: European and North American States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.

Respondents involved different sectors in their R&I process (Figure 240)<sup>1386</sup>. Most frequently 'Universit[ies] or college[s]' ( $n = 764$ , 22%) were specified, followed by 'Research organisation[s]' ( $n = 476$ , 14%), 'Government agenc[ies]' ( $n = 442$ , 13%), and 'Non-profit organisation[s]' ( $n = 396$ , 11%).

<sup>1384</sup> The total number of responses:  $N = 1369$

<sup>1385</sup> The total number of responses:  $N = 1426$

<sup>1386</sup> The total number of responses:  $N = 3010$

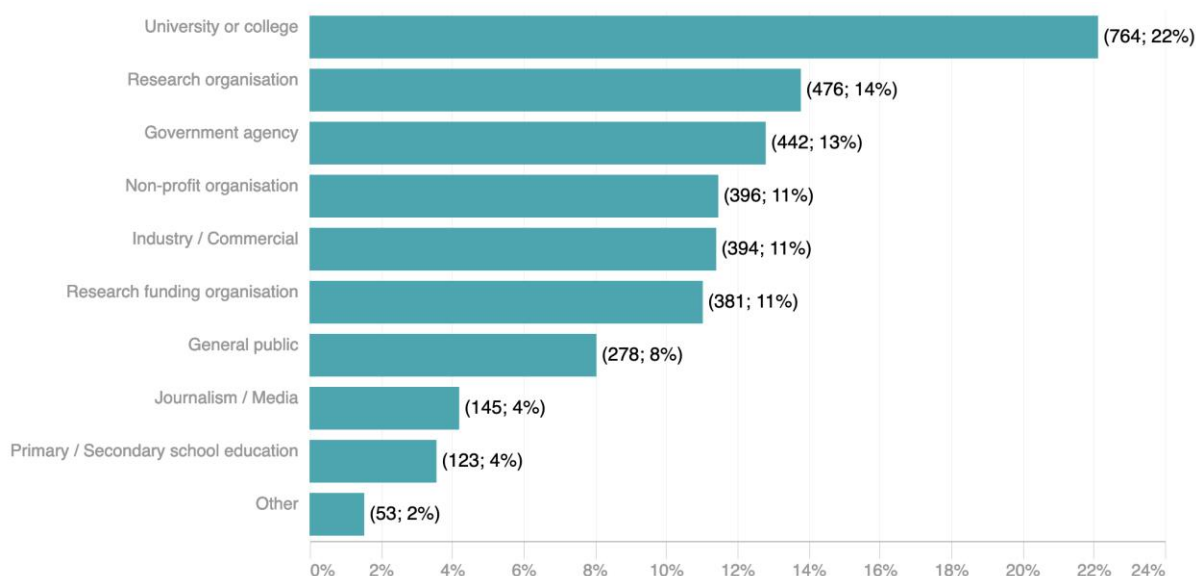


Figure 240: European and North American States - Sectors' participants involved in research and innovation practice.

In general, respondents reported similar proportions of involved stakeholders for R&I practice and dissemination (Figure 241)<sup>1387</sup>. Again, the sector most frequently involved was 'Universit[ies] or college[s]' ( $n = 694$ , 21%), followed by 'General public' ( $n = 383$ , 11%). 'Research organisation[s]' ( $n = 373$ , 11%) and 'Non-profit organisation[s]' ( $n = 351$ , 11%) were mentioned less often, while 'Journalism / Media' ( $n = 373$ , 11%) was involved more often.

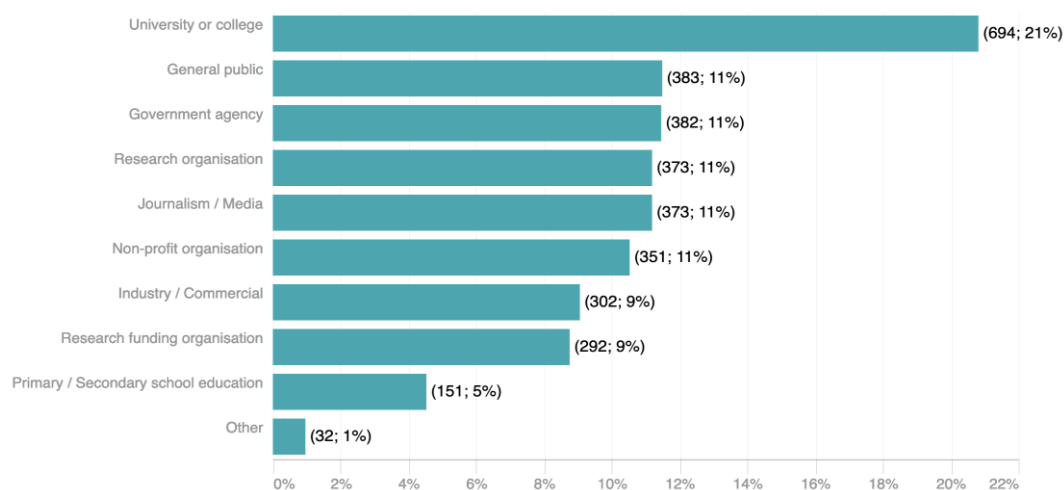


Figure 241: European and North American States - Sectors' participants involved in research and innovation dissemination.

<sup>1387</sup> The total number of responses:  $N = 3333$

### 3.9.3.1.2 Diverse and Inclusive – Gender Equality

There was broad agreement with the importance of promoting gender equality in R&I work (Figure 242)<sup>1388</sup>. The majority of respondents ( $n = 1048$ , 79%) responded positively, with almost half ( $n = 624$ , 47%) expressing the strongest level of agreement. A smaller portion ( $n = 276$ , 21%) responded neutrally or disagreed that promoting gender equality was important in their work.

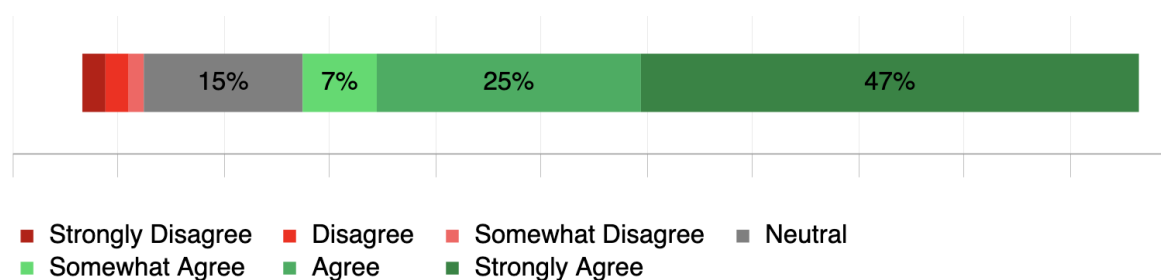


Figure 242: European and North American States - 'It is important to promote gender equality in my research and innovation work.'

Nearly half of respondents ( $n = 591$ , 42%) had taken steps to promote gender equality in their work over the past 12 months (Figure 243)<sup>1389</sup>. This represents 56% of those respondents who indicated a positive attitude towards gender equality. There was a proportion of those who thought it was attitudinally important ( $n = 457$ , 44%), but had not explicitly confirmed any actions.

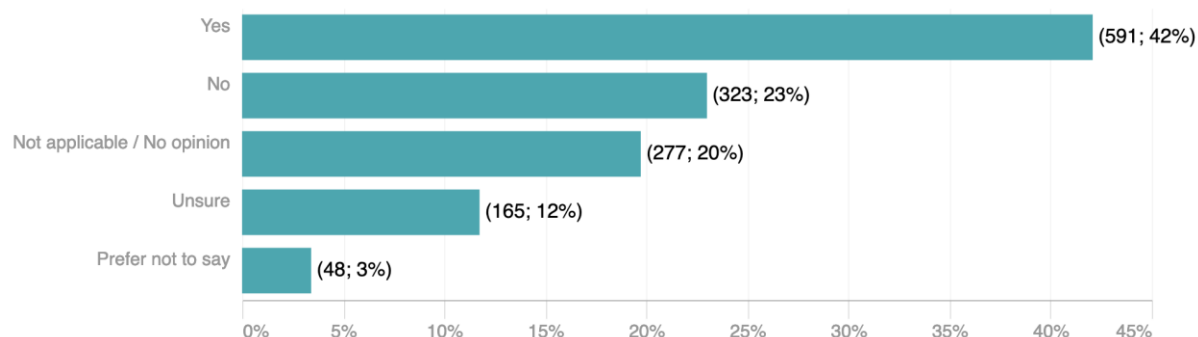


Figure 243: European and North American States - Promoted gender equality in research and innovation work in the past 12 months.

### 3.9.3.1.3 Diverse and Inclusive – Ethnic Minorities

The majority of respondents ( $n = 905$ , 71%) agreed it was important to include ethnic minorities in R&I work (Figure 244)<sup>1390</sup>. However this was to a lower degree than for diverse perspectives and gender equality measures. Fewer respondents agreed at the strongest level ( $n$

<sup>1388</sup> The total number of responses:  $N = 1324$

<sup>1389</sup> The total number of responses:  $N = 1404$

<sup>1390</sup> The total number of responses:  $N = 1393$

= 442, 35%) when compared to the same level of agreement for the gender equality measure (47%). A considerable portion ( $n = 368$ , 29%) responded neutrally or disagreed that promoting ethnic diversity was important in their work.

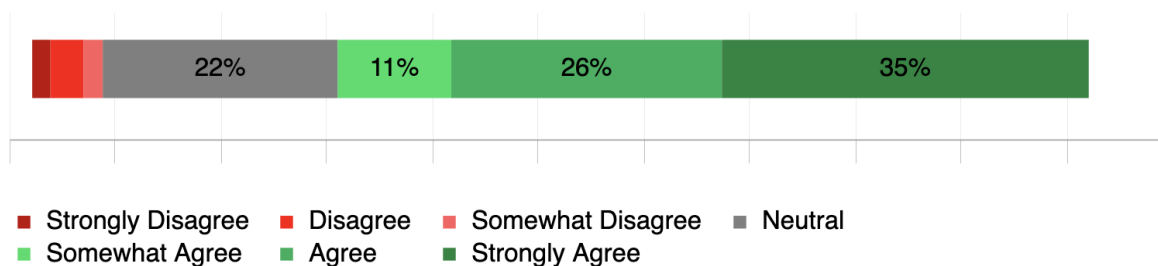


Figure 244: European and North American States - 'It is important to include ethnic minorities in my research and innovation work.'

Few respondents explicitly confirmed they had acted on including ethnic minorities ( $n = 337$ , 24%) (Figure 245)<sup>1391</sup>. This represents 37% of those respondents who indicated a positive attitude towards including ethnic minorities. This was the lowest indication of practical steps in comparison with the other measures of this dimension. Nearly two thirds of the respondents ( $n = 568$ , 63%) thought including ethnic minorities was important, but had not explicitly taken steps to ensure this or had not answered the question.

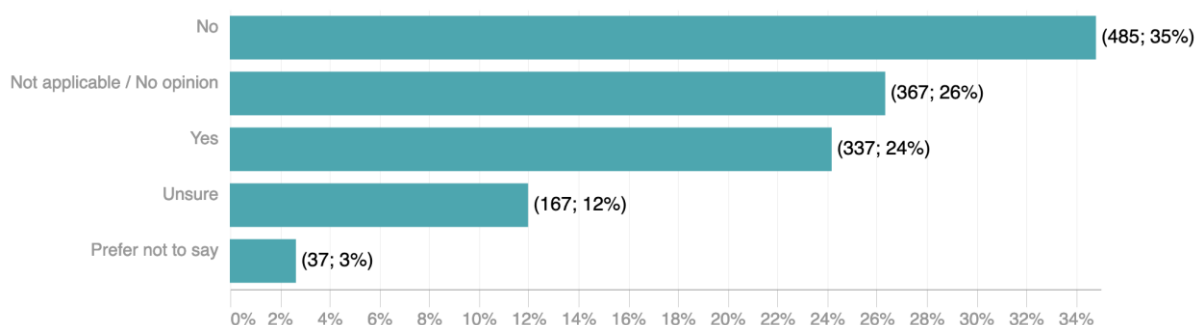


Figure 245: European and North American States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.

### 3.9.3.1.4 Diverse and Inclusive – Ethics

There was broad agreement amongst respondents regarding the importance of ethics (Figure 246)<sup>1392</sup>. The majority ( $n = 1169$ , 92%) responded positively and more than half of the respondents ( $n = 726$ , 57%) expressed the strongest level of agreement. A small portion of respondents ( $n = 30$ , 2%) explicitly disagreed that ensuring ethical guidelines was important in their work.

<sup>1391</sup> The total number of responses:  $N = 1273$

<sup>1392</sup> The total number of responses:  $N = 1266$

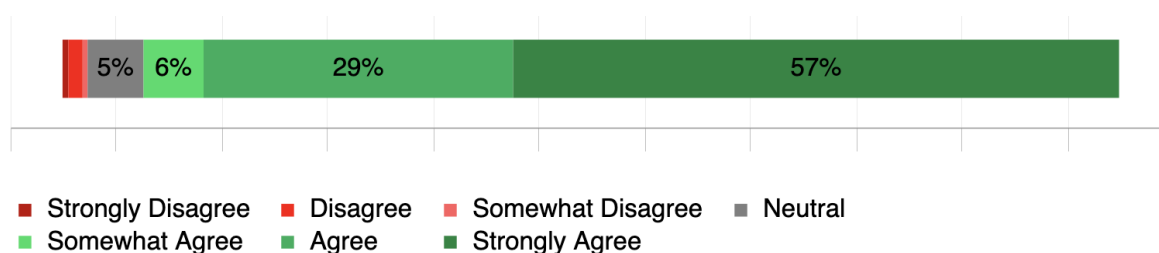


Figure 246: European and North American States - 'Ethical principles guide my research and innovation work'.

The majority of respondents ( $n = 772$ , 58%) had taken steps to be guided by ethical principles (Figure 247)<sup>1393</sup>. This represents 66% of respondents who considered it important. A notable proportion thought ethics were important ( $n = 397$ , 34%), but had not explicitly taken steps to ensure this or had not answered the question.

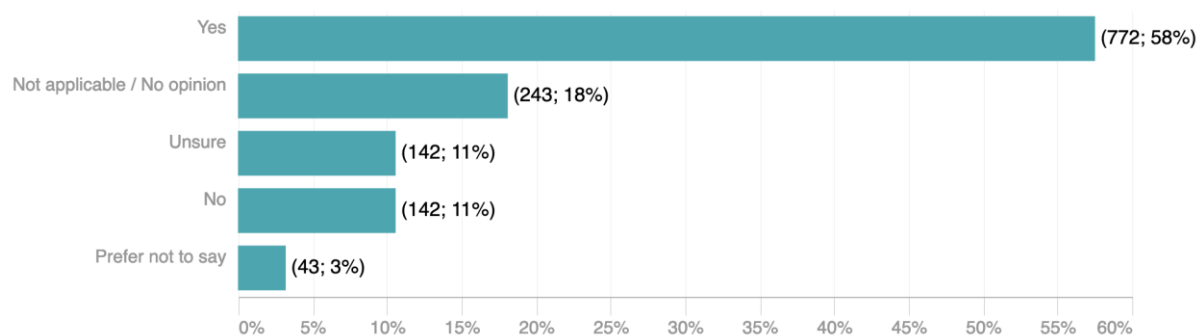


Figure 247: European and North American States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.

### 3.9.3.1.5 Further Diverse and Inclusive Agreement Statements

The previous findings on RRI measures are further explored through results on the levels of agreement towards the following statements regarding detailed perspectives on the UN SDGs (Figure 248).

Most respondents agreed that 'It is important to maintain an equal number of men and women in research and innovation teams' ( $n = 622$ , 60%)<sup>1394</sup> and thought that 'It is important to take gender into account when developing [their] research and innovation work' ( $n = 629$ , 64%)<sup>1395</sup>. Fewer than half of the respondents disagreed that 'Gender is irrelevant in [their] work' ( $n = 481$ , 48%)<sup>1396</sup>.

The majority of respondents agreed that 'It is important to take ethnic diversity into account when developing [their] research and innovation work.' ( $n = 617$ , 64%)<sup>1397</sup>, while few

<sup>1393</sup> The total number of responses:  $N = 1342$

<sup>1394</sup> The total number of responses:  $N = 1032$

<sup>1395</sup> The total number of responses:  $N = 987$

<sup>1396</sup> The total number of responses:  $N = 1012$

<sup>1397</sup> The total number of responses:  $N = 970$

respondents disagreed that ‘Ethnic differences are irrelevant in [their] work.’ (n = 404, 41%)<sup>1398</sup>.

More respondents disagreed (n = 613, 61%) than agreed (n = 317, 31%) that ‘The best time to talk to public audiences about [their] research and innovation work is at the very end of the process after all the work has been completed’<sup>1399</sup>. Most agreed they ‘feel a professional responsibility to communicate findings from [their] research or innovation work to public audiences’ (n = 915, 91%)<sup>1400</sup>.

Concerning the communication of findings to the public, the majority of respondents agreed that ‘[their] organisation encourages [them] to communicate findings from [their] research or innovation work to public audiences’ (n = 821, 82%)<sup>1401</sup>. Most also disagreed that ‘[their] organisation [...] discourages [them] from communicating the results of my research or innovation work to public audiences’ (n = 613, 61%)<sup>1402</sup>.

More respondents disagreed (n = 515, 51%) than agreed (n = 400, 39%)<sup>1403</sup> that ‘Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals’.

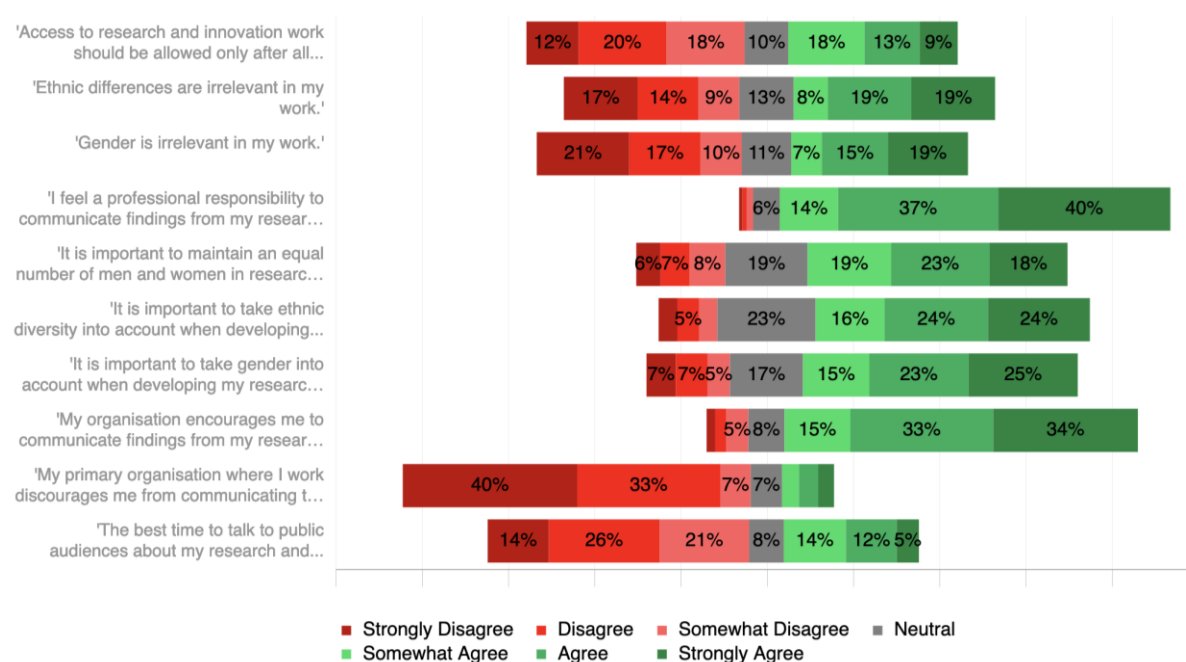


Figure 248: European and North American States - Statements related to working in research and innovation.

<sup>1398</sup> The total number of responses: N = 993

<sup>1399</sup> The total number of responses: N = 1011

<sup>1400</sup> The total number of responses: N = 1010

<sup>1401</sup> The total number of responses: N = 1002

<sup>1402</sup> The total number of responses: N = 922

<sup>1403</sup> The total number of responses: N = 1080

### 3.9.3.2 RRI DIMENSION – ANTICIPATIVE AND REFLECTIVE

Overall, there was broad agreement that R&I work should recognise societal concerns, although practical action was limited.

#### 3.9.3.2.1 Anticipative and Reflective – Societal Concerns

The majority of respondents agreed it was important that their work did not cause concerns for society ( $n = 1074$ , 82%) (Figure 249)<sup>1404</sup>. A fairly large proportion agreed with this statement ( $n = 555$ , 42%). A small but considerable portion ( $n = 119$ , 9%) explicitly disagreed, with a similar number of neutral responses ( $n = 114$ , 9%).

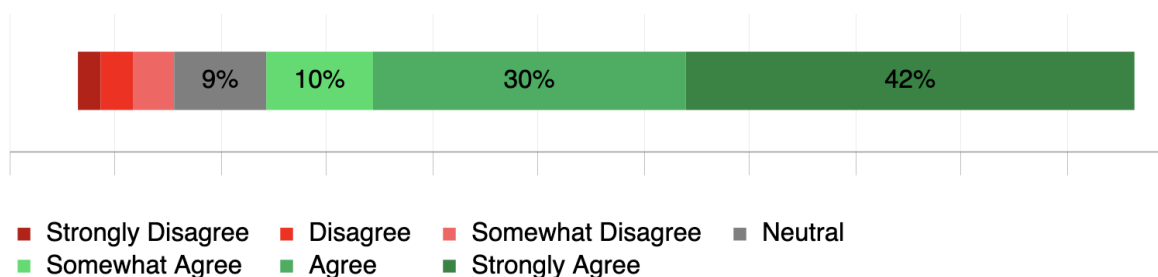


Figure 249: European and North American States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society.'

Most confirmed they had taken steps to ensure their work did not cause concerns for society ( $n = 520$ , 37%) (Figure 250)<sup>1405</sup>. This represents 48% of those respondents who indicated a positive attitude towards societal concerns. The next highest categories were 'Not applicable / No opinion' ( $n = 357$ , 25%) and 'No' ( $n = 225$ , 18%). This could indicate that ensuring R&I work does not cause concerns for society is surrounded by ambiguity, particularly regarding practical steps.

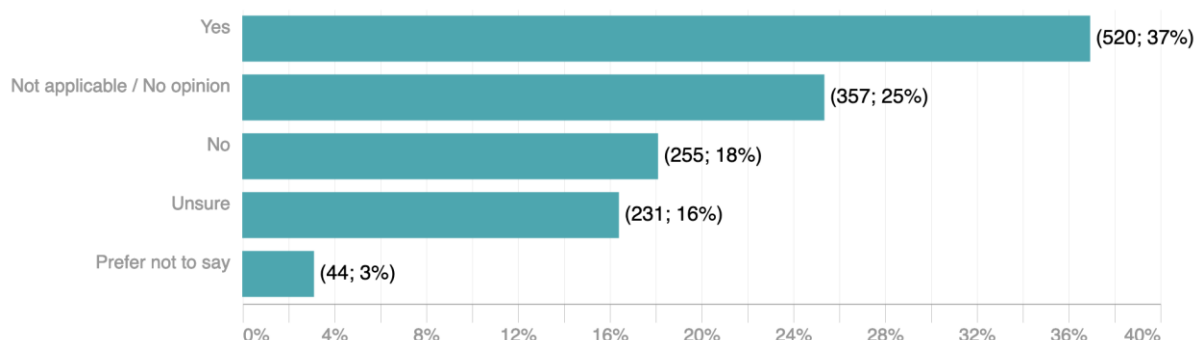


Figure 250: European and North American States - Ensured work does not cause concerns for society in the past 12 months.

<sup>1404</sup> The total number of responses:  $N = 1307$

<sup>1405</sup> The total number of responses:  $N = 1407$

### 3.9.3.3 RRI DIMENSION – OPEN AND TRANSPARENT

Overall, there was a level of support towards openness and transparency and public accessibility of results, although the open data was debated.

#### 3.9.3.3.1 Open and Transparent – Open and Transparent Methods and Processes

The majority of respondents ( $n = 1279$ , 94%,) agreed on the importance of ensuring methods and processes were open and transparent (Figure 251)<sup>1406</sup>. More than half of the respondents were in strong agreement ( $n = 747$ , 55%). A small portion disagreed ( $n = 37$ , 3%).

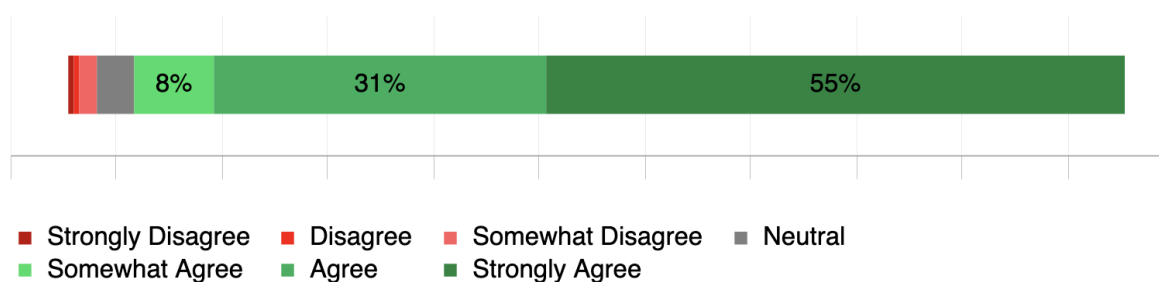


Figure 251: European and North American States - 'It is important to make my research and innovation methods/processes open and transparent.'

The majority of respondents ( $n = 921$ , 65%) reported taking practical steps to ensure R&I methods/processes are open and transparent (Figure 252)<sup>1407</sup>. This represents 72% of those respondents who indicated a positive attitude towards openness and transparency. A small but notable portion were 'Unsure' ( $n = 175$ , 12%), followed by explicitly negative responses ( $n = 96$ , 7%).

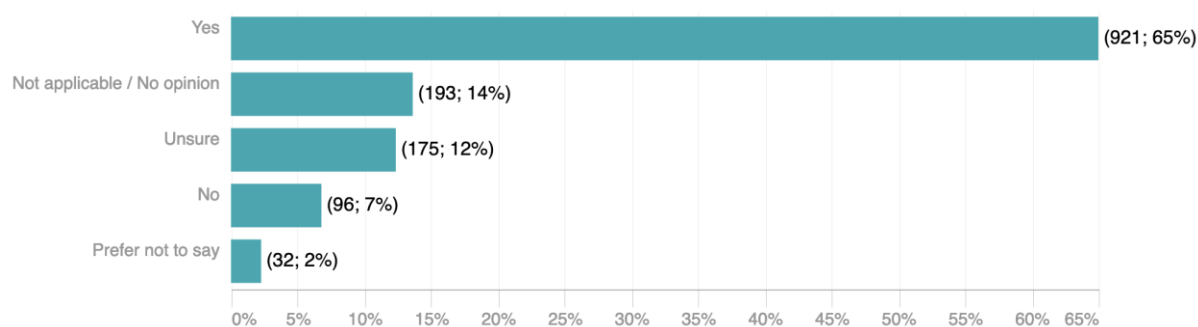


Figure 252: European and North American States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.

<sup>1406</sup> The total number of responses:  $N = 1364$

<sup>1407</sup> The total number of responses:  $N = 1417$

### 3.9.3.3.2 Open and Transparent – Public Accessibility

An overwhelming majority of respondents agreed that wide public accessibility of results was important ( $n = 1263$ , 94%) (Figure 253)<sup>1408</sup>. Overall disagreement was miniscule ( $n = 45$ , 3%).

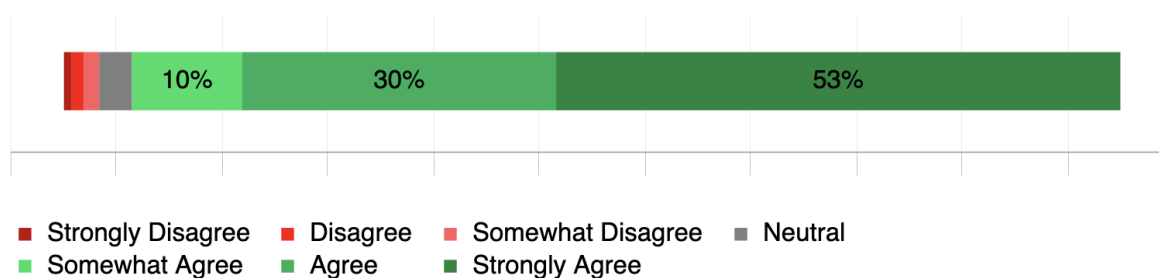


Figure 253: European and North American States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible.'

More than half of all respondents reported taking practical steps to make their work publicly accessible ( $n = 948$ , 68%). This represents 75% who indicated a positive attitude towards public accessibility and indicated the smallest value-action gap of all RRI measures (Figure 254)<sup>1409</sup>. A small number of respondents indicated taking no steps ( $n = 143$ , 10%).

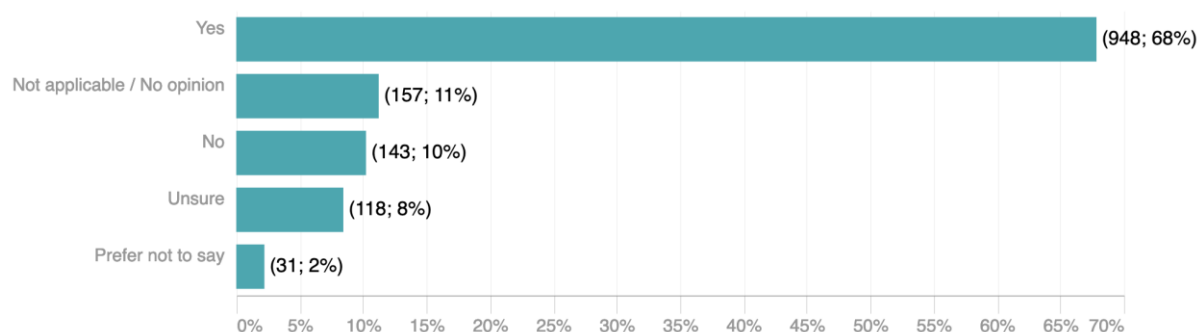


Figure 254: European and North American States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.

### 3.9.3.3.3 Open and Transparent – Open Data

The majority of respondents agreed on the importance of ensuring their research data was freely and publicly available ( $n = 1082$ , 83%) (Figure 255)<sup>1410</sup>. Disagreement was limited to under a tenth ( $n = 118$ , 9%).

<sup>1408</sup> The total number of responses:  $N = 1350$

<sup>1409</sup> The total number of responses:  $N = 1397$

<sup>1410</sup> The total number of responses:  $N = 1310$

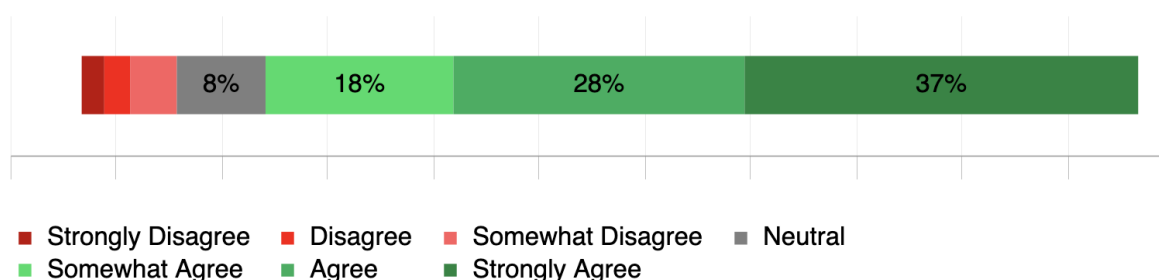


Figure 255: European and North American States - 'It is important to make data from my research and innovation activities freely available to the public.'

Most respondents indicated they had taken practical steps ( $n = 615$ , 45%), but nearly a quarter said they had not ( $n = 337$ , 24%) (Figure 256)<sup>1411</sup>. This indicates that there are diverging practices and no clear overall trend regarding taking practical steps toward making data freely and publicly available. This represents 57% who indicated a positive attitude towards open data. A rather large portion of respondents indicated taking no steps ( $n = 467$ , 43%).

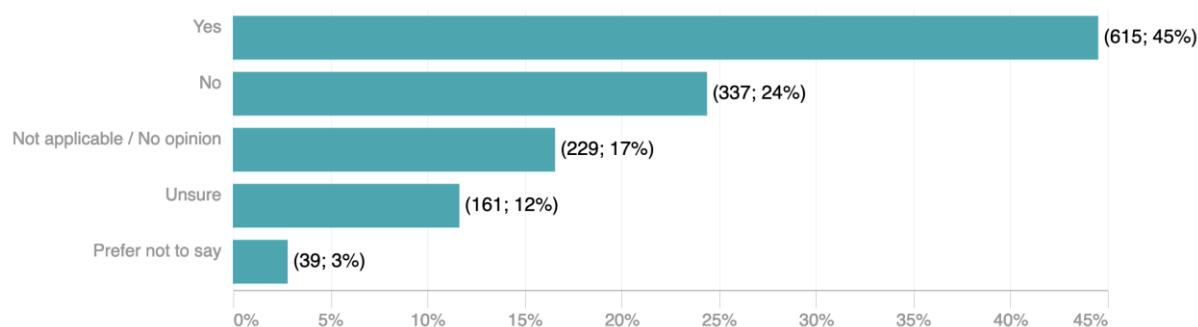


Figure 256: European and North American States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.

### 3.9.3.4 RRI DIMENSION – RESPONSIVE AND ADAPTIVE TO CHANGE

There was broad agreement regarding being responsive to societal needs. This was the case on both an attitudinal and practical level.

#### 3.9.3.4.1 Responsive and Adaptive to Change – Societal Needs

The overwhelming majority of respondents agreed that it is important to ensure their work addressed societal needs ( $n = 1240$ , 89%). Nearly half of the respondents agreed at the strongest level ( $n = 611$ , 44%), and few explicitly disagreed ( $n = 83$ , 6%) (Figure 257)<sup>1412</sup>.

<sup>1411</sup> The total number of responses:  $N = 1381$

<sup>1412</sup> The total number of responses:  $N = 1391$

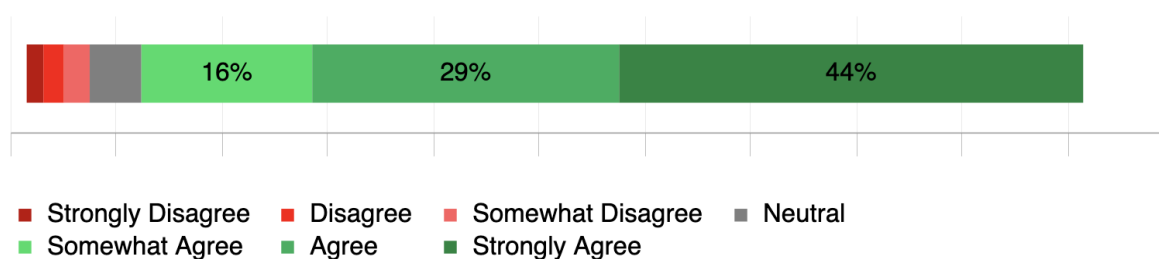


Figure 257: European and North American States - 'Research and innovation should address societal needs.'

This agreement translated into practical action for the majority who confirmed taking practical steps ensuring their work addressed societal needs ( $n = 875$ , 62%) (Figure 258)<sup>1413</sup>. This accounted for 71% of respondents who agreed it was important. A minority stated they had not taken any steps ( $n = 134$ , 9%).

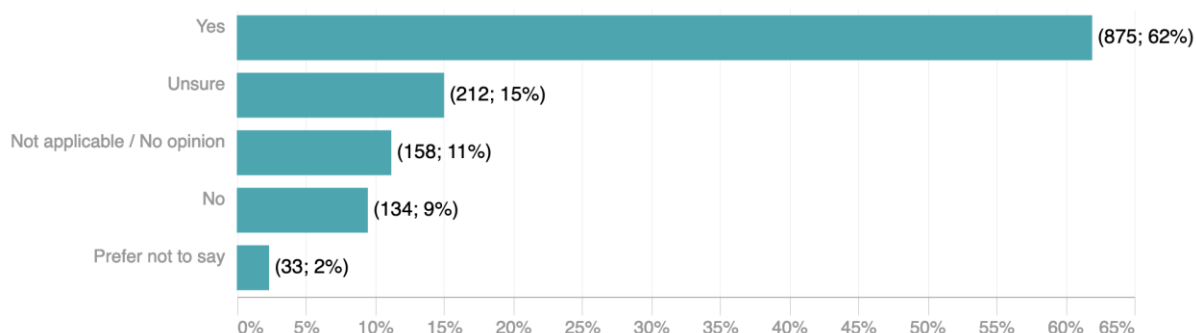


Figure 258: European and North American States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.

### 3.9.3.4.2 Regulatory Frameworks Relevant to Social Responsibility

Aside from 'Not applicable / No Opinion' responses, respondents indicated their work was 'Sometimes' ( $n = 166$ , 15%) guided by regulatory frameworks covering relevant aspects of social responsibility (Figure 259)<sup>1414</sup>. This was closely followed by 'Rarely' ( $n = 162$ , 15%), then 'Usually' ( $n = 158$ , 14%), 'Always' ( $n = 131$ , 12%), 'Frequently' ( $n = 120$ , 11%), 'Occasionally' ( $n = 87$ , 8%) and 'Never' ( $n = 65$ , 6%).

<sup>1413</sup> The total number of responses:  $N = 1412$

<sup>1414</sup> The total number of responses:  $N = 1094$

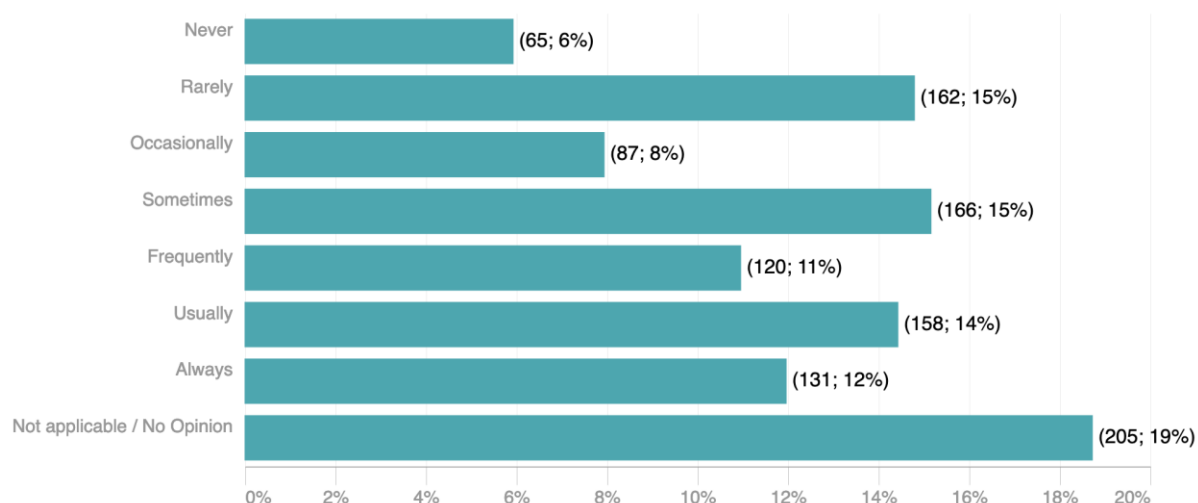


Figure 259: European and North American States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.

### 3.9.3.4.3 Crosscutting Findings

Overall, there were positive attitudes towards all RRI dimensions. Disagreement with open data was slightly higher, and a considerable portion of respondents explicitly indicated they had not taken any steps to ensure accessibility. For all other questions regarding application of the attitudinal measures, most participants indicated that steps had been taken.

Within each RRI dimension, there were considerable discrepancies between supportive attitudes and their translation into action.

## 3.9.4 RESULTS BY STAKEHOLDER CATEGORIES

### 3.9.4.1 STAKEHOLDER CATEGORY 1 – RESEARCH PERFORMING ORGANISATIONS / ACADEMICS / RESEARCHERS

Respondents indicated a substantial level of engagement with this category compared to others ( $Mdn = 12$  h/w) (Figure 260)<sup>1415</sup>. This was also by far the stakeholder type most engaged with for over ten hours in the last seven days ( $n = 599$ , 47%).

<sup>1415</sup> The total number of responses:  $N = 1187$

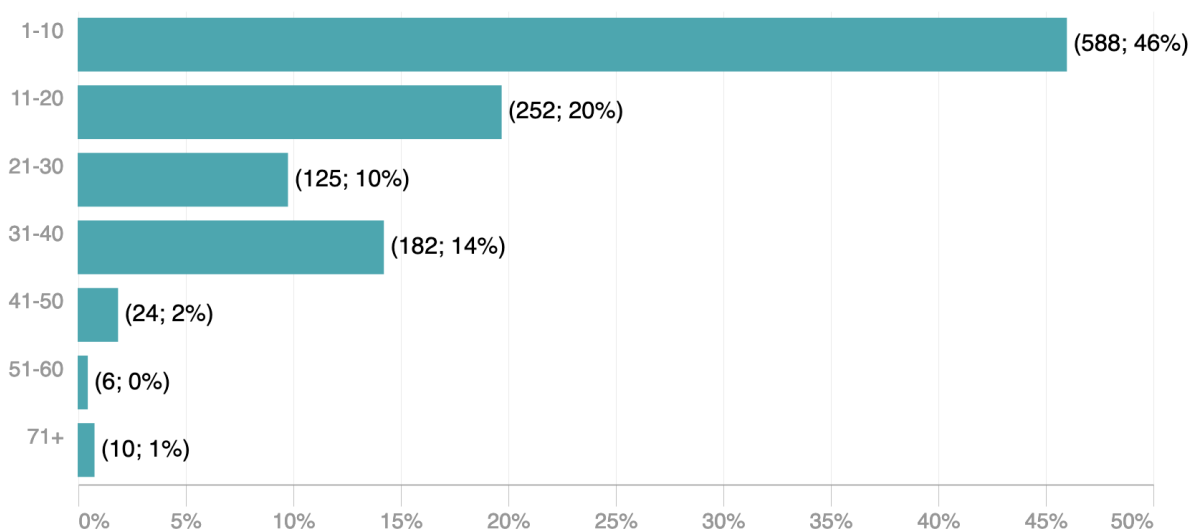


Figure 260: European and North American States - Hours interacting with research performing organisations/academics/researchers in the last 7 days.

### 3.9.4.2 STAKEHOLDER CATEGORY 2 – RESEARCH FUNDING ORGANISATIONS

On average, engagement with RFOs was among the lowest among all categories ( $Mdn = 3$  h/w) (Figure 261)<sup>1416</sup>. A handful of respondents ( $n = 48$ , 4%) indicated higher levels of interaction (i.e. over 10 hours in the last week).

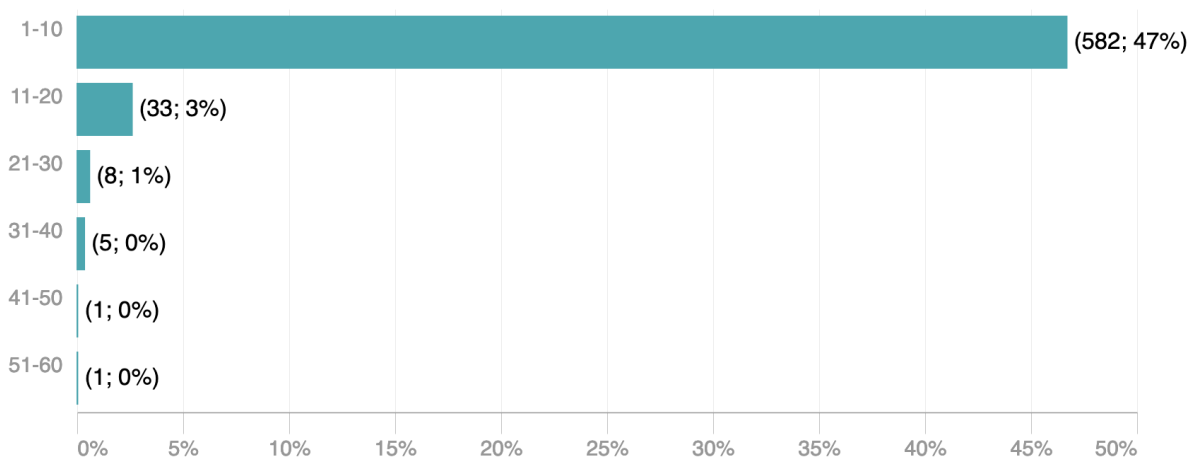


Figure 261: European and North American States - Hours interacting with research funding organisations in the last 7 days.

<sup>1416</sup> The total number of responses:  $N = 630$

### 3.9.4.3 STAKEHOLDER CATEGORY 3 – INDUSTRY / SMALL- AND MEDIUM-SIZED ENTERPRISES

Respondents tended to spend only a small amount of time interacting with this category ( $Mdn = 4$  h/w) (Figure 262)<sup>1417</sup>. Only a few respondents ( $n = 88$ , 3%) indicated a higher level of engagement (i.e. over 10 hours in the last week), and only three respondent ( $n = 3$ , < 1%) indicated a high level of interaction (i.e. over 40 hours in the last week).

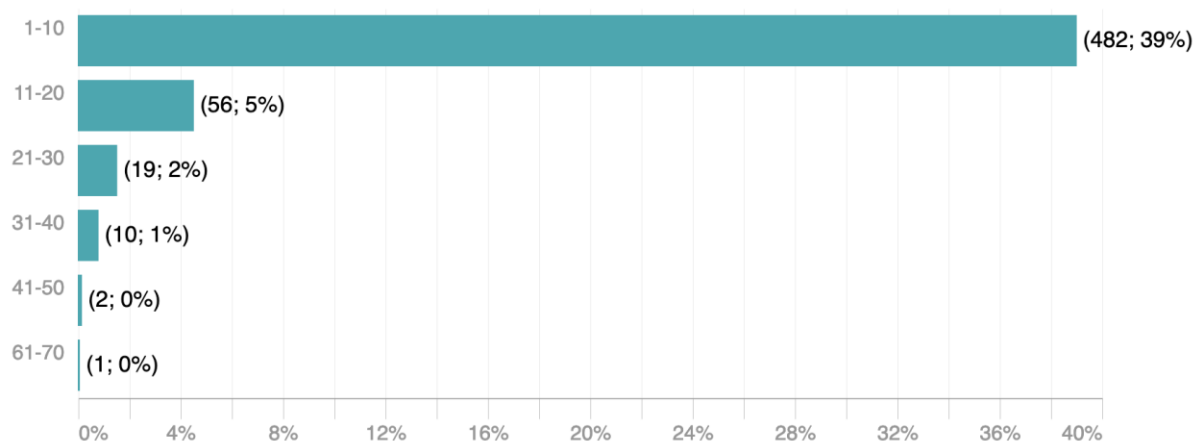
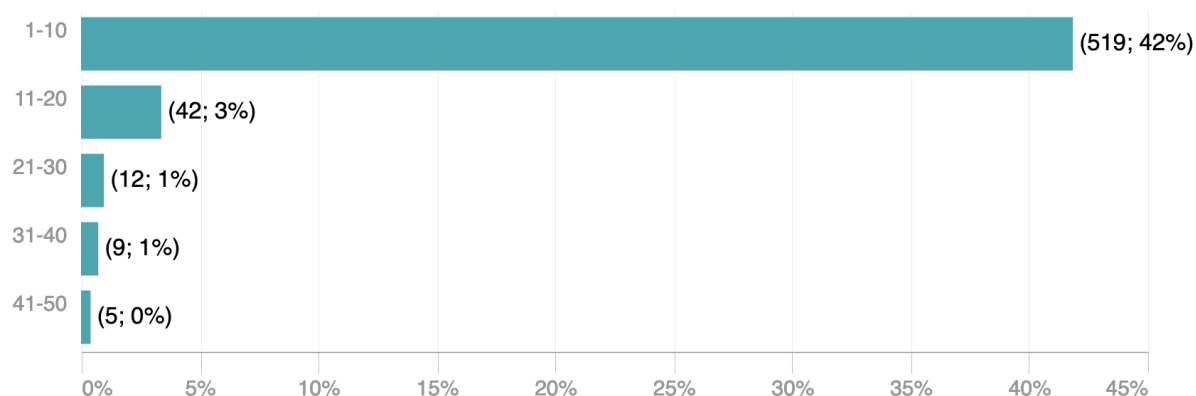


Figure 262: European and North American States - Hours interacting with industry/small- and medium-sized enterprise in the last 7 days.

### 3.9.4.4 STAKEHOLDER CATEGORY 4 – CIVIL SOCIETY / CITIZENS

Concerning the category ‘civil society / citizens’, there was a similar level of engagement as industry / SMEs (Figure 264)<sup>1418</sup>. The most respondents ( $n = 519$ , 42%) spent little time engaging with this category ( $Mdn = 4$  h/w). A small proportion indicated higher levels of interaction time (i.e. more than 10 hours in the last week) ( $n = 68$ , 5%). Many respondents indicated engaging for less than ten hours in the last week ( $n = 519$ , 42%).



<sup>1417</sup> The total number of responses.  $N = 551$

<sup>1418</sup> The total number of responses:  $N = 587$

Figure 263: European and North American States - Hours interacting with civil society/citizens in the last 7 days.

### 3.9.4.5 STAKEHOLDER CATEGORY 5 – POLICY MAKERS

Policy makers was the stakeholder category with which respondents tended to engage the least ( $Mdn = 3$  h/w) (Figure 264)<sup>1419</sup>. When time was spent, many respondents ( $n = 443$ , 36%) indicated the least amount of time (i.e. between 1 and 10 hours in the last week). Few respondents had higher levels of engagement (i.e. more than 11 hours) ( $n = 33$ , 3%).

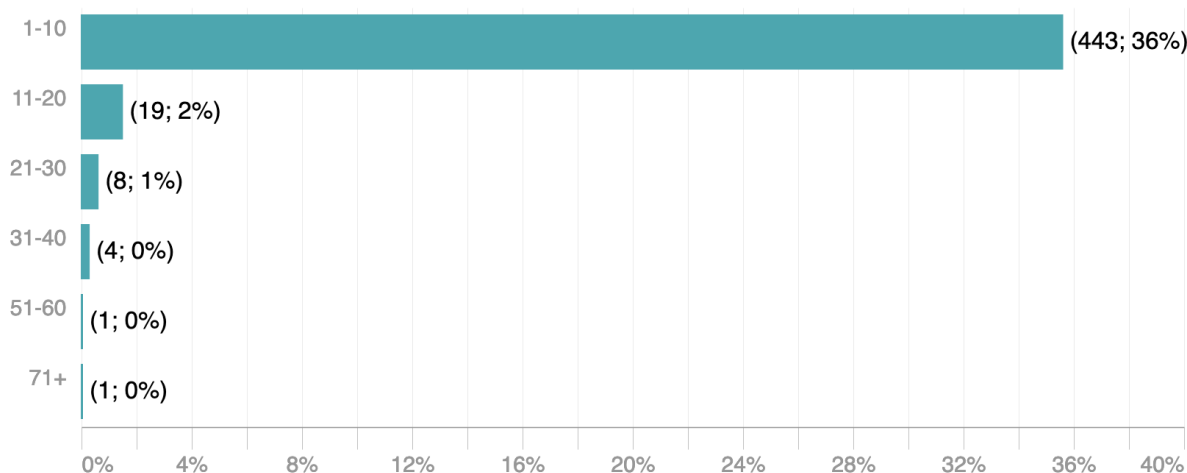


Figure 264: European and North American States - Hours interacting with policy makers in the last 7 days.

### 3.9.4.6 STAKEHOLDER CATEGORY 6 – NON-GOVERNMENTAL ORGANISATIONS

Engagement with this category tended to be low ( $Mdn = 3$  h/w) (Figure 265)<sup>1420</sup>. A small number of respondents ( $n = 27$ , 2%) indicated a higher level of engagement (i.e. more than 10 hours in the last week).

<sup>1419</sup> The total number of responses.  $N = 473$

<sup>1420</sup> The total number of responses:  $N = 103$

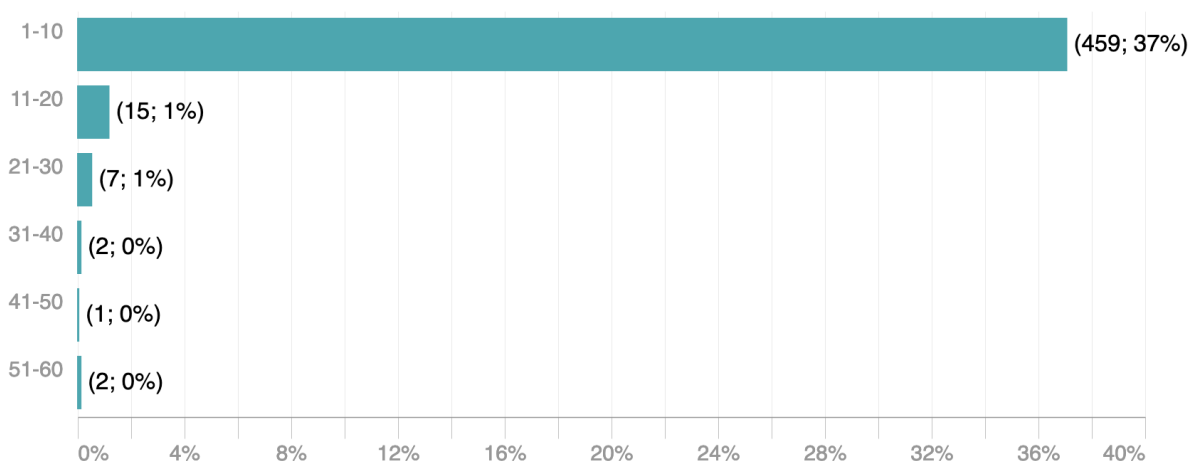


Figure 265: European and North American States - Hours interacting with NGOs/international organisations in the last 7 days.

### 3.9.4.7 OVERVIEW AND COMPARISON OF FINDINGS ACROSS STAKEHOLDER CATEGORIES

Participants engaged disproportionately more frequently with *RPOs*, *academics* and *researchers* ( $Mdn = 12$  h/w) (Figure 266)<sup>1421</sup>. Engagement with all other categories was low, as the median weekly interaction hours was between 3 and 4. Respondents interacted second most often with members of civil society and industry ( $Mdn = 4$  h/w, respectively).



Figure 266: European and North American States - Hours interacting with different stakeholders in the last 7 days (log scale).

<sup>1421</sup> The total number of responses:  $N = 190$

### 3.9.5 RESULTS SPECIFIC TO THE UN SUSTAINABLE DEVELOPMENT GOALS

This section explores respondents' level of exposure, attitudes towards, and detailed perspectives about the UN SDGs.

The majority of respondents indicated they are familiar with the UN SDGs ( $n = 163$ , 86%) (Figure 267)<sup>1422</sup>. Respondents expressed being '*Moderately Familiar*' ( $n = 368$ , 28%), with less reporting a slight familiarity ( $n = 158$ , 12%). More respondents indicated being '*Somewhat Familiar*' ( $n = 229$ , 18%) and fewer said they were '*Extremely Familiar*' ( $n = 215$ , 16%). A considerable proportion was '*Not at all Familiar*' ( $n = 337$ , 26%).

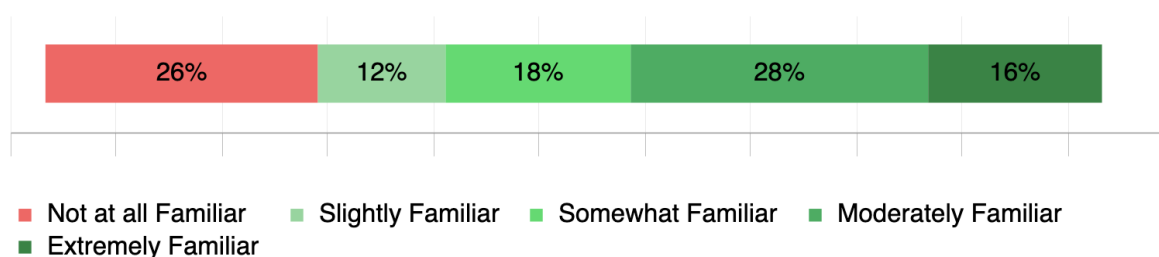


Figure 267: European and North American States - Participants' familiarity with the UN SDGs.

The majority of respondents ( $n = 132$ , 81%) heard or read about the UN SDGs in the last month (Figure 268)<sup>1423</sup>. Among the frequencies above '*Not at all*' ( $n = 223$ , 24%), '*2-3 times*' ( $n = 216$ , 22%) represented the largest group, followed by '*Once*' ( $n = 161$ , 17%), '*Once per week*' ( $n = 121$ , 13%), '*2-3 times a week*' ( $n = 81$ , 8%), '*Daily*' ( $n = 61$ , 6%), '*4-6 times per week*' ( $n = 52$ , 5%) and '*Unsure*' ( $n = 42$ , 4%).

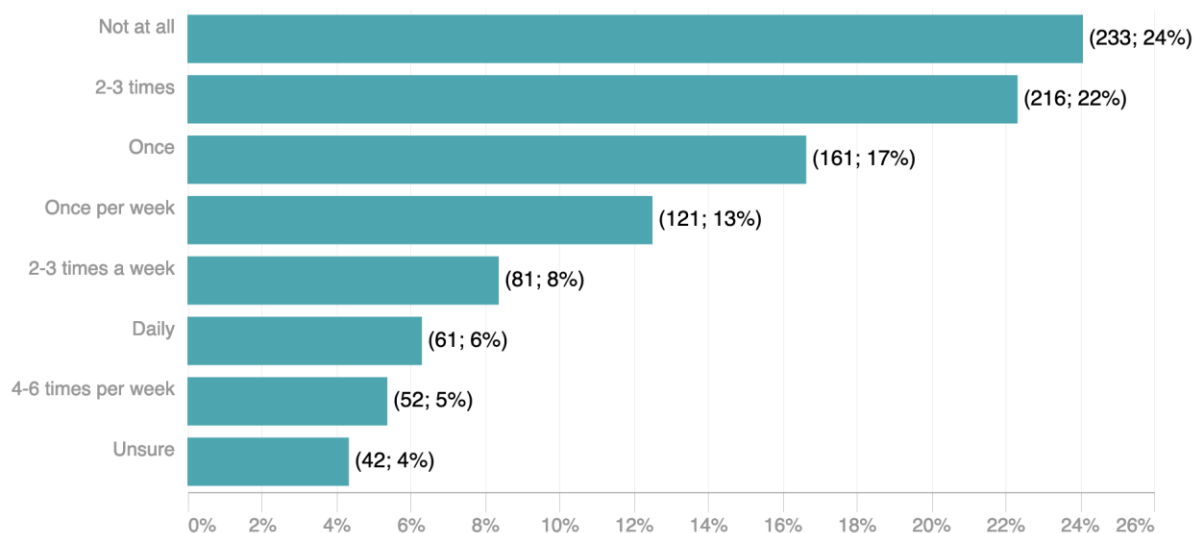


Figure 268: European and North American States - Heard or read about the UN Sustainable Development Goals in the last 30 days.

<sup>1422</sup> The total number of responses:  $N = 1307$

<sup>1423</sup> The total number of responses:  $N = 957$

The majority of respondents ( $n = 742$ ) thought about the UN SDGs in the last month (Figure 269)<sup>1424</sup>. Among the frequencies above 'Not at all' ( $n = 226$ , 23%), '2-3 times' ( $n = 215$ , 22%) represented the largest group, followed by 'Once' ( $n = 137$ , 14%), 'Once per week' ( $n = 107$ , 11%), '2-3 times a week' ( $n = 95$ , 10%), 'Daily' ( $n = 84$ , 9%), '4-6 times per week' ( $n = 53$ , 5%) and 'Unsure' ( $n = 51$ , 5%).

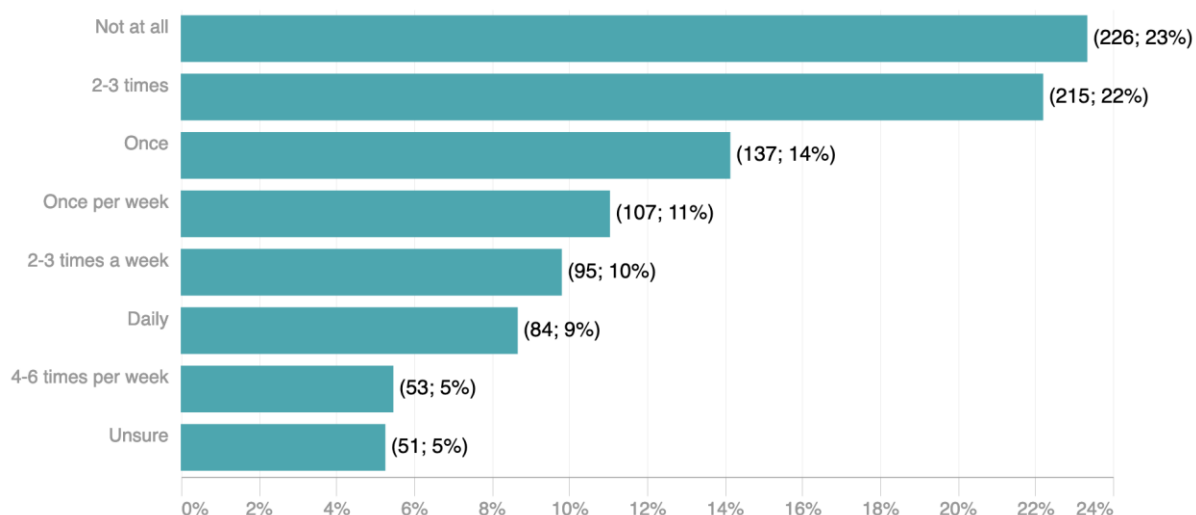


Figure 269: European and North American States - Thought about the UN Sustainable Development Goals in the last 30 days.

Respondents held mostly positive attitudes about the UN SDGs (Figure 270). Respondents most frequently perceived them as 'Important' ( $n = 868$ , 90%)<sup>1425</sup>, 'Useful' ( $n = 853$ , 89%)<sup>1426</sup>, 'Valuable' ( $n = 848$ , 88%)<sup>1427</sup>, 'Beneficial' ( $n = 844$ , 88%)<sup>1428</sup>, 'Relevant' ( $n = 841$ , 88%)<sup>1429</sup>, 'Essential' ( $n = 837$ , 87%)<sup>1430</sup>. However, some respondents perceived the UN SDGs as 'Irrelevant' ( $n = 56$ , 6%), and 'Unimportant' ( $n = 47$ , 5%).

<sup>1424</sup> The total number of responses:  $N = 968$

<sup>1425</sup> The total number of responses:  $N = 963$

<sup>1426</sup> The total number of responses:  $N = 961$

<sup>1427</sup> The total number of responses:  $N = 962$

<sup>1428</sup> The total number of responses:  $N = 962$

<sup>1429</sup> The total number of responses:  $N = 957$

<sup>1430</sup> The total number of responses:  $N = 959$

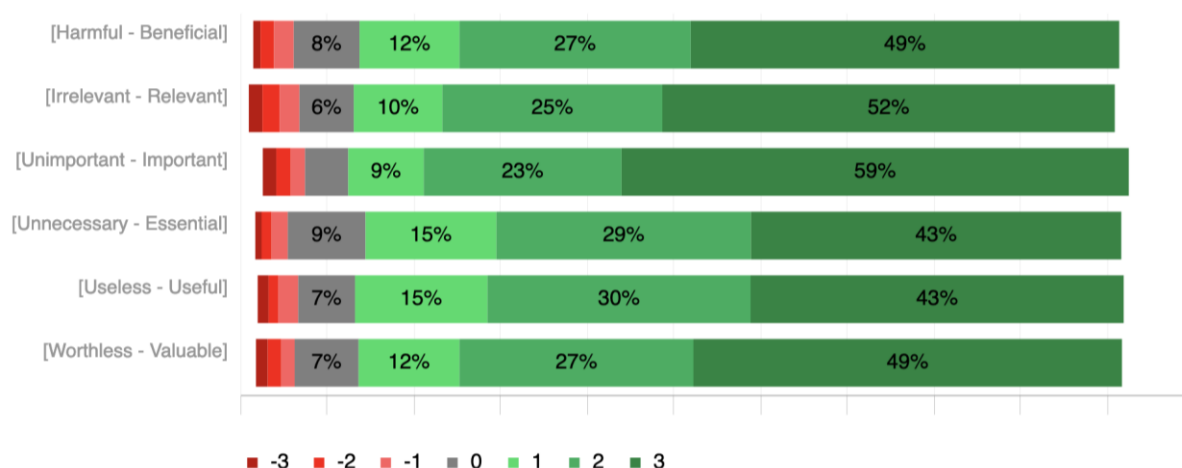


Figure 270: European and North American States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

Similarly, respondents held mostly positive attitudes about the UN SDGs related to their work (Figure 271). Respondents most frequently perceived the UN SDGs as ‘*Relevant*’ ( $n = 729$ , 76%)<sup>1431</sup>, ‘*Important*’ ( $n = 722$ , 76%)<sup>1432</sup>, ‘*Beneficial*’ ( $n = 700$ , 73%)<sup>1433</sup>, ‘*Valuable*’ ( $n = 697$ , 73%)<sup>1434</sup>, ‘*Useful*’ ( $n = 696$ , 73%)<sup>1435</sup>, and ‘*Essential*’ ( $n = 635$ , 66%)<sup>1436</sup>. However, some respondents perceived the UN SDGs as ‘*Irrelevant*’ ( $n = 88$ , 9%).

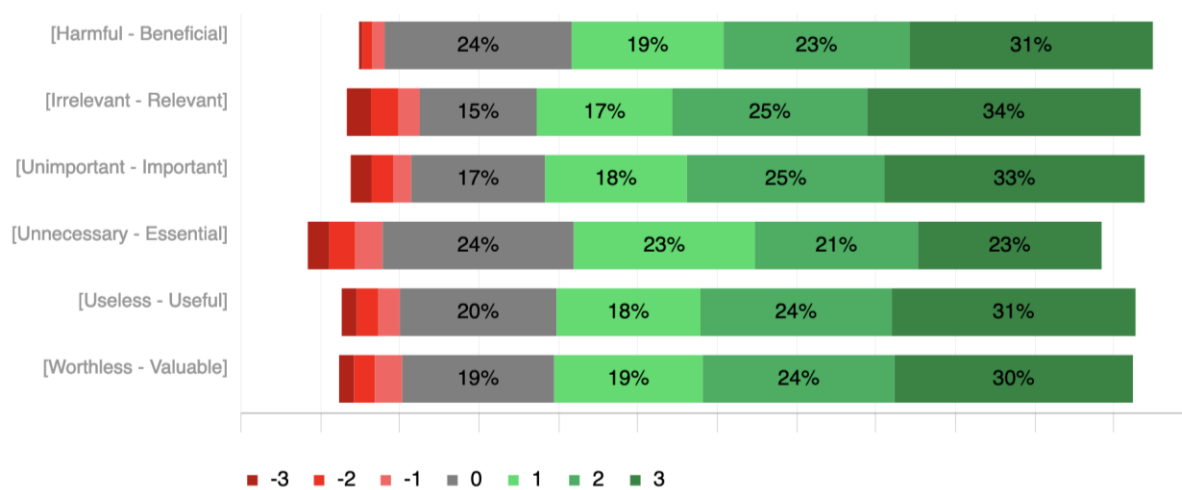


Figure 271: European and North American States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

Most respondents held positive perceptions on the UN SDGs (Figure 272). Most agreed with the statement ‘*The UN Sustainable Development Goals should be a priority for my professional*

<sup>1431</sup> The total number of responses:  $N = 958$

<sup>1432</sup> The total number of responses:  $N = 955$

<sup>1433</sup> The total number of responses:  $N = 956$

<sup>1434</sup> The total number of responses:  $N = 956$

<sup>1435</sup> The total number of responses:  $N = 954$

<sup>1436</sup> The total number of responses:  $N = 955$

*field.*’ ( $n = 678, 74\%$ )<sup>1437</sup>, followed by *‘The UN Sustainable Development Goals are a priority for me.’* ( $n = 571, 63\%$ )<sup>1438</sup>. Results were varied but still positive for *‘I follow stories in the news about the UN Sustainable Development Goals.’* ( $n = 498, 54\%$ )<sup>1439</sup> and *‘The UN Sustainable Development Goals represent legally binding international treaties to protect the environment.’* ( $n = 400, 47\%$ )<sup>1440</sup>, although they are not actually legally binding. A large portion disagreed with the statement *‘The UN Sustainable Development Goals are focussed only on long-term financial development.’* ( $n = 505, 59\%$ )<sup>1441</sup>.

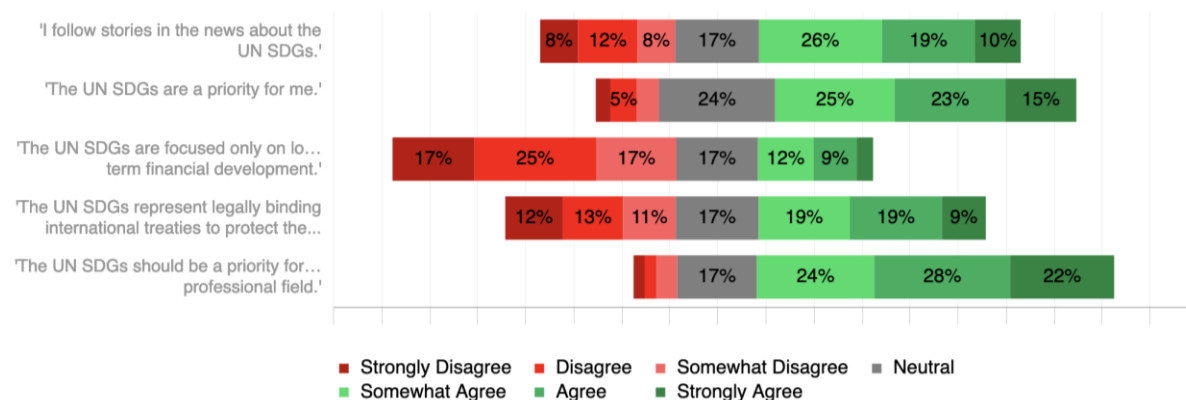


Figure 272: European and North American States - Detailed perspective on UN SDGs.

### 3.9.6 OPEN-ENDED CONTENT ANALYSIS RESULTS

This section sets out results of the content analysis conducted on the qualitative data obtained through the RRING Research and Innovation Global Survey.

#### 3.9.6.1 DIVERSE PERSPECTIVES

This section explored the range of responses given to the question *‘Please list the steps you have taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning your research and innovation work.’*

A moderate portion of respondents indicated they had reached out to diverse stakeholders ( $n = 145, 22\%$ ), with more indicating this engagement in a *‘general’* way ( $n = 120, 18\%$ ). Few respondents specified the steps they had taken ( $n = 24, 4\%$ ) (Figure 273)<sup>1442</sup>. Respondents referred to having engaged industry and businesses ( $n = 45, 7\%$ ) most commonly. Civil society organisations (CSOs) and policymakers were mentioned less often ( $n = 31, 5\%$ ). This category

<sup>1437</sup> The total number of responses:  $N = 912$

<sup>1438</sup> The total number of responses:  $N = 911$

<sup>1439</sup> The total number of responses:  $N = 914$

<sup>1440</sup> The total number of responses:  $N = 845$

<sup>1441</sup> The total number of responses:  $N = 855$

<sup>1442</sup> The total number of responses:  $N = 1029$

included entities separated either from the state or the market that have a declared social mandate, such as NGOs.

A large proportion of respondents indicated *‘In-reach to other disciplines, researchers, academics, experts or students’* ( $n = 245$ , 37%), which meant respondents included diverse perspectives from within their academic or professional environment. Another notable proportion indicated involvement in *‘Meetings, workshops, focus groups and ‘Consultations’* ( $n = 168$ , 25%).

A small number of respondents indicated taking *‘Steps for building collaboration/teams/consortia with no connection to diversity per se’* ( $n = 77$ , 12%), or referred to *‘General dissemination/broadcasting/dissemination of information about the research/innovation work’* ( $n = 45$ , 7%). This category was assigned when respondents indicated one-way dissemination, rather than including external views.

A notable proportion of respondents ( $n = 144$ , 22%) gave *‘Non-specific, vague, platitudes or virtue signalling response[s]’*.

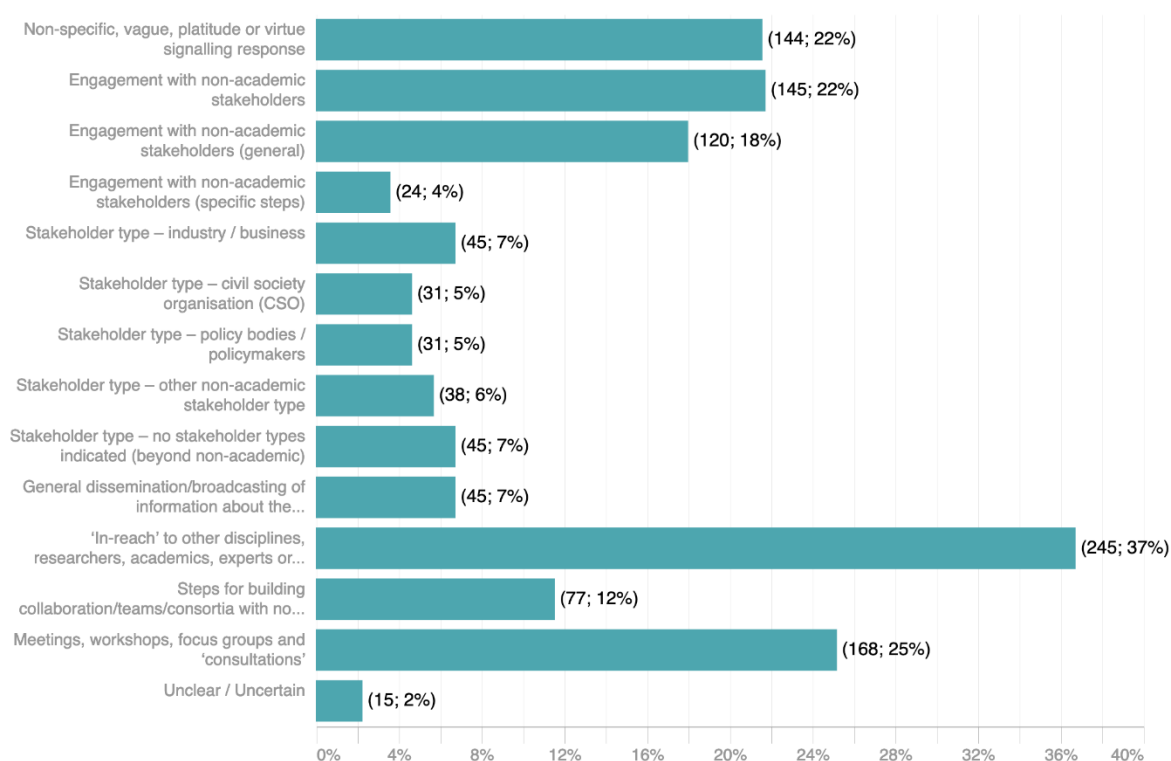


Figure 273: European and North American States - Steps taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning research and innovation work.

### 3.9.6.2 GENDER EQUALITY

This section explored the range of responses given to the question *‘Please list the steps you have taken to promote gender equality in your research and innovation work.’*

A majority of respondents ( $n = 383$ , 83%) indicated they had promoted gender equality. More respondents referred to taking ‘specific steps’ ( $n = 255$ , 55%), over a smaller proportion promoting gender equality in a ‘general’ way ( $n = 127$ , 27%) (Figure 274)<sup>1443</sup>.

The most common steps were ‘Fostering gender equality in research/innovation teams/workforce’ ( $n = 110$ , 24%), ‘Integrating gender as a substantive dimension/focus of R&I content/practice’ ( $n = 70$ , 15%), and ‘Ensuring gender equality in process of recruitment and selection of R&I staff’ ( $n = 49$ , 11%). Few respondents indicated ‘Participation in or engagement with equality committees’ ( $n = 14$ , 3%), ‘Compliance with rules, regulations and legal obligations’ ( $n = 12$ , %), or ‘Supporting female researchers’ publications, co-authorship, academic citations’ ( $n = 11$ , 2%). Many respondents indicated steps that could not be easily categorised ( $n = 137$ , 30%).

A moderate proportion of respondents gave a ‘Non-specific, vague, platitude or virtue signalling response’ ( $n = 73$ , 16%). This indicated they had promoted or supported gender equality without mentioning the steps they had taken.

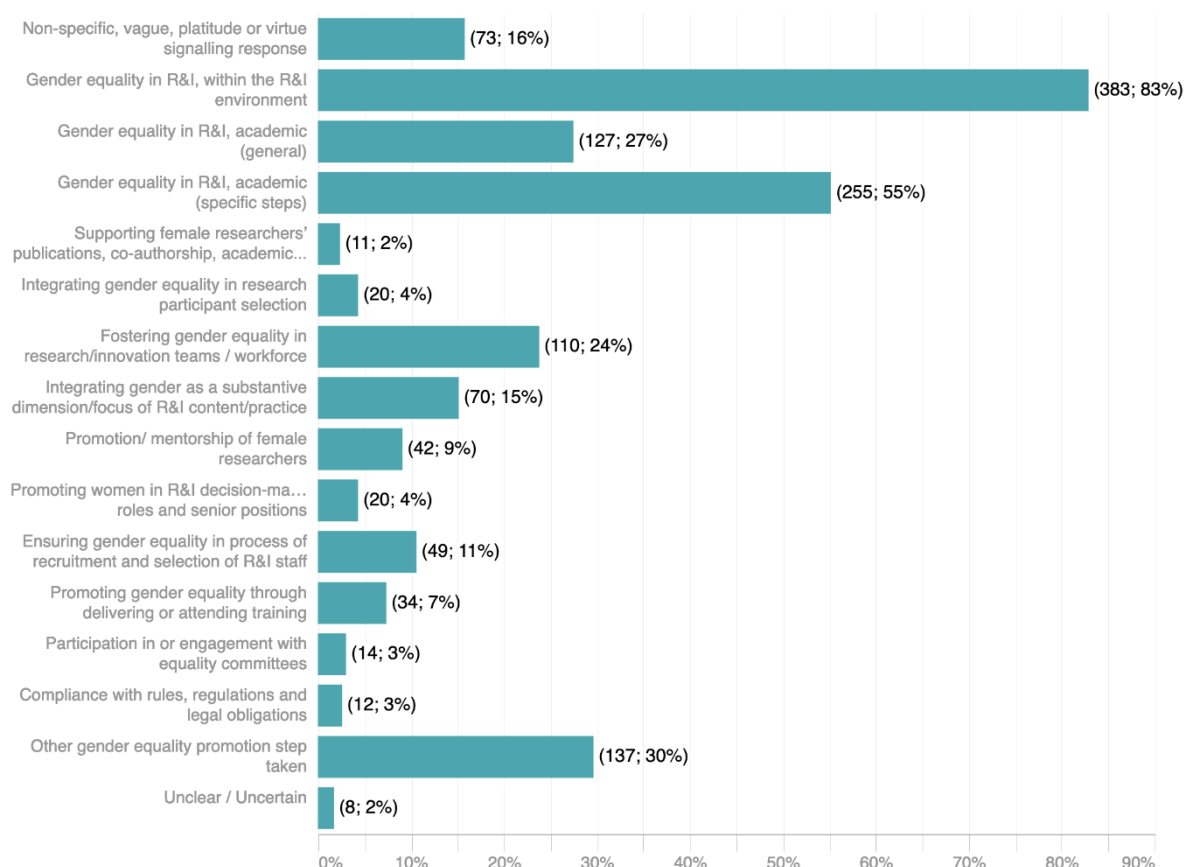


Figure 274: European and North American States - Steps taken to promote gender equality in research and innovation work.

<sup>1443</sup> The total number of responses:  $N = 1365$

### 3.9.6.3 ETHNIC MINORITIES

This section explored the range of responses given to the question *‘Please list the steps you have taken to include ethnic minorities in your research and innovation work.’*

The majority of respondents ( $n = 206$ , 77%) indicated they had promoted diversity of ethnic minorities, with more indicating *‘general’* views ( $n = 116$ , 43%), over *‘specific steps’* ( $n = 92$ , 34%) (Figure 275)<sup>1444</sup>. The most common steps were *‘Fostering racial/ethnic equality in research/innovation teams/workforce’* ( $n = 46$ , 17%), *‘Integrating race/ethnicity as a substantive dimension/focus of R&I content/practice’* ( $n = 41$ , 15%), *‘Ensuring racial/ethnic equality in process of recruitment and selection of R&I staff’* ( $n = 36$ , 13%), and *‘Integrating racial/ethnic equality in research participant selection’* ( $n = 36$ , 13%). A moderate proportion indicated *‘Other racial/ethnic equality promotion step[s] taken’* ( $n = 35$ , 13%), while few indicated *‘Downplaying, minimising and excusing ethnic diversity issues in R&I’* ( $n = 18$ , 17%).

A minority ( $n = 51$ , 19%) provided *‘Non-specific, vague, platitude or virtue signalling response[s]’*, indicating they supported equality of ethnic minorities without listing practical steps.

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<sup>1444</sup> The total number of responses:  $N = 733$

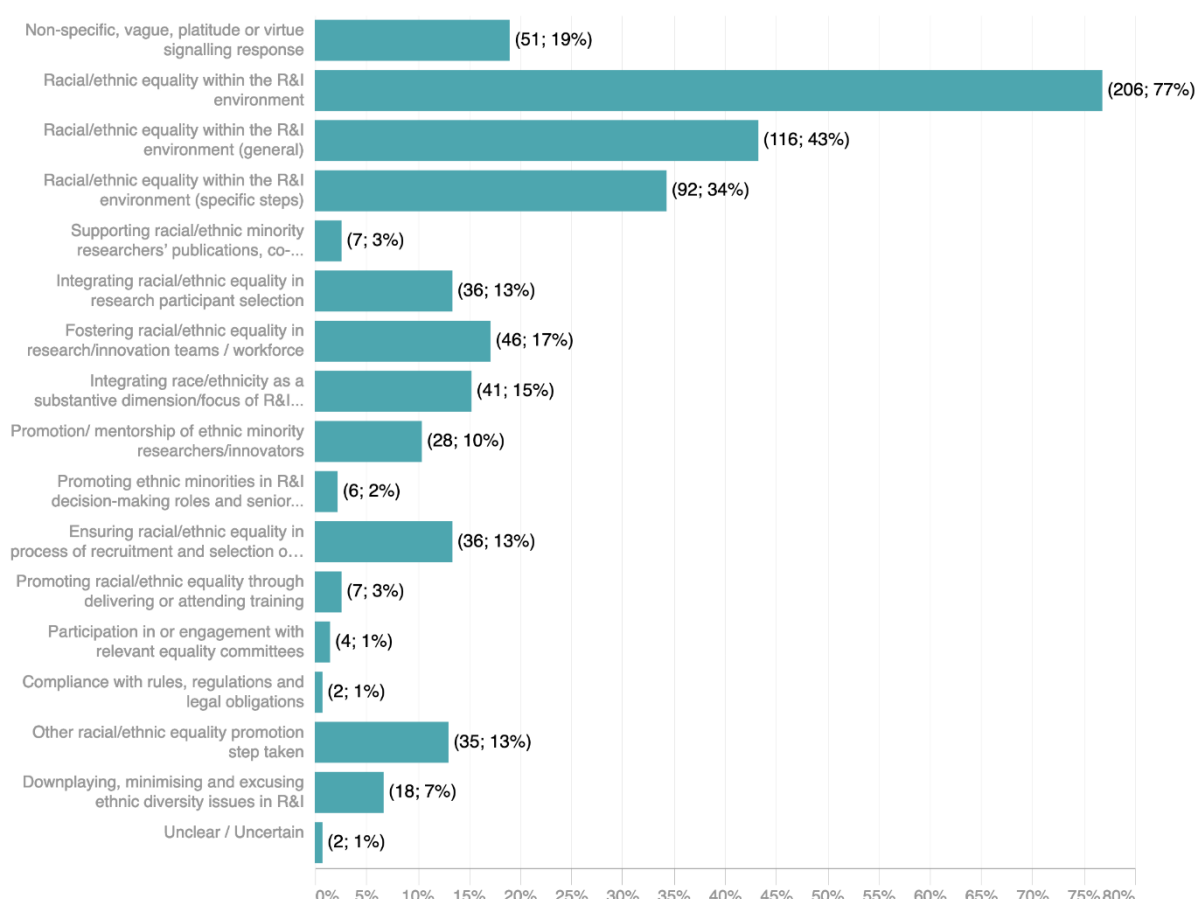


Figure 275: European and North American States - Steps taken to include ethnic minorities in research and innovation work.

### 3.9.6.4 ETHICS OF RESEARCH

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to ensure ethical principles guide your research and innovation work?*’.

Many respondents ( $n = 426$ , 77%) indicated they ‘*Integrat[ed] ethics in [their] R&I work*’, although most provided ‘*general*’ responses ( $n = 298$ , 54%) rather than ‘*specific steps*’ ( $n = 130$ , 23%) (Figure 276)<sup>1445</sup>.

The most common ways respondents ensured ethical working practices were through ‘*Participation in or engagement with ethics committees*’ ( $n = 156$ , 28%) and ‘*Compliance with rules, regulations, and legal obligations*’ ( $n = 128$ , 23%). This indicated respondents either contributed to or sought advice from ethical committees, while complying with internal rules and legal obligations. Less common steps were ‘*Ensuring participant anonymisation or confidentiality*’ ( $n = 26$ , 5%), and ‘*Ensuring informed consent with participants*’ ( $n = 23$ , 4%),

<sup>1445</sup> The total number of responses:  $N = 1523$

while the least common steps were ‘*Reporting of unethical conduct*’ ( $n = 5$ , 1%) and ‘*Integrating ethics through participatory methods*’ ( $n = 4$ , 1%).

A considerable proportion of respondents ( $n = 124$ , 22%) indicated a commitment to ethical principles but did not mention any steps, providing a ‘*Non-specific, vague, platitude or virtue signalling response*’.

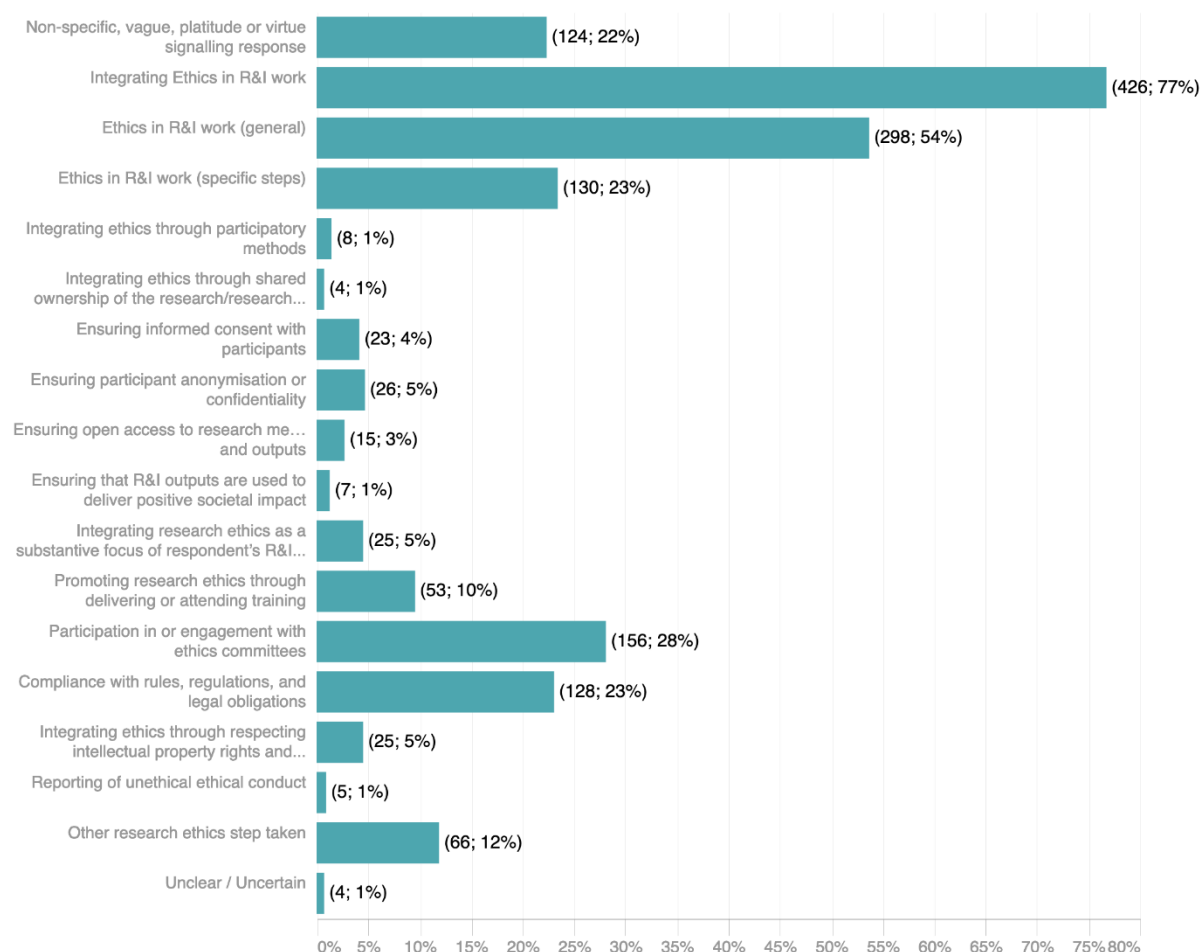


Figure 276: European and North American States - Steps taken to ensure that ethical principles guide research and innovation work.

### 3.9.6.5 TRANSPARENCY

This section explored the range of responses given to the question ‘*What steps have you taken to ensure your research and innovation methods/processes are open and transparent?*’.

A large proportion of respondents indicated they carried out ‘*One way dissemination with no reference to research methods/processes*’ ( $n = 375$ , 52%) without specifying how they ensured transparency (Figure 277)<sup>1446</sup>. A similar portion of respondents ( $n = 389$ , 54%) indicated having taken ‘*Pathways to open and transparent R&I methods and outputs*’. Fewer respondents

<sup>1446</sup> The total number of responses:  $N = 1879$

provided ‘*general*’ steps ( $n = 145$ , 20%), in comparison with those who indicated having taken ‘*specific steps*’ ( $n = 252$ , 35%).

In terms of practical steps, most ‘*Document[ed]/report[ed] research and decision-making processes*’ ( $n = 197$ , 27%) in at least a semi-public form that allowed for scrutiny of methods and decision-making. Another common step was ‘*Disclosing research data, raw data, codes, and statistics*’ ( $n = 109$ , 15%), which ensured their research data was publicly available. Many specified having used ‘*Open access publication[s]*’ ( $n = 154$ , 21%), while ‘*Participation in or engagement with relevant committees*’ ( $n = 13$ , 2%) was the least frequently taken step.

Few respondents provided answers coded as a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 72$ , 10%).

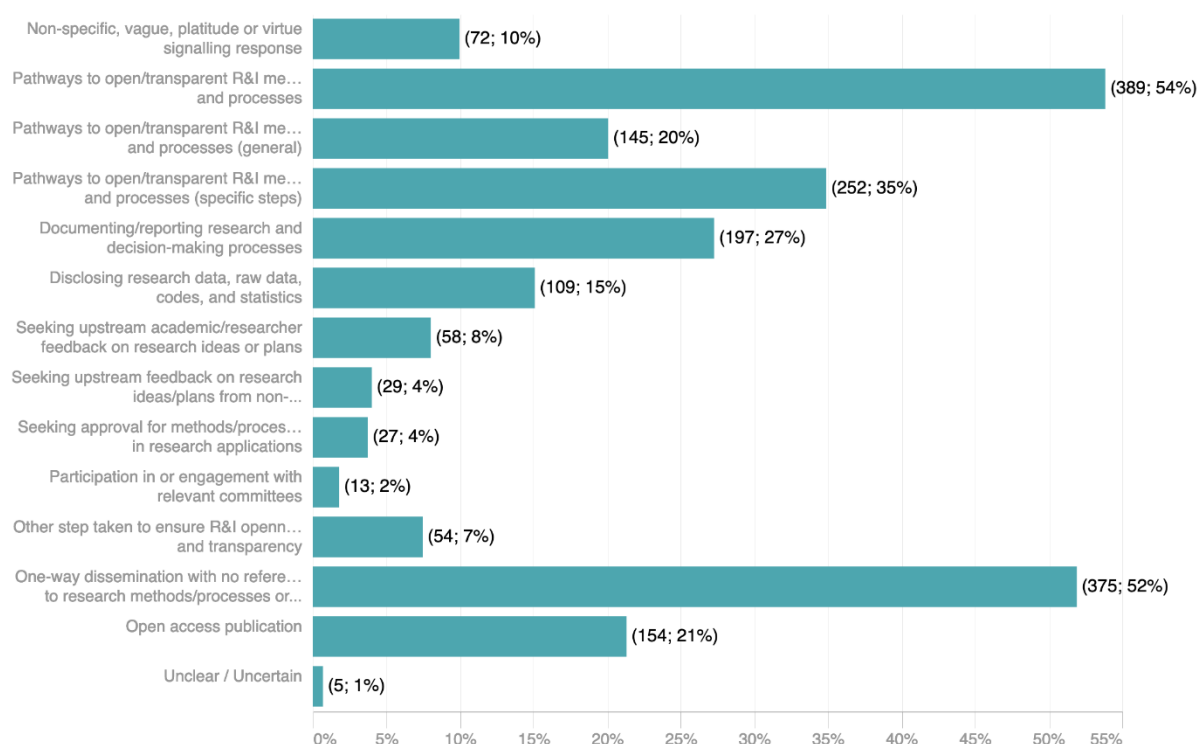


Figure 277: European and North American States - Steps taken to ensure research and innovation methods/processes are open and transparent.

### 3.9.6.6 PUBLIC ACCESSIBILITY

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to make the results of your research and innovation work accessible to as wide a public as possible?*’.

A considerable proportion of respondents described steps on ‘*Sharing R&I work within professional R&I stakeholder environments*’ ( $n = 307$ , 38%). This indicated they had not made their research results available to the general, non-academic public (Figure 278)<sup>1447</sup>.

However, most respondents ( $n = 583$ , 72%) indicated they had shared their findings with the public. More respondents ( $n = 558$ , 69%) reported taking ‘*specific steps*’ towards public accessibility of R&I results, compared to only a small proportion who referred to a ‘*general*’ compliance ( $n = 34$ , 4%).

The most common steps were ‘*Open access scholarly publishing*’ ( $n = 177$ , 22%), and ‘*Engaging with non-academic/public stakeholders through outreach activities after research is completed*’ ( $n = 163$ , 20%). This was followed by ‘*Personally publishing/disseminating R&I outputs to the public outside of scholarly publishing*’ ( $n = 151$ , 19%). The least common steps were ‘*Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research*’ ( $n = 15$ , 2%) and ‘*Efforts to facilitate public understanding of R&I results*’ ( $n = 49$ , 6%).

A few respondents provided answers which were coded as a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 56$ , 7%).

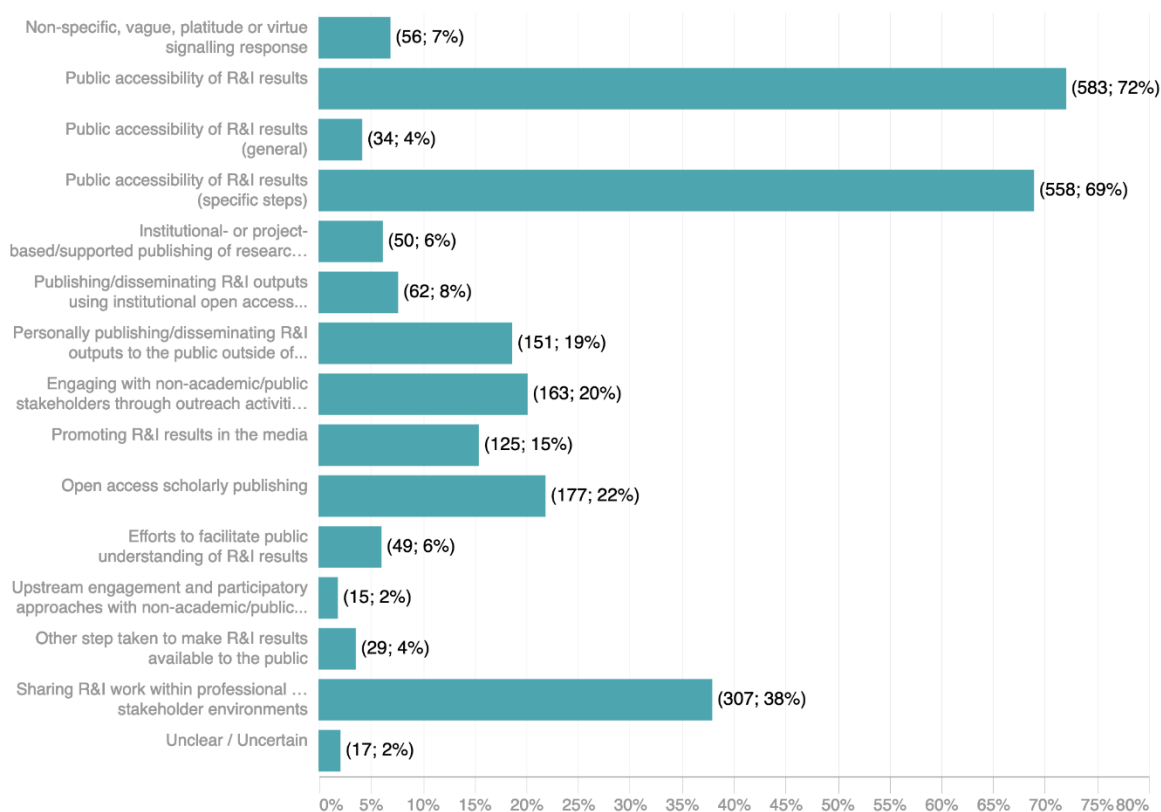


Figure 278: European and North American States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.

<sup>1447</sup> The total number of responses:  $N = 2376$

### 3.9.6.7 OPEN DATA

This section explored the range of responses given to the question *‘What steps, if any, have you taken to make the data from your research and innovation activities freely available to the public?’*.

Relative to the other categories, most respondents were *‘Confusing open access to research findings and open data’* in their responses ( $n = 274$ , 58%). They described making their research findings or outputs freely available, but not the data used to generate them (Figure 279)<sup>1448</sup>.

Few respondents indicated *‘Public availability of R&I data’* ( $n = 100$ , 21%). A higher proportion gave *‘general’* information ( $n = 52$ , 11%) as opposed to having listed *‘specific steps’* ( $n = 47$ , 10%). Most commonly, respondents indicated *‘Publishing research data to institutional/project websites’* ( $n = 3$ , 4%) and *‘Publishing data in public repositories’* ( $n = 44$ , 9%).

A considerable proportion of respondents ( $n = 85$ , 18%) gave a *‘Non-specific, vague, platitude or virtue signalling response’*. This applied to responses indicating respondents had made their data or generic *‘work’* freely available, without specifically indicating how.

Few respondents negated the necessity for open access. This was categorised as *‘Resisting/delimiting open data or supporting closed data’* ( $n = 33$ , 7%).

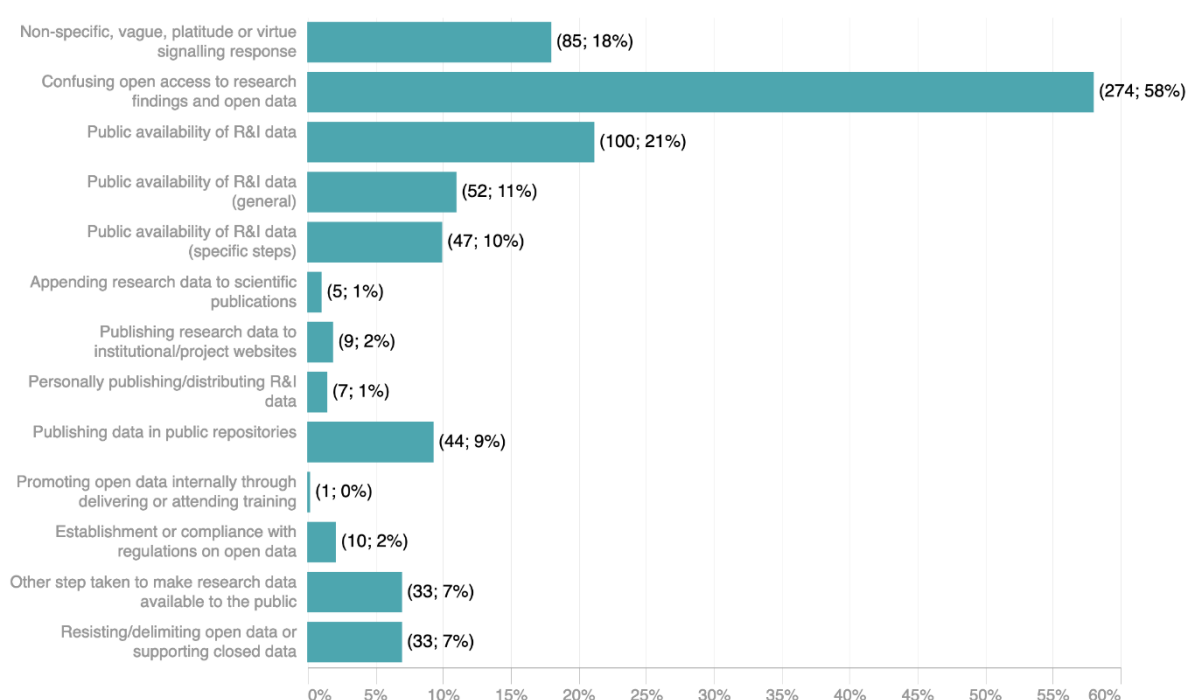


Figure 279: European and North American States - Steps taken to make the data from research and innovation activities freely available to the public.

<sup>1448</sup> The total number of responses:  $N = 700$

### 3.9.6.8 SOCIETAL NEEDS

This section explored the range of responses given to the question *‘What steps have you taken to ensure your research and innovation work addresses societal needs?’*.

A large proportion of respondents ( $n = 595$ , 90%) indicated they had taken steps toward *‘Addressing societal needs in R&I work’* (Figure 280)<sup>1449</sup>. More gave *‘general’* information ( $n = 333$ , 50%), as opposed to listing *‘specific steps’* ( $n = 266$ , 40%).

The most common specific step was *‘Selection of research topic/problem defined by researchers’ perceptions of societal needs’* ( $n = 287$ , 43%). Other steps were less common, such as *‘Societal issues as a substantive dimension in R&I content/focus’* ( $n = 112$ , 17%). Few respondents indicated their research design or methodological approach was informed by societal needs, which was coded as *‘Participatory process: research design/approach defined by societal needs’* ( $n = 35$ , 5%). The least common step was *‘Compliance with institutional/funding requirements’* ( $n = 16$ , 2%), indicating few respondents ensured their work addressed societal needs because of bureaucratic requirements.

Few respondents ( $n = 67$ , 10%) gave a *‘Non-specific, vague, platitude or virtue signalling response’*.

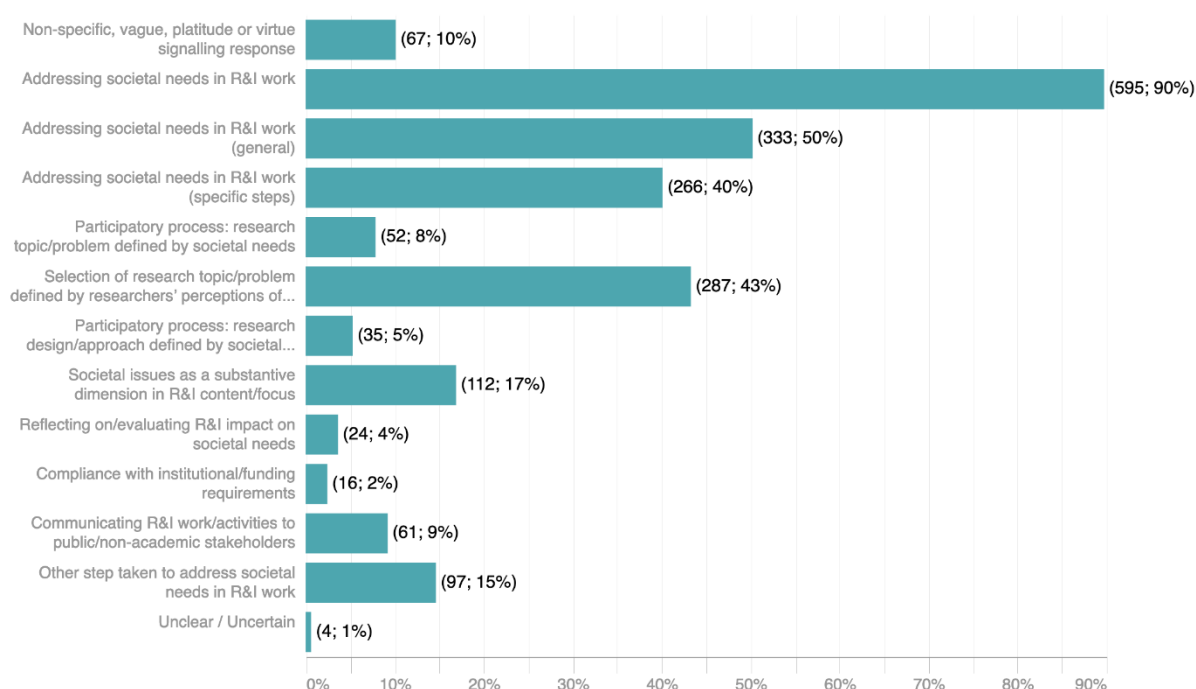


Figure 280: European and North American States - Steps taken to ensure research and innovation work addresses societal needs.

<sup>1449</sup> The total number of responses:  $N = 1949$

### 3.9.6.9 SOCIETAL CONCERNS

This section explored the range of responses given to the question *‘What steps, if any, have you taken to ensure that the way you do your work does not cause concerns for society?’*.

A large proportion of respondents ( $n = 351$ , 84%) indicated *‘Addressing societal concerns about implementation of R&I work’*, meaning they were taking measures to ensure their work did not cause concerns for society, or integrating societal views and perspectives (Figure 281)<sup>1450</sup>. More provided *‘general’* answers ( $n = 180$ , 43%), as opposed to listing *‘specific steps’* ( $n = 171$ , 41%). The most common practical steps included *‘Compliance with rules, regulations or legal obligations’* ( $n = 89$ , 21%) and *‘Participation in or engagement with relevant committees’* ( $n = 57$ , 14%). Smaller proportions of respondents indicated *‘Mitigating or preventing societal concerns through delivering or attending training’* ( $n = 15$ , 4%) and *‘Making the research directly responsive to societal concerns’* ( $n = 18$ , 4%).

A few respondents ( $n = 38$ , 9%) reported addressing societal concerns in a *‘Non-specific, vague, platitude or virtue signalling’* way.

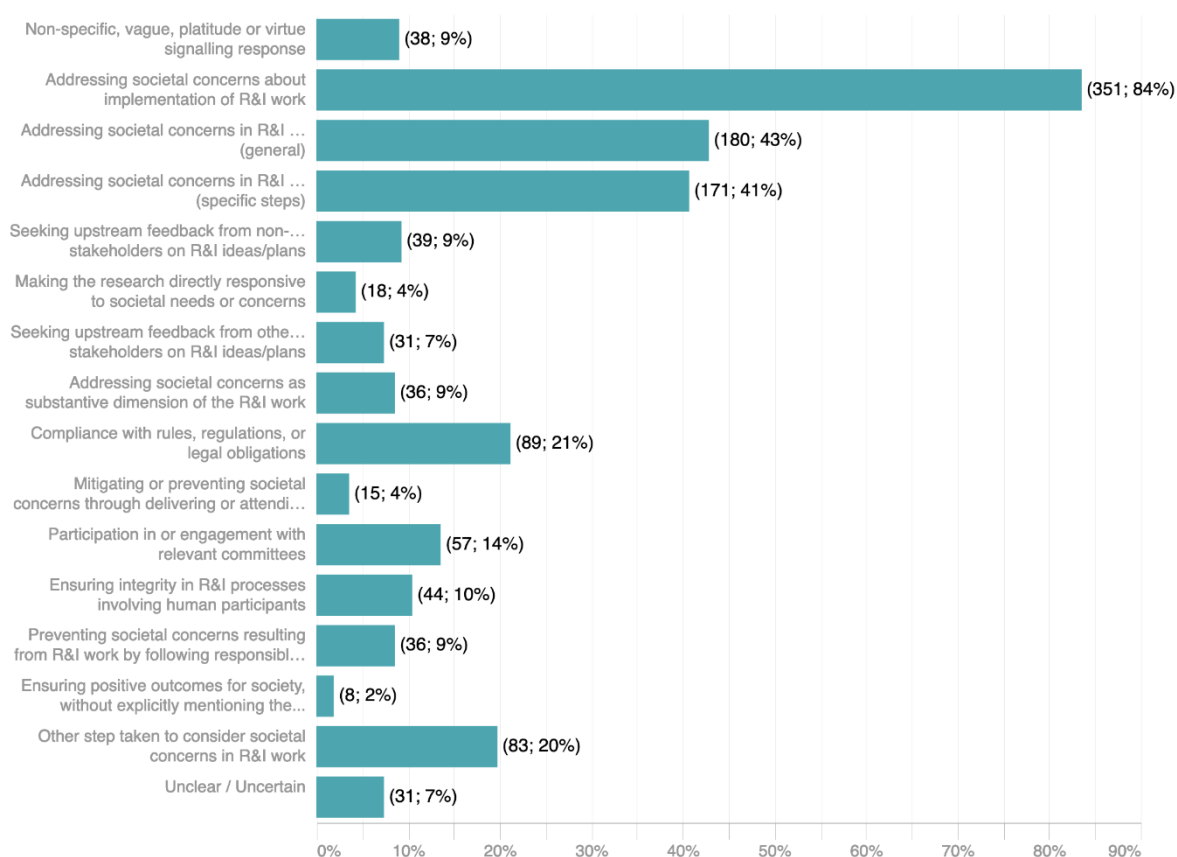


Figure 281: European and North American States - Steps taken to ensure that the way work is done does not cause concerns for society.

<sup>1450</sup> The total number of responses:  $N = 1227$

### 3.9.6.10 ASSOCIATIONS WITH RRI

This section explored the range of responses given to the question “*What comes to mind when you think of ‘responsible research and innovation’?*”.

The majority of respondents referred to ‘*Ideas, practices or policies associated with RRI*’ ( $n = 460, 61\%$ ) (Figure 282)<sup>1451</sup>. The most common associations with RRI were in a societal context. respondents associated it with ‘*Aligning research and innovation with societal benefits*’ ( $n = 178, 24\%$ ). This was applied to responses suggesting R&I needs to be socially relevant, create value for society, generate knowledge relevant to society, or contribute to a greater societal benefit. The next most common associations were ‘*Do no harm to people/society/participants with R&I*’ ( $n = 109, 14\%$ ), ‘*Protecting the environment, preventing negative impacts of research and innovation on the environment*’ ( $n = 69, 9\%$ ), and ‘*Ensuring ethical procedures and approvals are completed in R&I work*’ ( $n = 66, 9\%$ ).

A notable proportion gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 248, 33\%$ ). This applied to responses effectively repeating the term ‘*responsible research and innovation*’ in different ways. This was through use of abstract terms that were not linked to a sense of responsibility or generic mentions of research standards and societal issues without referring to ‘*responsibility*’ as such.

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<sup>1451</sup> The total number of responses:  $N = 1280$

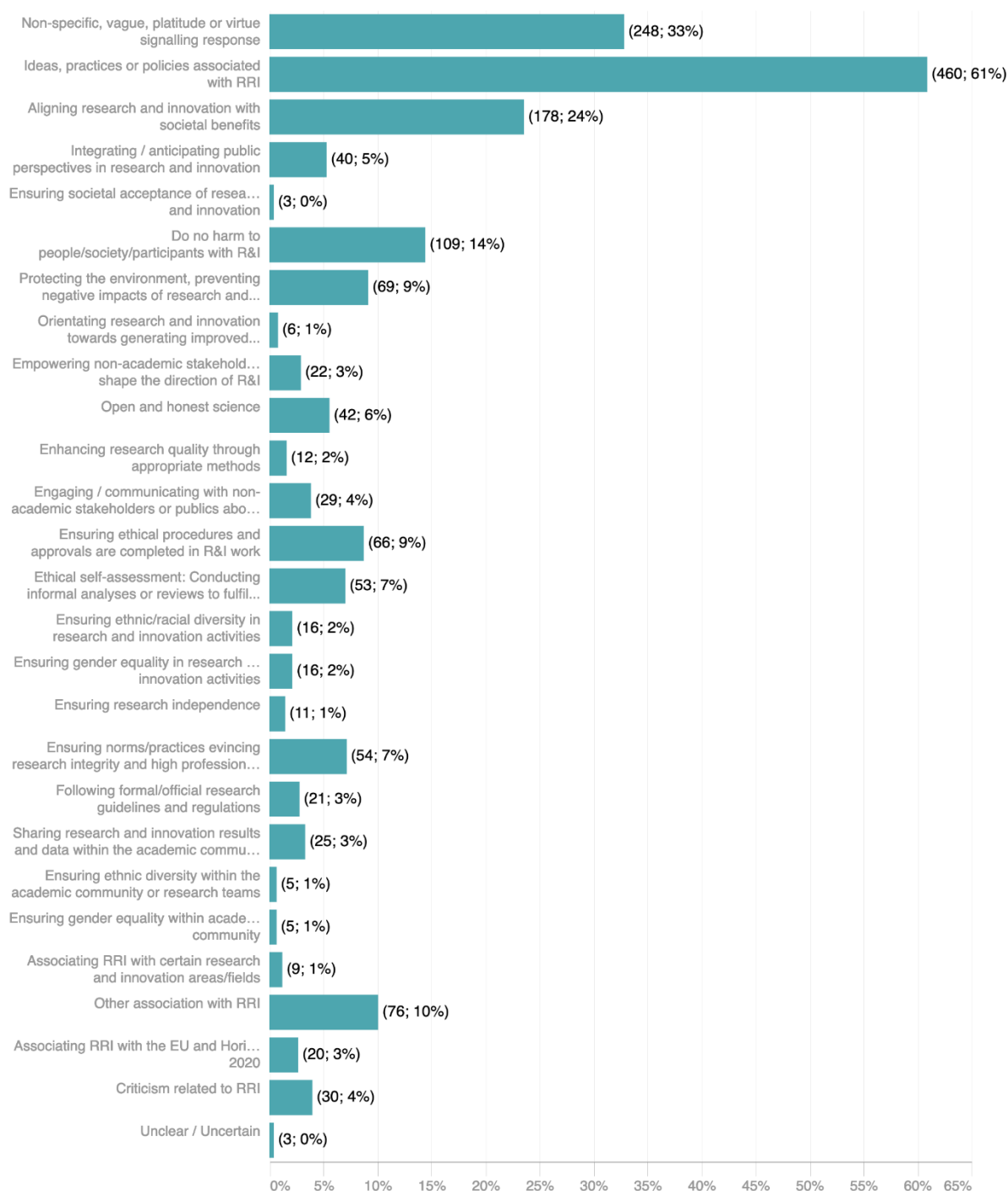


Figure 282: European and North American States - What comes to mind when you think of 'responsible research and innovation'?

### 3.9.6.11 ASSOCIATIONS WITH UN SDGS

This section explored the range of responses given to the question 'What comes to mind when you think of the UN Sustainable Development Goals?'.

A major portion of respondents more specifically ‘*Defin[ed] sustainable development*’ ( $n = 343$ , 48%), as entailing social, economic, and environmental aspects, such as associations with health, natural resources, and climate change (Figure 283)<sup>1452</sup>. ‘*Economic aspects of sustainable development*’ were indicated by most respondents ( $n = 152$ , 21%), followed by ‘*Diversity/inclusion aspects of sustainable development*’ ( $n = 128$ , 18%), and ‘*Preserving natural resources*’ ( $n = 102$ , 14%). Many respondents referred to ‘*Governance dimensions of SDGs*’ ( $n = 98$ , 14%), and therefore did not actually define them. This was applied when respondents mentioned international and/or national governance issues or drivers related to sustainable development or the UN SDGs. This included national, multi-national or global geopolitical dynamics, transnational collaboration, as well as challenges or shared targets at this level. Few respondents referred to ‘*Achieving the SDGs*’ in terms of specific implementation steps for successful delivery ( $n = 18$ , 2%).

A notable proportion of respondents responded in ways that were ‘*Non-specific, vague, platitude or virtue signalling response[s]*’ ( $n = 221$ , 31%). Respondents may have indicated they had heard of the UN SDGs, or referred to sustainability in general, but did not give any further relevant details about them.

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<sup>1452</sup> The total number of responses:  $N = 1513$

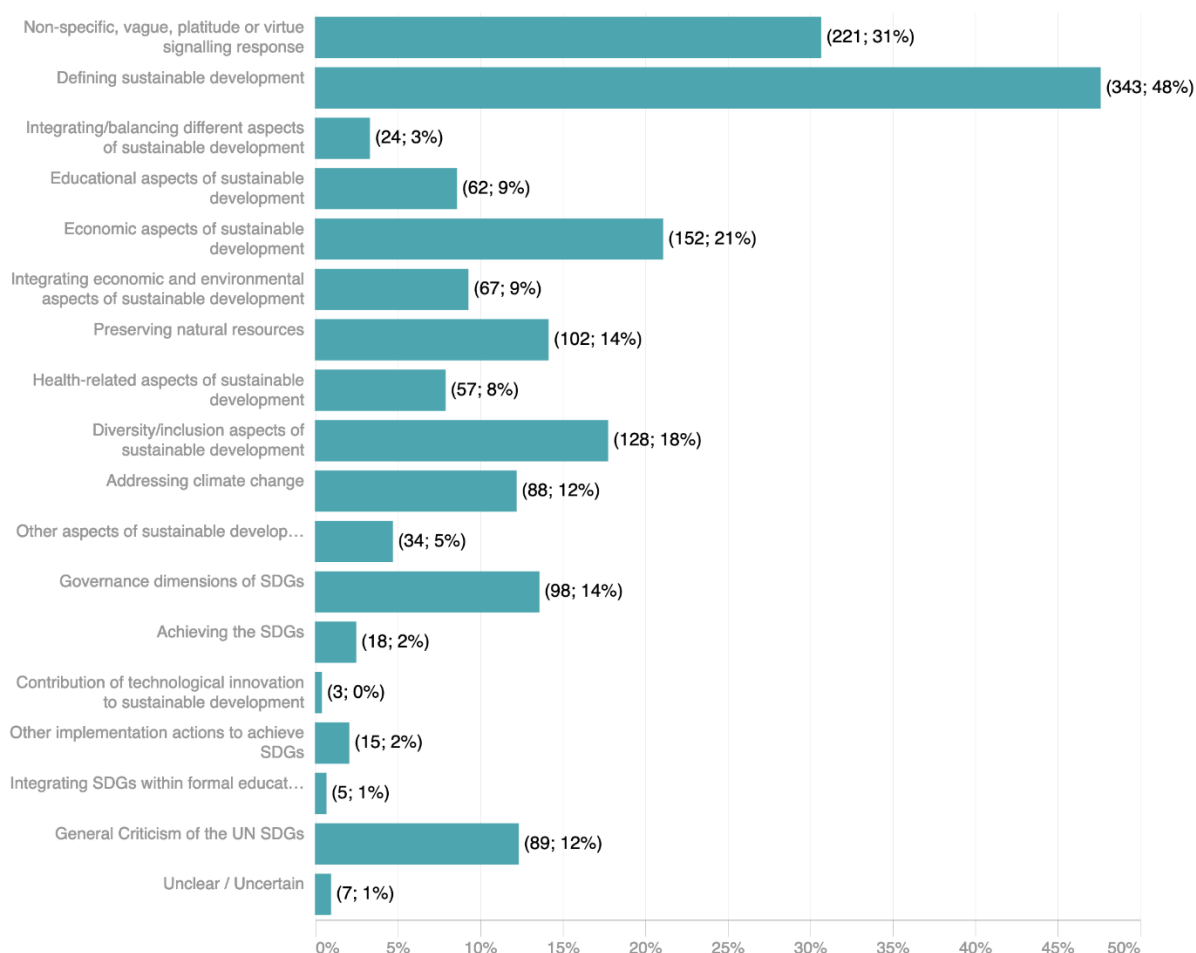


Figure 283: European and North American States - What comes to mind when you think of the UN Sustainable Development Goals?

### 3.9.7 SUMMARY OF FINDINGS

Socio-demographic results from the European and North American regions revealed the sample's gender distribution was slightly skewed towards women. While most worked in a 'University or similar research performing organisation' within the fields of 'Natural sciences, mathematics and statistics'.

Results by dimension of Responsible Research & Innovation (RRI), showed overall agreement on an attitudinal level, with value-action gaps for all measures. The gap was strongest for the inclusion of ethnic minorities, which displayed the lowest level of total agreement on an attitudinal level. For most other questions regarding practical actions, a large proportion of respondents indicated steps had been taken.

Results by stakeholder categories indicated disproportionately higher engagement with research performing stakeholders, such as RPOs, academics and researchers. This is most likely due to academic collaborations and joint research projects. Levels of engagement with non-academic stakeholders were relatively high for government agencies and non-profit organisations.

Measuring diverse perspectives, as part of RRI, related to researchers and innovators reaching out beyond academia to diverse stakeholders. Results for *‘Diverse Perspectives’* showed that respondents connected with industry and business most commonly. The most frequently reported practical steps for reaching out were through *‘In-reach to other disciplines, researchers, academics, experts or students’*. Engagement with civil society organisations (CSOs) and policymakers scored lowest. Many respondents indicated they diversified their perspectives with *‘Meetings, workshops, focus groups and “Consultations”’*.

Measures relating to *‘Gender Equality’* identified a shift towards monitoring equality within research teams and integrating gender as a substantive dimension in R&I. These steps were taken rather than, for example, boosting equality within the academic environment through supporting female researchers’ publications or providing/receiving gender training. Results showed its perceived importance as respondents mentioned specific steps, such as ensuring equality within research teams, in recruitment and staff selection, and promotion or mentorship of female researchers. A similar trend emerged in the *‘Ethnic Minorities’* results, as promoting researchers from ethnic minorities was as low as for the gender equality measures. The overall low response rate for steps towards including ethnic minorities suggests this aspect of RRI is not yet widely implemented in respondents’ R&I work.

Results for *‘Ethics of Research’* indicated respondents had adopted practical steps to ensure the integration of ethical principles. The specific steps described indicated normative approaches widely embedded in RPOs through ethics committees, as well as rules, regulations, and legal obligations. Those tendencies might be explained by the high number of respondents the European and North American sample working in the social sciences, often dealing with human subjects.

The measures applied to identify ‘openness and transparency’ revealed respondents shared perspectives related to conventional research processes. Results for *‘Transparency’* indicated that a high portion of respondents assumed one-way dissemination and methods documentation as a viable pathway for openness and transparency. Fewer respondents reported, for example, seeking upstream feedback on research projects from people affected by them.

Results for *‘Public Accessibility’* showed that sharing R&I work with non-academic and public stakeholders was valued less than sharing it within the professional/academic realm. Respondents who only indicated publications were not included in the data, although it was frequently mentioned. This suggests most respondents from the European and North American sample associate dissemination and outreach activities with public accessibility. This trend became clearer when looking at the respondents’ comprehension of making data publicly available. Results for *‘Open Data’* revealed that respondents confused open data with open access by describing processes of making their research findings or outputs freely available. This implied that ensuring open access is the predominant step respondents associated with research findings and open data, and that this RRI measure is not considered a normative approach to research and innovation.

Addressing societal needs in R&I seemed to be predominantly related to finding a relevant research and innovation topic, rather than empowering relevant groups of people to decide how the process is shaped. However, results for *'Societal Needs'* showed that most respondents selected research topics based on their own perceptions of societal needs. Considerably fewer respondents indicated public or non-academic engagement and consultation processes to define their research and innovation focus. This could imply top-down thinking. Focussing on the 'anticipative and reflective' dimension of R&I processes, results for *'Societal Concerns'* showed respondents considered compliance with rules and regulations most, as well as participation in or engagement with relevant committees. Also mentioned often was appropriate treatment of human research participants.

Identifying common associations with responsible research and innovation and the global blueprint on sustainable development showed respondents were familiar with some of these concepts' main ideas. Most respondents associated RRI with a general idea of doing no harm to society and protecting the environment. Results from *'Associations with RRI'* showed that many respondents referred to *'Aligning research and innovation with societal benefits'*. An ethical dimension was also mentioned often, suggesting a trend towards reflection of societal needs and ethical considerations in R&I.

Results from *'Associations with UN SDGs'* showed most respondents related sustainable development to economic aspects, social inclusion, natural resource conservation, and sustainable governance. This suggests respondents were familiar with the idea underlying the UN SDGs to build relationships, collaborations and addressing geopolitical dynamics on national, multinational and global levels.

## 3.10 GLOBAL INTERVIEW RESEARCH: LATIN AMERICA AND THE CARIBBEAN

### 3.10.1 EXECUTIVE SUMMARY

The aim was to investigate bottom-up perspectives of researchers in Latin America & the Caribbean. These findings are important for other parts of the RRING project (key RRI-related platforms, spaces and players operating in this region; interactions between different stakeholder types; domain-specific lessons related to Digital ICT, energy, bio-economy, waste management; and region-specific insights).

Data from 21 structured interviews were analysed for Latin America & the Caribbean: Uruguay (5 interviews); Bolivia (9); Brazil (7). We did qualitative content analysis using code counts to identify the most prevalent sub-themes for further qualitative interrogation. Inter-coder reliability was measured using Krippendorff's alpha tests.

Findings are structured around seven RRI-related themes, inspired by the EC pillars and AIRR dimensions. Within these themes, several sub-themes also emerged:

- *Gender equality and inclusivity*: gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; and lack or uncertainty of policy.
- *Public engagement*: organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open science*: levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: evaluation; and demand-drive research and innovation.
- *Science education*: the tools of science education; research and innovation capacity building.
- *Ethics*: responsibility; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: accounting for local contexts; conflicts and tensions.

Within these sub-themes, accounts are provided for the four RRING domains:

#### *Energy:*

- Women underrepresented, but there are signs of recognition and improvement.
- Multi-actor approaches for problem-solving complex and interlinked issues in a transitioning energy system.
- How energy was traded shaped how open the domain was.
- Little to no consideration of anticipative, reflective and responsiveness theme in this domain.
- Little to no consideration of science education theme in this domain.

- Renewables had less ethical scrutiny and bureaucracy than other forms of energy technologies.
- Flexibility of governance approaches varied amongst energy policymaking/compliance areas with differing views on policies.
- *Waste management:*
  - Limited and mundane consideration of gender and diversity issues.
  - Local engagement with municipalities was fruitful but also complicated via different expectations, scales, roles, and political priorities.
  - Government tensions could arise by publishing data openly; there was no domain-specific policies/guidance on open science.
  - Societal needs were defined through intersections of the domain, sustainability and government.
  - Discussion of training was less about science education and more about implementing innovations involving certain domain stakeholders.
  - Little to no consideration of ethics theme in this domain.
  - Engagement with the local decision-making system was crucial.
- *Information and Communications Technology (ICT):*
  - Large gender imbalances with in-depth discussion on challenges for women (e.g. connectivity access, career breaks, flexible working).
  - Public engagement exercises were evident, although tended to be more constrained to ideas of education, knowledge transfer and public skills.
  - Strong support for open science principles in ICT (e.g. consideration of open coding).
  - ICT was open to more cross-domain influences for the future.
  - The role and ambition of ICT stated as a central objective in education.
  - Ethics was taken seriously with data protection most commonly discussed.
  - Localised knowledge help to govern ICT projects, including facilitating lower-costs.
- *Bio-economy:*
  - Gender position is mixed across the region, but no policies or standards discussed.
  - Local support networks proved successful in developing research and innovation activities.
  - Little to no consideration of open science theme in this domain.
  - Bio-economy was influenced by other domains in its evaluation of societal needs.
  - Education was regarded as a way of developing technical expertise via professional training.
  - No domain-specific ethics guidance, but many relevant laws and regulations regarding intellectual property rights and material transfer agreements.
  - A sense that bio-economy regulation was very restrictive.

Key platforms, spaces and players essential to various aspects of RRI practice across Latin America & the Caribbean included:

- *Gender equality and inclusivity*: International Development Research Centre.
- *Public engagement*: Avina Foundation; Uruguayan National Telecommunications Administration; Transform Uruguay; and Uruguayan research council, CONICYT.
- *Open science*: Regional trading block, MERCOSUR; and Research Gate.
- *Anticipative, reflective and responsiveness*: No insights.
- *Science education*: Uruguayan Sectoral Energy Fund.
- *Ethics*: Asociación Computiery Machinery; International Organisation for Standardization; and Thematic network on environmental intelligence and information and communication technologies.
- *Governance of RRI*: Bolivian local political spaces; and North and South Bolivia tensions and possible cross-learning.

Key stakeholders interact within and across their research and innovation sectors in different ways:

- *Gender equality and inclusivity*: Funding played an important role, although politics are stifling innovation interactions towards greater inclusivity.
- *Public engagement*: Interactions driven by CSOs with a focus on improved societal outcomes through collaborating with others.
- *Open science*: No insights.
- *Anticipative, reflective and responsiveness*: Funders had a key role in shaping reflective practices and future orientation.
- *Science education*: An RPO used education tools to integrate science and entrepreneurial innovation for new business opportunities.
- *Ethics*: No insights.
- *Governance of RRI*: Multi-stakeholder strategies attracted other producers, although there were challenges with co-ownership and different publishing interests.

### 3.10.2 INTRODUCTION

Chapter 3 presents findings from Task 3.3 for the region of Latin America & the Caribbean. These interviews aim to investigate bottom-up perspectives of researchers and innovators.

This chapter is structured as follows:

- We begin with details of methods including country selection procedures, interview participant sampling targets, participant demographics, and analyses (Section 3.10.1). Note that in-depth information on the methodology for Task 3.3's global interviews is in the overarching report.
- The report is structured around seven RRI-related themes based on the EC pillars and AIRR dimension (Section 3.10.4 - 3.10.10). We begin by detailing the code counts part

of that theme. Following the discussion of the most prevalent sub-themes, domains (energy, waste management, bio-economy, ICT) and stakeholder types (Research Performing Organisations, Research Funding Organisations, Industry and Business, Civil Society Organisations, Policy Bodies), in specific Latin America & Caribbean regions.

- The conclusions section summarises the key findings from the Task 3.3 interviews for Latin America & the Caribbean (Section 3.10.11).

### 3.10.3 METHODS

#### 3.10.3.1 DATA COLLECTION

Structured interviews were used as the method for RRING's Task 3.3 qualitative study. Interviews were selected to provide in-depth perceptions, information and opinions of experiences in RRI in the five world-regions (Arab World; Asia; Europe and North America; Latin America and the Caribbean; Sub-Saharan Africa). A structured approach ensures consistency across regions. Structured interviews also provide more reliable, focused and uniform data across domains and stakeholder-types.

The structured interview format consists of questions on eight RRI themes and specific interview guidelines. Interviews were conducted face-to-face or through telephone/skype calls. Further details of the data collection methods and guidelines are provided in the overarching report.

Countries were selected on multi-based criteria. Four countries were chosen in Latin America & the Caribbean: One high and low ranked country based on GDP (per capita in USD), and one high and low ranked country based on GERD (Gross Expenditure on Research and Development). Only countries with a Travel Advisory Level of 1 & 2 were selected. Based on these criteria, the following four countries were selected:

1. Uruguay: GDP= 6954.17; GERD 0.50 (2013)
2. Bolivia: GDP= 300.31; GERD = 0.03 (2018)
3. Brazil: GDP= 5280.00; GERD = 0.80 (2016)
4. Guatemala: GDP = 1717.47; GERD = 0.85 (2015)

However, 10 interviews from Guatemala were not included since they did not comply with the guidelines.

#### 3.10.3.2 SAMPLING

The selection of participants from each country was based on standardised selection criteria:

- Number of interviews: A minimum of five interviews conducted per country.

- Gender: A 50-50 target split between males and females and/or other gender identities recommended for interview participant selection, with an acceptable minimum of 40% representation of females and/or other gender identities.
- Domains: Interview participation of respondents from at least one of each domain category in the country sample as a target (ICT/digital; energy; waste management; bio-economy).
- Stakeholder types: At least one of each stakeholder type included in the interview sample (Research organisation; Research funding organisation; Industry and business; Civil society organisation; Policy body).
- Relevance of their professional work to the RRING project's RRI interests: Interview participants selected based on their profiles indicating the presence of any publicly visible RRI-like activities to ensure their work complemented innovation/research approaches.

Interviews were designed with ethical guidelines from the Global Sustainability Institute's (GSI) Departmental Research Ethics Panel, under terms of Anglia Ruskin University's (ARU) Research Ethics Policy (Dated 8 September 2016, Version 1.7), and the Social Research Ethics Committee (SREC) under the terms of University College Cork. Partners/sub-contractors were asked to submit audio-recordings, signed consent forms, transcripts (both in English and local language; anonymised and non-anonymised), post-interview emails with transcriptions, proof of participants' background profiles, and fieldnotes. Partners/sub-contractors provided a statement of performance against the selection criteria with justifications if targets were not met.

Following the set criteria, a total of 21 interviews were conducted for Latin America & the Caribbean, covering: Uruguay (5 interviews), Bolivia (9), and Brazil (7). Qualitative content analyses were used, and details of the data and sample are provided in Table 13.

Table 13: List of interview details and participant demographics for each country

Latin American and Caribbean Country	Interview code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			Energy	Waste man.	ICT <sup>1453</sup>	Bio-economy	RPO <sup>1454</sup>	RFO <sup>1455</sup>	Industry & Business	CSO <sup>1456</sup>	Policy body	Male	Female
Uruguay	ROU01	01:01:36				1				1		1	
	ROU02	01:12:21	1	1		1					1	1	
	ROU03	01:07:39			1					1		1	1
	ROU04	00:52:27	1	1		1					1		1
	ROU05	00:36:51	1	1	1	1		1					1
Bolivia	BO01	00:42:37	1				1				1	1	
	BO02	00:56:09			1		1						1
	BO03	01:12:43		1			1					1	
	BO04	00:52:21	1				1					1	
	BO05	00:41:36				1	1			1			1
	BO06	01:26:17			1				1	1			1
	BO07	01:06:56				1	1						1

<sup>1453</sup> Information and Communications Technology<sup>1454</sup> Research Performing Organisation<sup>1455</sup> Research Funding Organisation<sup>1456</sup> Civil Society Organisation

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Latin American and Caribbean Country	Interview code	Interview duration	Domain coverage				Stakeholder type coverage					Gender distribution	
			<i>Energy</i>	<i>Waste man.</i>	<i>ICT</i> <sup>1453</sup>	<i>Bio-economy</i>	<i>RPO</i> <sup>1454</sup>	<i>RFO</i> <sup>1455</sup>	<i>Industry &amp; Business</i>	<i>CSO</i> <sup>1456</sup>	<i>Policy body</i>	Male	Female
	BO08	00:43:18	1				1					1	
	BO09	01:19:13	1				1						1
Brazil	BR01	01:16:00	1				1						1
	BR02	00:47:39	1		1		1						1
	BR03	01:04:38	2	1		2	2					1	1
	BR04	01:32:30				1	1						1
	BR05	00:54:56	1	1		1	1					1	
	BR06	01:07:54				1	1	1			1	1	
	BR07	00:54:56			1	1	1					1	

### 3.10.3.3 DATA ANALYSIS

Qualitative content analysis was used through coding of interviews in five phases:

1. In the first phase, 30 interviews (**26.5%** of the sample spanning all RRING regions) were inductively coded using NVivo 12 (a type of Computer-Aided Qualitative Data Analysis Software [CAQDAS]), with a line-by-line open coding approach. The 30 interviews were selected to ensure good distribution of countries. Within each country, at least one interview from each gender was included. Further selection was based on distribution of domains and stakeholder types. Coding was done for the respondents' social construction of responsible research and innovation practices and accounted for both cross-cutting themes and context-specific subject matter. Various cycles of review led to a codebook of 117 codes under 12 categories used for coder training.
2. The codebook was used to deductively code the remaining 94 interviews. The coders underwent extensive training in two practice rounds: (1) a full-day training workshop, and (2) each of the four coders was given a separate practice transcript to be coded independently. Coding was compared with the lead coder through dedicated virtual meetings, and inter-coder reliability was determined. This process led to further revisions of the codebook.
3. In the next stage, interview transcripts were distributed to coders using the revised codebook. During this stage, coders flagged any critical new codes and reached inter-coder agreement. Coding for the section on 'Responsibility' was carried out inductively due to the degree of variance in responses. This was a result of the open-ended nature of the question on responsibility and how participants understood it differently.
4. Inter-coder reliability was measured using Krippendorff's alpha. On average, coders achieved a Krippendorff's Alpha value of 0.95, and reliability of over 0.8 for 89% of variables.
5. Within each theme identified, code counting was done for each domain and stakeholder type in each region. After this, further in-depth qualitative interrogation of coded data was done to interpret the patterns in the selected codes (i.e. identified sub-themes).

The presentation of the qualitative data in this chapter uses example quotes for evidence and clarity. The following sections are based on seven themes: *gender equality and inclusivity*; *public engagement*; *open science: anticipative, reflective and responsiveness*; *science education*; *ethics*; and *governance of RRI*. Within each of these themes, we present two to four prevalent sub-themes.

### 3.10.4 GENDER EQUALITY AND INCLUSIVITY

Gender equality has been defined as “promoting gender-balanced teams, ensuring gender balance in decision-making bodies, and considering the gender dimension in R&I to improve the quality and social relevance of the results”.<sup>1457</sup> Inclusivity accounts for diversity and can promote R&I actors who are underrepresented (e.g. women, ethnic/economic minorities, etc.).

Establishing a diverse and inclusive process requires all actors involved to work together in R&I practice, deliberation, and decision-making.<sup>1458</sup> “Voices across a diversity of communities should be involved in research, from its beginnings to its commercialisation” to ensure higher quality science through different perspectives and expertise.<sup>1459</sup>

These are the boundaries of the gender equality and inclusivity theme within which the interviews were conducted. Out of the 14 codes identified for the theme, the four codes that ranked highest were: *gender and sexual diversity* [code 56]; *organisational norms and practices* [code 55]; *discrimination and lack of diversity* [code 65]; *lack or uncertainty of policy* [code 66].

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
53: Gender equality and inclusivity				
54: Contextual understanding of diversity and inclusion-societal and cultural norms	4	2	4	10
55: Organisational norms and practices	5	8	1	14
56: Gender-Sexual diversity	19	15	11	45
57: Ethnic and religious diversity	5	7	1	13
58: Country-based representation	0	2	0	2
59: Disability	3	1	4	8
60: Academic diversity	0	5	1	6
61: Age diversity	3	2	2	7
62: Socio-economic diversity and inclusion	2	5	0	7
63: Motives-Benefits of diversity and inclusion	2	2	1	5
64: Risks-Disadvantages associated with diversity and inclusion	1	0	0	1
65: Discrimination and lack of diversity	2	4	2	8

<sup>1457</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>1458</sup> <https://www.rri-tools.eu/about-rri>

<sup>1459</sup> <https://www.rri-tools.eu/documents/10184/16301/RRI+Tools.+A+practical+guide+to+Responsible+Research+and+Innovation.+Key+Lessons+from+RRI+Tools>

66: Lack or uncertainty of policy	8	6	2	16
67: Discrimination- a non-issue	3	2	1	6

The next four sections provide details about each of the four codes and their findings. Findings connected to particular domains of R&I and particular categories of stakeholders are discussed in the next sections. A final summary section then helps bring together the findings as it relates to the theme of *gender equality and inclusivity*.

### 3.10.4.1 GENDER AND SEXUAL DIVERSITY

*Gender and sexual diversity* encompass any references to gender/sexual diversity and inclusion in R&I/workplace. This includes references to improving gender/sexual equality, inclusion/support for LGBTQ+, reducing the gender gap (e.g. a gap in pay, recruitment, promotion, participation, scientific/research domains, etc.) and relevant support structures.

Name	Description
Gender/Sexual diversity	<p>Any references to gender/sexual diversity and inclusion in R&amp;I/workplace. This can include references to the need or methods employed for improving gender/sexual equality, inclusion/support for LGBTQ+, reducing the gender gap (e.g. a gap in pay, recruitment, promotion, participation, scientific/research domains, etc.) and providing relevant support structure.</p> <p>Rules: Any negative responses to gender/sexual diversity will be included in the code ‘Discrimination and lack of diversity.’</p>

The region’s interviews focused on gender decision-making, mental obstacles, and motherhood. There was wide acceptance of women’s rights inclusion in R&I and the workplace. Female participation rates improved, particularly in the CSO sectors in Uruguay and Brazil; Bolivia in general:

*“In the chemistry career, for example, it was 80% men and 20% women, nowadays we are [...] majority women in the faculty career, close to 59% women and 40% men”* [Male; Bolivia; RPO; Energy<sup>1460</sup>]

Gender participation was the main focus in the Bolivian sample. This focus overlooked much of the content of the definitions of gender equality and inclusivity. Participation rates were attributed to meritocratic developments based on the improved knowledge and performance of the women rather than external support or intervention:

<sup>1460</sup> BO04

*“[...] the ones that have taken the job vacancies, were the ones with more capability of coping the activities that were assigned to them.” [Male; Bolivia; Industry & Business; Waste Management<sup>1461</sup>]*

*“I think that [gender equality] limitations have been surpassed; somehow, it is a matter of knowledge but [not] of gender. It has been a [matter] of greater performance of women, there has not been said “it must be 50% women and 50% men”, but women became qualified, educated and have managed to enter, in a very good way, all the levels of scientific research and production.” [Male; Bolivia; RPO; Energy<sup>1462</sup>]*

Strong concerns were expressed over women being held back by their commitments to family life:

*“One of the projects that emerged as a spin-off of [anonymised organisation] was “Jóvenes A Programar” which is a project for people from 15 to 24 years old. [...] It has a clear objective that to recover students who left the educational system and to try to insert them again [by] working on programming and life skills. [...] This initiative has been carried out for several years and [...] the dropout rate was much higher in women than in men [...] due to situations of family attention, care or other obligations [...]” [Male, Female; Uruguay; CSO; ICT<sup>1463</sup>]*

Although more complex dimensions of gender equality were rarely mentioned an interview participant noted that greater gender inclusivity of women might contribute to a more sustainable knowledge output because they often consider family and societal factors:

*“[...] When a woman [...] is using ecological alternatives, she is not thinking about [...] marketing but her family first [...] and about society and tries to do as well as possible.” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1464</sup>]*

Participants also reported that women are taking up leadership and decision-making roles that were previously only occupied by men:

*“There is a great concern to bring women to the heart of it [...] since she is in charge of the registration within the Bolsa Floresta program [...] so [women] are taking spaces where the man has always been ahead in the decision making.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1465</sup>]*

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<sup>1461</sup> BO08

<sup>1462</sup> BO04

<sup>1463</sup> ROU03

<sup>1464</sup> BO06

<sup>1465</sup> BR03

*“[...] people already have very specific goals for women in leadership; we have been able to improve our indicators” [Female; Brazil; Industry & Business; Bio-economy<sup>1466</sup>]*

Mental obstacles were a concern amongst Bolivian-based participants because it discouraged women from certain roles in traditionally male-dominated domains:

*“I encourage everyone to participate. When there is some woman that does not want to participate I invite her to participate in the project. [...] I deliver a [...] talk, to let them know that there are women in this career field that have made important contributions in this area and that gender should not be an obstacle to be able to make a successful scientific career.” [Male; Bolivia; RPO; ICT<sup>1467</sup>]*

However, another participant suggested these obstacles are increasingly overcome leading to more equality in the workplace. He attributed these perception changes about gendered occupations to improved participation from young women:

*“There has been a mentality change in [young] women, who no longer see a problem when working in an industrial plant [...] with 50% men.” [Male; Bolivia; RPO; Energy<sup>1468</sup>]*

The role and responsibility towards improving gendered language which reaffirms exclusion was highlighted by a Uruguayan participant. In this case, gender exclusion was embedded in the Spanish distinction between a male and female engineer:

*“We seek not to inadvertently exclude words that end up excluding someone. As the theme energy is a subject that is generally associated with the masculine term, we did a workshop on gender, energy and environment principle; and they told us of very clear cases where the word engineer was used with the male suffix and many women did not show up because the call said “ingeniero” [engineer: masculine noun]. [...] we learned that the suffixes are not minor and that they are signals you are sending. I am not going to choose you because you are a woman, I will choose you because you are good and comply with the characteristics, but I'm going to make you feel invited to introduce yourself, not to exclude yourself from applying to the calls, research or whatever” [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1469</sup>]*

Finally, there was a general absence of commentary on other forms of sexual diversity. Likely due to interviewers concentrating on male and female constructs alone. In one quote an interview participant mentioned having “...developed several projects with LGBT [lesbian,

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<sup>1466</sup> BR01

<sup>1467</sup> BO09

<sup>1468</sup> BO04

<sup>1469</sup> ROU04

gay, bisexual, and transgender] community...” [Female; Brazil; RPO; Bio-economy<sup>1470</sup>]. However, there were no further specifics beyond this.

### 3.10.4.2 ORGANISATIONAL NORMS AND PRACTICES

The *organisational norms and practices* sub-theme covers any explicit or implicit mention of policies, formal/informal rules, norms, codes, guidelines, values, procedures, and models or frameworks used for diversity and inclusion within the organisation(s). Uncertainty about what such norms and practices entail are also included in this sub-theme.

Name	Description
Organisational norms and practices	Codes that describe organisational norms, policies and practices (i.e. formal/informal rules and procedures within the organisation or specific models or frameworks used) for diversity and inclusion <i>OR</i> if the respondent shows any uncertainty about what such norms and practices might be or how they might play a role in diversity and inclusion. Rules: This can include both explicit protocol (official institutional norms, codes, rules or guidelines) and implicit norms and values. If any norms/practices are mentioned regarding specific aspects of diversity and inclusion, they should be coded to the relevant codes below. This will NOT include any govt/supra-institutional policies, which will be coded in the relevant code.

Interview participants had little to say about organisational norms and practices. One interview participant described not having any inclusivity policies or practices in place:

*“No, I think it's one of those issues that comes up very forcefully [...], but that apart from the willingness to discuss the subject, we do not have any kind of rule, normative apparatus, protocol or procedure.”* [Male; Brazil; RPO; Energy, ICT<sup>1471</sup>]

In this organisation, gender participation and decision-making policies or practices were absent. However, their research funder required them to consider gender and ethnic inclusion as part of their research protocol:

*“Yes, for the [funder] generational gender [and] ethnicity integration are elements that cannot be outside. [...] therefore we had to take into account that one component in our studies was gender and that our research protocol [incorporated this], so that [gender] was present. [...] this is not because of a local policy, but*

<sup>1470</sup> BR04

<sup>1471</sup> BR02

*because of a policy that the [funder] has, locally there was [no] policy.” [Male; Bolivia; RPO, CSO; Waste Management<sup>1472</sup>]*

Although local policies should also be present, these funder requirements are a useful start to ensure gender diversity and inclusivity.

### 3.10.4.3 DISCRIMINATION AND LACK OF DIVERSITY

*Discrimination and lack of diversity* refer to any ethnic, age, female or disability discrimination within the organisation. This sub-theme includes references to specific organisational norms and practices that lead to a lack of diversity and inclusion.

Name	Description
Discrimination and lack of diversity	Reference to a lack of diversity and inclusion within the organisation that leads to discrimination. This can include references to lack of ethnic or age diversity, lack of female inclusion, lack of acknowledgement of disability, etc. This can include references to specific organisational norms and practices that lead to a lack of diversity and inclusion.  Rules: It will NOT include any reference to lack or uncertainty of govt/institutional policy, which is included in the code below.

There was a focus on ethnic diversity as opposed to gender diversity such as LGBT inclusivity. The lack of gender diversity in the comments suggest a weaker agenda positioning and deeper marginalisation of these issues. LGBT inclusivity currently lacks political support in Brazil which possibly influenced its inclusivity in publicly funded institutions.

For a researcher in Brazil, monitoring race and nationality quotas caused him to conclude that diversity existed in the student body was not ideal:

*“Now, we’ve done a recent survey because of the quota issue, and our student body is quite diverse. I do not have the numbers off the top of my head, but we have a degree of diversity that may not be what is considered ideal [...] but it is quite diverse.” [Male; Brazil; RPO; Energy, ICT<sup>1473</sup>]*

While mentions of sexual diversity were almost absent in the interviews, a researcher from Brazil said that the unsupportive political environment negatively influenced inclusivity projects in organisations.

*“For example, the episode recently occurred with the advertisement of “Banco do Brasil” [Bank of Brazil]. The federal government is my boss, and the message*

<sup>1472</sup> BO03

<sup>1473</sup> BR02

*given is clear. This is not the best time to [do] inclusive projects” [Female; Brazil; RPO; Bio-economy<sup>1474</sup>]*

The incident referred to the bank removing an advertisement that featured black and transgender actors after President Bolsonaro requested it.<sup>1475</sup>

In Uruguay, a participant noted that ethnic concerns were harder to measure than gender when applying for a project because gender can easily be distinguished based on the applicants' name. Therefore, ethnic concerns were perceived as more reliant on personal opinion rather than a measurable quota:

*“Sometimes more ethnic themes [...] we do not get to perceive [...], as something [like] the gender issue [which] you can measure more through the name, but ethnic issues [...] you cannot consult when applying for a project. It's like a more personal opinion.” [Female; Uruguay; RFO; Energy, Waste Management, ICT, Bio-economy<sup>1476</sup>]*

Another participant argued that the absence of clear gender guidelines negatively influenced gender equality in Uruguay. He said sexist management and selection practices are present in Uruguay and women are still forced to choose between professional commitment and family life. Whereas other countries such as Catalonia have implemented gender policies and guidelines to include women in all sectors:

*“I believe that we have sexist management practices, selection, etc. [...] I have evaluated institutes in Catalonia, and they have a gender policy, [...] in the courts there must be women, the curriculums have to look for women, communication in the institutes or the public light must have women. [...] they have a number of guidelines that we do not have here. So we favour this inertia that favours men when they are advanced in the institutional academic career [...] and women who have to suffer that have to choose between their family life and professional life. [...] Clear guidelines are missing, and I think we have a lot to see, things that are being done in the world and here we are a bit immature in that sense and then there is the personal dilemma of saying “well, in this context, [this is] what I should prioritize because I cannot do everything.” [Male; Uruguay; CSO; Bio-economy<sup>1477</sup>]*

A researcher pointed out that gender discrimination is still a problem in Bolivia despite the absence of gender restrictions in policies and guidelines. This points to the fact that gender discrimination endures even if there are policies against it because it is historically ingrained in society:

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<sup>1474</sup> BR04

<sup>1475</sup> <https://www.france24.com/en/20190427-brazil-ad-promoting-diversity-pulled-after-bolsonaro-request>

<sup>1476</sup> ROU05

<sup>1477</sup> ROU01

*“There are no restrictions, but there are realities that could affect the participation of [gender] diversity. This goes beyond the technological scope; this is a present problem of discrimination. I am convinced that in Bolivia there is discrimination”*  
[Male; Bolivia; RPO; ICT<sup>1478</sup>]

#### 3.10.4.4 LACK OF UNCERTAINTY OF POLICY

The *lack or uncertainty of policy* sub-theme includes any reference to uncertainty about government and supra-institutional policy beyond their organisation. It also refers to a lack of such policy on diversity and inclusion.

Name	Description
Lack or uncertainty of policy	<p>Coding for any reference to respondent’s uncertainty about govt/supra-institutional policy or a lack of govt/supra-institutional policy regarding diversity and inclusion (beyond the organisation).</p> <p>Rules: This does NOT include any discussion on organisational norms and practices, which will be coded for each of the types of diversity and inclusion specified in the codes above.</p>

A general view from Bolivian participants was that concrete policies or regulations were absent or they were unfamiliar with it. One participant stated that no policies for the inclusivity of ethnic minorities existed. However, the lack of such policies did not exclude ethnic minorities from scientific work. He emphasised the need for more standardized policies in Bolivia as implemented by other countries:

*“We could say that there is no exclusion, but there are no policies that encourage the inclusion of minority groups. In the case of Argentinean and Chilean society, the situation is more standardized.”* [Male; Bolivia; RPO, Policy body; Energy<sup>1479</sup>]

Another Bolivian participant suggested that general inclusivity rules were present and certain gender policies were implied by the government but not necessarily explicitly stated:

*“As far as I know, there are general rules but not in a precise form. I understand that the State promotes gender policies, but there is not yet something that we all share.”* [Male; Bolivia; RPO; Energy<sup>1480</sup>]

The effectiveness of public policy towards gender remained unclear for this Brazilian participant because while racial quotas were implemented there were no gender quotas.

<sup>1478</sup> BO09

<sup>1479</sup> BO01

<sup>1480</sup> BO04

*“We do not have [gender quotas] for the participation of women in these sectors, so I do not know to what extent public policy influences this issue or not.”* [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1481</sup>]

Without [gender-based] quotas it is difficult to identify how policy influences gender equality.

There was an apparent disconnect between government policy and this organisation in Brazil where the organisation had a clear ethical code on gender issues, but the government seemingly did not:

*“I do not know if there is a written [government] policy with a very detailed clause. However, [...] respect for gender issues can be identified in our [organisation’s] code of ethics.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1482</sup>]

Nevertheless, one participant indicated that gender was an important issue at government and institutional levels in Uruguay. She said that there were units dedicated to gender issues in all ministries and state companies:

*“Yes, from the government, there are several lines. Here in the [anonymised government department] itself, there is a unit dedicated to the gender issue. [...] in almost all the ministries and state companies, there is one.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1483</sup>]

Another Uruguayan participant noted that female involvement was more noticeable and that gender increasingly formed part of research output:

*“[...] It seems to me, [gender] has relevance and in fact, they are increasingly seen as gender aspects in the projects or projects [are] presented by more women.”* [Female; Uruguay; RFO; Energy, Waste Management, ICT, Bio-economy<sup>1484</sup>]

Uncertainty about relevant government policies was mostly present in Bolivia and to a lesser extent in Brazil. A disconnect was evident between the participants’ knowledge of inclusivity measures and the stance of their governments in these countries. However, participants from Uruguay noted that gender and inclusivity policies were implemented on governmental, institutional, and organisational levels.

### 3.10.4.5 DOMAIN RESULTS

Interview content was not particularly domain-specific because the participants work in multiple domains. Thus it was difficult to distinguish which domain they referred to. However, partial insights were obtained.

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<sup>1481</sup> BR05

<sup>1482</sup> BR03b

<sup>1483</sup> ROU04

<sup>1484</sup> ROU05

### 3.10.4.5.1 Energy

A Bolivian participant from the energy domain stated that female participation rates improved in other sectors, but gender imbalance was still present in the energy sector because of geographical restrictions:

*“In the field of Biology, there are more women than men in scientific research; then, in environmental subjects, it is the same. In the Energy Power subject, there are majority men, because of some characteristics of the type of work, mainly because it implies to be in rural areas for a long time [...] and other factors, but I can say that little by little, there is more and more women participation.”* [Male; Bolivia; RPO; Energy<sup>1485</sup>]

This participant pointed to the long periods where remote rural work is required for long periods as a contributing factor for the gender imbalance in the energy domain. However, a gradual improvement in the energy sector was also mentioned.

Another Bolivian interview participant echoed this statement. The harsh and remote terrain where some of the work happened was the reason for low female participation in that particular area:

*“Yes, there are female researchers. As [the work] is related to a natural mineral resource, the people involved [...] are not women because it is a resource that is located in inhospitable and remote areas. The mining sector does not encourage the participation of women.”* [Male; Bolivia; RPO, Policy body; Energy<sup>1486</sup>]

These excerpts support previous statements where women are expected to stay at home and fulfil a domestic role. On the other hand, a third Bolivian participant saw relatively equal participation rates in young plant personnel:

*“There has been a mentality change in [young] women, who no longer see a problem when working in an industrial plant [...] with 50% men”* [Male; Bolivia; RPO; Energy<sup>1487</sup>]

However, he did not attribute this to policy or quotas but rather as part of the collective mentality shift of young women advocating for gender equality.

### 3.10.4.5.2 Waste Management

The Uruguayan government includes gender inclusivity as criteria for funding:

*“For example, we are working on a specific project for waste energy recovery, and [...] when calls are made, [...] organisations will be rewarded or recognized to allocate funds for a given grant for a project. One of the elements [...] of selection*

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<sup>1485</sup> BO04

<sup>1486</sup> BO01

<sup>1487</sup> BO04

*is how the gender issue is addressed [...] how it is ensured that this company has [taken] action on gender issues [such as a] breastfeeding room and changing rooms for men and women.” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1488</sup>]*

The gender issues mentioned were mainly customary which emphasises the need for more progressive aspects of gender equality to be included in such criteria.

### 3.10.4.5.3 Information and Communications Technology (ICT)

A few interview participants referred to the lack of gender and diversity in the ICT sector. One female Bolivian participant made several statements on it which reflected the region’s role in impairing inclusivity in the field.

The traditional gendered roles of certain geographical areas were viewed as a contributing factor to the connective exclusion of women in ICT:

*“[...] My mother was from Tacna and she did not accede to formal education, because [she gave] first-order access to her brother. The same is happening today with the cell phone, which is assigned to the active member in the family and not to the passive one.” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1489</sup>]*

While the expansion of the internet benefitted those that were connected it meant rural women were even more marginalised:

*“[...] those hyper-connected [...] now they feel it is their responsibility to comment things; that caused that they are growing a little more, [...] about 30% to 40% of the population. [Women] from the countryside, who [are] distanced from everything [that] is happening, [are marginalised].” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1490</sup>]*

The speed of technological advancement in the ICT domain, with specific reference to systems engineering, was a serious obstacle for women to keep up with after career breaks for children:

*“[...] there are more restrictions for women. [...] many women have [...] taken their role as mothers and by their own experience are outdated from contexts, and it is very difficult in my career (systems engineering). It is very hard to climb the wave again because the [technological] advance takes huge steps.” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1491</sup>]*

One of the strategies being considered to overcome such problems was telework to encourage work alongside motherhood:

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<sup>1488</sup> ROU02

<sup>1489</sup> BO06

<sup>1490</sup> BO06

<sup>1491</sup> BO06

*“Therefore, we are thinking that women can take a protagonist role, [they] can do telework, that would allow them to maintain the role of mother, which is that we are worried about. Mainly, because young people have decided not to have children for example in certain cultures; and those cultures are arriving here.”*

[Female; Bolivia; Industry & Business, CSO; ICT<sup>1492</sup>]

This was perhaps linked to concerns over a loss of competitive advantage for some women who have children against younger women who do not.

#### 3.10.4.5.4 Bio-economy

Only a few interviewees commented on gender and diversity in the bio-economy sector with mixed views across regions.

One interview participant stated that there were no shared gender policies or standards in Bolivia:

*“As far as I know, there are general rules but not in a precise form. I understand that the State promotes gender policies, but there is not yet something that all we share.”* [Female; Bolivia; RPO; Bio-economy<sup>1493</sup>]

In Brazil, this participant noted a rapid improvement in female participation and leadership roles:

*“We have managed to increase considerably; we have not yet reached our goal. Our goal for 2020 is to have 50% women in leadership positions and leadership for people is from the board up, not managerial level, because if we look among the managers we already have a majority of women. [I am] almost sure that we have 38% women in leadership positions today, that's almost 10 points higher than 4 years ago [...] we have women in positions of leadership that in most of the companies are occupied by men.”* [Female; Brazil; Industry & Business; Bio-economy<sup>1494</sup>]

Across all of the domains for this theme, this participant displays the most progressiveness in gender and leadership. The types of leadership also included directorships in several areas:

*“So our industrial director is a woman, the director of investor relations is a woman. [...] It is not only in these [areas] that we have been able to move forward.”* [Female; Brazil; Industry & Business; Bio-economy<sup>1495</sup>]

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<sup>1492</sup> BO06

<sup>1493</sup> BO07

<sup>1494</sup> BR01

<sup>1495</sup> BR01

However, the same story was not repeated in Uruguay. Although women were strongly represented in research-focused fields such as agronomy, leadership positions in the bio-economy sector were much lower:

*“In my time when I was studying agronomy, we were 80%-90% men and 10% women. Now all that is agricultural sciences, [...] have a [female] component, [...] and agronomy has been fairly balanced [compared] to what it was in my time. So, usually, the [...] researchers are very balanced. The problems start at the level of management positions, the direction of research programs, and management of institutes, where the big filter towards men begin.”* [Male; Uruguay; CSO; Bio-economy<sup>1496</sup>]

Across all of these domains, there is a dominant role played by geographical exclusion. In the energy domain, rurality and remoteness excluded women. Whereas the lack of connectivity for women in certain areas with conservative gender values also contributed to ICT's gender exclusion. This geographical was not apparent in the bio-economy interviews.

### 3.10.4.6 STAKEHOLDER RESULTS

#### 3.10.4.6.1 Research Performing Organisations (RPO)

Gender equality improved within RPOs; however, rules and regulations were viewed as incoherent. Several RPO members (see *Lack or Uncertainty of Policy* section) argued that there were no government policies.

An RPO in Brazil suggested that the gender issue can be quite prominent in discussions, but it does not feature in the organisational policy framework:

*“No, I think it's one of those issues that comes up very forcefully [...], but that apart from the willingness to discuss the subject, we do not have any kind of rule, normative apparatus, protocol or procedure.”* [Male; Brazil; RPO; Energy, ICT<sup>1497</sup>]

Female participation and progression in STEM areas were noted and attributed to gendered changes in science education:

*“[...] these days, girls are promoted to be researchers and to work on science. There is a strong motivation to [participate in] science. Last year there was an announcement in schools to participate in science tests within the Olympic Games for student scientists. Those Olympic Games have girls as winners.”* [Female; Bolivia; RPO; ICT<sup>1498</sup>]

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<sup>1496</sup> ROU01

<sup>1497</sup> BR02

<sup>1498</sup> BO02

The representation of female winners in an initiative such as the student science Olympic Games may promote more female participation in STEM fields.

This participant mentioned that even though men still dominate STEM areas, programmes such as the Europe Horizon 2020 framework contribute to the integration and improvement of gender equality:

*“Not only in Bolivia, [...] the scientific activity is dominated by men as within research and management. But I believe that positive measurements [are being taken] mainly in Europe, to [promote] the diversity and equity in the projects. In the H2020 project, the Maria Curie scholarships with which I work, in some cases are awarded to those projects that promote participation [of] women and equity gender.”* [Male; Bolivia; RPO; ICT<sup>1499</sup>]

The effects of such external influence were regarded as part of a gradual development that professors were trying to encourage:

*“Our mission as professors is to encourage female students to participate and to protect them in such a way that they do not feel restrained. We try that they develop all their potential. We avoid designating an assignment based on gender choice. In my classes, we never have had problems of that type.”* [Male; Bolivia; RPO; ICT<sup>1500</sup>]

This same participant also discussed how certain male-dominated RPO fields such as engineering do not know how to encourage more women to participate:

*“Now it is a reality that in engineering there [are] very few women and [although men] are inside we do not know how to encourage more women to join the career.”* [Male; Bolivia; RPO; ICT<sup>1501</sup>]

#### 3.10.4.6.2 Research Funding Organisation (RFO)

The interviews did not provide any insights for RFOs in the context of the *Gender equality and diversity* theme.

#### 3.10.4.6.3 Industry & Business

Strong gender equity developments were apparent from the two stakeholders that offer insight into industry & business in this region. In Bolivia, a stakeholder defined gender equity as one of their goals but also noted that there were no regulations in place to support it. Despite the lack of regulations, their goals under UN sustainable development included gender equality with a gender balance among their administrative staff:

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<sup>1499</sup> BO09

<sup>1500</sup> BO09

<sup>1501</sup> BO09

*“No, we do not have it regulated, but one of our goals is gender equity for a sustainable development, following what the UN says, for example, in our company almost 50% of our administration staff are women, and that is not regulated, but this is the reality.”* [Male; Bolivia; Industry & Business; Waste Management<sup>1502</sup>]

It remained unclear as to the gender balance in other areas of this company and positions of seniority.

Similar improvements in female participation and leadership roles were identifiable in the experiences of one Brazilian participant:

*“We have managed to increase considerably; we have not yet reached our goal. Our goal for 2020 is to have 50% women in leadership positions and leadership for people is from the board up, not managerial level, because if we look among the managers we already have a majority of women. [I am] almost sure that we have 38% women in leadership positions today, that's almost 10 points higher than 4 years ago [...] we have women in positions of leadership that in most of the companies are occupied by men”* [Female; Brazil; Industry & Business; Bio-economy<sup>1503</sup>]

However, their company was seen as an exception from other companies suggesting its progressiveness might be an outlier.

This same interview participant also described the pursuance of gender equity goals through an entrepreneurial programme operated by their company:

*“We have a traditional Training Program, but last year we launched the Courage [...] program, for the development of entrepreneurs because we stopped looking just for the resume, but what [difference] [they] could bring to the company. [...] in this program, we got pretty interesting indicators of diversity between men and women [...] black or white or other ethnicities and also age. [...] We even had people over 45 years old.”* [Female; Brazil; Industry & Business; Bio-economy<sup>1504</sup>]

This entrepreneurial programme had diverse make-up and is also one of the few explicit mentions of race, age, and gender considerations.

#### 3.10.4.6.4 Civil Society Organisations (CSO)

CSOs made use of programmes and projects to enrol groups that experienced obstacles in research and innovation. While their comments mainly addressed gender equality, one organisation was concerned with broader inclusivity surrounding the inequalities of indigenous

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<sup>1502</sup> BO08

<sup>1503</sup> BR01

<sup>1504</sup> BR01

and black Brazilians. Programmes, projects and inclusive organisational composition were the main approaches to encouraging diverse participation in research and innovation.

The CSO stakeholder interviews hint that Brazil's deliberative and civic institutions established institutional grounds for more gender inclusivity:

*“There are women in the decision-making and deliberative councils.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1505</sup>]

However, increasing participation remained a difficult task, particularly in key decision-making and expert areas. A problem made worse by dependency on funders lacking a consistent gender inclusivity agenda:

*“I also aim at the proportion of women in the jurors' body, and also as proponents, i.e. scientists and inventors. However, [I have great difficulty in meeting goals for] female participation in the diagnostic phase, [and] in the other stages [...] it is still a great challenge. [...] this is an issue that has not yet entered consistently on the funding providers' agenda.”* [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1506</sup>]

This CSO's goal was to improve the skills and encourage the participation of young black youth in STEM research because they are considered most marginalized by the interviewee:

*“[...] at least half of the participants are black. In Brazil, 54% of the population is black, and it is the population that is most marginalized, especially in youth. [...] Starting with public calls, we try to encourage these groups to be present in the spaces of the laboratory.”* [Male; Brazil; CSO; ICT, Bio-economy<sup>1507</sup>]

This is also one of the few accounts of other forms of inclusivity and diversity besides gender.

Indigenous group presence was an essential part of their CSO projects and entrepreneurial activities:

*“Also, we work with indigenous people. [...] None of our projects [were] carried out without the presence of indigenous people. [...] we also have indigenous collaborators in the fields of entrepreneurship. This has been extremely gratifying [...] and we have achieved very interesting results. For example, in English classes, they stand out a lot since they already had this experience of learning another language, in this case, Portuguese and Guaraní, the language spoken in the village.”* [Male; Brazil; CSO; ICT, Bio-economy<sup>1508</sup>]

This also demonstrates an understanding of the beneficial role of inclusivity in potential contributions to knowledge output.

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<sup>1505</sup> BR03b

<sup>1506</sup> BR05

<sup>1507</sup> BR07

<sup>1508</sup> BR07

This CSO participant acknowledged that responsible innovation requires balanced inclusivity that should accurately represent the Brazilian society:

*“In this sense, it is impossible to produce responsible innovation if we do not have the protagonists [...] of Brazilian society. For example, in Brazil, you still go in the spaces of innovation and they are mostly male and white. [...] in our team, we have 10 employees, 5 are black, which is also a practical embodiment of everything that is under-represented in the structure and scenario of innovation and technology in Brazil.”* [Male; Brazil; CSO; ICT, Bio-economy<sup>1509</sup>]

That kind of racially inclusive philosophy extended to the composition of their team.

The same approach to gender inclusivity within the CSO body was applied by a Uruguayan organisation:

*“[...] we have an annual human capital tool called "climate survey" to determine some things, problem areas, aspects to improve, or positive areas [...]. And one of the things that come out clearly in this survey is that there is no gender difference. There is room for everyone, people say they do not feel violated in their rights, nor have fewer opportunities because of their [gender], and in that sense, I also think that [anonymised organisation] is an atypical institution because the vast majority of our managers are women (about 70%). It is an organisation where the remuneration is equitable.”* [Male, Female; Uruguay; CSO; ICT<sup>1510</sup>]

The interviewee also noted that their high proportion of female managers and equal pay were exceptions to the rule.

One of the methods for improved inclusivity was to include certain criteria (gender, race, income) in their public calls for project and programme participants:

*“All the projects and conventions we apply this [...] saying that we will use an application mechanism and selection process in the public call. We have a series of questions and protocols instituted to know as much about gender and race as about income.”* [Male; Brazil; CSO; ICT, Bio-economy<sup>1511</sup>]

A Uruguayan CSO member discussed a similar project of inclusivity that aimed to return people to ICT who left the educational system early:

*“One of the projects that emerged as a spin-off of [anonymised organisation] was "Jóvenes A Programar" which is a project for people from 15 to 24 years old. [...] It has a clear objective that to recover students who left the educational system and to try to insert them again [by] working on programming and life skills. [...] This initiative has been carried out for several years and [...] the dropout rate was much*

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<sup>1509</sup> BR07

<sup>1510</sup> ROU03

<sup>1511</sup> BR07

*higher in women than in men [...] due to situations of family attention, care or other obligations [...]*” [Male; Female; Uruguay; CSO; ICT<sup>1512</sup>]

However, women’s gender role as primary caretakers emerged as an identifiable obstacle to completing the project.

### 3.10.4.6.5 Policy bodies

Participants in Brazil and Uruguay suggested measures for gender inclusivity were part of policy body considerations. This included incorporating motherhood in evaluations of researchers and the implementation of gender units. Bolivian participants said that gender inclusivity was not considered in their policy body.

In Brazil, a central concern of the stakeholder was to adjust performance ratings to avoid inadvertent punishment for motherhood responsibilities. They subsequently included measures in calculating performance metrics that accounted for the effects of having children:

*“We also try to [correct] the curricular evaluation of the researchers who had children. Instead of the traditional 5 years, the scientific production is contrasted with the number of children [they] had, allowing the correction of this evaluation of scientific production according to this important role of women.”* [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1513</sup>]

Motherhood inclusivity was also demonstrated by certain funding requirements that included breastfeeding rooms:

*“For example, we are working on a specific project for waste energy recovery, and [...] when calls are made, [...] organisations will be rewarded or recognized to allocate funds for a given grant for a project. One of the elements [...] of selection is how the gender issue is addressed [...] how it is ensured that this company has [taken] action on gender issues [such as a] breastfeeding room and changing rooms for men and women.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1514</sup>]

Another female Uruguayan participant pointed to the dedicated gender units in policy bodies that promoted gender inclusivity:

*“Yes. From the government, there are several lines. Here in the [anonymised government department] itself, there is a unit dedicated to the gender issue. [...] in almost all the ministries and state companies, there is one.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1515</sup>]

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<sup>1512</sup> ROU03

<sup>1513</sup> BR06

<sup>1514</sup> ROU02

<sup>1515</sup> ROU04

This same policy body organisation also demonstrated gender sensitivity to biases embedded in language:

*“We seek not to inadvertently exclude words that end up excluding someone. As the theme energy is a subject that is generally associated with the masculine term, we did a workshop on gender, energy and environment principle; and they told us of very clear cases where the word engineer was used with the male suffix and many women did not show up because the call said “ingeniero” [engineer: masculine noun]. [...] we learned that the suffixes are not minor and that they are signals you are sending.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1516</sup>]

However, the meritocratic interpretation of recruitment implied that quotas were not the legitimated option:

*“I am not going to choose you because you are a woman, I will choose you because you are good and comply with the characteristics, but I'm going to make you to feel invited to introduce yourself, not to exclude yourself from applying to the calls, research or whatever”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1517</sup>]

Similarly, another Uruguayan participant acknowledged that the high proportions of female technicians “occurred naturally” and not due to policy:

*“[...] I think that if there was a gender claim [...] in the field of management, I am the only man, all the others are directors. In the area of hiring technicians, I would say [it is] more than equal and has occurred naturally in the case of the direction of women.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1518</sup>]

However, the naturalisation of gender balance can easily overlook the rate of inequalities in society. Policy and guidelines on inclusivity ensure that gender imbalance does not go unnoticed.

The stakeholder from Bolivia did not provide accounts of gender as a consideration for his policy body. He offered some revealing insights into the international nature of the energy economy in Bolivia. The triangle of Lithium countries (Argentina, Bolivia, Chile) played a role in increasing the relevance of women experts for the sector. He referred to mainly foreign female expertise in lithium processing:

*“I do not have any data about women participation, but I know that a woman is the manager of the battery assembler pilot plant. [...] The people who are studying the economy of innovation from a macro point of view are women. [...] I do not*

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<sup>1516</sup> ROU04

<sup>1517</sup> ROU04

<sup>1518</sup> ROU02

*know explicit policies to promote women participation in the mining sector.”*

[Male; Bolivia; RPO, Policy body; Energy<sup>1519</sup>]

The uncertainty of gender inclusivity policies in the mining sector also indicated the low status of such guidelines.

### 3.10.4.6.6 Interactions between stakeholders

The participants emphasised that interactions with stakeholders highlighted the importance of funding. One participant suggested that the political atmosphere had a stifling effect on inclusivity.

This participant said that funding bodies required stakeholders to include gender as a component of their research:

*“Yes, for the [funder], the generational gender integration ethnicity, are elements that cannot be outside. [...] therefore we had to take into account that one component in our studies was gender, and that our research protocol [incorporated this], so that [gender] was present. [...] this is not because of a local policy, but because of a policy that the [funder] has, locally there was [no] policy”*

[Male; Bolivia; RPO, CSO; Waste Management<sup>1520</sup>]

This mechanism possibly compensated for the lack of gender policies of the RPO.

Funding was also instrumental in another policy body organisation where aspects of gender inclusivity were incorporated into funding calls:

*“For example, we are working on a specific project for waste energy recovery, and [...] when calls are made, [...] organisations will be rewarded or recognized to allocate funds for a given grant for a project. One of the elements [...] of selection is how the gender issue is addressed [...] how it is ensured that this company has [taken] action on gender issues [such as a] breastfeeding room and changing rooms for men and women.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1521</sup>]

The political environment can exert pressure on policy bodies without any direct interaction:

*“For example, the episode recently occurred with the advertisement of “Banco do Brasil” [Bank of Brazil]. The federal government is my boss, and the message given is clear. This is not the best time to [do] inclusive projects”* [Female; Brazil; RPO; Bio-economy<sup>1522</sup>]

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<sup>1519</sup> BO01

<sup>1520</sup> BO03

<sup>1521</sup> ROU02

<sup>1522</sup> BR04

This participant commented on the oppressive nature of such an environment which can weaken RPO resolve for greater inclusivity.

#### **3.10.4.6.7 KEY PLATFORMS, SPACES AND PLAYERS**

The International Development Research Centre (IDRC) in Bolivia had a role in encouraging the inclusion of diversity as part of research outputs through its funding provisions.

There were allusions to possible key spaces such as the need to focus on the disadvantageous effects of rural remoteness, poor internet connectivity, and patriarchal tradition on gender participation. The area of the family was also an important space for consideration with indications that its pressures, commitments and lack of support can be a heavy burden on female participation and leadership. Finally, the possible role of internationalisation in heightening the salience of female expertise and leadership was mentioned.

#### **3.10.4.7 SUMMARY OF GENDER EQUALITY AND DIVERSITY**

There was a general acceptance of women's rights as a part of research and innovation in the workplace. The general agreement, particularly in Bolivia, was that female participation rates had improved.

Across the region, there was a clear recognition of the increasing representation of women in leadership and decision-making roles. However, the participants displayed limited expression of more progressive understandings of the process definitions laid out for gender equality and inclusivity.

Uncertainty about relevant government policies, as well as beliefs that none exist at all, were present particularly in Bolivia and to some degree Brazil. In some ways, we can see a disconnect between participants' knowledge of inclusivity measures and the stance of their governments.

There was some focus on women being held back by their commitments to family life and motherhood. Participants highlighted initiatives that provide support to counter these career effects.

In Bolivia, geographical location and terrain were regarded as key factors in lower female participation rates. This entailed geographical exclusion from the energy domain through remoteness and lack of connectivity in the ICT domain as a result of patriarchal regions.

There was a general absence of commentary on other forms of diversity. This might be a product of interviewers tending to concentrate on gender alone. Most of the commentary on the inclusivity of racial and indigenous minorities came from one Brazilian CSO interview participant.

### 3.10.5 PUBLIC ENGAGEMENT

*Public engagement* is one of the six key policy agendas of RRI. There are three key dimensions in how the EC define public engagement. It is collaborative, multi-actor, and should align with societal values, needs and expectations. For example, fostering collaborative and multi-actor research and innovation processes where “all societal actors work together during the whole process in order to align its outcomes to the values, needs and expectations of society.”<sup>1523</sup>

This definition outlines the boundaries of public engagement within which the interviews and subsequent analyses were conducted. Furthermore, the inclusion of the roles and interactions of the stakeholders facilitates the analysis of the collaborative and multi-actor dimension of the EC pillar definition.

Out of the 42 codes identified for the theme, the four specific codes that stood out through a total count for all countries included are: *organisational norms and practices* [code 2]; *motives-benefits of public engagement and collaboration* [code 4]; *building support network and strategic alliances* [code 112]; *integration of different domains and stakeholders* [code 114].

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
1: Public engagement	19	21	16	56
2: Organisational norms and practices	4	12	3	19
3: Lack or uncertainty of public engagement policy	5	4	2	11
4: Motives-Benefits of public engagement and collaboration	10	5	10	25
5: Risks-Disadvantages associated with public engagement and collaboration	0	0	2	2
6: Types of stakeholders for engagement	88	64	62	214
7: Government bodies, municipalities and regulatory authorities	30	11	19	60
8: Professional bodies	4	2	11	17
9: Research Funding organisations	2	3	2	7
10: Scientific community	29	19	14	62
11: Specialists-Experts	3	3	2	8
12: Civil society organisations	5	9	11	25
13: Industry and Business	11	10	7	28
14: Marketing and communication agencies- Public Relations Industry	1	0	0	1
15: Celebrities	0	1	0	1
16: Citizens or the general public	6	8	2	16

<sup>1523</sup> <https://www.rri-tools.eu/about-rri>

17: Others	3	2	3	8
26: Consultation tools	1	3	1	5
27: Surveys	1	0	1	2
28: Public-citizen consultations	0	2	1	3
29: Feasibility studies- working groups	0	1	0	1
30: Involvement tools	3	3	5	11
31: Open public calls and funding initiatives, etc	1	2	3	6
32: Focus groups and discussions	0	0	0	0
33: Competitions and awards	0	0	0	0
35: Collaboration tools	7	7	4	18
36: Social networks	2	0	1	3
37: University-based start-ups	2	1	0	3
38: Applied research laboratories	0	2	0	2
39: R&I matchmaking	4	4	3	11
40: Empowerment tools	1	5	2	8
41: Participatory management-approaches	1	3	2	6
42: Campaigning-Lobbying	0	1	0	1
43: Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0
107: Lack of (perceived) interest of general public	1	0	0	1
44: Other	0	0	0	0
111: Collaboration	31	37	23	91
112: Building support networks and strategic alliances	9	18	14	41
113: Actor mapping	1	2	1	4
114: Integration of different domains and stakeholders	8	11	7	26
115: RRI frameworks for new cross disciplinary research	2	3	1	6
116: Difficulties in collaboration and engagement	15	5	0	20
106: Financial constraints and considerations	20	10	4	34

The next four sections provide details about each of the four codes and descriptions of the analysed data. Findings connected to particular domains of R&I and categories of stakeholders (including key platforms, spaces and players) are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme of *public engagement*.

### 3.10.5.1 ORGANISATIONAL NORMS AND PRACTICES

*Organisational norms and practices* encompass findings that describe organisational rules and procedures within the organisation for public engagement. Any uncertainty displayed by the respondent about what such norms and practices might be or how they might play a role in public engagement also fall under the sub-theme. Government and supra-institutional level policy was included in other sub-themes.

Name	Description
Organisational norms and practices	Codes that describe organisational norms and practices (i.e. formal/informal rules and procedures within the organisation) for public engagement <i>OR</i> if the respondent shows any uncertainty about what such norms and practices might be or how they might play a role in public engagement.  Rules: This does NOT include govt/supra-institutional level policy (coded below).

In general, the organisational norms and practices emphasised tools and mechanisms for building multi-actor collaboration. There was scant information about engagement outcomes and whether they aligned with societal needs, expectations or values.

From the Bolivian interviews, two participants said that there were no rules in place:

*“Interviewer: Are there internal regulations to be taken into account?”*

*Interviewee: No, there are not. On the contrary, we are open to perform the evaluations with institutions, with individual people, [and] with producers”*  
[Female; Bolivia; RPO, CSO; Bio-economy<sup>1524</sup>]

*“[...] there was no rule that [forced] us to do something. We have had many operative difficulties, of course, because, when having an aim to influence public policies, we had to act with the public actors. Sometimes there were antipathies and political sympathies, and in those instances, it was [...] delicate to maintain a balance in that sense.”* [Male; Bolivia; RPO, CSO; Waste Management<sup>1525</sup>]

The latter also mentioned how the collaborative aspects involved maintaining a delicate balance.

A Uruguayan participant mentioned collaboration through their organisational practice of transparency regarding communication and accrediting service providers:

*“Here at [anonymised organisation] we have a vocation to [...] be very transparent with information even with the private sector. For example, we have a*

<sup>1524</sup> BO05

<sup>1525</sup> BO03

*habit in which if our providers contribute [...] and have a certain level of commitment, we put them as allies in the communication diffusions. That is something not written, and it is a practice as a group.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1526</sup>]

The theme of the tools of engagement was evident in the following quotes, which mentioned the use of tablets:

*“Yes, there is a long and extensive portfolio. From regulations for visits in early childhood projects to citizenship guide for adolescents. And we also use tablets.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1527</sup>]

Formal covenants were also used as collaboration tools:

*“Although some contacts begin in an informal way, there are several instruments of formalization encapsulated in the form of covenants. Agreements are signed with the university, which functions in a certain way as a company, or set of companies, from which this collaboration is made.”* [Male; Brazil; RPO; Energy, ICT<sup>1528</sup>]

Business incubators and technology parks were noted as important instruments of dissemination and formed part of the organisational innovation and “logistical infrastructure” of this institute:

*“COPPE<sup>1529</sup> is an institute within the Federal University of Rio de Janeiro (UFRJ), and part of our logistical infrastructure and innovation is a [business] incubator, a technology park, and an innovation agency.”* [Male; Brazil; RPO; Energy, ICT<sup>1530</sup>]

An interviewee from Brazil described the organisational pillars and organisational vision for engagement with other actors. Their strategy was oriented towards education, sustainability and interaction with research institutions to reach societal goals:

*“[The organisation] has a vision, a strategy [and] a vision of sustainability. It has some pillars. Education-oriented pillars range from basic education directed to consultants, or to other regions that have higher demand [...]. We have a pillar of science, [...] to engage research institutions in the development of research projects that generate more social and environmental economic benefits [...] of sustainability.”* [Female; Brazil; Industry & Business; Bio-economy<sup>1531</sup>]

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<sup>1526</sup> ROU04

<sup>1527</sup> BR03

<sup>1528</sup> BR02

<sup>1529</sup> The Alberto Luiz Coimbra Institute for Graduate Studies and Research in Engineering

<sup>1530</sup> BR02

<sup>1531</sup> BR01

Even where social, economic and sustainability benefits were listed as intended outcomes, the organisational set-up was still the emphasis. The details on how organisational practices identify and ensure alignment were missing.

This Brazilian participant mentioned some rules of the collaborative part of this engagement model. It is suggestive of an exclusive form of engagement with limited types of publics:

*“Involving the technology park, we have a set of rules for the participants that may be [interested] in collaborating in our projects. These rules [...] make it mandatory to invest in projects at the university.”* [Male; Brazil; RPO; Energy, ICT<sup>1532</sup>]

In contrast, one of the collaborative mechanisms listed in this approach to engagement featured the use of timebanks instead of remuneration to encourage a community-based and self-sustaining network of collaboration:

*“So it depends on each project. For example, we had a project with the British Council for innovation and entrepreneurship for young people, and we seek to apply our regulations, but also to follow the operational rules that the calls for proposals bring us. As our institution does not have permanent financing, we are also the producers of our own working conditions. The project offers all infrastructure available in the laboratory, training courses, English courses aiming to increase feasibility. And instead of paying us, we created a time bank among the 26 projects. [...] if we were to rely on money-only investment, we could not accomplish a number of things. [...] a community-based economy creates self-sustaining networks. An economy based on innovation and creativity.”* [Male; Brazil; CSO; ICT, Bio-economy<sup>1533</sup>]

### 3.10.5.2 MOTIVES-BENEFITS OF PUBLIC ENGAGEMENT AND COLLABORATION

The *motives-benefits of public engagement and collaboration* sub-theme covers any reference to the motivation behind or the various types of benefits derived from engagement and collaboration. Some of the motives and benefits include understanding attitudes, developing trust, increasing awareness, developing credibility and legitimacy, influencing behaviour change, and improving R&I outcomes.

Name	Description
Motives/benefits of public engagement/collaboration	Any reference to the motivation behind or the various types of benefits derived from engagement (for any/all stakeholders involved) and collaboration

<sup>1532</sup> BR02

<sup>1533</sup> BR07

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Rules: This can include understanding attitudes, developing trust, increasing awareness, developing credibility and legitimacy, influencing behaviour change, improving R&I outcomes.

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Some *motives-benefits of public engagement and collaboration* included being positive in tone and framing engagement as a two-way collaborative process. In general public collaboration was considered a very important tool.

No direct discussion of alignment/outcome was mentioned despite the commentary being about the benefits of collaboration. It seemed the concept of engagement was difficult for the participants to understand.

Interview participants described a myriad of benefits and motivations of collaborative activities, including the building of trust and public acceptability, gaining greater commitment from partners, and ensuring continuity.

There was discussion of public engagement as a tool for more robust results or solutions, and to build trust:

*“[Public engagement] has two virtues. One [...] is the quality of the result that ends up [...] more robust. The other is [...] it generates trust with other actors [with] healthy tension [between them] because they represent different interests, but it leads to the building of trust.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1534</sup>]

This trust can be useful for other actors to enter into a working relationship with an unfamiliar group through an established organisation:

*“There is always [...] some kind of organisation that has been working with that territory or that group of people for a long time, and therefore has some legitimacy to open the door for us.”* [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1535</sup>]

The importance of transparent research and the subsequent responsibility to disseminate knowledge to the community were mentioned:

*“We are not alone in this process. As [a] researcher, I cannot just enter a community to extract information, do my research and go away with the results without transmitting them. From my point of view, the bond to these platforms involves different actors [...] which gives a transparency level.”* [Female; Bolivia; RPO; Bio-economy<sup>1536</sup>]

In this case there was also the benefit of increasing public acceptability:

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<sup>1534</sup> ROU02

<sup>1535</sup> BR05

<sup>1536</sup> BO07

*“[Anonymised organisation] is the most accepted public policy in the history of Uruguay, it has a level of public acceptance of 80 percent, almost 90 percent. It is very high. Society sees [anonymised organisation] with very good eyes and I think those alliances with the education system is what makes it possible.”* [Male, Female; Uruguay; CSO; ICT<sup>1537</sup>]

The collective construction of these projects allowed those involved to feel part of the project resulting in better commitment and outcomes:

*“[...] from the collective construction [...] comes a better final result for both parties because then that provider has a higher level of commitment with us because they feel part of the project and not [just] a simple supplier. We want them to be part of the process. [...] the collective construction with all the actors whether public, private, academia or civil society, is a practice that is not written and that contributes beyond giving them money and receiving a service.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1538</sup>]

Another benefit was how multi-actor collaboration brought continuity to research projects:

*“Our University is interested in signing agreements with other organisations, public or private in order to give continuity to research projects.”* [Female; Bolivia; RPO; ICT<sup>1539</sup>]

There were similar support and continuity motives for a Uruguayan researcher behind collaborative approaches because the universities they worked with continued to use the data after the collaboration was over:

*“We decided to promote more research [...] with the academy. We could have chosen [...] the private sector, for example, a consultant with a laboratory but we prioritized the academy, [...] to generate not only primary data but also analysis of what potential it has, and to draw conclusions. Also to give the academy, in addition to research material for subsequent theses, information that is available to all public. [...] all the information of [anonymised organisation] is on an open web [and] it is also used afterwards for its own development and gives us support.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1540</sup>]

The following is an example of international networks of collaboration made possible by the internationalisation of higher education. Possibly through the connections of a shared language. The interviewee found the benefits of access to up-to-date technology trends and international validation of their research:

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<sup>1537</sup> ROU03

<sup>1538</sup> ROU04

<sup>1539</sup> BO02

<sup>1540</sup> ROU04

*“We have a very solid network in Bolivia and overseas. I studied in Spain and have a strong network with colleagues. I get the latest technology trends and recommendations [from them]. We tell them what we are doing, and they suggest something to be incorporated into the project. It also serves to validate what we are doing with people that are overseas.”* [Male; Bolivia; RPO; ICT<sup>1541</sup>]

### 3.10.5.3 BUILDING SUPPORT NETWORK AND STRATEGIC ALLIANCES

The *building support networks and strategic alliances* sub-theme covers references to opportunities for finding common grounds, building support networks and mutually beneficial relationships, and/or making connections for research and innovation. It also includes references to building relationships and making connections to facilitate useful outcomes for research and innovation. However, simple exchanges of knowledge are not included here.

Name	Description
Building support networks and strategic alliances	Any reference to opportunities for finding common grounds, building support networks and mutually beneficial relationships, and/or making connections for research and innovation.  Rules: This includes references to building relationships and making connections to facilitate useful outcomes for research and innovation (e.g. in terms of support for strategic ambitions). This does NOT include simple exchange/transfer of knowledge.

This section demonstrates the type of networks and strategic alliances valued by participants. Additionally, some of the support networks were aimed towards the alignment part of the definition of public engagement. To work towards alignment co-creative and deeper strategies and practices are aimed at understanding the needs, interests, and approaches of others.

Interview participants offered some semblance of the practices through which they can achieve alignment. An interviewee from Bolivia described their philosophy that is based on building networks of core-group support, operating through co-creative collaboration and their collective commitment to shared interests:

*“In these subjects of co-creation, if you review the Theory U,<sup>1542</sup> one must leave its ego system and pass to the eco-system, which means to leave its own interests and visions and to look for the collective interest.”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1543</sup>]

<sup>1541</sup> BO09

<sup>1542</sup> <https://link.springer.com/article/10.1007/s40926-018-0087-0>

<sup>1543</sup> BO06

Another referred to the alliance that existed in forestry management. Where the communities ensured forest resource utilisation while the company dealt with the administrative processes. This collective arrangement can also be viewed as a form of societal need alignment:

*“Communities in charge of the utilization of forest resources and companies in charge of the administrative process formed a win-win relationship. Until now it continues being a successful experience in forest management [...]”* [Female; Bolivia; RPO; Bio-economy<sup>1544</sup>]

The support of anthropologists in Brazil was indicative of greater efforts to create alliances based on mutual understanding:

*“[...] support through the participation of, for example, anthropologists within this dialogue to have clarity of understanding of what we are talking about, and what the community is understanding of this conversation.”* [Female; Brazil; Industry & Business; Bio-economy<sup>1545</sup>]

Finally, while not necessarily targeted at alignment, building strategic alliances were part of policy in Bolivia:

*“[...] promote the articulation of different groups of actors, mainly external, with whom we are linked and currently working with. [...] and leverage resources for scientific-technological activities”* [Male; Bolivia; RPO, Policy body; Energy<sup>1546</sup>]

Specifically, herein, the policy involved government bodies connecting external groups as part of leveraging resources for research and innovation.

### 3.10.5.4 INTEGRATION OF DIFFERENT DOMAINS AND STAKEHOLDERS

Any reference to the need for better integration and collaboration between different domains and stakeholders (both cross-disciplinary or otherwise) or involvement/participation at different phases of research and innovation are included under the *integration of different domains and stakeholders* sub-theme.

Name	Description
Integration of different domains and stakeholders	Any reference to the need for better integration and collaboration between different domains and stakeholders (both cross-disciplinary or otherwise) or involvement/participation at different phases of R&I.

This section recognises the need for inter-domain and multi-stakeholder integration to respond to some of the world’s increasingly complex problems such as managing rainforests and

<sup>1544</sup> BO07

<sup>1545</sup> BR01

<sup>1546</sup> BO01

treating AIDS. The discussions involved social organisations that highlighted some of the efforts underway towards alignment.

For example, a Brazilian CSO took integration to the level of participatory management in their public engagement:

*“The main innovation is the social technology of participative management of development processes with traditional communities, indigenous populations, and populations of high urban vulnerability, to which we have been working in recent years.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1547</sup>]

Indigenous stakeholder knowledge was an important part of this style of management. They sought to co-develop this strategy through collaboration and allied local knowledge to devolve more control to residents:

*“I think there is a very participatory and collaborative approach to the leadership of the communities involved. I think [...] local information is very important to define project success. We do not arrive with a ready strategy, we come with technical inputs and allied knowledge of several residents, in a collaborative approach, because devolution to the residents is one of the central perspectives of the projects.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1548</sup>]

This complex issue of forest management required multi-stakeholders with an alignment to community needs and value to achieve feasible and societally sensitive results:

*“In this, we invited more than 80 people to participate in the first meeting, which would be a public consultation. [...] to draw the issues we need to invite different actors. We [invited] the State Health Secretariat, the scientific academy, grassroots civil society organisations, among others. [...] in this way we can identify what is feasible to implement, a project that can be executed and approved [with] effective results. [...] a collaborative and consultative stance [brings] a lot of information that translates the issues of communities.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1549</sup>]

Similarly, issues such as AIDS treatment required strong partnerships with CSOs:

*“This notion of treating all people started in Brazil and is recommended by the World Health Organisation [today], which can only be done through a very strong partnership with social organisations.”* [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1550</sup>]

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<sup>1547</sup> BR03

<sup>1548</sup> BR03

<sup>1549</sup> BR03

<sup>1550</sup> BR06

Other indications of alignment efforts include acknowledgement of the need to incorporate social understanding through interdisciplinarity with the social sciences:

*“There were some steps of incorporation of sociologists or contact with a different faculty. It was promoted at the level of the Sectoral Energy Fund, specifically that there were lines that addressed social aspects.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1551</sup>]

In Bolivia, integration was not without its problems. One concern was how partners can be one-sided in their approach. This was the case for:

*“...private-public co-creation of different actors, including NGO or civil societies that supposedly do not have commercial interest.”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1552</sup>]

### 3.10.5.5 DOMAIN RESULTS

#### 3.10.5.5.1 Energy

Out of the following quotes, it was evident that multi-actor approaches were essential for solving complex and interlinked issues in a transitioning energy system. The public engagement aspects appeared problematic due to conflicting societal alignment interests such as R&I and sustainability.

The energy-related research and innovation of an RPO in Brazil attracted funding from the oil and gas industry which contributed a percentage of their turnover to research institutes in Brazil. While in conflict with sustainability, the funding added to research and innovation.

*“It attracts a substantial set of resources and funding for these activities, [...] and many of these collaborations, as in the case of the oil and gas sector, happen under legislation to encourage technological development. [...] There are several incentives, this is one of them [...] companies in this sector are forced to invest a percentage in the universities or research institutes in Brazil [...] in the form of applied projects, whose cooperation is formalized through agreements with the university”* [Male; Brazil; RPO; Energy, ICT<sup>1553</sup>]

An interview from a Uruguayan highlighted the important and widescale multi-stakeholder exchange that produced societal outcomes. The country’s laws promote solar energy development and distribution:

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<sup>1551</sup> ROU02

<sup>1552</sup> BO06

<sup>1553</sup> BR02

*“[...] it was possible to jointly draft laws that promoted the development of solar energy, [and advance] technical regulation [...]” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1554</sup>]*

This same interview participant also alluded to a multi-institutional approach:

*“At the urban level in [the most vulnerable] and deprived neighbourhoods [...] we have an important problem both in the conditions which the service [electricity] is given, [and] the quality-safety side [thereof]. [Therefore], there is an [...] approach that is multi-institutional [...] so that the solution that is found is sustainable.” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1555</sup>]*

Such an approach was employed for meeting the challenges of supplying electricity in disadvantaged neighbourhoods.

### 3.10.5.5.2 Waste Management

In this case regarding a sanitary landfill in Bolivia, working with public interests in mind required strategic agreement between municipalities:

*“In another case, we had a very small municipality that does not have a significant population that could make a sanitary fill just for them. But [we] can, [if] we call to negotiate with its larger neighbours. [Then] we are going to construct a suitable sanitary landfill jointly.” [Male; Bolivia; RPO, CSO; Waste Management<sup>1556</sup>]*

However, an alliance of this nature was complicated, especially when many people operating on different scales were involved. Confusion of roles suggested political difficulties in the waste management domain. The multi-scalar dimensions of the problem were exacerbated by the actions of the national environmental authority by deviation from other municipalities to punish destructive waste management practices:

*“There is a complication because the central government had a role as the national environmental authority. [...] when the municipal governments here in Cochabamba, are making barbarisms with solid waste. The national authority cannot exert its authority because the municipal governments say to them [...] if you constructed a sanitary filling, why don't you construct one for us?*

*[...] it would [have] been clearer that this would be exclusive operative work of the municipal governments, as it is in [...] the Constitution, so that the authority at the departmental and national level, maintains its role and can sanction the municipality [committing] the crimes.*

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<sup>1554</sup> ROU02

<sup>1555</sup> ROU02

<sup>1556</sup> BO03

*[...] They are polluting the rivers and the contamination is perfectly typified as a crime, but they cannot exert their role [...].” [Male; Bolivia; RPO, CSO; Waste Management<sup>1557</sup>]*

The problem appeared to require a certain standardization across scales towards municipalities.

### 3.10.5.5.3 Information and Communications Technology (ICT)

The following quote illustrates the importance of international networks of collaboration in ICT, the benefits included access to up-to-date technology trends and international validation of their research:

*“We have a very solid network in Bolivia and overseas. I studied in Spain and have a strong network with colleagues. I get the latest technology trends and recommendations [from them]. We tell them what we are doing, and they suggest something to be incorporated into the project. It also serves to validate what we are doing with people that are overseas.” [Male; Bolivia; RPO; ICT<sup>1558</sup>]*

Strategic alliances through the use of networks were central to a policy body’s goal of introducing ICT into the public education system. Their engagement made use of a very broad social network. This network was aided by a platform to improve strategic partnerships with different content:

*“We have a nexus with a strategic partner according to the area in which we work. We start from the basis that [anonymised organisation] has a technological platform that enhances and supports learning and strategic partnerships, with people or institutions that work in different content.” [Male, Female; Uruguay; CSO; ICT<sup>1559</sup>]*

Other alliances enabled them to reach further into the education system countrywide:

*“Through this strategic alliance with the National Telecommunications Administration, this quality and access can be provided in all schools and all the centres of the country.” [Male, Female; Uruguay; CSO; ICT<sup>1560</sup>]*

Their engagement made use of teachers who legitimated their attempts to improve the ICT skills of the public:

*“And regarding the development of [...] more transversal projects such as robotics, programming, and digital citizenship [...]. There is always a lot of information available about the projects, [and to] work with teachers as our main allies that validate [the] work. Families are very calm because the teacher involved*

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<sup>1557</sup> BO03

<sup>1558</sup> BO09

<sup>1559</sup> ROU03

<sup>1560</sup> ROU03

*is something very transparent, very much in line with what they do in school, so that is a first thing.*” [Male, Female; Uruguay; CSO; ICT<sup>1561</sup>]

Such alliances were seen as highly successful:

*“[Anonymised organisation] is the most accepted public policy in the history of Uruguay, it has a level of public acceptance of 80 percent, almost 90 percent. It is very high. Society sees [anonymised organisation] with very good eyes and I think that part of those alliances with the education system is what makes it possible.”* [Male, Female; Uruguay; CSO; ICT<sup>1562</sup>]

Herein, success was measured on widescale public acceptance of their ICT educational initiative.

### 3.10.5.5.4 Bio-economy

In Bolivia, successful forest management approaches required support networks between local communities (who utilised forest resources) and companies (who handled administration):

*“Communities in charge of the utilization of forest resources and companies in charge of the administrative process formed a win-win relationship. Until now it continues being a successful experience in forest management [...].”* [Female; Bolivia; RPO; Bio-economy<sup>1563</sup>]

In Uruguay, the accumulation of knowledge through a multi-actor stakeholder network was employed to provide data on needs and demands in the bio-economy sector:

*“We, for example, did all the elaboration of our institutional strategic plan in 2016 and put a strong emphasis on involving more than 350 people outside of [anonymised organisation], who represented the [...] agriculture sector, industrial agriculture sector, government sector, and some private referents, or technicians of recognized prestige. They helped us to identify the needs, demands and most relevant problems in each value chain and each territory of Uruguay. Surely, this process can be improved in the selection of participants and work dynamics, but we understand that it is a robust process, so our work agenda is closely linked to the relevant problems that representative actors told us are the main ones.”* [Male; Uruguay; CSO; Bio-economy<sup>1564</sup>]

The approach helped the organisation to understand the pressing concerns for those who occupied each value chain across Uruguay.

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<sup>1561</sup> ROU03

<sup>1562</sup> ROU03

<sup>1563</sup> BO07

<sup>1564</sup> ROU01

### 3.10.5.6 STAKEHOLDER RESULTS

#### 3.10.5.6.1 Research Performing Organisations (RPO)

There was a strong tendency for research organisations to view engagement in terms of collaboration. Yet, engagement was supposed to imply more than collaboration. The tools of collaboration were frequently referred to by the RPOs in the region. One example pointed to infrastructures of research and engagement in the form of a business incubator and a technology park:

*“COPPE<sup>1565</sup> is an institute within the Federal University of Rio de Janeiro (UFRJ), and part of our logistical infrastructure and innovation is a [business] incubator, a technology park, and an innovation agency.”* [Male; Brazil; RPO; Energy, ICT<sup>1566</sup>]

Another RPO described a customer-service type engagement arrangement:

*“We get involved as an integrated project, in that, users and clients give us requirements and we serve them [...] to provide technology. [...] I try to establish a meeting point, a researcher’s network with professionals, [and] social networks”* [Male; Bolivia; RPO; ICT<sup>1567</sup>]

This arrangement was user- and client-based; aligned with research and social network goals.

#### 3.10.5.6.2 Research Funding Organisations (RFO)

The interviews did not provide any insights for RPOs in the context of the *public engagement* theme.

#### 3.10.5.6.3 Industry & Business

The interviews did not provide any insights for industry and business in the context of the *public engagement* theme.

#### 3.10.5.6.4 Civil Society Organisations (CSO)

CSOs took advantage of collaboration and the increasing technological networking of society to develop engagement-focused projects. One of the CSOs used timebanks to encourage a community-based and self-sustaining network of collaboration:

*“So it depends on each project. For example, we had a project with the British Council for innovation and entrepreneurship for young people, and we seek to*

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<sup>1565</sup> The Alberto Luiz Coimbra Institute for Graduate Studies and Research in Engineering

<sup>1566</sup> BR02

<sup>1567</sup> BO09

*apply our regulations, but also to follow the operational rules that the calls for proposals bring us. As our institution does not have permanent financing, we are also the producers of our own working conditions. The project offers all infrastructure available in the laboratory, training courses, English courses aiming to increase feasibility. And instead of paying us, we created a time bank among the 26 projects.” [Male; Brazil; CSO; ICT, Bio-economy<sup>1568</sup>]*

The innovative approach to engagement established a network of time exchange between different groups. This approach took advantage of the “networked society” to access and utilise different resources other than finance:

*“[...] if we were to rely on money-only investment, we could not accomplish a number of things. [...] a community-based economy creates self-sustaining networks. An economy based on innovation and creativity.” [Male; Brazil; CSO; ICT, Bio-economy<sup>1569</sup>]*

In Brazilian forestry management, public engagement involved new forms of integration with participatory management from indigenous communities:

*“The main innovation is the social technology of participative management of development processes with traditional communities, indigenous populations, and populations of high urban vulnerability, to which we have been working in recent years.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1570</sup>]*

Indigenous stakeholder knowledge was an important part in defining project success:

*“I think there is a very participatory and collaborative approach to the leadership of the communities involved. I think [...] local information is very important to define project success. We do not arrive with a ready strategy, we come with technical inputs and allied knowledge of several residents, in a collaborative approach, because devolution to the residents is one of the central perspectives of the projects.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1571</sup>]*

Some members of the Uruguayan CSO sector viewed the process of engagement differently:

*“[Public engagement] has two virtues. One [...] is the quality of the result that ends up [...] more robust. The other is [...] it generates trust with other actors [with] healthy tension [between them] because they represent different interests,*

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<sup>1568</sup> BR07

<sup>1569</sup> BR07

<sup>1570</sup> BR03

<sup>1571</sup> BR03

*but it leads to the building of trust” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1572</sup>]*

Specifically, the perception that engagement involved building trust with other stakeholders and formed part of creating more robust solutions.

### 3.10.5.6.5 Policy bodies

In Bolivia, a policy body member described connecting multi-actor stakeholders as a core part of its functions:

*“Promote the articulation of different groups of actors, mainly external, with whom we are linked and currently working with. The proceeding of an organisation such as the Vice-Ministry of Science and Technology is to get involved with external groups and to link them up, and leverage resources for scientific-technological activities.” [Male; Bolivia; RPO, Policy body; Energy<sup>1573</sup>]*

This organisation facilitated connections through informal arrangements rather than formal policymaking initiatives.

### 3.10.5.6.6 Interactions between stakeholders

The interactions in this theme lacked the usual pivotal role of the research funder, due to the absence of sufficient commentary from the RFO interview participant. The interactions were instead driven by the CSOs and through one policy body. The stakeholder interactions were all aimed towards improved outcomes through collaboration and engagement.

Confronting social problems – such as climate change, energy transition, forestry management, and in this case, AIDS – required strong partnerships with CSOs:

*“This notion of treating all people started in Brazil and is recommended by the World Health Organisation [today], which can only be done through a very strong partnership with social organisations.” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1574</sup>]*

CSOs also took advantage of relationships of legitimacy established by other CSOs:

*“There is always an NGO or some kind of organisation that has been working with that territory or that group of people for a long time, and therefore has some legitimacy to open the door for us.” [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1575</sup>]*

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<sup>1572</sup> ROU02

<sup>1573</sup> BO01

<sup>1574</sup> BR06

<sup>1575</sup> BR05

A CSO in Uruguay obtained a high level of public acceptance and legitimacy through establishing alliances with policy and state education bodies:

*“[Anonymised organisation] is the most accepted public policy in the history of Uruguay, it has a level of public acceptance of 80 percent, almost 90 percent. It is very high. Society sees [anonymised organisation] with very good eyes and I think that part of those alliances with the education system is what makes it possible”*  
[Male; Female; Uruguay; CSO; ICT<sup>1576</sup>]

A policy member recognised the lasting public effects of research production through collaboration with universities and RPOs:

*“We decided to promote more research [...] with the academy. We could have chosen [...] the private sector, for example, a consultant with a laboratory but we prioritized the academy, [...] to generate not only primary data but also analysis of what potential it has, and to draw conclusions. Also to give the academy, in addition to research material for subsequent theses, information that is available to all public. [...] all the information of [anonymised organisation] is on an open web [and] it is also used afterwards for its own development and gives us support.”*  
[Female; Uruguay; Policy body; Energy, Bio-economy<sup>1577</sup>]

It was implied they would not have such effects if they chose to collaborate with a private organisation.

### 3.10.5.6.7 KEY PLATFORMS, SPACES AND PLAYERS

While the chapter was not revealing of spaces, several key players and platforms were explicitly discussed.

For example, the Avina Foundation was regarded as a key platform to promote solar energy development:

*“An example that I find interesting to mention is [...] that the evaluation is systematized by an NGO, which has a presence in Argentina, which is Avina, a space that we called, for example, Solar Committee or the Uruguayan Association of Renewable Energy, with which all sectors meet, in both the public and private sectors, academia [...] or entrepreneurs to advance the analysis or reflect on a certain technology. In the case of thermal solar, as a result of this exchange, [...] it was possible to jointly draft laws for a law that promoted the development of solar energy, [and advance] technical regulation [...]”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1578</sup>]

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<sup>1576</sup> ROU03

<sup>1577</sup> ROU04

<sup>1578</sup> ROU02

The National Telecommunications Administration was another key player through which large ICT changes were orchestrated on a national level in Uruguay:

*“Through this strategic alliance with the National Telecommunications Administration, this quality and access can be provided in all schools and all the centres of the country.”* [Male, Female; Uruguay; CSO; ICT<sup>1579</sup>]

The Transform Uruguay policy was especially useful in transcending inter-departmental government divisions through collaboration:

*“Transform Uruguay is a policy [...] which enabled us to engage in a greater dialogue with other actors. A Productivity Transformation Competitiveness Secretariat was created by law, as a dependent unit directly from the executive branch with a role [of] primary articulator. [Transform Uruguay] has been a great advantage to facilitate dialogue and articulation with other ministries, because [...] they are seen in a much more transversal way and niches that exist between [them]. [Transform Uruguay] puts initiatives in an umbrella and select those that lead to improved competitiveness and productive transformation.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1580</sup>]

The Uruguayan research council CONICYT was also a key player:

*“[...] Going to CONICYT gives me the possibility to interact with others from another place. [...] seeing other things and trying to be rigorous in the projects that speak of impact [...] and to try to refine those indicators that transcend the micro-projects. When we talk about impact on society, to go [...] there to see if that really is the case, and when it is not – to have the self-critical capacity to change.”* [Male; Uruguay; CSO; Bio-economy<sup>1581</sup>]

CONICYT also served as a space for researchers and CSO members to interact and gain access to other perspectives to think critically about societal impact and how it is measured.

### 3.10.5.7 SUMMARY OF PUBLIC ENGAGEMENT

In general, collaboration tended to dominate these discussions, whereas actual public engagement played a smaller role. Interview participants described a myriad of benefits and motivations of collaborative activities, including the building of trust and public acceptability, gaining greater commitment from partners, and ensuring continuity. The frequent mentions of an ‘ecosystem’ implied that support networks and strategic alliances were salient and valued by all.

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<sup>1579</sup> ROU03

<sup>1580</sup> ROU04

<sup>1581</sup> ROU01

While alignment was generally weak in the overall commentary, some support networks and strategic alliances implied alignment with societal needs and values.

There was also recognition of the need for inter-domain and multi-stakeholder integration to comprehend and respond to some of the world's increasingly complex problems. The participants discussed issues such as managing rainforests and treating AIDS. The co-creative and deeper strategies and practices mentioned are part of working towards alignment aimed at understanding the needs, interests, and approaches of others. Also, the involvement of social organisations and local groups highlights that some efforts are underway towards alignment.

### 3.10.6 OPEN SCIENCE

*Open science* includes both the EU 'open access' pillar and 'open and transparent' process dimension. The open-access pillar definition incorporates the FAIR principle (Findable, Accessible, Interoperable, Reusable). According to the principle, the attributes of open access are the easy accessibility and findability of data, shareability of data without reconfiguration. Open access is intended to encourage collaboration; catalyse innovation; be cost-effective, facilitate productive dialogue; and improve research quality.<sup>1582</sup>

The 'open and transparent' dimension involves inclusivity and the provision of meaningful information at all stages of the process. All actors should be encouraged and enabled to engage with, discuss, and scrutinise science and technology. This will empower them to make more informed decisions. Openness and transparency should develop a multiple-way dialogue with all relevant parties, foster accountability and public trust. This R&I process then includes those that are not normally part of science and technology systems.

These definitions outline the boundaries of the theme of open science within which the interviews and analyses were conducted. Out of the 10 codes identified for the theme, the four specific codes that stood out through a total count of the relevant codes for all countries included in the interviews are: *levels and limits of open access* [code 46]; *lack or uncertainty of policy* [code 50]; *risks-disadvantages associated with open data access* [code 51]; *motives-benefits of open access and data* [code 52].

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
45: Open Science				
46: Level and limits of open access	11	11	6	28
47: Data protection	2	1	7	10
48: Data accessibility	11	3	4	18

<sup>1582</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

49: Organisational norms and practices	4	5	1	10
50: Lack or uncertainty of policy	11	4	2	17
51: Risks-Disadvantages associated with open data-access	10	7	4	21
52: Motives-Benefits of open access and data	18	8	5	31
76: Transparency	2	6	13	21
77: Accountability	0	1	5	6
106: Financial constraints and considerations	20	10	4	34

For this region, the code count of 34 for *financial constraints and considerations* places it top of the code count for this theme. *Transparency*, with 21, shares a joint fourth spot. However, to improve comparability with other regions these are excluded based on not being in the top four when the count is for all regions.

The next four sections provide details about each of the four codes and descriptions of the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders (including key platforms, spaces and players) are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme of *open science*.

### 3.10.6.1 LEVELS AND LIMITS OF OPEN ACCESS

The *levels and limits of open access* sub-theme refer to different rules, procedures or criteria for open access/data needed at different levels of the organisation.

Name	Description
Levels and limits of open access	<p>Any reference to limits on open access or different rules, procedures or criteria for open access/data needed at different levels of the organisation (or beyond).</p> <p>Rules: This can include any references to sharing only particular forms of data (e.g. sharing results and outcomes, not data or vice versa; sharing policy-driven research, not market-driven research, sharing with key stakeholders and not the general public, etc.)</p> <p>This should also be distinguished from risks/disadvantages of open access/data, which are concerned with negative consequences, while this includes the limits that need to be applied in certain specific instances to open access/data.</p>

The main limits to the open distribution of data were competition-based, legislative restrictions, public sensitivity of the data, and data ownership. A few examples also hinted at the importance of open access for more robust and informed outcomes, public trust, and inclusivity. However,

two interview participants raised concerns about the political implications of making some data public. Another participant was also apprehensive over national and economic consequences. Intellectual property rights appeared to be prioritised before open access across the interviews. There were conflicts in whether to release information for the public good or keep it for private gain:

*“[...] There is also another debate on the issue of open access which is the extent to which a researcher from an institution, funded by public money, must make available its final products without compromising its strategic contribution in terms of career, identity and ethics. [...] because our position is funded by the public power, all citizens have the right to created knowledge, whether in the classroom or in publications. The university is part of the executive power of a country”* [Female; Brazil; RPO; Bio-economy<sup>1583</sup>]

One researcher from Bolivia mentioned Research Gate as an important open access database. However, the database’s institutional email requirements limit access to affiliated researchers:

*“There is open access by registering [on] Research Gate network [...] it also allows access to more direct information with researchers who are working in certain topics and areas. Research Gate is very similar to Facebook, but only for scientists from institutions. They require an institutional mail. If you do not have this e-mail they are not going to accept your participation. Therefore, it is not open [to] the entire world. But it is a good nexus where you can work with researchers in various interesting subjects; it is a very interesting network of open access”* [Male; Bolivia; RPO; Energy<sup>1584</sup>]

A member of a research organisation motivated why they limit their access based on the risk of plagiarism:

*“Part of what we do is the know-how of PROINPA and if it is open we take the risk that people plagiarize what we are doing; so, this is also a risk. [...] This is a policy of PROINPA and there [is information] that is open access. But the topic of formulation and other things [...] are reserved data. It is because of institutional policy in order to protect that.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1585</sup>]

The role of the funder imposing limitations because of commercial value was a recurring theme across the interviews:

*“In some of the sponsored projects [...], the sponsor imposes data disclosure restrictions. Given that the project has a concrete potential at commercial value.*

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<sup>1583</sup> BR04

<sup>1584</sup> BO04

<sup>1585</sup> BO05

*Hence, it is another source where you may find limitations in the possibility of [open data access].” [Male; Brazil; RPO; Energy, ICT<sup>1586</sup>]*

The following researcher took a normative position based on whether it was private or public research. They argued that publicly funded projects should deliver open access for public good but private companies could use their discretion. They also expressed a need for more access to international research publications:

*“In the case of a public contract, I think there would be a norm [...] that information should be in a public regional repository, [...]. I am talking about Latin America, Ibero-America. And why not in the world? Because, for example, the USA has closed policies with respect to [its] research publications, and the same occurs in Europe.*

*[...] In the particular case of financed research it must be mandatory to put [the data] in a public repository because it has been generated as a public good. [...]*

*On the other side, if knowledge is generated by a private company it would have to be what the private company says. [...]” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1587</sup>]*

The public good was also considered by an interview participant from a Brazilian policy body. There was discussion of openness to negotiations on data sharing involving companies to encourage innovation:

*“Our intention is [to] ensure that the population has access to this knowledge generated [clearly], but at the same time, we are open to important negotiations for companies [that do] open innovation. That is, [to] take advantage of the intellectual knowledge that is protected by some companies, and to combine our knowledge by having a rational way of dividing these issues.” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1588</sup>]*

This participant recognised the benefits of public knowledge transfer to improve access to cost-effective medicine:

*“It really does not make sense to have medicine that saves [...] hundreds of thousands of dollars. In this, we are pursuing technology transfer partnership strategies to ensure that these new advances reach the population.” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1589</sup>]*

He also emphasised the importance of policy in price control and reduction in the pharmaceutical industry:

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<sup>1586</sup> BR02

<sup>1587</sup> BO06

<sup>1588</sup> BR06

<sup>1589</sup> BR06

*“A Ministry of Health policy has secured a market for public-private partnerships for up to 10 years as long as all technology is transferred. If we follow the evolution of the price of the drugs that have had this policy in the last six years, [...] more expensive drugs [...] have lowered their final price by around 55%, while those who did not have this policy did not have a [price reduction], and in some cases, the price even rose.” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1590</sup>]*

Other levels of access appeared to be regulated by organisational approval:

*“Interviewer: Does anybody force you to put your data in a [knowledge]base?”*

*Interviewee: [...] Yes, in the CATIE [database], it is not forced but each researcher must leave a copy of its data [...].” [Female; Bolivia; RPO; Bio-economy<sup>1591</sup>]*

*“Interviewer: Is it an internal norm?”*

*Interviewee: Correct, for example, if you enter the Web and look for the database of Fátima Baqueros’ research, it is not there. But if you make contact with the computer science department of CATIE, they can offer the information to you” [Female; Bolivia; RPO; Bio-economy<sup>1592</sup>]*

Political and economic ramifications featured in some of the CSO open access comments. This included the possible political dangers of premature data being misused for national interests and fearmongering. He also described the conflicting interests between the democratic imperative and commitments to scientific advancement:

*“Philosophically I would say that I share the idea that knowledge [should be] available as open as possible and that anyone anywhere in the world can access knowledge to advance, [...] and to share it in a democratic and transparent way.*

*[...] if I have a publication [...] which I know could affect the economy of my country and I know that those who are going to use it are not concerned about the ethics and the advancement of knowledge [but] how to damage my country image [...], I like not to be naive. [...] it does not seem right to hide the results of the research, but I like to take some time to process those results and to try to be beneficial to the community and not to be naive.*

*[...] I think that it is necessary to analyse case by case and in some cases, it is necessary to analyse if the results [...] are rigorous and to take some measurement around those results. [...] The dimension of research is one dimension, but [we] also have the economic dimension of the country, the social dimension and the consequences generated by a particular publication.*

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<sup>1590</sup> BR06

<sup>1591</sup> BO07

<sup>1592</sup> BO07

*Interviewer: I understand, and do you think of an example of these cases in which you think you have to be more cautious or wait a bit? Can you think of a concrete example while we talked about you thinking about a particular case?*

*Interviewee: Yes, the meat sector is very important and there was an investigation by a group of researchers that found certain bacteria and wanted to publish it straight away. [...] the industry said, "wait a little bit, first you have to analyse it well, then you will see where the problem is and if we can solve it shortly". Because it was not a dramatic issue [...], that information should not come out that way because it was going to generate panic and to affect a very important sector of the country. So, there was an agreement with the researchers to process that information, to analyse it well, to take action and after a while to make it public."*  
[Male; Uruguay; CSO; Bio-economy<sup>1593</sup>]

CSOs restricted the release of data that might serve a political or agenda-driven position. They also stress the importance of scientific publication before considering other publications:

*"In what was unanimous in all sectors of the council [...] submitting the results to a political agenda, prior to its communication in a scientific publication, [was in no way acceptable]."* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1594</sup>]

The following CSO member said that certain CSO records are open but that vulnerable data about teachers and children need to be anonymised. The assurance of anonymity also ensures more honest answers when prompted for feedback:

*"Yes, I completely agree with publishing everything that is related to our management and what [anonymised organisation] gives to society. We publish it as it is in our records. Everything is very open. I have my reluctance when the information is from a third-party, [...] for example, feedback from teachers, I consider part of their honesty, [...] due to the anonymity that we assure them because they are in a situation of vulnerability [...]. The students are minors [...] and consent must be given by their families and it is also a very vulnerable situation [with] ethical questions of competition and ranking [at stake]."* [Male, Female; Uruguay; CSO; ICT<sup>1595</sup>]

The Uruguayan interviews shifted between withholding personal and business data but publishing data that was processed for open publication:

*"There is a public policy, if I am not mistaken, of open data [...]. There is a law [personal data law] that [...] does not allow the disclosure of personal data. [...] It is our duty to publish certain information, [while] respecting privacy and [...]"*

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<sup>1593</sup> ROU01

<sup>1594</sup> ROU02

<sup>1595</sup> ROU03

*the associated risks of publishing personal or business information.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1596</sup>]

Across the interviews, there was a clear perception of the limits to what could be achieved through implementing open access.

### 3.10.6.2 LACK OR UNCERTAINTY OF POLICY

The *lack or uncertainty of policy* sub-theme includes any reference to respondents’ uncertainty about government and supra-institutional policy beyond their organisation. Therefore, any discussion on organisational norms and practices are not included here.

Name	Description
Lack or uncertainty of policy	<p>Coding for any reference to respondent’s uncertainty about govt/institutional policy or a lack of govt/institutional policy for open access and open data (beyond the organisation).</p> <p>Rules: This does NOT include any discussion on organisational norms and practices (both formal and informal) (coded above).</p>

Many participants expressed either that policy does not exist or that they are unsure of it. For example, the following participant connected the lack of policy to lithium not trading as a commodity in Bolivia:

*“[...] lithium is not a commodity [...] on the stock exchange that [has] transparent information. [...] Therefore, the information in most cases is handled [approximately], as, in the case of the prices, there is no transparency [...].”*  
[Male; Bolivia; RPO, Policy body; Energy<sup>1597</sup>]

Bolivia was viewed as behind other smaller countries because of their lack of policy framework on open access:

*“[...] there are many things that we don’t have, that other countries have. We have still not crawled, and it would be as to decide to jump when we have [not even] obtained a unique office of proceedings, nor electronic government or stuff like this”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1598</sup>]

This industry interviewee noted that there was no policy implemented and no in-depth information available:

<sup>1596</sup> ROU04

<sup>1597</sup> BO01

<sup>1598</sup> BO06

*“[...] in-depth information does not exist, because there is not an established policy.” [Male; Bolivia; Industry & Business; Waste Management<sup>1599</sup>]*

Another Bolivian based researcher said that there was no policy at government or institutional level:

*“Not one, neither governmental nor [institutional]. If I use open access, there is nothing that tells me that I should not do it or that tells me I should not use any research result. The only limiting factor is to look for the quality of the publication.” [Male; Bolivia; RPO; ICT<sup>1600</sup>]*

For ICT in Bolivia, regulations were in the process of being drawn up for patent options:

*“There is not, there are just major norms. Other norms would have to be developed with the Informatics Research Institute at the UMSA, with specific regulation [for patents]. This regulation work has already started.” [Female; Bolivia; RPO; ICT<sup>1601</sup>]*

This researcher stated that a transparency policy was applied at the public access level but implied an individualised approach on a research generation level:

*“[...] If you are talking about information to be for public access, yes it is; but if you are talking [about] a protocol for research generation, [then] no. Each researcher has [their] own approach” [Female; Bolivia; RPO; Bio-economy<sup>1602</sup>]*

For one Brazilian interview participant, despite the absence of policy, other organisations were engaged in facilitating open access:

*“[...] we have facilitating elements. For example, CAPES is a major graduate funder in Brazil and one of the requirements for maintaining funding is that all [theses] are made publicly available. So it's a [...] compulsory mechanism for opening information.” [Male; Brazil; RPO; Energy, ICT<sup>1603</sup>]*

One Uruguayan interview participant stated that no government policy existed:

*“[...] But one of the issues that concern us, at the level of publications, is to have clear practices to determine when a thing is confidential [or] open, and who will decide that. [...] how to establish policies and governance bodies that are credible and respected by the majority and that define guidelines that go from case to case; [...]h but who solves these cases is not clear today, neither at the policy level nor at the level of governance bodies.” [Male; Uruguay; CSO; Bio-economy<sup>1604</sup>]*

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<sup>1599</sup> BO08

<sup>1600</sup> BO09

<sup>1601</sup> BO02

<sup>1602</sup> BO07

<sup>1603</sup> BR02

<sup>1604</sup> ROU01

### 3.10.6.3 RISKS-DISADVANTAGES ASSOCIATED WITH OPEN DATA ACCESS

The *risks-disadvantages associated with open data access* sub-theme includes references to the negative consequences of open data access. This may relate to but is not limited to: IP rights, patents, commercially sensitive data, competitive advantage, data distortion, financial concerns, data overload, misuse or shortcomings and negative perceptions attached to open-access journals.

Name	Description
Risks/Disadvantages data/access	Any reference to the negative consequences/disadvantages of having associated with open data open access (e.g. in terms of IP rights, patents, commercially sensitive data, competitive advantage, data distortion, financial concerns, data overload, misuse/shortcomings or negative perceptions attached to open-access journals, etc.).

Intellectual property, as in many other sub-themes, was shown to conflict with open access for this sub-theme:

*“[...] some parts of the knowledge being generated is important [and regarded as] intellectual property.”* [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1605</sup>]

Intellectual property was necessary for the business model of this company to ensure positive business impact:

*“We mobilize philanthropic resources to invest in research that can solve social and environmental problems in the form of structured business to generate and escalate results. And therefore, we seek to protect the intellectual property generated in these processes [...]. However, we are working with this concept of [business impact]. Businesses that [have to] turn around [positive] revenue and costs for the enterprise to continue.”* [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1606</sup>]

Consequently, open access was regarded as a financial threat to researchers taking an entrepreneurial path towards innovation:

*“[...] for an academic career researcher to take this path of innovation and entrepreneurship [they] often need financial return. These researchers possess a certain stability and clarity with [an] academic career: they need to publish, they guide students, they know prospective salaries. [...] when assuming the role of entrepreneur, the research has to leave its comfort zone and take risks. [...] this*

<sup>1605</sup> BR06

<sup>1606</sup> BR05

*effort deserves a financial reward.” [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1607</sup>]*

A potential risk noted was others generating profit from someone else’s data against the university’s regulations:

*“Interviewer: When you put your data in an open base, is that meaning that other faculty members can use your data to get profit? Is that correct?”*

*Interviewee: If they respect authors and [...] mention the source of results. However, when they generate profit with those results that is an ethic fault. Profit is not possible when those results belong in part to the university, and the research authors. This is under university norms and regulations.” [Female; Bolivia; RPO; ICT<sup>1608</sup>]*

A similar concern was noted by a Bolivian participant, concerning innovative solutions that are “copied” by other organisations when developing a competing commercial product:

*“[On] the formulation topic, one places the [...] ingredients, how [it] is going to affect our microorganism [...] and for that, mixtures and combinations are tested. To arrive at that point is complicated, and then a person can copy [the formulation] without effort; commercialize a product that has been developed for about 2 or 3 years of testing [...].” [Female; Bolivia; RPO, CSO; Bio-economy<sup>1609</sup>]*

In Uruguay, there were also concerns of open access and its risks to the national economy:

*“Philosophically I would say that I share the idea that knowledge [should be] available as open as possible and that anyone anywhere in the world can access knowledge to advance, [...] and to share it in a democratic and transparent way.*

*[...] if I have a publication [...] which I know could affect the economy of my country and I know that those who are going to use it are not concerned about the ethics and the advancement of knowledge [but] how to damage my country image [...], I like not to be naive. [...] it does not seem right to hide the results of the research, but I like to take some time to process those results and to try to be beneficial to the community and not to be naive.*

*[...] I think that it is necessary to analyse case by case and in some cases, it is necessary to analyse if the results [...] are rigorous and to take some measurement around those results. [...] The dimension of research is one dimension, but [we] also have the economic dimension of the country, the social dimension and the consequences generated by a particular publication.*

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<sup>1607</sup> BR05

<sup>1608</sup> BO02

<sup>1609</sup> BO05

*Interviewer: I understand, and do you think of an example of these cases in which you think you have to be more cautious or wait a bit? Can you think of a concrete example while we talked about you thinking about a particular case?*

*Interviewee: Yes, the meat sector is very important and there was an investigation by a group of researchers that found certain bacteria and wanted to publish it straight away. [...] the industry said, "wait a little bit, first you have to analyse it well, then you will see where the problem is and if we can solve it shortly". Because it was not a dramatic issue [...], that information should not come out that way because it was going to generate panic and to affect a very important sector of the country. So, there was an agreement with the researchers to process that information, to analyse it well, to take action and after a while to make it public."*  
[Male; Uruguay; CSO; Bio-economy<sup>1610</sup>]

The experience of open access becoming an inequitable one-sided sharing platform was noted by one participant emphasising the need for data protection:

*"What is going to be public, what are we going to make protected for the network, what is going to be private? We [made] this decision in 2018 because we realized that we shared data at the public level, and the other people did not share their data [...]."* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1611</sup>]

Open access publishing, as opposed to publishing in recognised and respected journals, was viewed as a lesser form of publishing that might affect the performance ranking of researchers:

*"This is very common among scientist, you only publish in the main journals, [without] open access. [...] to publish in those main editorials or [journals] is so important that, for tradition, you have to publish there. If you do not publish there, you do not qualify within their research ranking. This is an issue of the universities."* [Male; Bolivia; RPO; ICT<sup>1612</sup>]

An additional risk was the breaching of agreements with the government:

*"Producing waste generation maps [involved substantial] exchange with the Ministry [government], and they said: 'with that information, you could say who the company [is] and give information about it' and that was not allowed."*  
[Female; Uruguay; Policy body; Energy, Bio-economy<sup>1613</sup>]

Herein the concern was that agreements with governments had conflicted with perceived obligations for publishing data transparently. It was noted that sometimes risks had been taken to ensure the best transparency standards despite concerns about anonymity.

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<sup>1610</sup> ROU01

<sup>1611</sup> BO06

<sup>1612</sup> BO09

<sup>1613</sup> ROU04

### 3.10.6.4 MOTIVES-BENEFITS OF OPEN ACCESS AND DATA

Any reference to benefits or motivations of open access, such as influencing public opinion, furthering research and policy, improved visibility, allowing corrective measures, etc. are covered by this *motives-benefits of open access and data* sub-theme.

Name	Description
Motives/Benefits	of Any reference to benefits of open access, such as influencing public opinion, furthering research and policy, improved visibility, allowing corrective measures, etc.

Across the interviews, this sub-theme included benefits to research quality and output as a consequence of open access. An important development involved reducing costs, and the exclusionary effects thereof. Righting the moral contradiction in privatising publicly funded research was also mentioned.

Most of the benefits-motives revolved around the improved quality of research and research output for example how open access prevented redundant research:

*“I believe that it is an obligation of the institutions [...] to make available knowledge to society, and mainly to other researchers because very often we want to rediscover the gunpowder when [...] this research already [...] exists.”* [Male; Bolivia; RPO; Energy<sup>1614</sup>]

Sharing data was also said to improve the quality and rigour of the analysis because of wider peer review of one’s methodologies and outcomes:

*“[...] it seems to me that the bases that give rise to analysis [...] have to be shared because it is a way for other researchers to see if those models are sustainable, accurate, and rigorous or not.”* [Male; Uruguay; CSO; Bio-economy<sup>1615</sup>]

Open access also enabled mass collaboration between researchers and organisational networks:

*“For a researcher, there is wealth when accessing this information. This link that I have through the Bio-economy network and climatic change with a number of researchers is harnessed by thousands. That is the subject of information access to meet the goals I have [...].”* [Female; Bolivia; RPO; Bio-economy<sup>1616</sup>]

Open access magnified the benefits of research and innovation as others may be inspired or seek to replicate their approach in other contexts:

<sup>1614</sup> BO04

<sup>1615</sup> ROU01

<sup>1616</sup> BO07

*“We do not want to have the project locked; we always want others to copy it. Where others are influenced, [...] the benefits are magnified, right?”* [Female; Brazil; Industry & Business; Bio-economy<sup>1617</sup>]

Open access was also helping CSO researchers to stay updated with the latest contributions in their research field. This enabled better sharing of research outputs for the benefit of the knowledge network. However, access to comprehensive literature reviews were often restricted by pay-walls:

*“I normally review literature for all my research work. Unfortunately, one has to pay for having access to [...] the literature. So, one cannot access those documents, and this limits development [...].”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1618</sup>]

Open code (e.g. Java) was discussed by another Bolivian researcher as having demonstrated its value to research worldwide:

*“As a researcher access to data, generated in the world, is very important [...]. You [can] not [do] research if you [do] not know what is being done in the rest of the world. With the current technology, we have [...] a lot of open sources, from journals, software, and articles that are helping to improve the process of scientific research. In the technological case [...] we have Linux and [other] platforms of open source and open code software. In the computational field, there is a revolution [...] colleagues all over the world use open code language [...] Java for our scientific work. I am sure that if someone has a switch and turns this off, the research [in] the world would stop.”* [Male; Bolivia; RPO; ICT<sup>1619</sup>]

The same participant continued by drawing parallels between the provision of open code to the provision of open access publications which reiterated previous points made by another Bolivian researcher (BO05):

*“Open [access] in relation to publications is very important because this means that the article is available without having to pay any editorial costs. When you have to pay access to an article [...] it is very expensive. This problem has been recognized by the scientific community and there is a [worldwide] movement to support open access. [...] the European Union project, H2020, enforces that all the results of the projects funded through European funds must be published by open access sources. So, I am convinced that this is a line that we have to follow.”* [Male; Bolivia; RPO; ICT<sup>1620</sup>]

The elimination of access costs would particularly benefit “underdeveloped countries” as they were deprived of access in comparison to the Global North:

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<sup>1617</sup> BR01

<sup>1618</sup> BO05

<sup>1619</sup> BO09

<sup>1620</sup> BO09

*“I believe that the subject on Open Access has been defined; [...] Europe already has 2025 [as the year] that practically all the publishing houses and journals must be in an Open Access format. That benefits, in a significant form, the researchers mainly in underdeveloped countries, where we do not have much development of knowledge.”* [Male; Bolivia; RPO; Energy<sup>1621</sup>]

Finally, open access could remove the contradiction of privatising publicly funded research:

*“[...] the access to open data, is a little bit contradictory [...]. It is not fair that all the scientific information, that is supported by public funding, is privatized and public access to that information is restricted”* [Male; Bolivia; RPO, Policy body; Energy<sup>1622</sup>]

*“If this was paid with public funds, why [can] that information [not] be of public access [...]? Everything coming from public funds would have to be public. [If] the funds are private, it enters under the authority of the private entity [...].”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1623</sup>]

There was a clear moral dilemma with regard to the relationship between the distribution of benefits and the funding sources.

### 3.10.6.5 DOMAIN RESULTS

#### 3.10.6.5.1 Energy

The following participant ascribed the lack of transparency to Lithium not trading as a commodity in Bolivia:

*“[...] lithium is not a commodity [...] on the stock exchange that [has] transparent information. [...] Therefore, the information in most cases is handled [approximately], as, in the case of the prices, there is no transparency [...].”* [Male; Bolivia; RPO, Policy body; Energy<sup>1624</sup>]

How energy was traded on the market directly shaped how open the sector and policies were to engage with *Open Science*.

#### 3.10.6.5.2 Waste Management

For this participant, there was no policy or in-depth information available in Bolivia for waste-based data:

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<sup>1621</sup> BO04

<sup>1622</sup> BO01

<sup>1623</sup> BO06

<sup>1624</sup> BO01

*“[...] there is information [...] on how many old rubber tires enter each department; how many tires they gather of each garbage dump are open access [information]. But more in-depth information does not exist, because there is not an established policy.”* [Male; Bolivia; Industry & Business; Waste Management<sup>1625</sup>]

For a CSO in Uruguay, they risked tension with their government in publishing some of their data on the waste management domain:

*“Producing waste generation maps [involved substantial] exchange with the Ministry [government], and they said: ‘with that information, you could say who the company [is] and give information about it’ and that was not allowed.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1626</sup>]

### 3.10.6.5.3 Information and Communications Technology (ICT)

In Bolivia, regulations were in the process of being drawn up for patent options in ICT developments:

*“There is not, there are just major norms. Other norms would have to be developed with the Informatics Research Institute at the UMSA, with specific regulation [for patents]. This regulation work has already started.”* [Female; Bolivia; RPO; ICT<sup>1627</sup>]

Another Bolivian participant spoke at length on the value of open access concerning ICT research worldwide. He noted that the efficient and effective generation of knowledge was facilitated by the sharing of data:

*“As a researcher access to data, generated in the world, is very important [...]. You [can] not [do] research if you [do] not know what is being done in the rest of the world. With the current technology, we have [...] a lot of open sources, from journals, software, and articles that are helping to improve the process of scientific research.”* [Male; Bolivia; RPO; ICT<sup>1628</sup>]

He went on to acknowledge that the technological capabilities provided by ICT technologies enable domain-wide innovations. Computational developments, which are shared through open coding software, was a key part of the scientific community’s development:

*In the technological case [...] we have Linux and [other] platforms of open source and open code software. In the computational field, there is a revolution [...] colleagues all over the world use open code language [...] Java for our scientific*

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<sup>1625</sup> BO08

<sup>1626</sup> ROU04

<sup>1627</sup> BO02

<sup>1628</sup> BO09

*work. I am sure that if someone has a switch and turns this off, the research [in] the world would stop.*” [Male; Bolivia; RPO; ICT<sup>1629</sup>]

This same participant also discussed how costs of purchasing were inhibitive to the development of research and innovations:

*“Open [access] in relation to publications is very important because this means that the article is available without having to pay any editorial costs. When you have to pay access to an article [...] it is very expensive. This problem has been recognized by the scientific community and there is a [worldwide] movement to support open access. [...] the European Union project, H2020, enforces that all the results of the projects funded through European funds must be published by open access sources. So, I am convinced that this is a line that we have to follow.”* [Male; Bolivia; RPO; ICT<sup>1630</sup>]

Although insights for this ICT domain are mostly drawn from this one Bolivian ICT participant there are several interesting questions and issues raised which are supported by participants from other domains.

#### 3.10.6.5.4 Bio-economy

The interviews did not provide any insights for this bio-economy domain, in the context of the *Open science* theme.

### 3.10.6.6 STAKEHOLDER RESULTS

#### 3.10.6.6.1 Research Performing Organisations (RPO)

The main dimensions of open access that RPO participants discussed were the means of access and the organisational approaches to *Open Science*. The dialogic aspects of the open access definitions were not commented on and one participant denied societal benefits from the practice:

*“Information is shared, documentation is shared, a lot of data and knowledge is shared, but this is not directly related to satisfying social needs.”* [Male; Bolivia; RPO, Policy body; Energy<sup>1631</sup>]

However, the other participants recognised several benefits from engaging in open access. An interview participant from Bolivia acknowledged the expansive effects on research by making their research and innovation accessible:

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<sup>1629</sup> BO09

<sup>1630</sup> BO09

<sup>1631</sup> BO01

*“We have [...] publications, abstracts and also an open publication [on] the web so that any person all over the world has access to all the information. [...] We have received tens of thousands of visits and the publications that we did through their links have been reported in thousands. The publications [...] became the greater satisfaction because of the information that we have generated.”* [Male; Bolivia; RPO, CSO; Waste Management<sup>1632</sup>]

Other benefits were improved knowledge resources for researchers in developing countries:

*“I believe that the subject on Open Access has been defined; [...] Europe already has 2025 [as the year] that practically all the publishing houses and journals must be in an Open Access format. That benefits, in a significant form, the researchers mainly in underdeveloped countries, where we do not have much development of knowledge.”* [Male; Bolivia; RPO; Energy<sup>1633</sup>]

And preventing duplication of the research development process:

*“I believe that it is an obligation of the institutions [...] to make available knowledge to society, and mainly to other researchers because very often we want to rediscover the gunpowder when [...] this research already [...] exists.”* [Male; Bolivia; RPO; Energy<sup>1634</sup>]

This issue of open access allowing for better reproducibility was also raised by a Brazilian RPO participant with a focus on transparency being at stake:

*“The more transparency, and consequently reproducibility, the better the level of results obtained with research.”* [Male; Brazil; RPO; Energy, ICT<sup>1635</sup>]

Open access was also considered necessary for complicated environmental problems. Open access was regarded as part of the solution in distributing information for countries that were struggling to deal with the environment:

*“For a researcher, there is wealth when accessing this information. This link that I have through the Bio-economy network and climatic change with a number of researchers is harnessed by thousands. That is the subject of information access to meet the goals I have [...].”* [Female; Bolivia; RPO; Bio-economy<sup>1636</sup>]

*“Considering all the complications that are in the environment, open access would be a great solution so that [...] developed technology can reach more people because if we do not have access it is not worth [developing the technology] or it stays in small niches.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1637</sup>]

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<sup>1632</sup> BO03

<sup>1633</sup> BO04

<sup>1634</sup> BO04

<sup>1635</sup> BR02

<sup>1636</sup> BO07

<sup>1637</sup> BO05

One participant pointed to their RPO policy and the different levels where open access was allowed. The RPO was engaged with other institutions that restricted data sharing. These types of integrative and collaborative arrangements meant that other actors influenced the organisation's open access:

*“Part of what we do is the know-how of PROINPA and if it is open we take the risk that people plagiarize what we are doing; so, this is also a risk. [...] This is a policy of PROINPA and there [is information] that is open access. But the topic of formulation and other things [...] are reserved data. It is because of institutional policy in order to protect that.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1638</sup>]

Another organisation indicated that there were access issues that might limit the operationality of the FAIR open access principles. This involved contact with the RPO's institution before information can be accessed:

*“Interviewer: Does anybody force you to put your data in a [knowledge]base?”*

*Interviewee: [...] Yes, in the CATIE [database], it is not forced but each researcher must leave a copy of its data [...].”* [Female; Bolivia; RPO; Bio-economy<sup>1639</sup>]

*“Interviewer: Is it an internal norm?”*

*Interviewee: Correct, for example, if you enter the Web and look for the database of Fátima Baqueros' research, it is not there. But if you make contact with the computer science department of CATIE, they can offer the information to you”* [Female; Bolivia; RPO; Bio-economy<sup>1640</sup>]

The approach to open access was generally decided by the researcher or the organisation:

*“[...] If you are talking about information to be for public access, yes it is; but if you are talking [about] a protocol for research generation, [then] no. Each researcher has [their] own approach”* [Female; Bolivia; RPO; Bio-economy<sup>1641</sup>]

Researchers, RPOs, and their institutions were open to access, but institutional ownership and authorship were prioritised in the context of profit:

*“Interviewer: When you put your data in an open base, is that meaning that other faculty members can use your data to get profit? Is that correct?”*

*Interviewee: If they respect authors and [...] mention the source of results. However, when they generate profit with those results that is an ethic fault. Profit is not possible when those results belong in part to the university, and the research*

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<sup>1638</sup> BO05

<sup>1639</sup> BO07

<sup>1640</sup> BO07

<sup>1641</sup> BO07

*authors. This is under university norms and regulations.” [Female; Bolivia; RPO; ICT<sup>1642</sup>]*

A major concern for some researchers was the effect of publishing in open access journals on the ranking of their research:

*“This is very common among scientist, you only publish in the main journals, [without] open access. [...] to publish in those main editorials or [journals] is so important that, for tradition, you have to publish there. If you do not publish there, you do not qualify within their research ranking. This is an issue of the universities.” [Male; Bolivia; RPO; ICT<sup>1643</sup>]*

The closed-access journals were more generally associated with higher impact evaluations with a better influence on the researcher’s career.

*“I seek journals of high impact [...] with a proven track [record] of outstanding quality within the publishing ranking. This is [the] danger [of] open access – it is an advantage because you have immediate and free access to publications, but it is a disadvantage because they are not of good quality. [...] I publish through open access, but I am selective [in] choosing the journals because there are journals of low quality and we have to avoid them.” [Male; Bolivia; RPO; ICT<sup>1644</sup>]*

### 3.10.6.6.2 Research Funding Organisations (RFO)

The two RFOs did not provide much discussion on open access as part of funding arrangements.

Interestingly, one RFO participant explicitly responded by stating that it was not relevant to what they do:

*“Particularly for my work, no. I would say that [open access to publications is not] relevant.” [Female; Uruguay; RFO; Energy, Waste Management, ICT, Bio-economy<sup>1645</sup>]*

This is certainly noteworthy, considering that in general there is a relatively generic and somewhat passive agreement to the importance of open access principles.

### 3.10.6.6.3 Industry & Business

The normative position from this industry member suggested different levels of access indicating that some knowledge must be public, and some should remain private:

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<sup>1642</sup> BO02

<sup>1643</sup> BO09

<sup>1644</sup> BO09

<sup>1645</sup> ROU05

*“In the case of research [for a University or NGO], we maintain an ethical principle to do what the contract and protocol of the research. But when [the] research work [is] ours we segment it in three levels. There [...] must be knowledge that should be public, the opportunity must be public; knowledge should be protected because it is part of the network members; and knowledge should remain private for the entities or actors who took part in the project.” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1646</sup>]*

Intellectual property was considered necessary for the business model of research and innovation:

*“We mobilize philanthropic resources to invest in research that can solve social and environmental problems in the form of structured business to generate and escalate results. And therefore, we seek to protect the intellectual property generated in these processes [...]. However, we are working with this concept of [business impact]. Businesses that [have to] turn around [positive] revenue and costs for the enterprise to continue.” [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1647</sup>]*

In this case, the CSO's organisation were employing a business model whereby ownership of intellectual property was consciously prioritised as part of securing positive change for society.

#### 3.10.6.6.4 Civil Society Organisations (CSO)

The following CSO member believed that almost all data collected should be published without the need for anonymization. However, data from third parties were excluded due to issues of consent, trust and vulnerable demographics:

*“Yes, I completely agree with publishing everything that is related to our management and what [anonymised organisation] gives to society. We publish it as it is in our records. Everything is very open. I have my reluctance when the information is from a third-party, [...] for example, feedback from teachers, I consider part of their honesty, [...] due to the anonymity that we assure them because they are in a situation of vulnerability [...]. The students are minors [...] and consent must be given by their families and it is also a very vulnerable situation [with] ethical questions of competition and ranking [at stake].” [Male, Female; Uruguay; CSO; ICT<sup>1648</sup>]*

Political and economic ramifications featured in some of the CSO open access comments. This included the possible political dangers of premature data being misused for national interests

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<sup>1646</sup> BO06

<sup>1647</sup> BR05

<sup>1648</sup> ROU03

and fearmongering. He also described the conflicting interests between the democratic imperative and commitments to scientific advancement:

*“Philosophically I would say that I share the idea that knowledge [should be] available as open as possible and that anyone anywhere in the world can access knowledge to advance, [...] and to share it in a democratic and transparent way.*

*[...] if I have a publication [...] which I know could affect the economy of my country and I know that those who are going to use it are not concerned about the ethics and the advancement of knowledge [but] how to damage my country image [...], I like not to be naive. [...] it does not seem right to hide the results of the research, but I like to take some time to process those results and to try to be beneficial to the community and not to be naive.*

*[...] I think that it is necessary to analyse case by case and in some cases, it is necessary to analyse if the results [...] are rigorous and to take some measurement around those results. [...] The dimension of research is one dimension, but [we] also have the economic dimension of the country, the social dimension and the consequences generated by a particular publication.*

*Interviewer: I understand, and do you think of an example of these cases in which you think you have to be more cautious or wait a bit? Can you think of a concrete example while we talked about you thinking about a particular case?*

*Interviewee: Yes, the meat sector is very important and there was an investigation by a group of researchers that found certain bacteria and wanted to publish it straight away. [...] the industry said, "wait a little bit, first you have to analyse it well, then you will see where the problem is and if we can solve it shortly". Because it was not a dramatic issue [...], that information should not come out that way because it was going to generate panic and to affect a very important sector of the country. So, there was an agreement with the researchers to process that information, to analyse it well, to take action and after a while to make it public.”*

*[Male; Uruguay; CSO; Bio-economy<sup>1649</sup>]*

Within this account, there were various instances of how the mitigation of risks was confronted. The relationships between science and politics/policymaking were noted as being inherent to the dynamics in play.

### 3.10.6.6.5 Policy bodies

The general division for policy bodies on open access was between private and public interest. However, there was discussion of being open to negotiations on data sharing involving companies through “open innovation”:

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<sup>1649</sup> ROU01

*“Our intention is [to] ensure that the population has access to this knowledge generated [clearly], but at the same time, we are open to important negotiations for companies [that do] open innovation. That is, [to] take advantage of the intellectual knowledge that is protected by some companies, and to combine our knowledge by having a rational way of dividing these issues.” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1650</sup>]*

There was also recognition of the benefits to the public of broader distribution of access and transfer of knowledge on the cost of medicine:

*“It really does not make sense to have medicine that saves [...] hundreds of thousands of dollars. In this, we are pursuing technology transfer partnership strategies to ensure that these new advances reach the population” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1651</sup>]*

*“A Ministry of Health policy has secured a market for public-private partnerships for up to 10 years as long as all technology is transferred. If we follow the evolution of the price of the drugs that have had this policy in the last six years, [...] more expensive drugs [...] have lowered their final price by around 55%, while those who did not have this policy did not have a [price reduction], and in some cases, the price even rose.” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1652</sup>]*

One participant indicated that restrictions on releasing results might serve a political or agenda-driven position:

*“In what was unanimous in all sectors of the council [...] submitting the results to a political agenda, prior to its communication in a scientific publication, [was in no way acceptable].” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1653</sup>]*

As such, he suggested that the release procedure should first go through the level of scientific publication to ensure peer-review rather than instrumentally-led by political agendas.

### 3.10.6.6.6 Interaction between stakeholders

The interviews did not provide any insights on the interactions between stakeholders, in the context of the *Open science* theme.

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<sup>1650</sup> BR06

<sup>1651</sup> BR06

<sup>1652</sup> BR06

<sup>1653</sup> ROU02

### 3.10.6.6.7 key platforms, spaces and players

Although operating on a considerably larger scale than most platforms, one participant explained that regional trading blocks were regarded as having a broad influence over the sharing of data:

*[...] In the particular case of financed research it must be mandatory to put [the data] in a public repository because it has been generated as a public good. [As demonstrated] by MERCOSUR.” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1654</sup>]*

The Research Gate database was mentioned as an important open access platform by one Bolivian researcher:

*“There is open access by registering [on] Research Gate network [...] it also allows access to more direct information with researchers who are working in certain topics and areas. Research Gate is very similar to Facebook, but only for scientists from institutions. They require an institutional mail. If you do not have this e-mail they are not going to accept your participation. Therefore, it is not open [to] the entire world. But it is a good nexus where you can work with researchers in various interesting subjects; it is a very interesting network of open access” [Male; Bolivia; RPO; Energy<sup>1655</sup>]*

Although the access was limited to researchers with an institutional email address.

### 3.10.6.7 SUMMARY OF OPEN SCIENCE

Many participants expressed that open science policies did not exist or that they were unsure of it in their specific domain.

Cost reduction, inclusive effects as well as improved quality of research were seen as benefits of open access. Righting the moral contradiction in privatising publicly funded research was also referred to.

Intellectual property conflicted with open access in this region too. The main limits to the release of data were commercial and competition-based. The limits related to legislative restrictions, the public sensitivity of the data, and data ownership. A few examples also hinted at the importance of open access for more robust and informed outcomes, public trust and inclusivity. However, two interview participants raised concerns about the political implications of making some data public. Another participant also raised concerns over national and economic consequences. In the end, commercialisation and intellectual property rights appeared to be prioritised first over open access.

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<sup>1654</sup> BO06

<sup>1655</sup> BO04

### 3.10.7 ANTICIPATIVE, REFLECTIVE AND RESPONSIVENESS

*Anticipative, reflective and responsiveness* includes both the ‘anticipative and reflective’ and ‘responsive and adaptive’ process dimension definitions. For research and innovation to be responsible it requires actors to engage in a process of anticipating and reflecting on the future they are trying to create. They need to consider how that future can be achieved, and what possible impacts and unintended consequences may arise. Responsible actors should reflect on why that future is desirable, and on the underlying assumptions, values and purposes of the tasks and objectives to achieve that future. The insights generated from such anticipation and reflection should guide more responsible action.

Research and innovation must also be responsive and adaptive to change. Actors must include responsiveness to the views of the public and stakeholders in their process. It is also necessary to adapt and change goals and methods if these views and changing circumstances require it.<sup>1656</sup>

These definitions define the boundaries of this theme of anticipative, reflective and responsiveness, within which the interviews and subsequent analyses were conducted. Out of the 17 codes identified for this theme, the four specific codes that stood out through a total count of the relevant codes for all countries included in the final interview sample: *evaluation* [code 100]; *demand-driven research and innovation* [code 81]; *targeting critical societal challenges* [code 82]; *furthering research-developing policy or standards* [code 84]. Note that meeting societal needs [code 80] is an aggregation of seven of the codes listed here and therefore overrepresented. Demand-driven research and innovation on the other hand is also an aggregation of three codes, including code 82 and code 84. As demand-driven research and innovation sufficiently reflected the two amalgamated codes, as well as containing its own additional coding, we decided to treat the three codes as one section.

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
88: Anticipative, reflective and responsive RRI				
89: Future societal needs and challenges	8	2	2	12
90: Environmental sustainability	14	4	2	20
91: Responsive approach	10	6	7	23
92: Organisational norms and practices	3	3	0	6
93: Lack or uncertainty of anticipation policy and framework	2	0	2	4
100: Evaluation	0	8	9	17
101: Importance of feedback	1	2	3	6
103: Participation in upstream R&I	7	5	2	14

<sup>1656</sup> <https://www.rri-tools.eu/-/rri-tools-a-practical-guide-to-responsible-research-and-innovation-key-lessons-from-rri-tools->

80: Meeting societal needs	62	50	23	135
81: Demand-driven research and innovation	50	41	19	110
82: Targeting critical societal challenges	25	29	10	64
83: Benefiting specific groups	13	4	4	21
84: Furthering research-developing policy or standards	16	3	3	22
85: Organisational norms and practices	1	8	0	9
86: Lack of consideration of societal benefits	4	0	0	4
87: Lack or uncertainty of policy for meeting societal needs	8	1	3	12
105: Time frames and time constraints	2	4	2	8

The next two sections provide details about each of the two codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *anticipative, reflective and responsiveness*.

An important point about the interview participants is that many displayed difficulties with grasping the concept of anticipation. The interviewers substituted “anticipation” for “future implications” for clarity. However, “future implications” also appeared to be too abstract for the participants. In the end, the data that is coded for this theme contains very little future perspective.

### 3.10.7.1 EVALUATION

The sub-theme refers to the evaluation of research and innovation. This can include formative evaluation; implementation evaluation; and impact evaluation. Evaluation here is understood in terms of the formal procedures and established methods used. It also includes references to evaluation for any stage of the research and innovation process. Therefore, this sub-theme is not reduced to including anticipatory or future-oriented processes only.

Name	Description
Evaluation	<p>Any reference to undertaking research and innovation through evaluation processes. This can include formative evaluation (such as assessing risk, feasibility, forecasting, etc.); implementation evaluation (such as assessing/ensuring applicability, implementation, etc.); and impact evaluation.</p> <p>Rule: Evaluation here is understood more in terms of the formal procedures and established methods used, e.g. quality testing, forecasting, risk assessment, impact assessment, etc.</p>

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This code will include references to evaluation FOR AND AT *any stage* of the R&I process. It will NOT be confined to anticipatory (future-oriented) processes only.

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Interview participants talked about present evaluation with some corresponding intention towards a desirable future. However, the discussions in the interviews mainly referred to standard evaluation procedures, including risk analysis and feasibility studies. One Brazilian participant indicated that contending with changing health trends played a large role in orienting their research and innovation:

*“Although we have a significant reduction in infectious diseases, we have recently had a very large increase in non-infectious chronic degenerative diseases such as cancer, heart disease and diabetes. So the trend is to [...] strengthen areas of evaluation and technological development related to these [...] major health challenges at the moment.”* [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1657</sup>]

As a bio-economy organisation, the ‘supremacy of data’ and ‘trial and error’ were described as being central to their evaluative and adaptive capacity:

*“The first important premise is that the researchers have to be open to the supremacy of the data. We do not want our hypotheses to be stronger than the results obtained in the experiments. And the curious thing is that this process of trial and error is a very important process of learning and innovation. [...] We also have the Research Center with our prospective group debating [...] about the information being taken from databases [...], promoting internal reflection, and reach those results [more easily] by trying to identify these changes earlier.”* [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1658</sup>]

Funders were also said to have a key role in shaping reflective practices and future orientations:

*“[In] a project, we have monitoring indicators that must be met [for example] reduction of emissions, amount of financial projects, and gender. To achieve these indicators we monitor the project because it is part of the objective. When you have to answer for the funds they gave you, you have to monitor exactly how you have progressed on these issues; [...] it is some way of projecting into the future as well. I want to reach that goal, what do I have to do to get there?”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1659</sup>]

However, it was unclear how the process aligned with the critically-robust RRI qualities of anticipative, reflective and responsiveness.

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<sup>1657</sup> BR06

<sup>1658</sup> BR06

<sup>1659</sup> ROU04

### 3.10.7.2 DEMAND-DRIVEN RESEARCH AND INNOVATION

The *demand-driven research and innovation* sub-theme encompasses references of solutions to societal problems as part of setting the goals and agenda for research and innovation. This can include references to meeting societal needs through a focus on UN SDGs, local development, developing the right types of products etc. In coding terms, it is the parent node for targeting critical societal challenges and furthering research/developing policy/standards.

Name	Description
Demand-driven research and innovation	Reference to setting the goal/agenda for R&I based on providing specific solutions to specific problems existing in society.  Rules: This can include references to meeting societal needs through a focus on UN SDGs, local development, developing the right types of products that are needed etc.

*Targeting critical societal challenges* codes any reference to existing or imminent critical challenges that research and innovation focus on. This can include issues of health and wellbeing and environmental protection etc. *Furthering research-developing policy or standards* references to local policy development or support in the development of regulations. Both these codes are about meeting societal needs and have very little to do with future-oriented thinking.

Name	Description
Targeting critical societal challenges	Any reference to existing or imminent critical challenges that R&I focuses on (can be around the UN SDGs). This can include issues of health and wellbeing, waste management, access to resources and infrastructure, environmental protection, etc.
Furthering research/Developing policy/standards	Any reference to local policy development or support in development of regulations/standards.

While much of the interviews overlooked many of the elements of *anticipative, reflective and responsiveness*, there were some insights into how ‘societal needs’ were defined by organisations. Where ‘societal needs’ were referenced it offered some insight into the kind of future organisations they were seeking to create. There was also insight into the first steps of responsiveness aided by closer interaction with communities.

Some researchers were merely responding to the needs and priorities of other organisations, such as local authorities:

*“[...] we did not have pre-established research lines. We established them according to the demand of the authorities with whom we had agreements so that*

*they can say what their priorities are. [...].” [Male; Bolivia; RPO, CSO; Waste Management<sup>1660</sup>]*

Other societal needs were defined through intersections of domains, sustainability and government. For example, the circular economy was of particular concern to waste management and encouraged by local authorities:

*“[...] we recycle [by] holding the rubber tire [putting] it into the crushing machine to get powdered rubber, which [becomes] the end input for tiles. [This creates] a circular economy that goes from the first actors [...] who dedicate themselves to make sandals, rubber belts, and residues which we buy to turn them into rubber grain and end-items.” [Male; Bolivia; Industry & Business; Waste Management<sup>1661</sup>]*

*“[...] we go to the local government and they ask for the product and they tell us how the product is projected to be. Then, what we do is to work on projects that really generate [sustainable] impact on the population and the environment. [...] After analysing these proposals of environmental and social benefit, the municipal government accepts.” [Male; Bolivia; Industry & Business; Waste Management<sup>1662</sup>]*

However, certain domains might be open to more cross-domain influences. An organisation turned to social sciences to identify and frame societal needs from which collaborations were then organised:

*“We look for [examples] in other areas of thought, such as humanities, social sciences, or health studies. Then, [...] attention is given to developing internal networks that allow us to tackle problems of interest in its [societal] scope.” [Male; Brazil; RPO; Energy, ICT<sup>1663</sup>]*

Concerning the responsive and adaptive side of the sub-theme, a Brazilian CSO sought to arrive at the future through a process that was inclusive and participative of the population. This indicated that inclusivity is necessary to achieve responsiveness:

*“The main innovation is the social technology of participative management of development processes with traditional communities, indigenous populations, and populations of high urban vulnerability, to which we have been working in recent years.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1664</sup>]*

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<sup>1660</sup> BO03

<sup>1661</sup> BO08

<sup>1662</sup> BO08

<sup>1663</sup> BR02

<sup>1664</sup> BR03a

*“[...] we have an approach that considers the skills, not only of the technicians but also the ethno-knowledge of the communities with which we work [...].” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1665</sup>]*

Local and indigenous knowledge was highly valued in their definitions of societal needs and processes of reflectivity:

*“Well, when we [establish] a participatory approach, we automatically solve problems that are listed by the community. [...] we had an innovation with the British Council and a private company [...] a [while] ago, in which the idea was to build a research call where we [used] a multistakeholder participatory [approach]. Then, considering issues raised by the community, the project sought to answer these questions by associating scientific points from both the UK and Amazon participants. So I would say it's a bottom-up approach that we cover for virtually every project.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1666</sup>]*

*“We understood [...] the need to invest in basic social issues, such as drinking water, [...] radio for communication, a boat for displacement, and school infrastructure etc. Communities lack investment within productive chains [...]. And that is exactly the local knowledge that we have to have in this participatory approach with the communities in the Bolsa Floresta program.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1667</sup>]*

Another Brazilian CSO participant was similarly open to the knowledge and practices of indigenous communities:

*“[We construct] research and innovation with the focus on social transformation from an idea that citizenship should be a protagonist in these processes. [...] [It is important to] introduce knowledge and practices while [using] sources of traditional [Western] science but also [...] other perspectives of knowledge, especially Afro-Brazilian indigenous people with ancestral knowledge [and] other dynamics of innovation and transformation [...].” [Male; Brazil; CSO; ICT, Bio-economy<sup>1668</sup>]*

A more quantitative economic evaluation by this CSO demonstrated a different approach to examining research and innovation outcomes:

*“The other issue is to be able to evaluate the impact that our policies have on these fields. [...] I think the clearest case we have analysed is [...] the production of biofuels because in general, it ends up [...] having a positive impact in the reduction of greenhouse gas emissions, but also end up pulling productive chains.*

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<sup>1665</sup> BR03a

<sup>1666</sup> BR03b

<sup>1667</sup> BR03b

<sup>1668</sup> BR07

*The analysis of [these] socioeconomic externalities is quantified from an economic point of view and to number the social impacts [...] of those productive chains in particular.” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1669</sup>]*

Finally, the following detailed account related to both process dimensions included in this theme. Other societal needs can reveal themselves through efforts to achieve innovations:

*“The original mission was to reduce the access gap to digital technology to provide equity and equality of opportunities and access to technologies. I believe that from that point on, all the pedagogical innovation, or technological innovation [...] was built to support education from different places. [...] For example, we generated a project in English years ago due to the need that had existed since 2008. [...] Then the problem was the lack of English teachers, so what happened? We generated a project [...] where teachers from abroad or from here give classes through videoconferencing in places where there were no teachers available. [...] So I think that the needs or problems that exist both in society and in the education system [...], give rise to the most beautiful and important projects [...]. Another example is the digital library that emerged as a solution to the problem of access to school texts. Today we have a huge library of recreational literature [and] the plus is that all students of primary education and middle school access the textbooks for free.” [Male, Female; Uruguay; CSO; ICT<sup>1670</sup>]*

This example showed how societal and social needs are interconnected and alertness to those connections might be an important means of increasing responsiveness and adaptiveness.

### 3.10.7.3 DOMAIN RESULTS

#### 3.10.7.3.1 Energy

The interviews did not provide any insights in the context of the *anticipative, reflective and responsiveness* theme in this domain.

#### 3.10.7.3.2 Waste Management

Other societal needs were defined through intersections of domains, sustainability and government. For example, the circular economy was of particular concern to waste management and encouraged by local authorities:

*“[...] we recycle [by] holding the rubber tire [putting] it into the crushing machine to get powdered rubber, which [becomes] the end input for tiles. [This creates] a*

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<sup>1669</sup> ROU02

<sup>1670</sup> ROU03

*circular economy that goes from the first actors [...] who dedicate themselves to make sandals, rubber belts, and residues which we buy to turn them into rubber grain and end-items.” [Male; Bolivia; Industry & Business; Waste Management<sup>1671</sup>] “*

And:

*“[...] we go to the local government and they ask for the product and they tell us how the product is projected to be. Then, what we do is to work on projects that really generate [sustainable] impact on the population and the environment. [...] After analysing these proposals of environmental and social benefit, the municipal government accepts.” [Male; Bolivia; Industry & Business; Waste Management<sup>1672</sup>]*

We only had attributable insights into the waste management domain from one interview participant. It was evident that this participant was working closely with numerous stakeholders, across many domains, in the common pursuit of meeting societal needs. These needs were defined by local policy/political interests.

### 3.10.7.3.3 Information and Communications Technology (ICT)

Certain domains such as ICT, however, might have been open to more cross-domain influences:

*“It would have a high impact [...] towards the people that produce the garbage, that we develop an awareness [and] communicate that the people who are gathering the garbage [...] are human beings that do noble work. This application – [...] would have a very high social effect and we are going to work on it this semester.” [Male; Bolivia; RPO; ICT<sup>1673</sup>]*

Here, waste management intersected with ICT, and existing socio-economic environments influenced the societal concerns.

### 3.10.7.3.4 Bio-economy

The bio-economy also provided an example of how domains influenced the evaluation of societal needs. An interview participant from a Brazilian bio-economy organisation indicated that contending with changing health trends played a large role in orienting their research and innovation:

*“Although we have a significant reduction in infectious diseases, we have recently had a very large increase in non-infectious chronic degenerative diseases such as*

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<sup>1671</sup> BO08

<sup>1672</sup> BO08

<sup>1673</sup> BO09

*cancer, heart disease and diabetes. So the trend is to [...] strengthen areas of evaluation and technological development related to these [...] major health challenges at the moment.” [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1674</sup>]*

It was clear that strategies of development, resource prioritisation, and allocation was led by major challenges in the world.

### 3.10.7.4 STAKEHOLDER RESULTS

#### 3.10.7.4.1 Research Performing Organisations (RPO)

Stakeholders were able to play a defining role in deciding on research priorities and societal needs:

*“[...] we did not have pre-established research lines, we established them according to the demand of the authorities with whom we had agreements so that they can say what their priorities are.” [Male; Bolivia; RPO, CSO; Waste Management<sup>1675</sup>]*

Some RPOs were more participatory and bottom-up in their approach to identifying research foci. As opposed to a top-down approach that could risk their research being of little use to those that they are wanting to impact.

#### 3.10.7.4.2 Research Funding Organisations (RFO)

The interviews did not provide any insights for RFOs, in the context of the *anticipative, reflective and responsiveness* theme.

#### 3.10.7.4.3 Industry & Business

The interviews did not provide any insights for industry and business, in the context of the *anticipative, reflective and responsiveness* theme.

#### 3.10.7.4.4 Civil Society Organisations (CSO)

Some Brazilian CSOs were set up to be responsive and adaptive to the needs of communities through their participatory approaches.

A Brazilian CSO sought to arrive at the future through a process that was participative and inclusive to the communities. This indicated that inclusivity is necessary to achieve responsiveness:

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<sup>1674</sup> BR06

<sup>1675</sup> BO03

*“The main innovation is the social technology of participative management of development processes with traditional communities, indigenous populations, and populations of high urban vulnerability, to which we have been working in recent years.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1676</sup>]*

*“[...] we have an approach that considers the skills, not only of the technicians but also the ethno-knowledge of the communities with which we work [...].” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1677</sup>]*

Local and indigenous knowledge was highly valued in their definitions of societal needs and processes of reflectivity:

*“Well, when we [establish] a participatory approach, we automatically solve problems that are listed by the community. [...] we had an innovation with the British Council and a private company [...] a [while] ago, in which the idea was to build a research call where we [used] a multistakeholder participatory [approach]. Then, considering issues raised by the community, the project sought to answer these questions by associating scientific points from both the UK and Amazon participants. So I would say it's a bottom-up approach that we cover for virtually every project.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1678</sup>]*

*“We understood [...] the need to invest in basic social issues, such as drinking water, [...] radio for communication, a boat for displacement, and school infrastructure etc. Communities lack investment within productive chains [...]. And that is exactly the local knowledge that we have to have in this participatory approach with the communities in the Bolsa Floresta program.” [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1679</sup>]*

Another Brazilian CSO was similarly open to the knowledge and practices of indigenous communities:

*“[We construct] research and innovation with the focus on social transformation from an idea that citizenship should be a protagonist in these processes. [...] [It is important to] introduce knowledge and practices while [using] sources of traditional [Western] science but also [...] other perspectives of knowledge, especially Afro-Brazilian indigenous people with ancestral knowledge [and] other dynamics of innovation and transformation [...].” [Male; Brazil; CSO; ICT, Bio-economy<sup>1680</sup>]*

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<sup>1676</sup> BR03a

<sup>1677</sup> BR03a

<sup>1678</sup> BR03b

<sup>1679</sup> BR03b

<sup>1680</sup> BR07

It was clear that the multiplicity of knowledge was at the forefront of the participant's mind when discussing indigenous knowledge. Not as one homogenous mass but as different communities of knowledge-makers with different epistemic traditions.

#### 3.10.7.4.5 Policy bodies

One of the policy bodies' societal needs was enhanced industrialisation and development. The participant was unsure how the needs were defined and determined but resource exploitation were some of the main concerns of government throughout history:

*“The research is more focused on scientific policy, linked mostly to applied research and to the opportunities that a natural resource presents in the process of industrialization [...].”* [Male; Bolivia; RPO, Policy body; Energy<sup>1681</sup>]

For Bolivia, the natural resource referred to is lithium— an important part of the energy transition.

#### 3.10.7.4.6 Interaction between stakeholders

As is typical of stakeholder interactions, the funding arrangements were a crucial influential aspect of how organisations related to each other. For example:

*“[In] a project, we have monitoring indicators that must be met [for example] reduction of emissions, amount of financial projects, and gender. To achieve these indicators we monitor the project because it is part of the objective. When you have to answer for the funds they gave you, you have to monitor exactly how you have progressed on these issues; [...] it is some way of projecting into the future as well. I want to reach that goal, what do I have to do to get there?”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1682</sup>]

Herein, funders had a key role in shaping reflective practices and future orientation. However, it was unclear how the process aligned with the RRI qualities of anticipative, reflective and responsiveness.

#### 3.10.7.4.7 Key platforms, spaces and players

The interviews did not provide any insights for key platforms, spaces and players, in the context of the *anticipative, reflective and responsiveness* theme.

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<sup>1681</sup> BO01

<sup>1682</sup> ROU04

### 3.10.7.5 SUMMARY OF ANTICIPATIVE, REFLECTIVE AND RESPONSIVENESS

The qualitative accounts contained in this theme caution that this was one of the RRI areas that needed much more progress. Both in terms of understanding and application by the LAC research and innovation communities. Indeed, the perspectives detailed across the interviews were overall rather confused.

While there was little direct account of desirable futures, there were signs that the structures of these futures were influenced by the intersectionality with countries or governments. The case of Lithium in Bolivia was illustrative of this. How energy was traded on the market directly shaped how open the sector and policies were.

The CSOs demonstrated some of the strongest versions of responsiveness within their current research and innovation activities.

### 3.10.8 SCIENCE EDUCATION

As per the European Commission pillar definition, *science education* involves developing current processes to spread scientific knowledge, understanding, insight, and critical capacity to better equip citizens with the necessary skills to be part of research and innovation debates. A second component is to expand the number of scientific researchers and promote science as a vocation.<sup>1683</sup>

Additional components include the “promotion of innovative problem-solving and critical thinking”; “embedding social, economic and ethical principles”; “promoting engagement and an entrepreneurial mindset”; “empowering citizens to participate in science policymaking”; “sharing responsibility while solving social challenges”; “facilitating a strong interdisciplinary approach, and stakeholders' involvement”.<sup>1684</sup>

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
Science education				
18: Tools for engagement	12	18	12	42
19: Information-based tools	0	0	0	0
20: Training and workshops	9	3	6	18
21: Conferences, symposiums, talks and exhibitions	1	1	6	8
22: Research publications and policy reports	5	0	4	9
23: Information centres	0	1	0	1

<sup>1683</sup> <https://www.rri-tools.eu/about-rri>

<sup>1684</sup> <https://www.rri-tools.eu/science-education>

24: University open days	0	0	0	0
25: Media	2	0	1	3
34: Tie-ups with local schools	2	1	2	5
102: R&I Capacity Building	0	2	6	8

The codes (i.e. sub-themes) used for this science education theme are chosen on their closeness to the concept of science education. The first sub-theme deals with *the tools of science education* [codes 18-25, 34]. The second concerns *R&I Capacity Building* [code 102].

The next two sections provide details about each of the two codes and descriptions of the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme of *science education*.

### 3.10.8.1 THE TOOLS OF SCIENCE EDUCATION

*The tools of science education* sub-theme include seven categories. The seven categories are as follows: information-based tools; conferences, symposiums, talks and exhibitions; training and workshops; research publications and policy reports; information centres; university open days; and media.

Name	Description
Information-based tools	Any references to tools that provide information for understanding R&I in the organisation and its norms, procedures and practices related to it.  Rules: This will include only one-way communication strategies and NOT two-way communication or engagement.
Conferences, symposiums, talks and exhibitions	Any reference to providing information through different presentation-focused events, such as conferences, seminars, lectures, talks, etc.
Training and workshops	Any reference to setting up training sessions and/or workshops, where the aim is skills development and capacity building (as opposed to simple information sharing, as in the above two codes; conferences and talks).
Research publications and policy reports	Any reference to providing information through research journals, publication, online research repositories, digital research platforms, and public databases, policy reports, etc.

Information centres	Any reference to providing information through information centres, such as visitor centres.
University open days	Any reference to communication/providing information through university open days.
Media	<p>Any reference to communication through different media, including print media, broadcast media, and the Internet. Examples include newspapers, brochures, films, radio, TV, websites, blogs and social media.</p> <p>Rules: This will NOT include any online research sources such as research papers and online data sets, rather it will include online sources used for communication, such as websites or blogs. Research-based sources should be included in the code ‘Research publications and policy reports’.</p>

*Information-based tools* broadly cover any references to tools that provide information for understanding research and innovation in the organisation. This will include only one-way communication strategies and NOT two-way communication or engagement.

Some one-way engagements were referred to in the interviews, which emphasised the passive nature of engagement approaches. For example, ties with local schools were mentioned. In general, little expansion was given, it was only mentioned in passing as part of a list of engagement activities provided by interview participants.

*Conferences, symposiums, talks and exhibitions* include any reference to providing information through different presentation-focused events, such as conferences, seminars, lectures, talks, etc.

The interview participants referred to these types of tools being employed for myriad science education reasons. The following provided some indication as to how they were being used:

*“It was actually an event with teachers from all over the country ... [through] a network of countries that works with the concept of deep learning and competences of the twenty-first century. [...] it was an event to share innovative educational experiences that are happening in our country.”* [Male, Female; Uruguay; CSO; ICT<sup>1685</sup>]

*“With the students, we generate learning opportunities through courses, virtual trips, videoconferences, a lot of direct activities for students as well as for families.”* [Male, Female; Uruguay; CSO; ICT<sup>1686</sup>]

<sup>1685</sup> ROU03

<sup>1686</sup> ROU03

One example was of short public talks being used to broaden female participation in science education:

*“I encourage everyone to participate. When there is some woman that does not want to participate I invite her to participate in the project. [...] I deliver a [...] talk, to let them know that there are women in this career field that have made important contributions in this area and that gender should not be an obstacle to be able to make a successful scientific career.”* [Male; Bolivia; RPO; ICT<sup>1687</sup>]

*“We involve students and teachers with [...] either teacher training or professional development [...]. [...] the involvement is at the level of workshops, conferences, face-to-face meetings in different centres [...] throughout the country.”* [Male, Female; Uruguay; CSO; ICT<sup>1688</sup>]

*“At this moment we are organizing a series of tours open to all public [...] to go to visit the demonstration projects that are posted on the web. [...] then, if civil society wants to control us, they have all the information. You can even go and see in person the results of what we are doing if you are concerned about it.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1689</sup>]

*Training and workshops* concern references to training sessions and/or workshops, where the aim was skills development and capacity building.

The interviews yielded several reasons why training was used. This entailed helping individuals find ways to use their initiative, methods and processes. Also, teaching in-depth technical knowledge which they may be able to apply within their professions:

*“We are always training people either from the municipality or they can also be housewives that encounter a problem. [...] they look for alternative solutions and what we do is to train them, teach them how these micro-organisms work, what they have to do, what are the advantages of using these micro-organisms vs. using chemical products.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1690</sup>]

*“In the field of training, [...] we have supported many institutions; we work with the universities, [and organisations]. [...] recently we facilitated a course that was based on the use of these micro-organisms [...] for the farmers to be able to do it themselves.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1691</sup>]

The workshops were mentioned with the implicit assumption that they were appropriate means of transferring knowledge, and encouraging interaction with their target audiences:

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<sup>1687</sup> BO09

<sup>1688</sup> ROU03

<sup>1689</sup> ROU04

<sup>1690</sup> BO05

<sup>1691</sup> BO05

*“You will see in our report a number of workshops around 100 to 150 per year, having between 5 and 10,000 people participating in these workshops.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1692</sup>]

*“Even when we do an activity for the young audience, [...] we invite parents to participate and to attend the final presentations.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1693</sup>]

*“We involve students and teachers with learning proposals, either teacher training, professional development, or instances of learning projects for the classroom for students. In the family generally, the involvement is at the level of workshops, conferences, face-to-face meetings [...] in different centres throughout the country.”* [Male, Female; Uruguay; CSO; ICT<sup>1694</sup>]

Research publications and policy reports provide a list of tools referred to by interview participants used for providing information, such as research journals, publication, online research repositories, digital research platforms, and public databases, policy reports, etc.

In the interviews, participants’ research data appeared as part of interconnecting politics and research:

*“[We] generate information [that is] rigorously scientific, so that the decisions of the authorities, their political decisions, have an objective technical sustentation.”* [Male; Bolivia; RPO, CSO; Waste Management<sup>1695</sup>]

Information centres cover any reference to providing information through visitor centres:

*“The laboratory also has a physical seat that is in the centre of Santos. Where we have an open system, a permanent group as if it were a continuous call, aimed at proposing what we call working groups.”* [Male; Brazil; CSO; ICT, Bio-economy<sup>1696</sup>]

University open days include any reference to communication/providing information through university open days. There was nothing to note for the Latin American and Caribbean region, in this regard.

The *Media* covers references to communication through different media, including print media, broadcast media, and the Internet. Examples include newspapers, brochures, films, radio, TV, websites, blogs and social media.

There was scant discussion in the interviews on media in this region but a participant from Uruguay said they put effort into contacting the media:

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<sup>1692</sup> BR03a

<sup>1693</sup> BR03b

<sup>1694</sup> ROU03

<sup>1695</sup> BO03

<sup>1696</sup> BR07

*“I am not sure whether this information is available on the web page.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1697</sup>]

*“We make a great effort to go to radio stations, to speak in the media press.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1698</sup>]

Perhaps, by its absence, it implied that such tools were an underused medium.

### 3.10.8.2 RESEARCH AND INNOVATION (R&I) CAPACITY BUILDING

*Research and innovation capacity-building* provide a list of references to building capacity for research and innovation to improve responsibility. This can be in terms of local development, contextual development, etc.

Name	Description
R&I building	Any reference to building capacity for research and innovation as a means of improving responsibility. This can be in terms of local development, contextual development, etc.

There were some references to capacity building in the interviews that leant towards expanding science education:

*“[...] we try to encourage people, especially students, who are involved with projects [...] to form companies and eventually to incubate.”* [Male; Brazil; RPO; Energy, ICT<sup>1699</sup>]

*“[anonymised organisation] arises from the need to increase the capacity of research in education in Uruguay. Its objectives are prospective research, to determine what trends there are, [...] to generate research capacity in education.”* [Male, Female; Uruguay; CSO; ICT<sup>1700</sup>]

It was clear that science education was sometimes used to build capacity in other areas. Science education was usually discussed in terms of what would be offered formally through institutions (e.g. universities). Informal learning and educational opportunities through other communities and organisations did not feature in the interviews.

<sup>1697</sup> BO05

<sup>1698</sup> ROU04

<sup>1699</sup> BR02

<sup>1700</sup> ROU03

### 3.10.8.3 DOMAIN RESULTS

#### 3.10.8.3.1 Energy

There were no science education activities that related directly to energy research and innovation.

Whilst there was some interview content on science education their discussion was very generic and could not be sufficiently attributed to energy domain contexts.

#### 3.10.8.3.2 Waste Management

Some of the training references were less about science education and more about implementing innovations involving certain domain stakeholders:

*“We give technical courses to the [engineers], teaching them how they must generate or keep residues [that] they previously did not store.”* [Male; Bolivia; Industry & Business; Waste Management<sup>1701</sup>]

Waste management procedures for rubber were a core part of local training activities.

#### 3.10.8.3.3 Information and Communications Technology (ICT)

Only one participant provided directly relevant insights for the ICT domain. This participant discussed how the role and ambition of ICT in education was a central objective:

*“Through this strategic alliance with the National Telecommunications Administration, this quality and access can be provided in all schools and all the centres of the country.”* [Male, Female; Uruguay; CSO; ICT<sup>1702</sup>]

Relatedly, they explained how their organisation resulted from the social need to prioritise education across Uruguay:

*“[anonymised organisation] arises from the need to increase the capacity of research in education in Uruguay. Its objectives are prospective research, to determine what trends there are, [...] to generate research capacity in education.”* [Male, Female; Uruguay; CSO; ICT<sup>1703</sup>]

This same participant gave examples of how ICT was used with students in various educational activities:

*“With the students, we generate learning opportunities through courses, virtual trips, videoconferences, a lot of direct activities for students.”* [Male, Female; Uruguay; CSO; ICT<sup>1704</sup>]

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<sup>1701</sup> BO08

<sup>1702</sup> ROU03

<sup>1703</sup> ROU03

<sup>1704</sup> ROU03

This same participant also made clear that, in the ICT domain, they not only prioritised engaging/educating students:

*“We involve students and teachers with learning proposals, either teacher training, professional development, or instances of learning projects for the classroom for students. In the family generally, the involvement is at the level of workshops, conferences, face-to-face meetings [...] in different centres throughout the country.”* [Male, Female; Uruguay; CSO; ICT<sup>1705</sup>]

They also prioritised working with students, teachers, and families through a number of different activities to encourage more education.

### 3.10.8.3.4 Bio-economy

One interview participant from Bolivia discussed training in relation to bio-economy. There were several assertions regarding training as a necessary part of involving domain stakeholders in new forms of technology:

*“We are always training people either from the municipality or they can also be housewives that encounter a problem. [...] they look for alternative solutions and what we do is to train them, teach them how these micro-organisms work, what they have to do, what are the advantages of using these micro-organisms vs. using chemical products.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1706</sup>]

*“In the field of training, [...] we have supported many institutions; we work with the universities, [and organisations]. [...] recently we facilitated a course that was based on the use of these micro-organisms [...] for the farmers to be able to do it themselves.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1707</sup>]

Herein, the focus was on equipping other stakeholders with the skills and knowledge to confront problems that may come across in their professional roles. Therefore, education was regarded as a way of developing technical expertise.

## 3.10.8.4 STAKEHOLDER RESULTS

### 3.10.8.4.1 Research Performing Organisations (RPO)

The RPOs, despite dealing directly with science, had only a few comments on science education.

Firstly, there was a somewhat generic view of science education, which was often used interchangeably with ‘training’, for example:

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<sup>1705</sup> ROU03

<sup>1706</sup> BO05

<sup>1707</sup> BO05

*“Training courses for students.”* [Male; Bolivia; RPO; Energy<sup>1708</sup>]

*“We have trained people.”* [Male; Bolivia; RPO; Energy<sup>1709</sup>]

Within these sorts of accounts, there seemed to be the prevailing assumption that education/training was inherently equipping the trainees with new expertise.

In a similar vein other RPOs p would talk about organising events or expanding engagement within their university:

*“I’m organizing some University events, off-campus, in neighbourhoods in Rio de Janeiro.”* [Female; Brazil; RPO; Bio-economy<sup>1710</sup>]

*“The idea is to have a physical space where we can articulate not only the participation of our undergraduate students but above all a more transversal participation in relation to the University”* [Male; Brazil; RPO; Energy, ICT<sup>1711</sup>]

As such, it was clear that there was a limited understanding of what could be achieved, and indeed what exactly was offered by, science educations within LAC RPOs.

#### 3.10.8.4.2 Research Funding Organisations (RFO)

The interviews did not provide any insights for RFOs, in the context of the *science education* theme.

#### 3.10.8.4.3 Industry & Business

The industry & business participants said little in the interviews on science education, with the following exception:

*“We give technical courses to the [engineers], teaching them how they must generate or keep residues [that] they previously did not store.”* [Male; Bolivia; Industry & Business; Waste Management<sup>1712</sup>]

Although the training in question appeared to be part of the operational activities of the organisation and less a part of science education.

#### 3.10.8.4.4 Civil Society Organisations (CSO)

As part of their participatory management approach to stakeholders, this CSO was engaged in a wide-reaching workshop programme:

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<sup>1708</sup> BO04

<sup>1709</sup> BO04

<sup>1710</sup> BR04

<sup>1711</sup> BR02

<sup>1712</sup> BO08

*“You will see in our report a number of workshops around 100 to 150 per year, having between 5 and 10,000 people participating in these workshops.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1713</sup>]

There was clear enthusiasm from CSOs regarding science education activities. Whether it was the dissemination of particular project outputs (e.g. through a radio station) or through regional development via universities:

*“We make a great effort to go to radio stations, to speak in media press”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1714</sup>]

*“What we were looking for then was to try to generate local capacity development in the universities of Uruguay.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1715</sup>]

Education was not only provided to the traditional end-user, and efforts were underway to diversify the target audience. This was achieved through educating the educators, or including a range of civil society groups:

*“We involve students and teachers with learning proposals, either teacher training, professional development, or instances of learning projects for the classroom for students. In the family generally, the involvement is at the level of workshops, conferences, face-to-face meetings [...] in different centres throughout the country.”* [Male, Female; Uruguay; CSO; ICT<sup>1716</sup>]

*“At this moment we are organizing a series of tours open to all public [...] to go to visit the demonstration projects that are posted on the web. [...] then, if civil society wants to control us, they have all the information. You can even go and see in person the results of what we are doing if you are concerned about it.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1717</sup>]

Out of all of the stakeholder groups in LAC, it certainly seemed that the CSOs were most experienced and enthusiastic about science education.

### 3.10.8.4.5 Policy bodies

The interviews did not provide any insights for policy bodies, in the context of the *science education* theme.

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<sup>1713</sup> BR03a

<sup>1714</sup> ROU04

<sup>1715</sup> ROU02

<sup>1716</sup> ROU03

<sup>1717</sup> ROU04

#### 3.10.8.4.6 Interactions between stakeholders

There was almost nothing in the interviews about stakeholder interactions, concerning science education. Except for one point on the role of RPOs in creating business stakeholders:

*“[...] we try to encourage people, especially students, who are involved with projects [...] to form companies and eventually to incubate.”* [Male; Brazil; RPO; Energy, ICT<sup>1718</sup>]

Education tools were used to integrate science and entrepreneurial innovation. They also demonstrated the common motivation for bringing organisations together and creating new start-up organisations.

#### 3.10.8.4.7 Key platforms, spaces and players

There was little in the interviews on the players, platforms and spaces of science education. The spaces most referred to appeared to be schools and local community or stakeholders. One specific player explicitly noted was the Uruguayan Sectoral Energy Fund:

*“The Sectoral Energy Fund was promoted [...] for what is called the Sectoral Data Fund, for the purpose of financing initiatives that would allow processing of that information [...] and presenting projects [...].”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1719</sup>]

In this case, the Sectoral Energy Fund was linked to the financing of data repositories.

### 3.10.8.5 SUMMARY OF SCIENCE EDUCATION

When faced with questions relating to science education, the interview participants usually provided lists of science education tools and activities being used.

The participants rarely discussed the underlying rationales of why they were undertaking science education. This consequently led to somewhat brief and generic accounts of their work, whereby education was used interchangeably with e.g. training, events, workshops, etc. In general, the target audience of their educational activities tended to be students, schools, parents, and local stakeholders.

The main organisations involved in dissemination and training appeared to be the CSOs, who were especially interested in particular development outcomes concerning local societal needs. The Policy Bodies, RFOs and Business & Industry appeared to make relatively little use of such practices, as is implied by the general absence of science education discussions in their interviews.

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<sup>1718</sup> BR02

<sup>1719</sup> ROU02

Some of the more innovative tools included the use of incubators and technology parks and encouraging students to make use of them.

### 3.10.9 ETHICS

As part of the European Commission’s RRI agenda, ethics focuses on (1) preventing research and research practices that lack integrity, and on (2) the relationship between science and society. For policymakers, this definition requires that R&I policy consciously meets the ethical demands of society. For the research community, scientific processes and outcomes should meet the demands of research integrity. Within Business & Industry related research “social actors should work together from the beginning to embed ethical considerations in their R&I processes.” Finally, R&I should be “aligned with society's values and demands, while minimising risks and maximising benefits.”<sup>1720 1721</sup>

This definition defines the boundaries of the ethics’ theme within which the interviews and subsequent coding were conducted. They also guide how interview findings are presented in this chapter. Out of the nine codes identified for the theme, the four specific codes that stood out through a total count of the relevant codes for all countries included are: *positioning ethics* – *where does the responsibility lie* [code 69]; *organisational norms and practices* [code 72]; *lack or uncertainty of ethical standards and policies* [code 78]; and *protection of rights* [code 79].

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
68: Ethics				
69: Positioning ethics- where does the responsibility lie	14	0	5	19
70: Disidentification with ethical responsibility	3	0	1	4
71: Personal responsibility and morality	9	0	3	12
72: Organisational norms and practices	18	8	1	27
73: Safety and security	2	4	0	6
74: Justice and fair dealing	1	1	1	3
75: Quality assurance and testing	8	1	3	12
78: Lack or uncertainty of ethical standards and policies	6	6	4	16
79: Protection of rights	8	8	16	32

The next four sections provide details about each of the four codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and

<sup>1720</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>1721</sup> <https://www.rri-tools.eu/ethics>

innovation and particular categories of stakeholders (including key platforms, spaces and players) are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *ethics*.

### 3.10.9.1 POSITIONING OF ETHICS – WHERE DOES THE RESPONSIBILITY LIE?

The *positioning ethics – where does the responsibility lie?* sub-theme includes perceptions of where ethical responsibilities are located. Whether they are found in existing rules/standards/policies within or beyond the organisation at the individual, institutional, national or international level.

Name	Description
Positioning ethics- where does the responsibility lie?	Reference to where the ethical responsibilities lie and who defines them (within the organisation or beyond). This can be in terms of rules/standards within the organisation or beyond, national vs international level policies, etc.

The interviews offered vague and somewhat distant comments on ethics and did not offer much insight into the ethical positionality of research and innovation. The vagueness itself suggested that there was not much consideration into the issue of ethics amongst interview participants. For Brazil, in particular, there was nothing on the positioning of ethics in any of the interviews.

From the more informative interviews, there was an absence of insight at organisational levels. The source of ethical values and guidelines were mostly located at institutional levels. The lack of organisational ethical standards appeared to coincide with a tendency for ethics becoming an issue of personal responsibility and morality.

One Bolivian researcher considered ethics irrelevant for their research:

*“I believe, from a point of view of the thesis analysis, that it does not involve directly ethical values.”* [Male; Bolivia; RPO, Policy body; Energy<sup>1722</sup>]

Potential ethical responsibilities were also displaced to others outside the research:

*“My thesis is not centred on the topic of ethics but [...] the scope of academic research has its limitations at the moment. [The] information is used with different purposes than the [...] research posed.”* [Male; Bolivia; RPO, Policy body; Energy<sup>1723</sup>]

For another interview participant, there were suggestions of a combination of personal, discipline-specific, and institutional ethics:

<sup>1722</sup> BO01

<sup>1723</sup> BO01

*“Yes, I believe that this is a constant in science [...]. Disciplinary ethical rules [that] also apply to the human moral rules of each of us.” [Male; Bolivia; RPO; ICT<sup>1724</sup>]*

*“At UCB, there is an ethical code [for] professors [...] they have helped us to establish the objectives of the work and the way to proceed.” [Male; Bolivia; RPO; ICT<sup>1725</sup>]*

*“Well my training is systems engineering and to control and mark my ethical limits I have two sources. The main one is the ethics code of the ACM (Asociación Computery Machinery) a global association in computing with a highly developed code of ethics [...]. [...] I also have an [ethical code] acquired at school, complemented with a religious formation. All this has given me a set of ethical principles that I have always been able to respect and hope to always fulfil.” [Male; Bolivia; RPO; ICT<sup>1726</sup>]*

However, while a disciplinary sense of ethics was influenced by ACM and university guidelines, they ascribed the other source of ethical responsibility to their upbringing and even to nationalistic decency:

*“Yes [I have a religious education] and the Bolivian human honesty that we all carry to fulfil the objectives.” [Male; Bolivia; RPO; ICT<sup>1727</sup>]*

In the Uruguayan interviews, there was also personalisation of ethical responsibility in the absence of policies and protocols. Personal responsibility was largely attributed to the training the researchers underwent outside of Uruguay:

*“I think that everyone has incorporated it from their training. Generally, here those who [...] lead the research projects have been trained in the United States, in Europe, in Oceania, etc. [...] where they already had it very ruled. [...] but I think it would [be of] merit to formulate [ethics] in policies and clearer protocols.” [Male; Uruguay; CSO; Bio-economy<sup>1728</sup>]*

Another participant working with renewables noticed that they have lower ethical risk than other sectors:

*“[...] I think that in the case of renewables it is easier. [...] we clearly have it easier than some electrical colleagues who have worked in the evaluation of a nuclear power plant, or the oil partners [...]. [...] we have a lower level of*

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<sup>1724</sup> BO09

<sup>1725</sup> BO09

<sup>1726</sup> BO09

<sup>1727</sup> BO09

<sup>1728</sup> ROU01

*questioning, I think.*” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1729</sup>]

Ethical standards are often graded in terms of ethical risk.

### 3.10.9.2 ORGANISATIONAL NORMS AND PRACTICES

The *organisational norms and practices* sub-theme refers to the treatment of ethics within the organisation’s structure and operations. It also covers uncertainty about what such norms and practices might be and their role in the organisation’s approach to ethics.

Name	Description
Organisational norms and practices	<p>Codes that describe organisational norms and practices (i.e. formal/informal rules and procedures within the organisation) for ethics <i>OR</i> if the respondent shows any uncertainty about what such norms and practices might be or how they might play a role in ethics.</p> <p>Rules: This can include both explicit protocol (official institutional norms, codes, rules or guidelines) and implicit norms and values. It will NOT include any reference to lack or uncertainty of govt/institutional policy, which is included in the relevant code below.</p>

Many interview participants lacked clarity on what ethics norms or practices existed. There was very little information regarding citizen inclusivity and the integrity and moral deliberation of ethics. There were occasions where ethics appeared to be about data protection or quality control while some committees and standards existed.

The Bolivian interviews offered the impression that ethics was specifically relevant to research. It was less salient when it came to working standards or potential societal consequences. The following policy body participant commented on his ethical commitments to the university:

*“The university at which I am doing my research is a European institution and has various rules and procedures when it comes to [gathering] information from companies, and different actors. I am subject to those European norms. Any time I use information, I have the obligation to document the information, and also to request the consent to any institution that provides the information.”* [Male; Bolivia; RPO, Policy body; Energy<sup>1730</sup>]

There was a tendency for researchers to view ethics as more relevant when directly involving live subjects:

<sup>1729</sup> ROU02

<sup>1730</sup> BO01

*“[...] when we are studying human communities, we have to get previous informed consent. This is part of our research protocol [at] the University.*

*I am part of the Bioethics Committee. One of our duties, when research projects arrive, is to determine if that project deals with human or animal life, and if that project needs previous informed consent.”* [Female; Bolivia; RPO; ICT<sup>1731</sup>]

One Bolivian interview featured a rare comment that acknowledged wider societal ethical concerns:

*“[...] we have to assess the impacts within the research that one is going to develop, as far as possible, to see and [...] solve the problems of the society.”* [Male; Bolivia; RPO; Energy<sup>1732</sup>]

However, they were dismissive of some students in the Science Faculty for their failure to adhere to ethical standards:

*“We try to always implement and to question [them], and we demand [...] that they consider the ethical, legislative, environmental aspects, that in the area of technology, they really do not take into account, in the Faculty of Sciences.”* [Male; Bolivia; RPO; Energy<sup>1733</sup>]

However, their organisation was still dependent on ethical standards of other organisations with which they were partnered. These organisations’ ISO compliance commitments may be suggestive of how their ethics were equated with quality:

*“[anonymised organisation] works with ISO 9001 meaning that we have standardized procedures. [...] there are certain levels where it is possible to verify, limit, or restrain some of these things. Because the quality system forces us, in a certain way, so that all is communicated in the subjects.”* [Male; Bolivia; RPO; Energy<sup>1734</sup>]

There also appeared to be some element of equating ethics with quality control, in another Bolivian interview:

*“When you register a product you elaborate the technical sheet, and it is given to the producer [...]. [To ensure] how to apply the product, the care, [compatibility] with a fungicide, pesticide or micro-organism [...].”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1735</sup>]

Ethics was also associated with data protection and confidentiality:

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<sup>1731</sup> BO02

<sup>1732</sup> BO04

<sup>1733</sup> BO04

<sup>1734</sup> BO04

<sup>1735</sup> BO05

*“The ethical subject has been a strong subject in our Association; we have a commission of ethics and transparency [...]. When we address scientific research for which they have contracted us, [...] we have confidentiality agreements. When it is considered that there is a vulnerable population, we follow protocols [...].”*

[Female; Bolivia; Industry & Business, CSO; ICT<sup>1736</sup>]

*“If there is a contract [ I must remain silent] because of legal issues, and it must be according to the policy.”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1737</sup>]

*“We try to follow APA norms [...] from [anonymised university department] and we have confidentiality agreements. [Also] when we work with vulnerable populations, there is requirement to follow protocols of data protection, image protection, and protection of [...] young people.”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1738</sup>]

For the Brazilian interviews, ethics-related discussions concerning organisational norms and practices were rather very vague:

*“No, look, [ethical evaluation] is a very contemporary issue where we are learning as we go.”* [Male; Brazil; RPO; Energy, ICT<sup>1739</sup>]

*“[...] We, given our more technological culture, have set up an ethics committee to look at all the projects involving external collaborations in order to analyse if we encounter any kind of ethics-related problems, but I reckon that's still very little.”* [Male; Brazil; RPO; Energy, ICT<sup>1740</sup>]

It is clear that some organisations suggested standards were in place, but that they were still insufficient.

### 3.10.9.3 LACK OR UNCERTAINTY OF ETHICAL STANDARDS AND POLICIES

Participants' uncertainty about government or institutional policy regarding ethics are included under this sub-theme. This refers to policy beyond the organisation and does not include any discussion on organisational norms and practices, which is covered in the previous section/sub-theme.

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<sup>1736</sup> BO06

<sup>1737</sup> BO06

<sup>1738</sup> BO06

<sup>1739</sup> BR02

<sup>1740</sup> BR02

Name	Description
Lack or uncertainty of standards/policy	Coding for any reference to respondent's uncertainty about ethical govt/institutional policy or a lack of govt/institutional policy regarding ethics (beyond the organisation).  Rules: This does NOT include any discussion on organisational norms and practices, which will be coded above in the relevant code.

There was an explicit mention of a “*lack of a specific regulation*” [Male; Bolivia; Industry & Business; Waste Management<sup>1741</sup>] by a Bolivian participant. In Brazil, there were also two participants unsure of existing policies:

*“Interviewer: And in terms of public policies and ethics, are there any policies that in any way influence your performance?”*

*Interviewee: I do not think so.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1742</sup>]

*“For the projects, no.”* [Female; Brazil; RPO; Bio-economy<sup>1743</sup>]

Another Brazilian participant described ethics standards as something they were in the process of developing rather than relying on a broader ethical policy framework:

*“Yes, the protocols are being forged according to practices. Once we have a structure among the groups involved, we have established a protocol. I believe that we are not [there] yet, the laboratory has less than 2 years of operation [but] we are developing with practice.”* [Male; Brazil; CSO; ICT, Bio-economy<sup>1744</sup>]

There was also a similar situation reported by a Uruguayan participant, who noted that policy was absent for the area of ethics in research:

*“A commission was created in the CONICYT [...] on how to approach the bioethical issue in Uruguay. Today we do not have an explicit norm [...] that addresses these issues. [...] there is an Institutional Ethics Committee, but it works on personal problems, labour harassment and those things. It is not thought from the point of view of ethics in research, the use of data, animal welfare or misuse of people in surveys [...]. We do not have rules for that. [...].”* [Male; Uruguay; CSO; Bio-economy<sup>1745</sup>]

Although a commission had been set up to try to remedy the absence of policy the participant emphasised how there was little to no ethical policies.

<sup>1741</sup> BO08

<sup>1742</sup> BR03a

<sup>1743</sup> BR04

<sup>1744</sup> BR07

<sup>1745</sup> ROU01

Overall, it was evident that there was a clear lack of ethical standards for organisations/individuals to draw upon in their work.

### 3.10.9.4 PROTECTION OF RIGHTS

The content under this sub-theme covers references to protecting the rights of all stakeholders through: ensuring consent, confidentiality, ownership and intellectual rights, preventing copyright infringement, plagiarism and fraud, protection from liabilities, and avoiding conflict of interest.

Name	Description
Protection of rights	Any reference to protecting the rights of all stakeholders by ensuring consent, confidentiality, ownership and intellectual rights, preventing copyright infringement, plagiarism and fraud, avoiding conflict of interest, protection from liabilities, etc.

This sub-theme covers concerns relating to protecting responsibilities, consent, and ownership. The practicalities of ensuring and protecting these rights framed the sub-theme in general.

For example, patents and authorship rights were noted as key obstacles to the open circulation of knowledge:

*“The companies would like to have all that knowledge for free [...]. Although we have to be at the service of society, the researcher or the student who developed an innovation does not have the license of that knowledge. It is necessary to think [...] about the subject of patents, and author rights.”* [Male; Bolivia; RPO; Energy<sup>1746</sup>]

In a similar vein, intellectual property was noted as a means of protecting outputs from one’s research:

*“We seek to protect the intellectual property generated in these processes.”* [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1747</sup>]

The use of confidentiality agreements and adherence to specific protocols when working with vulnerable communities were noted as mechanisms by which stakeholders may protect their and/or others’ rights:

*“We try to follow APA norms [...] from [anonymised university department] and we have confidentiality agreements. [Also] when we work with vulnerable populations, there is requirement to follow protocols of data protection, image*

<sup>1746</sup> BO04

<sup>1747</sup> BR05

*protection, and protection of [...] young people.” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1748</sup>]*

*“All the officers of the Agency have confidentiality agreements on the information we are dealing with because we are handling projects of different actors in society [...].” [Female; Uruguay; RFO; Energy, Waste Management, ICT, Bio-economy<sup>1749</sup>]*

In addition, protection can come from being strict with public data sharing – either in what was provided to others or by ensuring that high standards were maintained:

*“This [reminds me of when we] worked for a bank [...] to do data mining based on customer data. [...] they provided us with all the client’s personal information, including ID cards. Immediately we returned the information, indicating that this was not correct, and we asked to get the information [anonymously]. This is a clear example that we are very careful with external sources, we are taking care of ourselves and that way we take care of the clients.” [Male; Bolivia; RPO; ICT<sup>1750</sup>]*

An interesting contrast to much of the concerns with private ownership was how communities feature in the ownership of e.g. fund management:

*“Sometimes the [anonymised organisation] manages the funds, other times we bridge the lender with the communities [...] to develop a sense of ownership by those involved.” [Male; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1751</sup>]*

One of the more detailed accounts of intellectual property rights displayed the complex relationship of maintaining public good, biodiversity, as well as dealing with international competition:

*“It is good [that] animal welfare procedures are respected as much as possible to avoid the unnecessary suffering of animals. I think that the sensitivity has increased internationally because there is a lot of lobbying [in] the food sector. Each country and each region [...] tries to strengthen and show the benefits of its productions and insult and criticize the productions [...] in other regions that [compete] internationally.” [Male; Uruguay; CSO; Bio-economy<sup>1752</sup>]*

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<sup>1748</sup> BO06

<sup>1749</sup> ROU05

<sup>1750</sup> BO09

<sup>1751</sup> BR05

<sup>1752</sup> ROU01

### 3.10.9.5 DOMAIN RESULTS

#### 3.10.9.5.1 Energy

Renewables were viewed as having less ethical scrutiny and bureaucracy in Uruguay, than other forms of energy technologies:

*“[...] I think that in the case of renewables it is easier. [...] we clearly have it easier than some electrical colleagues who have worked in the evaluation of a nuclear power plant, or the oil partners [...]. [...] we have a lower level of questioning, I think.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1753</sup>]

Other than less ethics-related questions for renewables, the participant was not clear on what the differences were between other energy technologies.

#### 3.10.9.5.2 Waste Management

The interviews did not provide any insights for waste management, in the context of the *Ethics* theme.

#### 3.10.9.5.3 Information and Communications Technology (ICT)

Data protection and confidentiality was the main concern of a Bolivian ICT participant surrounding ethics:

*“The ethical subject has been a strong subject in our Association; we have a commission of ethics and transparency [...]. When we address scientific research for which they have contracted us, [...] we have confidentiality agreements. When it is considered that there is a vulnerable population, we follow protocols [...]”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1754</sup>]

*“If there is a contract for me, obviously because of the legal issues I must remain silent when they indicate to me about the research for which I have been contracted and it must be according to the policy.”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1755</sup>]

*“We try to follow APA norms [...] from [anonymised university department] and we have confidentiality agreements. [Also] when we work with vulnerable populations, there is requirement to follow protocols of data protection, image*

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<sup>1753</sup> ROU02

<sup>1754</sup> BO06

<sup>1755</sup> BO06

*protection, and protection of [...] young people.” [Female; Bolivia; Industry & Business, CSO; ICT<sup>1756</sup>]*

A core message from this participant was that they take ethics seriously. There are established procedures in place based on relevant organisational and professional guidance.

Data protection was also a concern of another Bolivian ICT participant. They made the point that all parties needed to adhere to a minimum ethical standard when sharing data:

*“This [reminds me of when we] worked for a bank [...] to do data mining based on customer data. [...] they provided us with all the client’s personal information, including ID cards. Immediately we returned the information, indicating that this was not correct, and we asked to get the information [anonymously]. This is a clear example that we are very careful with external sources, we are taking care of ourselves and that way we take care of the clients.” [Male; Bolivia; RPO; ICT<sup>1757</sup>]*

In Uruguay, ICT was said to be particularly affected by the Law of Protection of Personal Data:

*“I wanted to add that the Law of Protection of Personal Data is another law we are governed by. We have had to adapt as new regulations are obviously emerging [and] we have to comply with certain obligations, which previously could be not written in law or could not be so clear, despite the professionalism of the management.” [Male, Female; Uruguay; CSO; ICT<sup>1758</sup>]*

This represents a clear evolution from informal agreements to a mandatory legal requirement of particular ethics standards.

#### 3.10.9.5.4 Bio-Economy

Material Transfer Agreements, sensitivity to animal welfare, and national policy concerning animal experimentation play a role in ethical responsibilities in the Uruguayan bio-economy. But the participant also noted how there was a general absence of strict practice and policy at the research level:

*“In principle, we mainly work with plant material [and] some animal material. It is always a matter of using national germplasm banks, respecting biodiversity, and intellectual property protection at country level. Every time we bring materials from abroad, it is important to make an MTA [Material Transfer Agreement] and to be very respectful of the contribution that other actors make. There is a lot of sensitivity lately in the issue of animal welfare. There are also people from [anonymised organisation] who have been trained in this subject and there is a policy that is being seen more at a national level, at the production level, but I also*

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<sup>1756</sup> BO06

<sup>1757</sup> BO09

<sup>1758</sup> ROU03

*understand that it should affect the practices of research, the use of animals and the research conditions. [...] but we have nothing, neither a protocol nor established good practices.” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1759</sup>]*

Another participant provided one of the more detailed accounts of intellectual property rights and their complex relationship to maintaining the public good, and dealing with international competition:

*“It is good [that] animal welfare procedures are respected as much as possible to avoid the unnecessary suffering of animals. I think that the sensitivity has increased internationally because there is a lot of lobbying [in] the food sector. Each country and each region [...] tries to strengthen and show the benefits of its productions and insult and criticize the productions [...] in other regions that [compete] internationally.” [Male; Uruguay; CSO; Bio-economy<sup>1760</sup>]*

It is interesting to note here how those who know the business landscape are best equipped to protect themselves but often to the detriment of others.

The same interview participant also described a similar policy absence at the research level, despite ethical standards in place for personal relations:

*“A commission was created in the CONICYT [...] on how to approach the bioethical issue in Uruguay. Today we do not have an explicit norm [...] that addresses these issues. [...] there is an Institutional Ethics Committee, but it works on personal problems, labour harassment and those things. It is not thought from the point of view of ethics in research, the use of data, animal welfare or misuse of people in surveys [...]. We do not have rules for that. [...].” [Male; Uruguay; CSO; Bio-economy<sup>1761</sup>]*

Given that a commission had been set up to remedy these issues we infer a wider recognition that improvements were needed within the organisation.

### 3.10.9.6 STAKEHOLDER RESULTS

#### 3.10.9.6.1 Research Performing Organisations (RPO)

The interviews did not provide any insights for RPOs, in the context of the *ethics* theme.

#### 3.10.9.6.2 Research Funding Organisations (RFO)

The interviews did not provide any insights for RFOs, in the context of the *ethics* theme.

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<sup>1759</sup> ROU02

<sup>1760</sup> ROU01

<sup>1761</sup> ROU01

### 3.10.9.6.3 Industry & Business

The interviews did not provide any insights for industry and business, in the context of the *ethics* theme.

### 3.10.9.6.4 Civil Society Organisations (CSO)

One CSO participant raised concern over the absence of policy and protocol in research Uruguay:

*“I think that everyone has incorporated it from their training. Generally, here those who [...] lead the research projects have been trained in the United States, in Europe, in Oceania, etc. [...] where they already had it very ruled. [...] but I think it would [be of] merit to formulate [ethics] in policies and clearer protocols.”*  
[Male; Uruguay; CSO; Bio-economy<sup>1762</sup>]

He also explained how the globalisation of research contributed to common perspectives surrounding ethics. For instance, those leading bio-economy research projects in LAC regions had often been for training in western countries.

### 3.10.9.6.5 Policy Bodies

Policy body members viewed ethics as relevant to the actual research but not specifically for their organisation. As an example, the following participant appeared to locate his ethical commitments in the university where he was doing his research, but he had much less to say on the ethics of his policy body:

*“The university at which I am doing my research is a European institution and has various rules and procedures when it comes to [gathering] information from companies, and different actors. I am subject to those European norms. Any time I use information, I have the obligation to document the information, and also to request the consent to any institution that provides the information.”* [Male; Bolivia; RPO, Policy body; Energy<sup>1763</sup>]

Again, it was also interesting to note how Europe was used as a reference point for excellence within LAC-specific projects.

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<sup>1762</sup> ROU01

<sup>1763</sup> BO01

### 3.10.9.6.6 Interactions between stakeholders

The interviews did not provide any insights into the interactions between stakeholders in the context of the *ethics* theme.

### 3.10.9.6.7 KEY Platforms, spaces and players

The global association ACM (Asociación Computiery Machinery) was described here as having a highly developed code of ethics:

*“Well my training is systems engineering and to control and mark my ethical limits I have two sources. The main one is the ethics code of the ACM (Asociación Computiery Machinery) a global association in computing with a highly developed code of ethics [...]. [...] I also have an [ethical code] acquired at school, complemented with a religious formation. All this has given me a set of ethical principles that I have always been able to respect and hope to always fulfil.”* [Male; Bolivia; RPO; ICT<sup>1764</sup>]

The International Organisation for Standardization (ISO) was also mentioned as the source of a participant’s standardized procedures:

*“[anonymised organisation] works with ISO 9001 meaning that we have standardized procedures. [...] there are certain levels where it is possible to verify, limit, or restrain some of these things. Because the quality system forces us, in a certain way, so that all is communicated in the subjects.”* [Male; Bolivia; RPO; Energy<sup>1765</sup>]

Another Bolivian interview participant from the ICT domain said they “use rules defined by *AMITIC*”<sup>1766</sup> (Thematic network on environmental intelligence and information and communication technologies) [Female; Bolivia; Industry & Business, CSO; ICT<sup>1767</sup>].

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<sup>1764</sup> BO09

<sup>1765</sup> BO04

<sup>1766</sup> (Centro Agronómico Tropical de Investigación y Enseñanza) <http://www.redamitic.utp.ac.pa/>

<sup>1767</sup> BO06

### 3.10.9.7 SUMMARY OF ETHICS

There was explicit discussion in the interviews of the lack of regulation and government policy relating to ethics. Additionally, participants were generally unsure of existing policies.

Beyond formal policies, there was the same lack of clarity and uncertainty at the organisational level. Indeed, the sources of ethical values and guidelines were commonly located elsewhere. For example, at disciplinary and institutional levels, or even through training done abroad (e.g. US, Europe).

There was limited information about citizen inclusivity, integrity, and moral deliberation. While some committee's standards existed, ethics appeared to be more about data protection or quality control.

The Bolivian interviews in particular offered the impression that ethics was viewed as specifically relevant to the actual research. Ethics was less salient when it came to working standards or societal consequences. More generally though, participants commonly seemed to disidentify entirely with ethics. Some researchers deemed ethics irrelevant to their research and innovation activities.

### 3.10.10 GOVERNANCE OF RESPONSIBLE RESEARCH AND INNOVATION (RRI)

Governance of RRI is defined by the European Commission as “arrangements that lead to acceptable and desirable futures.”<sup>1768</sup> Such arrangements have to be “robust and adaptable” to unpredictable R&I development; “familiar enough to align with existing practices in R&I”; shares “responsibility and accountability among all actors” and “provide governance instruments to foster this shared responsibility.”<sup>1769</sup>

This defines the boundaries of the governance theme within which the subsequent coding is presented. The parent nodes from which the codes are derived are *accounting for local contexts* [codes 95, 96, 97, 98, 99]; and *conflicts and tensions* [code 109, 110]. The constituent codes for the former include:

Chapter-wise code counts	Latin America & the Caribbean			
	Bolivia	Brazil	Uruguay	Total
Governance of RRI in Latin America & the Caribbean				
94: Enablers	26	24	25	75
95: Accounting for local contexts	22	9	8	39
96: Importance of customisation	1	1	2	4

<sup>1768</sup> <https://www.rri-tools.eu/about-rri#why>

<sup>1769</sup> <https://www.rri-tools.eu/about-rri#why>

97: Contextualising technology and innovation	3	0	2	5
98: Importance of politics	5	2	2	9
99: Accounting for geographic scale	5	4	1	10
109: Conflicts between theory and practice	16	20	11	47
110: Conflicts and tensions in R&I expectations	16	16	11	43
105: Time frames and time constraints	2	4	2	8
108: Lack of (perceived) applicability of RRI	1	0	0	1

The next two sections provide details about each of the two codes and descriptions of what is to be found in the analysed data. Findings connected to particular domains of research and innovation and particular categories of stakeholders are then provided in the next results sections. A final summary section then helps bring together the findings as it relates to the theme *governance of RRI*.

### 3.10.10.1 ACCOUNTING FOR LOCAL CONTEXTS

This sub-theme includes any reference to the role of context in determining and/or undertaking RRI practices. In coding terms, it is the aggregated parent node for the subcategory codes in this section, which are: Importance of customisation; Contextualising technology and innovation; Importance of politics; and Accounting for geographic scale. We now discuss each of these in turn.

Name	Description
Importance of customisation	Any reference to the importance of a custom-tailored approach for R&I in all/varying aspects of responsibility (e.g. communication and engagement, ethics, etc.)
Contextualising technology and innovation	Any reference to not simply focusing on the technology development, but also providing space for experimentation and dissemination <i>in context</i> for maximising positive impact
Importance of politics	Any reference to how local/international politics or internal politics within the organisation can play a role or influence (R)RI practices

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Accounting for geographic scale	<p>Text coded to references of differences in or accounting for geographical scales to highlight how local/ area-specific policies might influence/apply to technologies or products that are, in fact, for global use or how local policies are applied to/influenced by larger national, international or even global standards/policies.</p> <p>Rules: This code can include any implications on the difference in scale of policies. It can also include interactions or comparisons between different contexts like the Global North and South.</p>
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*Importance of customisation* includes any reference to the importance of a custom-tailored approach for research and innovation in all/varying aspects of responsibility (e.g. communication and engagement, ethics, etc.).

For this region, the interviews provided no insights on the governance of RRI.

*Contextualising technology and innovation* encompasses comments that are not only focusing on technology development but also providing space for experimentation and dissemination for maximising positive impact.

The interviews provided some examples of the strategies that were being applied to develop and strengthen research and innovation. For example, it was said to be important to utilise local knowledge over outsourcing maintenance of technology and projects. Outsourcing proved to be costly and affects the sustainability of RRI:

*“The subject is that knowledge [...] must be local. We have already passed through this when they gave things to us at the international level. [...] Spain donated computers and terminals and we had a problem, because when some equipment was damaged. [...] At that time we had to bring people from other countries in order to fix technical problems. [...] When internal intellectual capital is not developed, it is more expensive later to maintain [...].”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1770</sup>]

The use of prototypes or micro-projects was also described as a strategy of demonstrating a project’s effectiveness to motivate funders:

*“[...] if the project is nonviable because financial resources do not exist, then we generate micro-projects or prototype projects, so that they see the amount of people that it can generate an impact on.”* [Male; Bolivia; Industry & Business; Waste Management<sup>1771</sup>]

Another recognised strategy was keeping abreast of technological advancements:

*“[In] the technological field, you must be informed and know these last scientific advances. If you are not aware of its advances you are not going to be able to apply*

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<sup>1770</sup> BO06

<sup>1771</sup> BO08

*them, you are not going to be able to make a development of these in the projects [...]” [Male; Bolivia; RPO; ICT<sup>1772</sup>]*

A Uruguayan participant referred to strategies of co-innovation, scaling-up, creating consortiums networks, and selective use of producers to develop and disseminate their technological solutions:

*“Yes, now we are developing, apart from research projects, projects of technology transfer or co-innovation. [...] these technologies are like a lighthouse or an attractor [for] other producers in the area for the scaling up of the experiences, linking government technicians, rural development, etc. [...] they are also incorporated there and then into networks and innovation consortiums. We also incorporate them at the level of governance, the agenda and, in some cases, in the commercialization of the products that are generated.” [Male; Uruguay; CSO; Bio-economy<sup>1773</sup>]*

*Importance of politics* includes how local/international politics or internal politics within the organisation can play a role or influence RRI practices. We note three governance insights included in the interviews:

First, the local political decision-making system was regarded as crucial to the development of waste management RRI in Bolivia:

*“The decision starts [with] the political decision-makers [...]. For example, the majority of the municipalities of the department do not have sanitary fillings; then a priority for them is to establish its sanitary fillings.” [Male; Bolivia; RPO, CSO; Waste Management<sup>1774</sup>]*

Second, national strategic planning processes were seen as a serious hindrance to the development of RRI. In the Uruguayan energy domain, national politics signalled that energy was a market problem that impeded the development of research and innovation:

*“[...] signals had been given from the political sector to the whole society, and particularly to the academy, that energy was a market problem, and the market was going to take care of supplying all the requirements.” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1775</sup>]*

Third, national politics hampered forest certification in Bolivia:

*“In Santa Cruz, we have worked with the subject of the forest certification, although at this moment this subject is extinguished by government policies or rather by political positions.” [Female; Bolivia; RPO; Bio-economy<sup>1776</sup>]*

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<sup>1772</sup> BO09

<sup>1773</sup> ROU01

<sup>1774</sup> BO03

<sup>1775</sup> ROU02

<sup>1776</sup> BO07

*Accounting for geographic scale* includes accounting for geographical scales to highlight how local policies might influence technologies or products that are for global use. Also, how local policies are influenced by larger national, international standards/policies. This can include any implications on the difference in scale of policies. It can also include interactions or comparisons between different contexts like the Global North and South.

According to a participant from Bolivia, international funding was based on deficiency and not technological advancement and innovation which they found discriminatory:

*“Many donor countries only link to Bolivia to deficiency [...]. The topic of innovation and development is assigned to Uruguay because they relate that country to advances. Or, in politics, they give support to those of the Center, and link [Bolivia] to subjects related to health, or more basic needs. That really is discriminating”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1777</sup>]

Bolivia’s research and innovation costs are exacerbated by the absence of local experts:

*“There are no local experts and expertise now, [and] it is costing more. The payment of [...] a researcher who comes from [another] country could be almost six times compared to the earnings of a local researcher who does not have access to knowledge.”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1778</sup>]

Brazil was noted as behind in terms of the global arena of research and innovation:

*“Debates [on] innovation and entrepreneurship gained [...] more important dynamism in modern society. Although I think that in Brazil we’re a bit late compared to some other countries.”* [Male; Brazil; RPO; Energy, ICT<sup>1779</sup>]

The disadvantages and inequalities can also be ascribed to the relationship between the Global North and the Global South:

*“And the activities are always innovative given a context traditionally dominated by the unequal relationship of the North and South or between the rest of Brazil versus the Amazon.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1780</sup>]

However, the following participant suggested Global North can learn from the Global South:

*“[...] I believe that our [free health system model] can contribute [...] worldwide with new treatments and how to transfer benefits to society.”* [Male; Brazil; RPO, RFO, Policy body; Bio-economy<sup>1781</sup>]

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<sup>1777</sup> BO06

<sup>1778</sup> BO06

<sup>1779</sup> BR02

<sup>1780</sup> BR03a

<sup>1781</sup> BR06

It was stated that the Global North could learn from how the national free health system in Brazil had shaped some of Brazil's innovation.

### 3.10.10.2 CONFLICTS AND TENSIONS

*Conflicts between theory and practice* [code 109] are the aggregated parent node for *conflicts/tensions in R&I expectations* [code 110]. It includes any reference to conflicts between the motivations and priorities of scientific research and innovation. The conflicts can be because of different normative frames or different research priorities and end-goals.

Name	Description
Conflicts/tensions in R&I expectations	<p>Any reference to conflicts between the motivations and priorities of scientific R&amp;I and those of different stakeholders. Any tensions between what is 'wanted' and what is 'needed'.</p> <p>Any reference to tensions, conflicts or disconnects between:</p> <ul style="list-style-type: none"> <li>- Fundamental and applied research</li> <li>- Scientific theory and practice</li> <li>- Research and industry/business</li> <li>- Research and policy, etc.</li> <li>- Regulations versus research progress</li> </ul> <p>Rules: These can be because of different normative frames or different research priorities and end-goals.</p>

In Bolivia, the local and national contradictions in waste management hindered the RRI aspects of their research:

*“There is a complication because the central government had a role as the national environmental authority. [...] when the municipal governments here in Cochabamba, are making barbarisms with solid waste. The national authority cannot exert its authority because the municipal governments say to them [...] if you constructed a sanitary filling, why don't you construct one for us?*

*[...] it would [have] been clearer that this would be exclusive operative work of the municipal governments, as it is in [...] the Constitution, so that the authority at the departmental and national level, maintains its role and can sanction the municipality [committing] the crimes.*

*[...] They are polluting the rivers and the contamination is perfectly typified as a crime, but they cannot exert their role [...].” [Male; Bolivia; RPO, CSO; Waste Management<sup>1782</sup>]*

<sup>1782</sup> BO03

A Bolivian participant considered plant health regulations as an obstacle to their research and innovation:

*“SENASAG [Plant health service] limits us because in many cases [the regulations] are not clear [...]. Instead of simplifying it, they start to block it, so that it becomes difficult for us.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1783</sup>]

Another interview participant alluded to the competing interests of business and research, with the former favouring innovation over the latter:

*“One of the problems that we detected [...] is that in Bolivia we have a divorce between research - as is considered in the universities - and what it requires the industry, this last one gives more value to the innovation.”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1784</sup>]

Aspects of their research conflicted with RRI because of the ethical dilemma between their contracts and public health implications:

*“In many places in Santa Cruz, there are septic wells [and] hazardous waste. These wells must have a legal depth that prevents underground waters from being polluted. Nevertheless, I know for sure that they do not fulfil the regulations. [...] similar cases happen with the ethanol tanks, gasoline tanks, many things that are not regulated, and this knowledge would have to be a global public good. [...] the ethical dilemma [exists because] they contract you and you must respond to [them and not the public].*

[Female; Bolivia; Industry & Business, CSO; ICT<sup>1785</sup>]

Attempting to govern co-innovative approaches and identifying priorities was also a challenge:

*“We are very supportive of co-innovation, defining together [...] the problems from the beginning. That is the ideal case. [But] it is hard to give space for other stakeholders to define priorities. The networks that have been sustainable and strong in time, occur when that agenda is really shared [...]”* [Male; Uruguay; CSO; Bio-economy<sup>1786</sup>]

Similar tensions in collaborative arrangements occurred with the contrasting interests between researchers and government or employers toward publishing:

*“Generally the whole issue of publications is a field of tension because the researcher tends to [...] believe that everything has to be [...] open access. [...] while the employer and the government usually have resistance in publishing data that may be sensitive and may affect competitiveness, the country image or the*

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<sup>1783</sup> BO05

<sup>1784</sup> BO06

<sup>1785</sup> BO06

<sup>1786</sup> ROU01

*reputation of a company, etc. This is one of the most controversial topics.” [Male; Uruguay; CSO; Bio-economy<sup>1787</sup>]*

Another Uruguayan policy body participant noted the imbalance between the government ministry and international funders:

*“Given that we work with many actors we have to be very careful to respect the tasks of each ministry [...]. We have some issues of concern from the international funders [...] who are usually very concerned about the speed at which the funds are executed [...]. But on the Uruguayan side, it does not really matter to the government. What matters is that they are spent on really effective things.” [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1788</sup>]*

Such imbalances come from different expectations and paces of working, in part due to the different roles that need to be fulfilled in research and innovation.

### 3.10.10.3 DOMAIN RESULTS

#### 3.10.10.3.1 Energy

The policy body in the energy domain in Uruguay had a level of flexibility that was not apparent in other departments:

*“The Energy Directorate, in particular, is one of the least regulated Directorates within the Ministry, or more flexible [with] a less rigid framework around regulations to be able to interact with actors.” [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1789</sup>]*

The centrality of lithium to the Bolivian energy domain also raised multiple complications:

*“There is divergent thinking. Some people say that we have to produce batteries; some say that the business is not for [producing] batteries and that we have to be efficient in the [extraction] and administration of [lithium], to [establish] international prices.” [Male; Bolivia; RPO, Policy body; Energy<sup>1790</sup>]*

In particular, there were concerns about the role that natural resource extraction should play in a country’s economy and future economic strategy.

#### 3.10.10.3.2 Waste Management

Engagement with the local decision-making system was crucial to the development of waste management RRI in Bolivia:

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<sup>1787</sup> ROU01

<sup>1788</sup> ROU04

<sup>1789</sup> ROU02

<sup>1790</sup> BO01

*“The decision starts [with] the political decision-makers [...]. For example, the majority of the municipalities of the department do not have sanitary fillings; then a priority for them is to establish its sanitary fillings.”* [Male; Bolivia; RPO, CSO; Waste Management<sup>1791</sup>]

Local needs were identified and then the local government aligned its research with these priorities.

### 3.10.10.3.3 Information and Communications Technology (ICT)

It was important to have some localised knowledge in place for maintaining ICT and its projects, otherwise, it may have proved costly and affected the sustainability of RRI:

*“Spain donated computers and terminals and we had a problem, because when some equipment was damaged. [...] At that time we had to bring people from other countries in order to fix technical problems. [...] When internal intellectual capital is not developed, it is more expensive later to maintain [...].”* [Female; Bolivia; Industry & Business, CSO; ICT<sup>1792</sup>]

The point raised herein is that ideas and solutions that worked in other countries are not automatically transferable to LAC regions. Therefore, the focus should be on developing local knowledge to address ICT problems.

### 3.10.10.3.4 Bio-economy

The bio-economy regulations were regarded as restrictive in Bolivia by this participant:

*“SENASAG [Plant health service] limits us because in many cases [the regulations] are not clear [...]. Instead of simplifying it, they start to block it, so that it becomes difficult for us.”* [Female; Bolivia; RPO, CSO; Bio-economy<sup>1793</sup>]

Essentially, there were prerequisite evaluation tasks that must be completed before a new product can be registered. The complexity of these evaluation tasks recently changed, which made registration more difficult to achieve.

## 3.10.10.4 STAKEHOLDER RESULTS

### 3.10.10.4.1 Research Performing Organisations (RPO)

A key strategy for this RPO member was keeping abreast of technological advancements:

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<sup>1791</sup> BO03

<sup>1792</sup> BO06

<sup>1793</sup> BO05

*“[In] the technological field, you must be informed and know these last scientific advances. If you are not aware of its advances you are not going to be able to apply them, you are not going to be able to make a development in the projects [...].”*

[Male; Bolivia; RPO; ICT<sup>1794</sup>]

Consideration of the latest technological advances are contextualised and firmly grounded in the current Bolivian social and economic realities. This forms part of seeking to improve society through their research.

#### 3.10.10.4.2 Research Funding Organisations (RFO)

The interviews did not provide any insights for RFOs, in the context of the *Governance of RRI* theme.

#### 3.10.10.4.3 Industry & Business

The use of prototypes or micro-projects was described as a strategy of demonstrating effectiveness, and was utilised by one Bolivian business & industry participant:

*“[...] if the project is nonviable because financial resources do not exist, then we generate micro-projects or prototype projects, so that they see the amount of people that it can generate an impact on.”* [Male; Bolivia; Industry & Business; Waste Management<sup>1795</sup>]

Developing prototypes was discussed as a successful and cost-effective way of testing out solutions that could potentially be developed at scale. There was also an implicit sense that this could be a useful mechanism for fringing stakeholders together by making them realise the value and impact of the project.

#### 3.10.10.4.4 Civil Society Organisations (CSO)

Some CSOs were directly impacted by the electoral developments in their countries:

*“[...] we have to respect the electoral periods, for example, [during the election period], we stopped doing activity.”* [Male, Female; Brazil; CSO; Energy, Waste Management, Bio-economy<sup>1796</sup>]

This connection with national government cycles meant that the strategies needed were time-restricted, and thus longer-term planning were fundamentally inhibited due to longer-term uncertainties.

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<sup>1794</sup> BO09

<sup>1795</sup> BO08

<sup>1796</sup> BR03b

### 3.10.10.4.5 Policy bodies

The policy body in the energy domain in Uruguay has a level of flexibility that was not apparent in other departments:

*“The Energy Directorate, in particular, is one of the least regulated Directorates within the Ministry, or more flexible [with] a less rigid framework around regulations to be able to interact with actors.”* [Male; Uruguay; Policy body; Energy, Waste Management, Bio-economy<sup>1797</sup>]

### 3.10.10.4.6 Interaction between stakeholders

In developing and disseminating their technological solutions, a Uruguayan participant referred to multi-stakeholder strategies of co-innovation, scaling-up, creating consortiums and networks. The selective use of producers also attracted other producers in the area:

*“Yes, now we are developing, apart from research projects, projects of technology transfer or co-innovation. [...] these technologies are like a lighthouse or an attractor [for] other producers in the area for the scaling up of the experiences, linking government technicians, rural development, etc. [...] they are also incorporated there and then into networks and innovation consortiums. We also incorporate them at the level of governance, the agenda and, in some cases, in the commercialization of the products that are generated.”* [Male; Uruguay; CSO; Bio-economy<sup>1798</sup>]

A Uruguayan policy body participant also provided an account of the temporal imbalance between various stakeholders, such as between the government ministry and international funders:

*“Given that we work with many actors we have to be very careful to respect the tasks of each ministry [...]. We have some issues of concern from the international funders [...] who are usually very concerned about the speed at which the funds are executed [...]. But on the Uruguayan side, it does not really matter to the government. What matters is that they are spent on really effective things.”* [Female; Uruguay; Policy body; Energy, Bio-economy<sup>1799</sup>]

Similar tensions in collaborative arrangements were associated with publishing and the contrasting interests towards publishing:

*“Generally the whole issue of publications is a field of tension because the researcher tends to [...] believe that everything has to be [...] open access. [...] while the employer and the government usually have resistance in publishing data that may be sensitive and may affect competitiveness, the country image or the*

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<sup>1797</sup> ROU02

<sup>1798</sup> ROU01

<sup>1799</sup> ROU04

*reputation of a company, etc. This is one of the most controversial topics.” [Male; Uruguay; CSO; Bio-economy<sup>1800</sup>]*

In sum, there did not appear to be an obvious stakeholder group that cemented the relationships and configured the dynamics across the stakeholders as seen with RFOs. Instead, issues of multi-stakeholder strategies, temporal imbalances, co-ownership of priorities, and publishing interests came to the fore in this theme.

#### 3.10.10.4.7 Key Platforms, Spaces and Players

In Bolivia, the local political space was a key part of the functioning of the waste management domain. However, there were conflicts between local and national jurisdictions with some municipalities seemingly exploiting the confusion.

Other spaces of note were between the North and the South. A Bolivian participant described the relationship as somewhat discriminatory. Others argued how the North could learn from the South and its implementation of RRI innovations.

#### 3.10.10.5 SUMMARY OF GOVERNANCE OF RESPONSIBLE RESEARCH AND INNOVATION (RRI)

When considering how local context was accounted for, there was no discussion in the interviews on the importance of customisation. However, there were strategies in use (e.g. utilising localised knowledge, prototyping) that aimed to contextualise technology and innovation.

The importance of politics was clear through evidence of engagement with local decision-making systems; national strategic planning processes; and national politics influencing policies and policy compliance.

There was discussion of how the geographic scale was accounted for, including how international funding was sourced and managed, as well as how expertise was imported.

Several conflicts and tensions existed in the context of RRI governance, such as one’s view on the (economic) positioning of a country and how society should be organised around such ambitions (e.g. how much to rely on natural resource extraction).

#### 3.10.11 INTERVIEW FINDINGS

Chapter 3 presents findings from the RRING Work Package 3’s Task 3.3 – specifically its global interview task – for the region of Latin America & the Caribbean. RRING’s Task 3.3 interviews aim to investigate bottom-up perspectives and experiences of researchers and

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<sup>1800</sup> ROU01

innovators. The focus here is on collecting data through and from researchers and innovators themselves, in Latin America & the Caribbean.

In total, 21 interviews were undertaken for Latin America & the Caribbean, covering: Uruguay (5 interviews); Bolivia (9); Brazil (7). We undertook a Qualitative Content Analysis approach to analysing these interview data.

Our findings are structured around seven RRI-related themes, which are inspired by the EC pillars and AIRR dimensions, and indeed are core to structuring the interview sections of this report. Within each of these themes, several prevalent sub-themes also emerged:

- *Gender equality and inclusivity*: gender and sexual diversity; organisational norms and practices; discrimination and lack of diversity; and lack or uncertainty of policy.
- *Public engagement*: organisational norms and practices; motive-benefits of public engagement and collaboration; building support networks and strategic alliances; and integration of different domains and stakeholders.
- *Open Science*: levels and limits of open access; lack or uncertainty of policy; risk-disadvantages associated with open data access; and motive-benefits of open access and data.
- *Anticipative, reflective and responsiveness*: evaluation; and demand-drive research and innovation.
- *Science education*: the tools of science education; and research and innovation capacity building.
- *Ethics*: positioning ethics – where does the responsibility lie?; organisational norms and practices; lack or uncertainty of ethical standards and policies; and protection of rights.
- *Governance of RRI*: accounting for local contexts; and conflicts and tensions.

Taking each of these themes in turn, we now briefly reiterate salient findings that have been generated through our analysis:

### **1. Gender equality and inclusivity (Section 3.10.4)**

There was evident agreement for and acceptance of the rights of women to be part of research and innovation in the workplace. The general perception, particularly in Bolivia, was that female participation rates had improved.

Across the region, there was a clear recognition of increasing levels of women in leadership and decision-making roles. However, still noting limited expression of more progressive understandings of gender equality and inclusivity.

Uncertainties about relevant government policies were present across the interviews, particularly for Bolivia and to some degree for Brazil. From this, we can see a disconnect between participants' knowledge of inclusivity measures and the stance of their governments.

There was also a focus on women being held back by their commitments to family life further highlighting the need to counter these effects with innovative solutions.

Geographical location and terrain played a large part in lower female participation rates, particularly in the energy and ICT domains in Bolivia. Geographical circumstances excluded women from the energy domain because of its rural remoteness which often jarred with their domestic responsibilities. In ICT, a lack of connectivity in certain areas together with conservative gender values excluded some women.

There was a general absence of commentary on other forms of diversity, although partially a product of interviewers tending to concentrate on gender alone. Most of the commentary on the inclusivity of racial and indigenous minorities came from one Brazilian CSO interview participant.

## **2. Public engagement (Section 3.10.5)**

In general, collaboration tended to dominate these discussions, whereas public engagement played a smaller role. Interview participants described a myriad of benefits and motivations to collaborative activities, including the building of trust and public acceptability, gaining greater commitment from partners, and ensuring continuity. The frequent mentions of an ‘ecosystem’ implied that support networks and strategic alliances were salient and valued by all.

While alignment was generally weak in the overall commentary, some of the support networks and strategic alliances were aimed towards alignment with societal needs and values.

There was also recognition of the need for inter-domain and multi-stakeholder integration to respond to some of the world’s increasingly complex problems, such as managing rainforests and treating AIDS. The mentions of co-creative, deeper strategies and practices aimed at understanding the needs, interests, and approaches of others can be viewed as part of working towards that alignment. The involvement of social organisations and local groups also highlights that some efforts are underway towards alignment.

## **3. Open Science (Section 3.10.6)**

Many participants expressed either beliefs that open science policies did not exist or that they were unsure of it in the context of their particular domain.

An important benefit of open access was cost-reduction and accessibility for improved quality of research and research output. Righting the moral contradiction in privatising publicly funded research was also referred to.

Intellectual property, as in many other regions, conflicted with open access. The main limits to the release of data were commercial and competition-based. Data release restrictions were related to legislative regulations, the public sensitivity of the data, and data ownership. A few examples also hinted at the importance of open access for more robust and informed outcomes,

public trust, and inclusivity. However, participants raised concerns about the political and economic implications of making some data public. Often commercialisation and intellectual property rights appeared to be prioritised first over open access.

#### **4. Anticipative, reflective and responsiveness (Section 3.10.7)**

The qualitative accounts in this theme caution that this was one of the RRI areas that needed much more progress in terms of understanding and application by the LAC research and innovation communities. Indeed, the perspectives detailed across the interviews were overall rather confused.

While there was little direct account of desirable futures, there were signs that they were influenced by how the domains intersected with countries or governments. The case of Lithium in Bolivia and energy was illustrative of this because of the role that natural resource extraction played in the country's future economic strategy.

In terms of responsiveness, much of the detail was lacking but the CSOs demonstrated responsiveness within their current research and innovation activities. They emphasised how alertness to societal and social needs might be an important means of increasing responsiveness.

#### **5. Science education (Section 3.10.8)**

When faced with questions relating to science education, the interview participants usually provided lists of science education tools and activities being used.

The participants rarely discussed the underlying rationales of why they were undertaking science education. This consequently led to somewhat brief and generic accounts of their work, whereby education was used interchangeably with e.g. training, events, workshops, etc. In general, the target audience of their educational activities tended to be students, schools, and local stakeholders.

The main organisations involved in dissemination and training appeared to be the CSOs, who were especially interested in particular development outcomes in relation to local societal needs. The Policy Bodies, RFOs and Business & Industry appeared to make relatively little use of such practices, as is implied by the general absence of science education discussions in their interviews.

Some of the more innovative tools included the use of incubators and technology parks which formed part of the logistical infrastructure of some institutes.

#### **6. Ethics (Section 3.10.9)**

There was explicit discussion in the interviews of the lack of regulation and government policy relating to ethics. In addition, participants were generally unsure of existing ethics policies.

Beyond formal policies, there was the same lack of clarity at an organisational level. The sources of ethical values and guidelines were commonly located elsewhere on, for example, disciplinary and institutional levels or through training done abroad.

There was scant information about citizen inclusivity and moral deliberation of keeping RRI ethical. While some ethical standards existed, there were occasions where it appeared to be more about data protection or quality control.

The Bolivian interviews in particular offered the impression that ethics was viewed as relevant to the actual research. Ethics was less salient, however, when it came to work standards or potential societal consequences. More generally though, participants seemed to disidentify with ethics, with some researchers considering ethics as irrelevant to their research and innovation activities.

## **7. Governance of RRI (Section 3.10.10)**

In the interviews, participants mentioned the strategies in use aimed to contextualise technology and innovation by utilising localised knowledge and prototyping projects.

The importance of politics was clear through evidence of: engagement with local decision-making systems; national strategic planning processes hindering the development of RRI; and national politics influencing policies and policy compliance.

There was discussion of how the geographic scale was accounted for, including how international funding was sourced and managed, as well as how expertise was imported.

Several conflicts and tensions existed in the context of RRI governance. This can be seen in participants account of the economic positioning of their country and how its stakeholders should be organised around such ambitions (e.g. how much to rely on natural resource extraction).

## 3.11 GLOBAL SURVEY RESEARCH: LATIN AMERICAN AND CARIBBEAN STATES

### 3.11.1 INTRODUCTION

The sample size from Latin American and Caribbean states represented only a part of the complete global picture and was largely dominated by respondents from Guatemala and Brazil. The socio-demographic measures showed the dominant age group as 18 to 28, and the gender distribution was slightly skewed toward men. Almost half of all respondents indicated working in one of the four RRING key domains. Most worked in a university or similar RPO, with the most dominant professional fields relating to natural sciences and engineering.

RPOs and other academics were most engaged, suggesting a higher internal engagement in comparison with non-academic stakeholders. This is most likely due to academic collaborations and joint research projects. RRI was mostly associated with environmental aspects of R&I, and dominant associations with the SDGs were for economic aspects of sustainable development.

There was an overall agreement on the importance of diverse and inclusive RRI dimensions, and results suggested that engaging other researchers and academics was a typical part of research processes. Outside academia, respondents most frequently reached out to civil society. Gender equality was ensured internally by creating equal research teams and promoting female researchers but lacked widely adopted measures to integrate gender equality on a more substantive level. This also applied to ethnic minorities, as their promotion was less valued than other RRI measures.

Respondents expressed broad agreement towards the anticipative and reflective dimension of RRI, which translated into various practical steps. These mostly referred to rules, regulations, and legal obligations, but also aspects relating to seeking upstream feedback from non-academics and making research directly responsive to societal needs.

Transparency of research at all levels of R&I work was broadly ensured through one-way dissemination, presumably as it was considered a viable pathway towards open and transparent methods and processes. Researchers and innovators also shared their work more often within the academic field, than with public and non-academic stakeholders. However, making research findings and data openly available to the public was widely confused with open access.

The attitudinal agreement for societal needs was high in comparison with other RRI dimensions. In practice, rather than empowering relevant groups of people to shape the R&I process, there seemed to be a dominant and less responsive top-down approach when selecting research topics.

### 3.11.2 OVERVIEW

This section focuses on the sample of respondents from Latin American and Caribbean states. It was represented by a majority of respondents from Guatemala ( $n = 98$ , 41%) and Brazil ( $n = 61$ , 25%). The sample size for Latin American and Caribbean states was  $n = 240$  (completed surveys), making up 9% of the global sample.

#### 3.11.2.1 SOCIO-DEMOGRAPHICS OF LATIN AMERICAN AND CARIBBEAN STATES

The dominant age group was 18 to 28 ( $n = 97$ , 41%) (Figure 284)<sup>1801</sup>, and the gender distribution was slightly skewed towards men ( $n = 126$ , 53%) rather than women ( $n = 106$ , 45%) (Figure 285)<sup>1802</sup>.

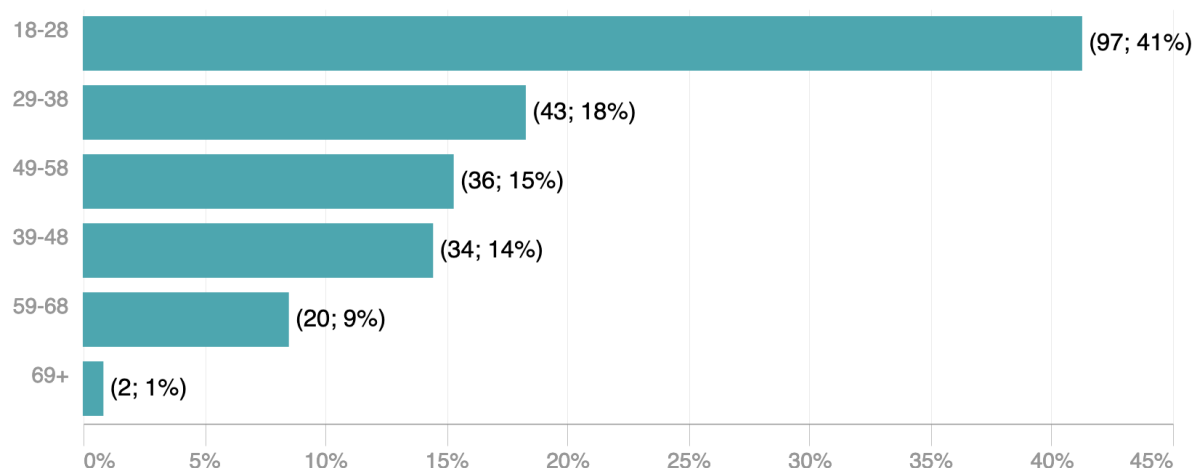


Figure 284: Latin American and Caribbean States - Distribution of age.

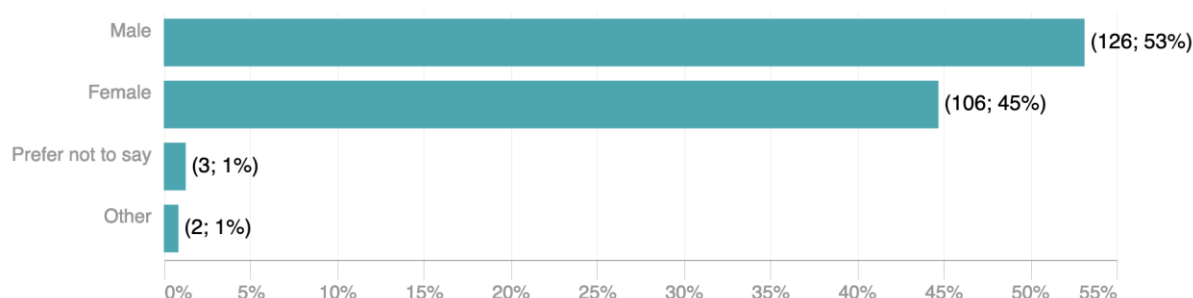


Figure 285: Latin American and Caribbean States - Distribution of gender.

More than half of respondents indicated that they are currently participating in an educational programme ( $n = 129$ , 55%) (Figure 286)<sup>1803</sup>. The overall level of formal education was the lowest compared to the other regions. Most held a Bachelor's degree ( $n = 95$ , 41%), while

<sup>1801</sup> The total number of responses:  $N = 232$

<sup>1802</sup> The total number of responses:  $N = 237$

<sup>1803</sup> The total number of responses:  $N = 233$

fewer respondents reported holding a Master's degree ( $n = 60$ , 26%) or Doctoral degree ( $n = 54$ , 23%) (Figure 287)<sup>1804</sup>. This might be explained by the lower average age for this sample and the high level of respondents reported as actively studying.

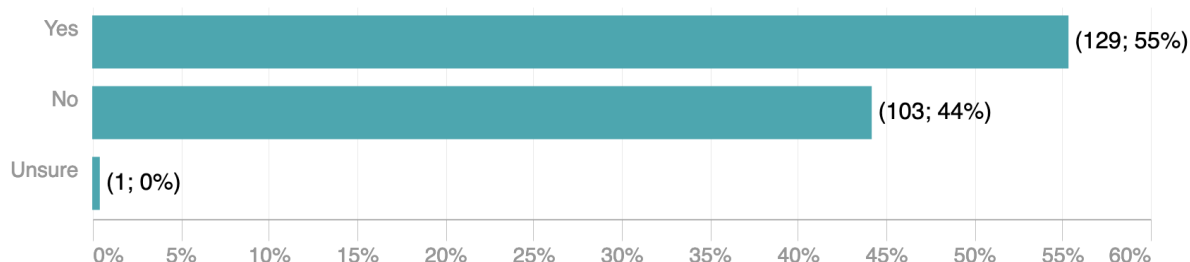


Figure 286: Latin American and Caribbean States - Currently studying at school, college, or university.

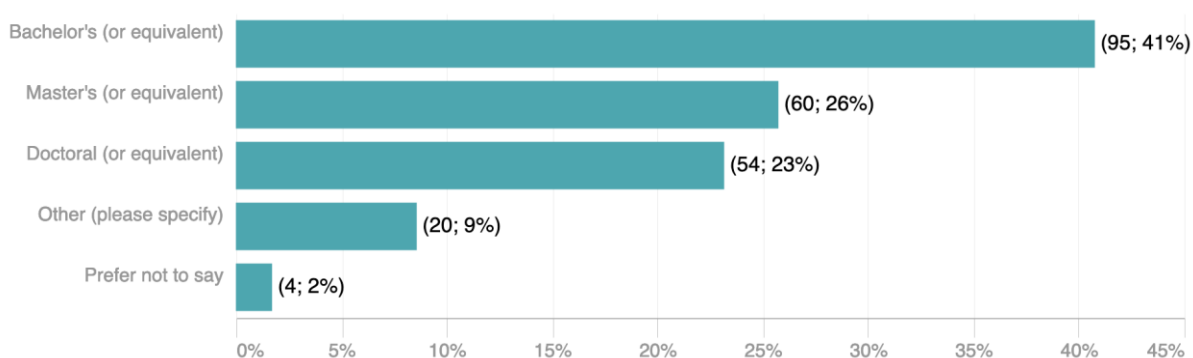


Figure 287: Latin American and Caribbean States - Highest level of formal education completed.

In general, the subject areas of respondents' degrees were diverse (Figure 288)<sup>1805</sup>. Among the degree subject areas, '*Natural sciences, mathematics and statistics*' ( $n = 71$ , 23%) represented the largest group, followed by '*Engineering, manufacturing and construction*' ( $n = 59$ , 19%), '*Information and communication Technology*' ( $n = 33$ , 11%), '*Education*' ( $n = 27$ , 9%), '*Other*' ( $n = 27$ , 9%), '*Social sciences, journalism and information*' ( $n = 24$ , 8%), '*Business, administration and law*' ( $n = 24$ , 8%), '*Agriculture, forestry, fisheries and veterinary*' ( $n = 17$ , 6%), '*Arts and humanities*' ( $n = 13$ , 4%), '*Health and welfare*' ( $n = 7$ , 2%), and '*Services*' ( $n = 4$ , 1%).

<sup>1804</sup> The total number of responses:  $N = 233$

<sup>1805</sup> The total number of responses:  $N = 306$

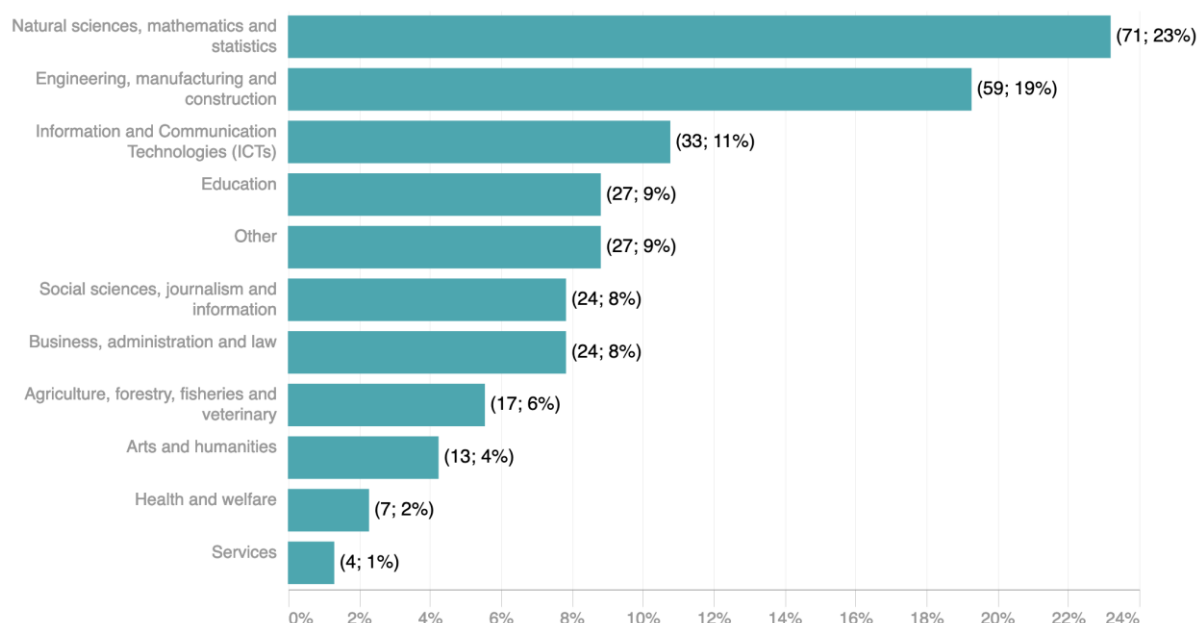


Figure 288: Latin American and Caribbean States - Distribution of degrees by subject area (multiple choice).

Respondents tended to have more years of professional experience ( $Mdn = 20$  years) than after completing their doctoral degree ( $Mdn = 7$  years) (Figure 289)<sup>1806</sup>.

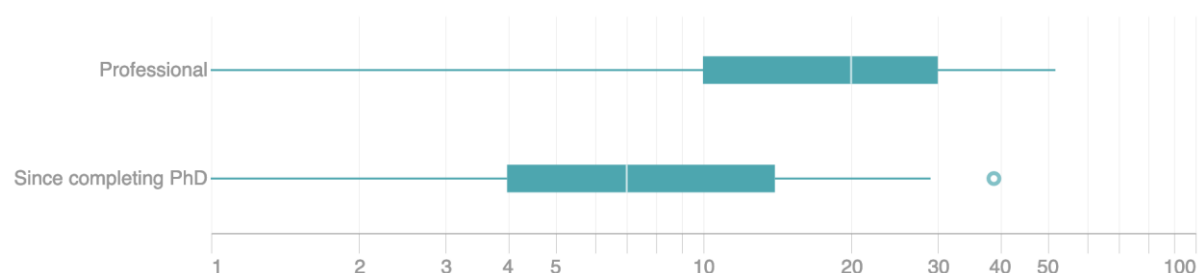


Figure 289: Latin American and Caribbean States - Years of experience as professional/since completing PhD (log scale).

In terms of respondents' academic fields of work, the most dominant were 'Engineering, manufacturing and construction' ( $n = 105$ , 45%) and 'Natural sciences, mathematics and statistics' ( $n = 43$ , 19%) (Figure 290)<sup>1807</sup>.

<sup>1806</sup> The total number of responses for 'Professional':  $N = 104$ ; & 'Since completing PhD':  $N = 41$

<sup>1807</sup> The total number of responses:  $N = 231$

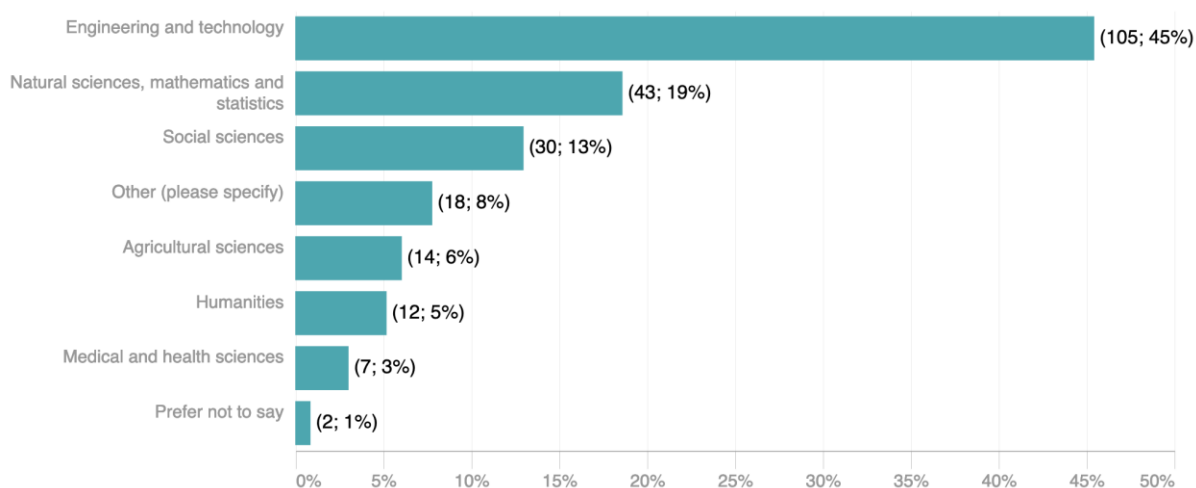


Figure 290: Latin American and Caribbean States - Fields or professions in which respondents work.

The most common sub-fields within these categories were ‘Other’ ( $n = 39$ , 37%) (Figure 291)<sup>1808</sup> and ‘Earth and related environmental sciences’ ( $n = 11$ , 25%) respectively (Figure 292)<sup>1809</sup>.

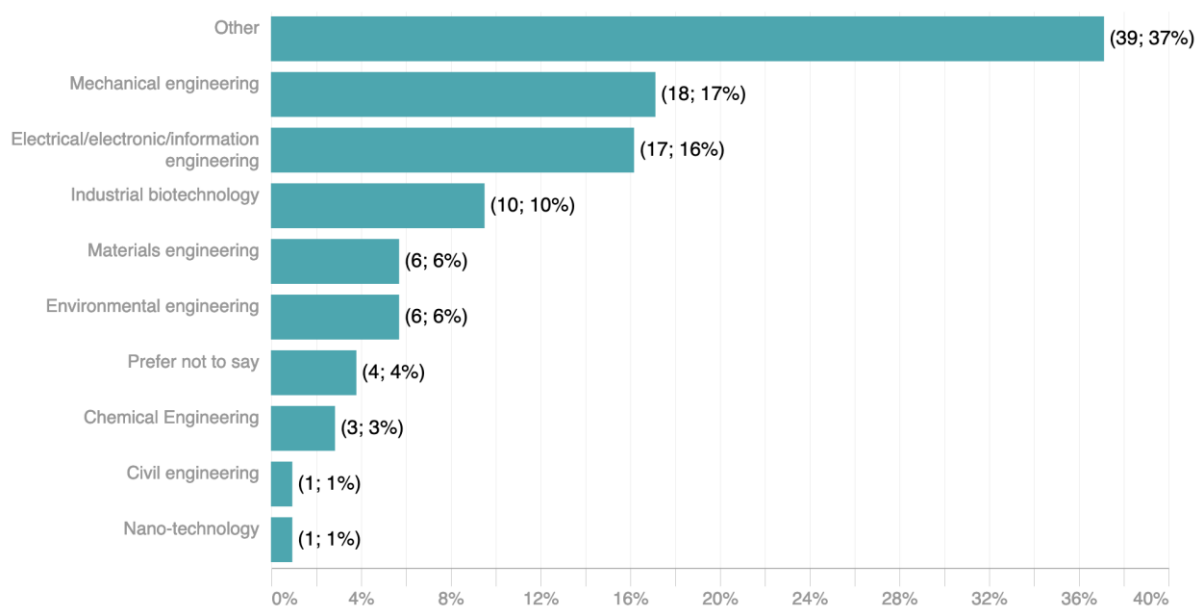


Figure 291: Latin American and Caribbean States - Sub-fields of engineering and technology.

<sup>1808</sup> The total number of responses:  $N = 105$

<sup>1809</sup> The total number of responses:  $N = 44$

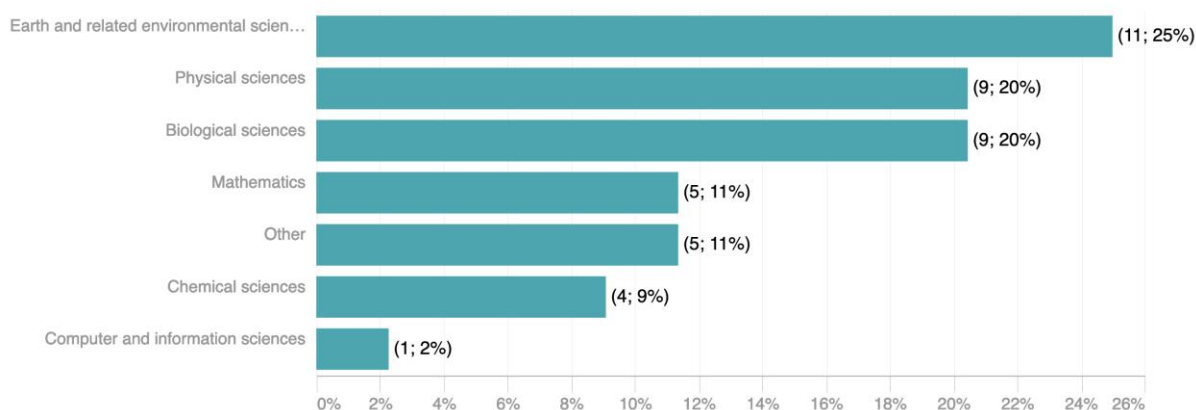


Figure 292: Latin American and Caribbean States - Sub-fields of natural sciences.

The most common sub-fields of ‘Social sciences’ were ‘Economics and business’ ( $n = 7$ , 23%) and ‘Other’ ( $n = 6$ , 19%) (Figure 293)<sup>1810</sup>. For ‘Agricultural sciences’, these were ‘Agriculture, forestry, and fisheries’ ( $n = 8$ , 53%), and ‘Other’ ( $n = 5$ , 33%) (Figure 294)<sup>1811</sup>.

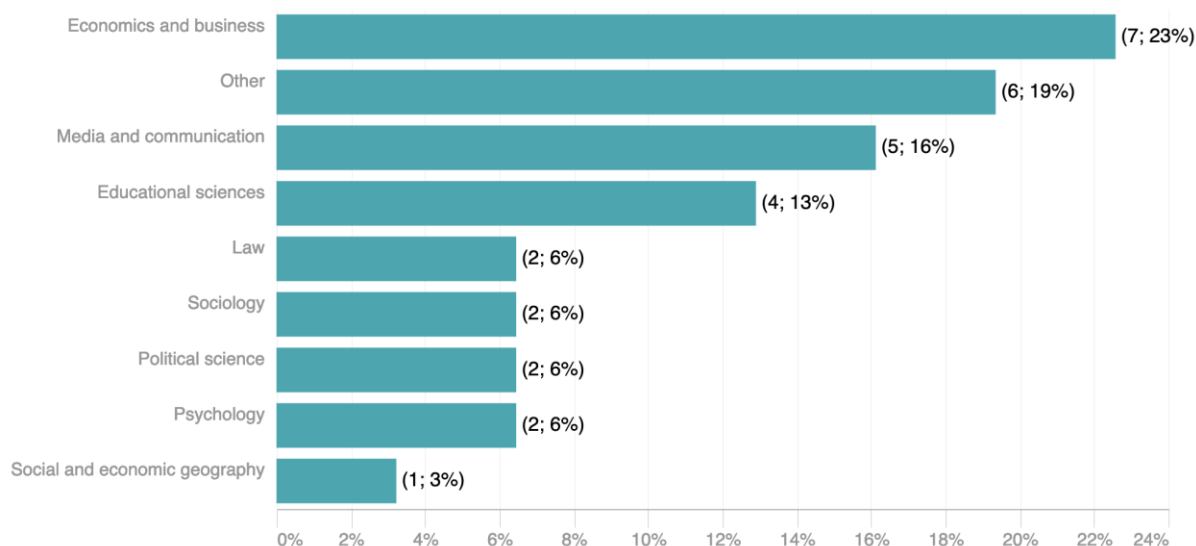


Figure 293: Latin American and Caribbean States - Sub-fields of social sciences.

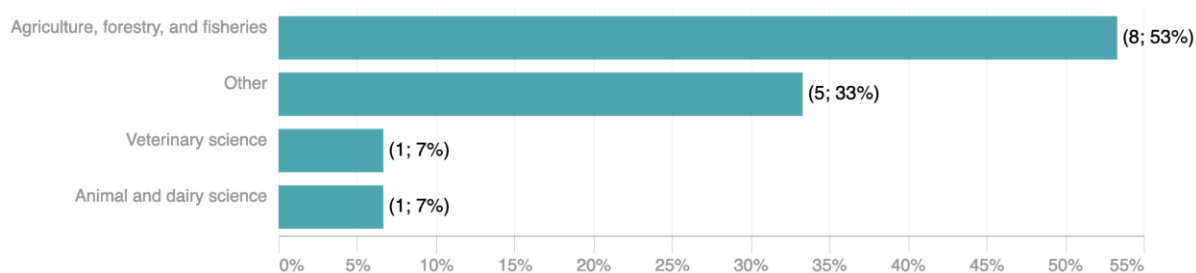


Figure 294: Latin American and Caribbean States - Sub-fields of agricultural sciences.

<sup>1810</sup> The total number of responses:  $N = 31$

<sup>1811</sup> The total number of responses:  $N = 15$

Other sub-fields were ‘Other’ ( $n = 7$ , 54%) within ‘Humanities’ (Figure 295)<sup>1812</sup>, and ‘Health sciences’ ( $n = 14$ , 67%) within ‘Medial and health sciences’ (Figure 296)<sup>1813</sup>.

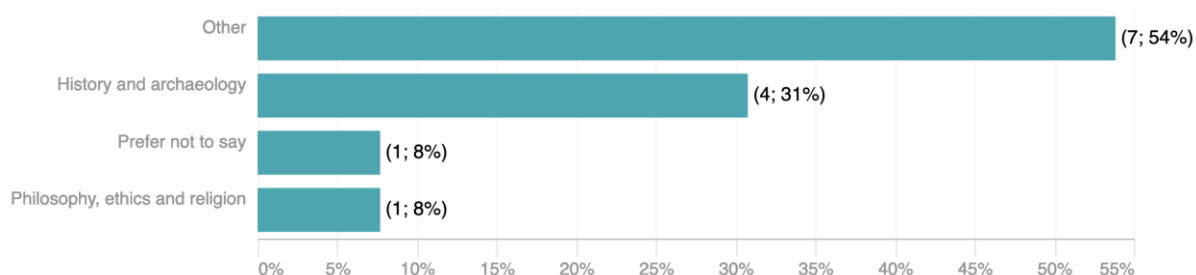


Figure 295: Latin American and Caribbean States - Sub-fields of humanities.

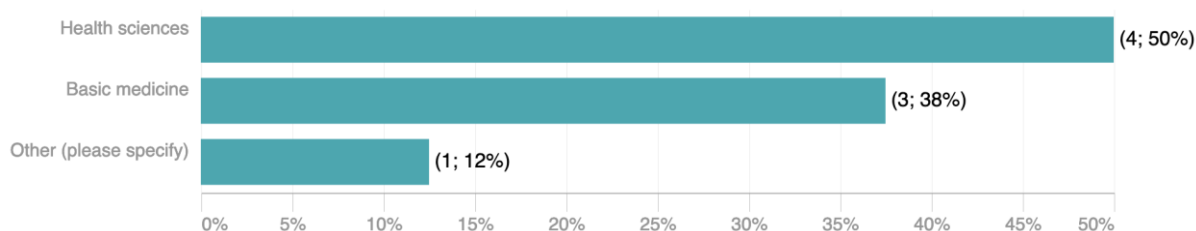


Figure 296: Latin American and Caribbean States - Sub-fields of medical and health sciences.

Most respondents worked full-time ( $n = 92$ , 40%) (Figure 297)<sup>1814</sup> in ‘Universit[ies] or similar research performing organisation[s]’ ( $n = 82$ , 35%) or ‘Small and medium-size enterprise[s]’ ( $n = 37$ , 16%), while a notable portion preferred not to say ( $n = 43$ , 19%) (Figure 298)<sup>1815</sup>.

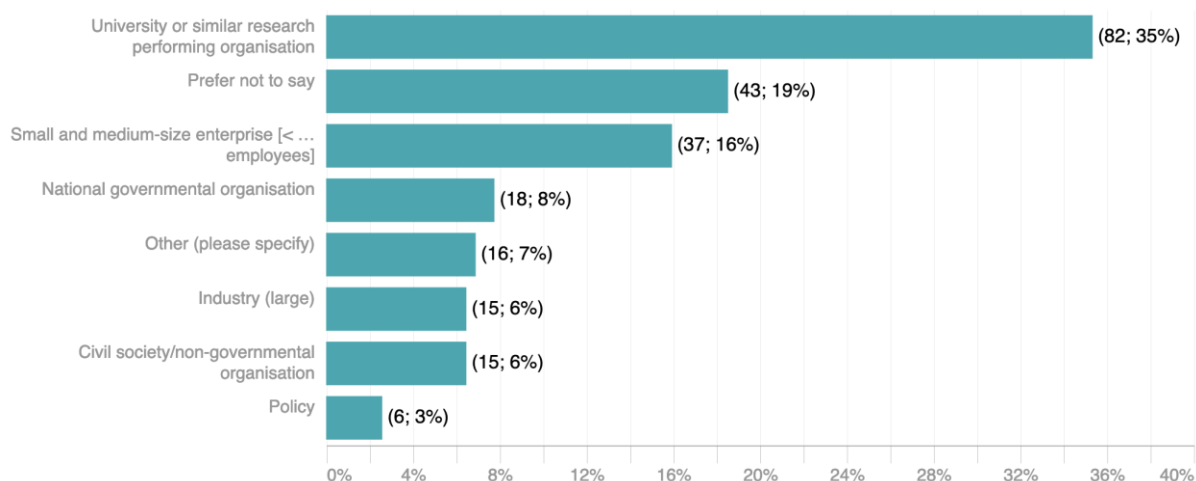


Figure 297: Latin American and Caribbean States - Sectors in which participants work[ed].

<sup>1812</sup> The total number of responses:  $N = 13$

<sup>1813</sup> The total number of responses:  $N = 8$

<sup>1814</sup> The total number of responses:  $N = 232$

<sup>1815</sup> The total number of responses:  $N = 232$

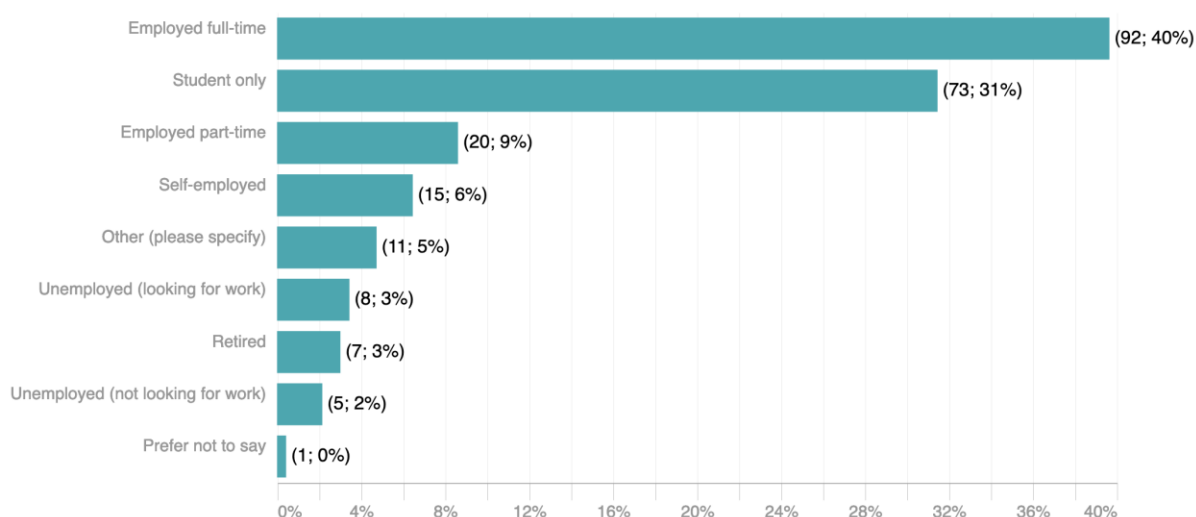


Figure 298: Latin American and Caribbean States - Participants' employment status.

In general, respondents spent their working hours on a diverse range of tasks. The most time was spent on 'Research and innovation work' (Mdn = 10 hours)<sup>1816</sup> and 'Teaching or capacity building' (Mdn = 7 hours)<sup>1817</sup> (Figure 299).

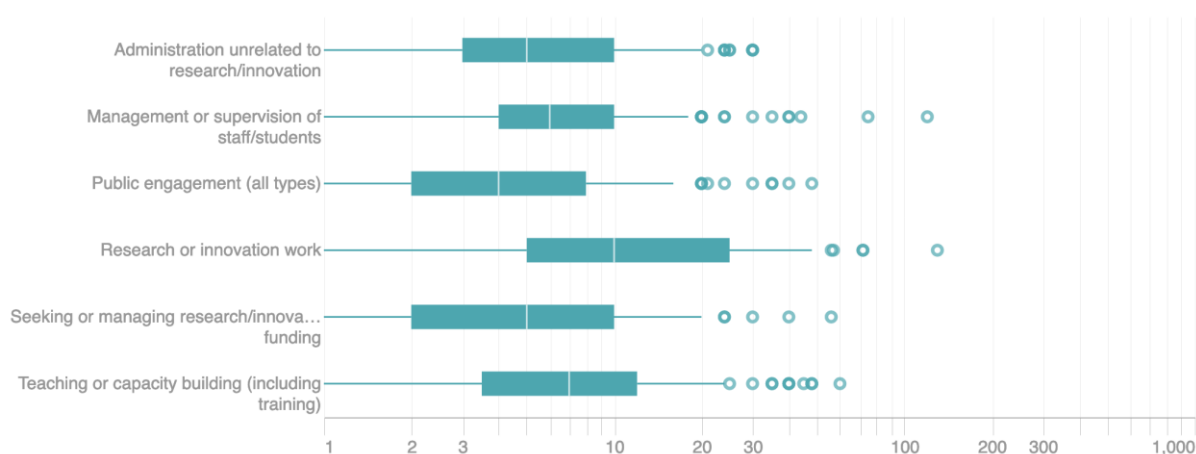


Figure 299: Latin American and Caribbean States - Hours spent on activities in the last 7 days (log scale).

The median number of years that respondents had worked as researchers and innovators was 10 years<sup>1818</sup>. In terms of their current positions, the median number of years of respondents' work experience was 5 years<sup>1819</sup> (Figure 300). Generally, respondents tended to have worked longer as a researcher and innovator than in their current role.

<sup>1816</sup> The total number of responses for 'Research or innovation work':  $N = 224$

<sup>1817</sup> The total number of responses for 'Teaching or capacity building':  $N = 219$

<sup>1818</sup> The total number of responses '... as researcher or innovator':  $N = 198$

<sup>1819</sup> The total number of responses '... in their current role':  $N = 177$

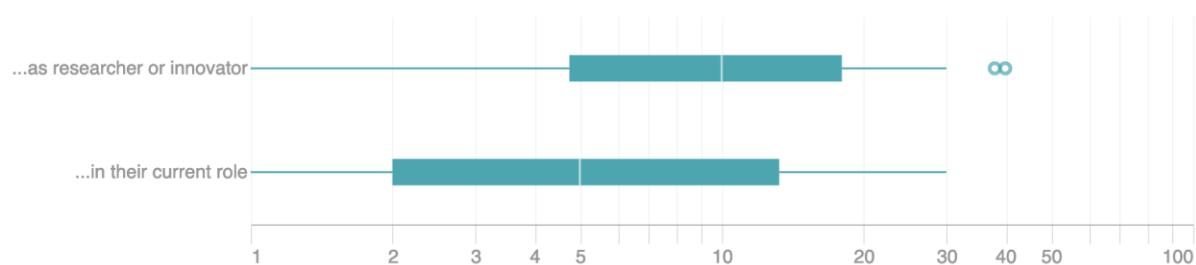


Figure 300: Latin American and Caribbean States - Years that respondents worked in their current role/as researcher or innovator (log scale).

From the four RRING key domains, respondents most frequently indicated working in ‘Digital (ICT)’ ( $n = 37$ , 16%). The less common domains were ‘Waste Management’ ( $n = 21$ , 9%), ‘Energy’ ( $n = 20$ , 9%), and ‘Bio-economy’ ( $n = 16$ , 7%) (Figure 301)<sup>1820</sup>.

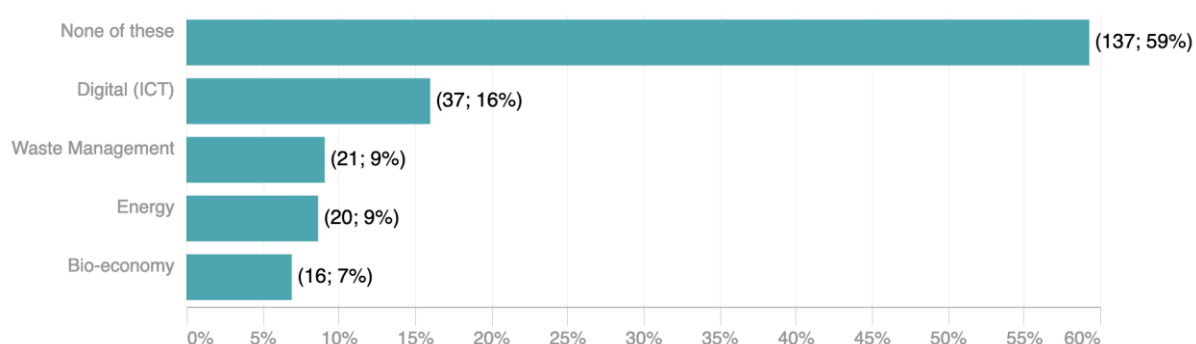


Figure 301: Latin American and Caribbean States - Domains relating to participants' recent work.

### 3.11.3 RESULTS BY DIMENSION OF RESPONSIBLE RESEARCH & INNOVATION

This section describes the level of engagement with the four RRI process dimensions, both on an attitudinal and practical level.

#### 3.11.3.1 RRI DIMENSION – DIVERSE AND INCLUSIVE

While there was overall agreement on an attitudinal level, there were value-action gaps for each measure. This was most apparent for the inclusion of ethnic minorities as attitude and reporting practical steps did not align. This measure also had the lowest level of total attitudinal agreement (77%, compared to 83% for diverse perspectives, 85% ethics, and 86% for gender equality).

<sup>1820</sup> The total number of responses:  $N = 231$

### 3.11.3.1.1 Diverse and Inclusive – Diverse Perspectives

The majority of respondents agreed, but with differing levels of strength, that it is important to involve diverse stakeholders ( $n = 173$ , 83%) (Figure 302)<sup>1821</sup>. Most respondents expressed the strongest level of agreement ( $n = 83$ , 40%), whereas fewer responded neutrally ( $n = 20$ , 10%) or disagreed ( $n = 17$ , 8%).

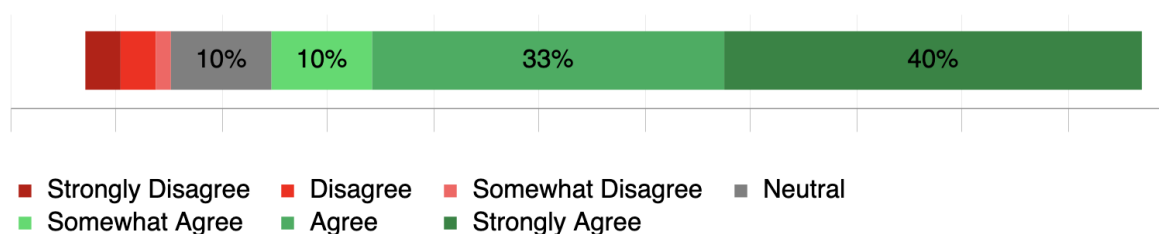


Figure 302: Latin American and Caribbean States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work'.

Fewer than half of respondents ( $n = 99$ , 45%) reported taking practical steps to involve diverse stakeholders (Figure 303)<sup>1822</sup>. This represents 57% of those who indicated a positive attitude towards involving diverse perspectives. There were many ( $n = 74$ , 43%) whose attitudinal agreement had not translated into practical action or who did not answer the question. A notable portion explicitly reported taking no steps ( $n = 56$ , 25%) or thought taking action did not apply to them or had no opinion ( $n = 34$ , 15%).

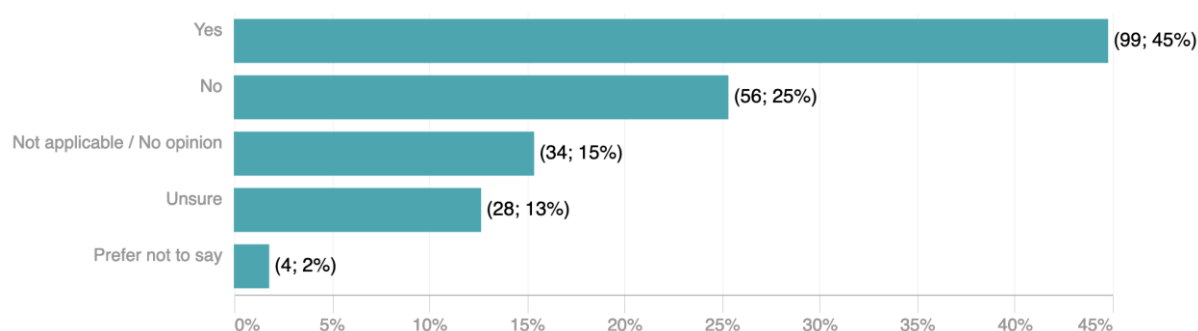


Figure 303: Latin American and Caribbean States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.

Respondents involved different sectors in their R&I process (Figure 304)<sup>1823</sup>. Most frequently 'Universit[ies] or college[s]' ( $n = 78$ , 22%) were specified, followed by 'Government agenc[ies]' ( $n = 49$ , 14%), 'Non-profit organisation[s]' ( $n = 40$ , 11%), and the 'General public' ( $n = 37$ , 11%).

<sup>1821</sup> The total number of responses:  $N = 210$

<sup>1822</sup> The total number of responses:  $N = 221$

<sup>1823</sup> The total number of responses:  $N = 348$

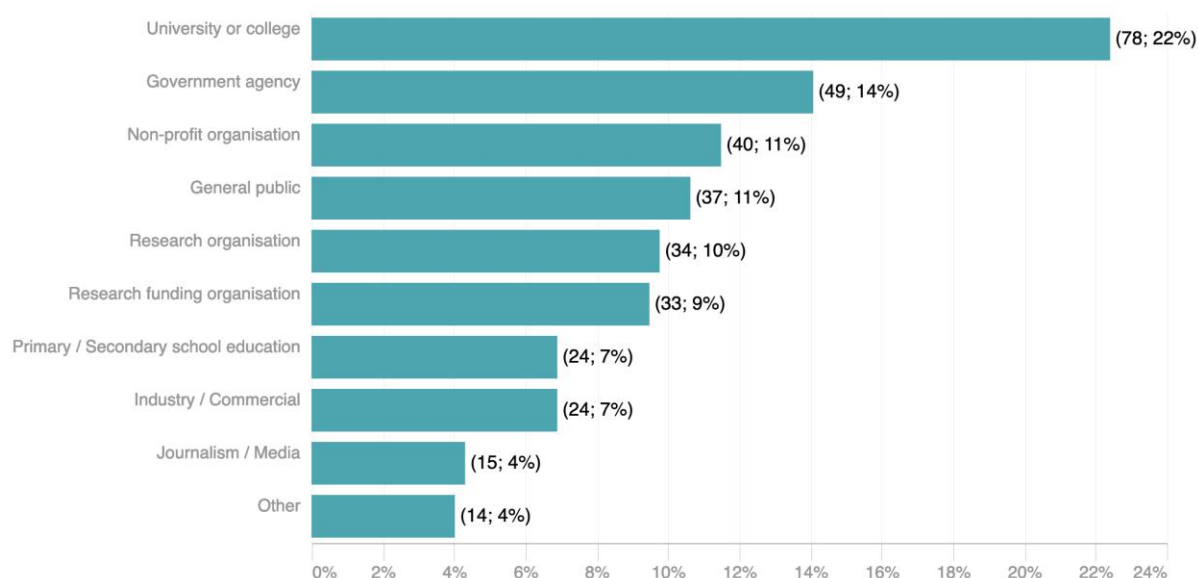


Figure 304: Latin American and Caribbean States - Sectors participants involved in research and innovation practice.

In general, respondents reported remarkably similar proportions of involved stakeholders for R&I practice and dissemination (Figure 305)<sup>1824</sup>. The sector most frequently involved was ‘*Universit[ies] or college[s]*’ ( $n = 68$ , 20%). However, ‘*General public*’ ( $n = 45$ , 13%) was mentioned more frequently for dissemination than ‘*Government agenc[ies]*’ ( $n = 44$ , 13%) and ‘*Non-profit organisation[s]*’ ( $n = 44$ , 13%). Additionally, ‘*Industry / Commercial*’ ( $n = 17$ , 5%) was mentioned less often, while ‘*Journalism / Media*’ ( $n = 31$ , 9%) was involved more often.

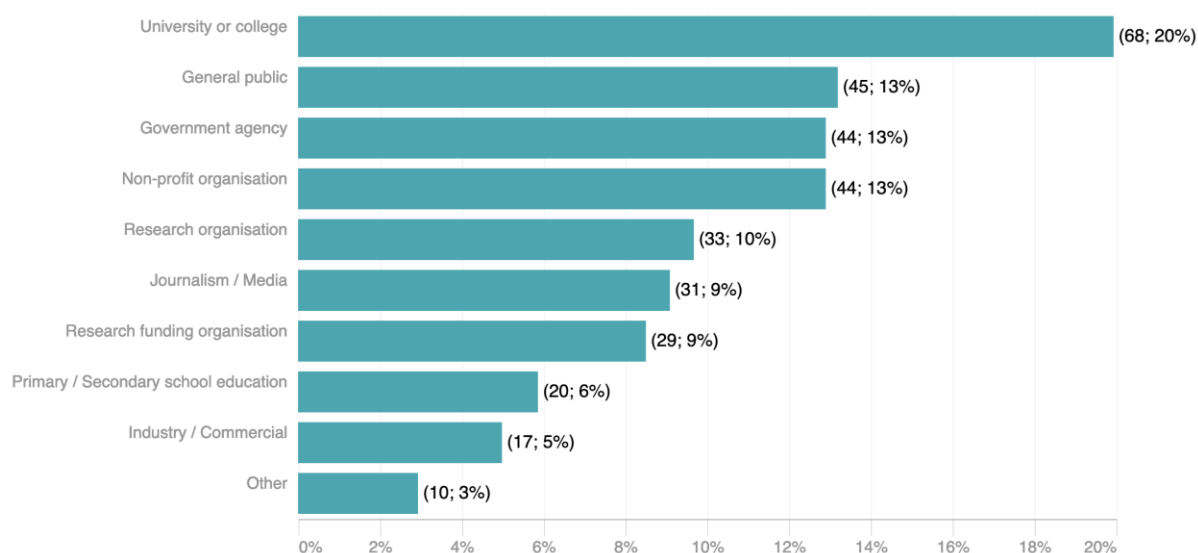


Figure 305: Latin American and Caribbean States - Sectors participants involved in research and innovation dissemination.

<sup>1824</sup> The total number of responses:  $N = 341$

### 3.11.3.1.2 Diverse and Inclusive – Gender Equality

There was broad agreement with the importance of promoting gender equality in R&I work (Figure 306)<sup>1825</sup>. The majority of respondents ( $n = 178$ , 86%) responded positively, with most ( $n = 127$ , 62%) expressing the strongest level of agreement. A minority disagreed ( $n = 27$ , 8%) that promoting gender equality was important in their work or responded neutrally ( $n = 11$ , 5%).

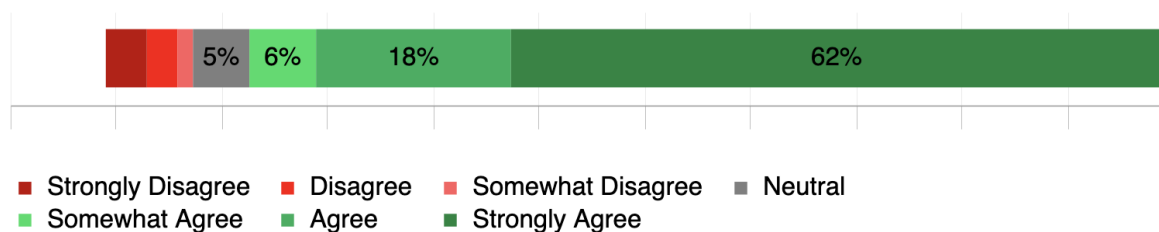


Figure 306: Latin American and Caribbean States - 'It is important to promote gender equality in my research and innovation work'.

Most respondents ( $n = 91$ , 42%) had taken steps to promote gender equality in their work over the past 12 months (Figure 307)<sup>1826</sup>. This represents 72% of those respondents who indicated a positive attitude towards gender equality. There was a proportion of those who thought it was attitudinally important ( $n = 38$ , 28%), but had not explicitly confirmed any actions.

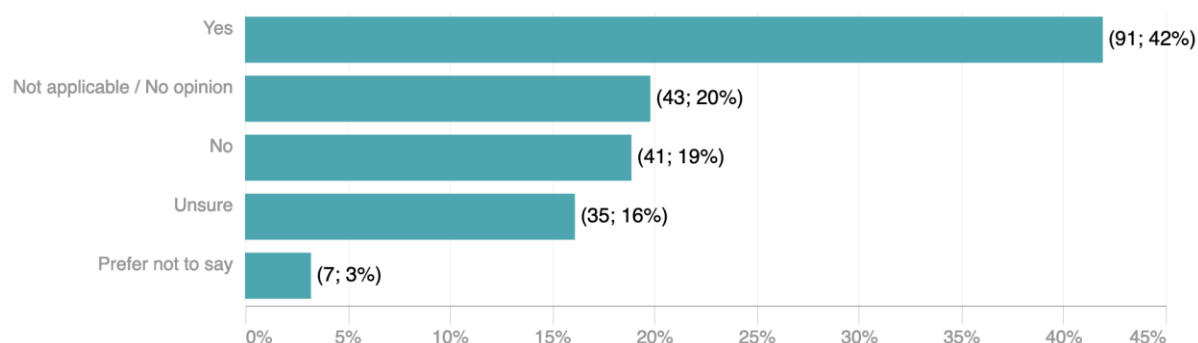


Figure 307: Latin American and Caribbean States - Promoted gender equality in research and innovation work in the past 12 months.

### 3.11.3.1.3 Diverse and Inclusive – Ethnic Minorities

The majority of respondents ( $n = 154$ , 77%) agreed it was important to include ethnic minorities in R&I work (Figure 308)<sup>1827</sup>, however this was to a lower degree than for diverse perspectives and gender equality measures. Fewer respondents agreed at the strongest level ( $n = 84$ , 42%) when compared to the same level of agreement for the gender equality measure (48%). Disagreement was expressed by a similar portion ( $n = 17$ , 9%) as for diversity and

<sup>1825</sup> The total number of responses:  $N = 206$

<sup>1826</sup> The total number of responses:  $N = 217$

<sup>1827</sup> The total number of responses:  $N = 200$

inclusivity measures. However, this was the lowest level of general agreement for an RRI measure.

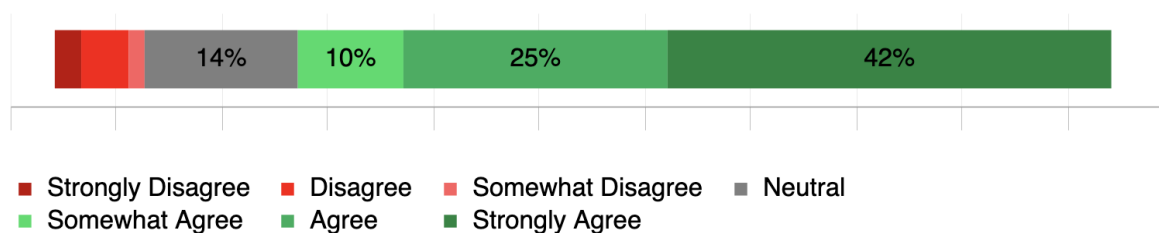


Figure 308: Latin American and Caribbean States - 'It is important to include ethnic minorities in my research and innovation work'.

Few respondents explicitly confirmed they had acted on including ethnic minorities ( $n = 55$ , 25%) (Figure 309)<sup>1828</sup>. This represents 36% of those respondents who indicated a positive attitude towards including ethnic minorities. This was the lowest indication of practical steps in comparison with the other measures of this dimension. A notable portion ( $n = 99$ , 64%) thought including ethnic minorities was important, but had not explicitly taken steps to ensure this or had not answered the question.

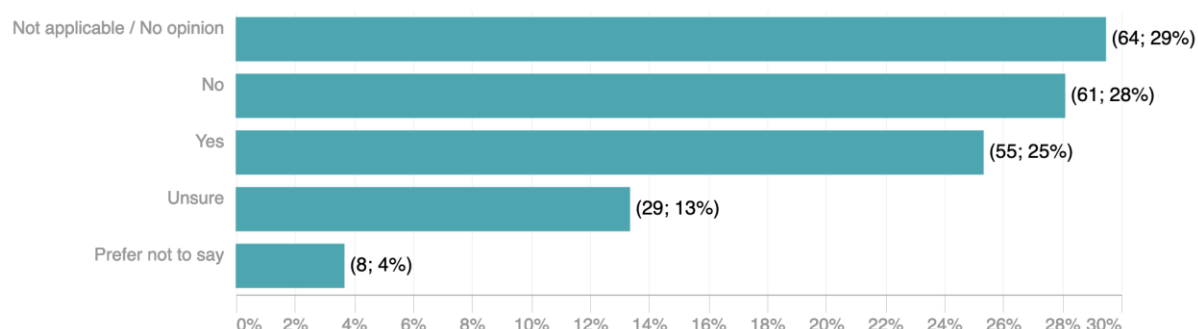


Figure 309: Latin American and Caribbean States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.

### 3.11.3.1.4 Diverse and Inclusive – Ethics

There was broad agreement amongst respondents regarding the importance of ethics (Figure 310)<sup>1829</sup>. The majority ( $n = 170$ , 85%) responded positively and most ( $n = 117$ , 59%) expressed the strongest level of agreement. A small portion of respondents ( $n = 10$ , 5%) explicitly disagreed that ensuring ethical guidelines was important in their work.

<sup>1828</sup> The total number of responses:  $N = 217$

<sup>1829</sup> The total number of responses:  $N = 199$



Figure 310: Latin American and Caribbean States - 'Ethical principles guide my research and innovation work'.

Exactly half of respondents ( $n = 106$ , 50%) had taken steps to be guided by ethical principles (Figure 311)<sup>1830</sup>. This represents 62% of respondents who considered it important. A notable proportion thought ethics were important ( $n = 64$ , 38%), but had not explicitly taken steps to ensure this or had not answered the question.

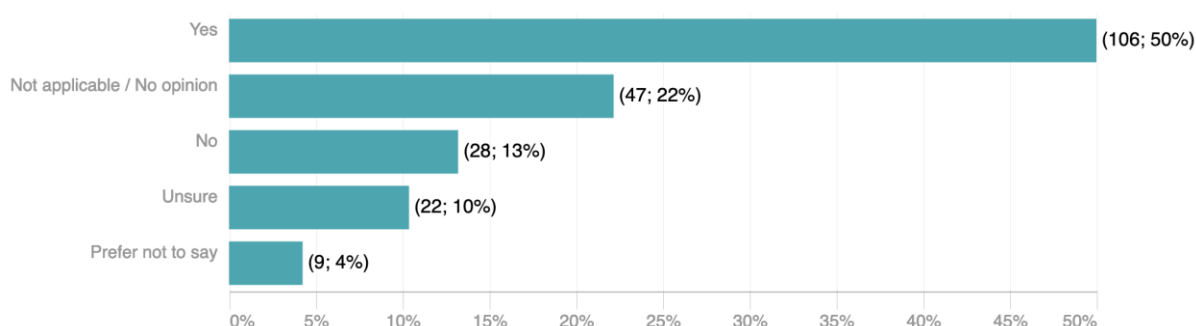


Figure 311: Latin American and Caribbean States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.

### 3.11.3.1.5 Further Diverse and Inclusive Agreement Statements

The previous findings on RRI measures are further explored through results on the levels of agreement towards the following statements regarding detailed perspectives on the UN SDGs (Figure 312).

More respondents agreed ( $n = 87$ , 55%) their 'work should be allowed [for access] only after all findings ha[d] been published in peer reviewed journals'. Fewer respondents agreed that ethnicity ( $n = 72$ , 48%)<sup>1831</sup> and gender ( $n = 73$ , 47%)<sup>1832</sup> was irrelevant in their work. Almost half of respondents indicated 'the best time to talk to public audiences [is after] the very end of [research and innovation processes,] after all the work has been completed' ( $n = 77$ , 49%)<sup>1833</sup>.

<sup>1830</sup> The total number of responses:  $N = 212$

<sup>1831</sup> The total number of responses:  $N = 155$

<sup>1832</sup> The total number of responses:  $N = 157$

<sup>1833</sup> The total number of responses:  $N = 158$

An overwhelming majority of respondents agreed they *'feel/[felt] a professional responsibility to communicate findings from [their]work to public audiences'* ( $n = 109$ , 90%)<sup>1834</sup>. Respondents agreed that *'It is important to maintain an equal number of men and women in research and innovation teams'* ( $n = 109$ , 71%)<sup>1835</sup> and that *'It is important to take ethnic diversity into account when developing [their] research and innovation work.'* ( $n = 113$ , 76%)<sup>1836</sup>. Furthermore, respondents thought that *'It is important to take gender into account when developing [their] research and innovation work'* ( $n = 92$ , 62%)<sup>1837</sup>.

Concerning the communication of findings to the public; the majority of respondents agreed ( $n = 93$ , 67%) *'[their] organisation encourages [...]'*<sup>1838</sup>, and disagreed ( $n = 56$ , 72%) *'[it discourages them] from communicating the results of my research or innovation work to public audiences'*<sup>1839</sup>.

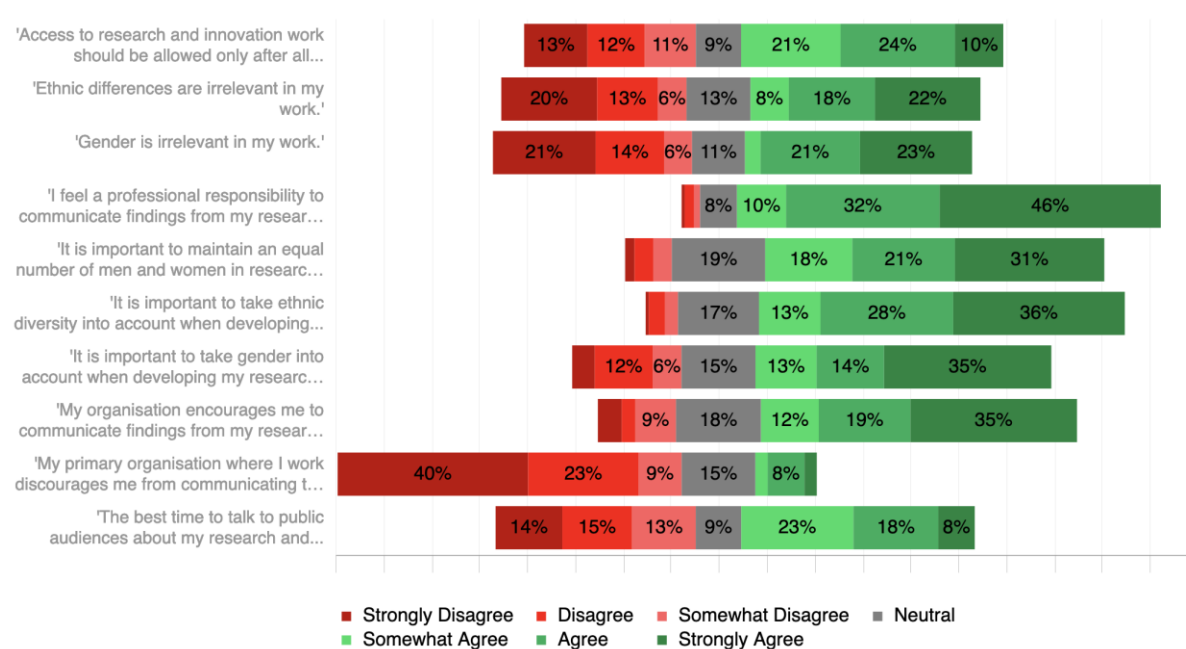


Figure 312: Latin American and Caribbean States - Statements related to working in research and innovation.

### 3.11.3.2 RRI DIMENSION – ANTICIPATIVE AND REFLECTIVE

Overall, there was broad agreement that R&I work should recognise societal concerns. This was noticeable on a high attitudinal level regarding practical action.

<sup>1834</sup> The total number of responses:  $N = 156$

<sup>1835</sup> The total number of responses:  $N = 158$

<sup>1836</sup> The total number of responses:  $N = 155$

<sup>1837</sup> The total number of responses:  $N = 156$

<sup>1838</sup> The total number of responses:  $N = 152$

<sup>1839</sup> The total number of responses:  $N = 135$

### 3.11.3.2.1 Anticipative and Reflective – Societal Concerns

Most respondents agreed it was important that their work did not cause concerns for society ( $n = 162$ , 79%) (Figure 313)<sup>1840</sup>, with most strongly agreeing ( $n = 86$ , 42%). A small but considerable portion responded neutrally or disagreed ( $n = 23$ , 11% for both).

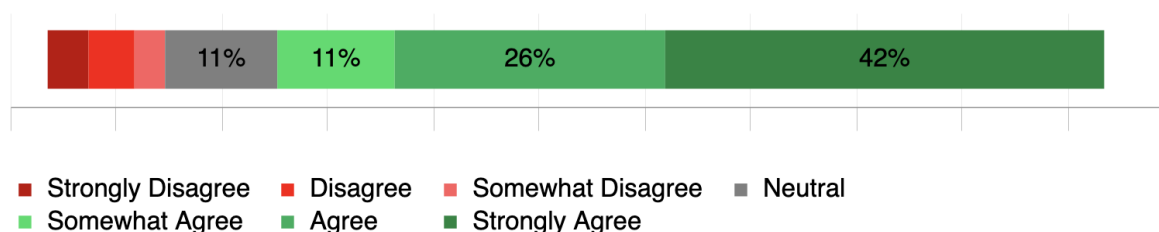


Figure 313: Latin American and Caribbean States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society'.

More respondents confirmed they had taken steps to ensure their work did not cause concerns for society ( $n = 62$ , 29%) (Figure 314)<sup>1841</sup>. This represents only 38% of those respondents who indicated a positive attitude towards societal concerns. The next highest category was 'Not applicable / No opinion' ( $n = 28$ , 14%), followed by 'Unsure' ( $n = 27$ , 13%). The sample had a notable portion of explicitly negative responses ( $n = 23$ , 11%). This indicates that respondents thought R&I work should not cause concerns, especially when considering most respondents held a degree in 'Natural sciences, mathematics and statistics' ( $n = 71$ , 23%) (Figure 288).

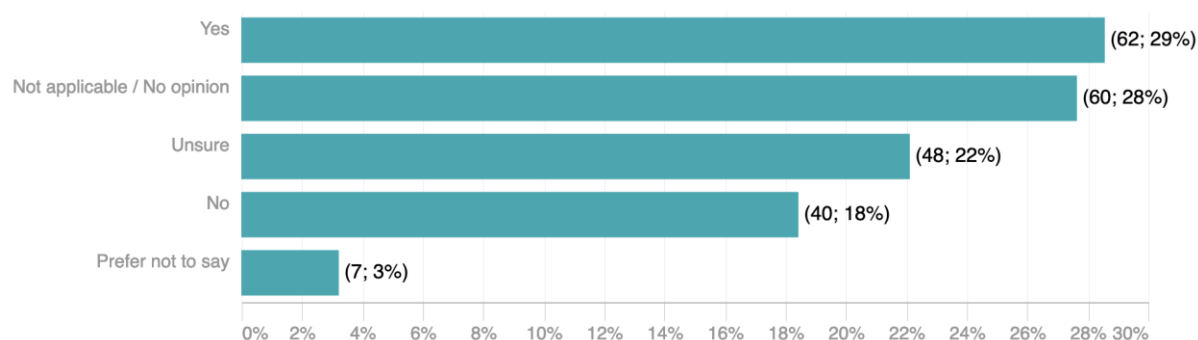


Figure 314: Latin American and Caribbean States - Ensured work does not cause concerns for society in the past 12 months.

### 3.11.3.3 RRI DIMENSION – OPEN AND TRANSPARENT

Overall, there was a level of support towards openness and transparency and public accessibility of results, although the level of accessibility was debated.

<sup>1840</sup> The total number of responses:  $N = 207$

<sup>1841</sup> The total number of responses:  $N = 217$

### 3.11.3.3.1 Open and Transparent – Open and Transparent Methods and Processes

The majority of respondents ( $n = 188$ , 89%,) agreed on the importance of ensuring methods and processes were open and transparent (Figure 315)<sup>1842</sup>, with most in strong agreement ( $n = 126$ , 60%). A small portion disagreed ( $n = 13$ , 6%).



Figure 315: Latin American and Caribbean States - 'It is important to make my research and innovation methods/processes open and transparent'.

The majority of respondents ( $n = 99$ , 45%) reported taking practical steps to ensure R&I methods/processes are open and transparent (Figure 316)<sup>1843</sup>. This represents 53% of those respondents who indicated a positive attitude towards openness and transparency. A notable but small portion were 'Unsure' ( $n = 48$ , 22%), followed by 'Not applicable / No opinion' ( $n = 38$ , 17%).

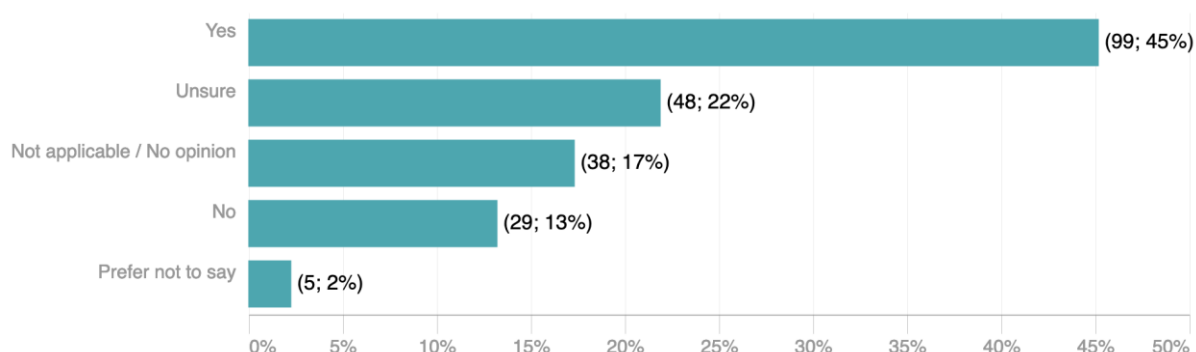


Figure 316: Latin American and Caribbean States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.

### 3.11.3.3.2 Open and Transparent – Public Accessibility

The majority of respondents agreed that wide public accessibility of results was important (Figure 317)<sup>1844</sup>. However, while the majority agreed ( $n = 186$ , 88%), overall disagreement was notable ( $n = 13$ , 14%).

<sup>1842</sup> The total number of responses:  $N = 211$

<sup>1843</sup> The total number of responses:  $N = 219$

<sup>1844</sup> The total number of responses:  $N = 211$



Figure 317: Latin American and Caribbean States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.

The majority reported taking practical steps to make their work publicly accessible ( $n = 97$ , 44%). This represents 52% who indicated a positive attitude towards public accessibility (Figure 318)<sup>1845</sup>. A notable portion selected 'Not applicable / No opinion' ( $n = 39$ , 18%), 'No' ( $n = 38$ , 17%), or 'Unsure' ( $n = 38$ , 17%).

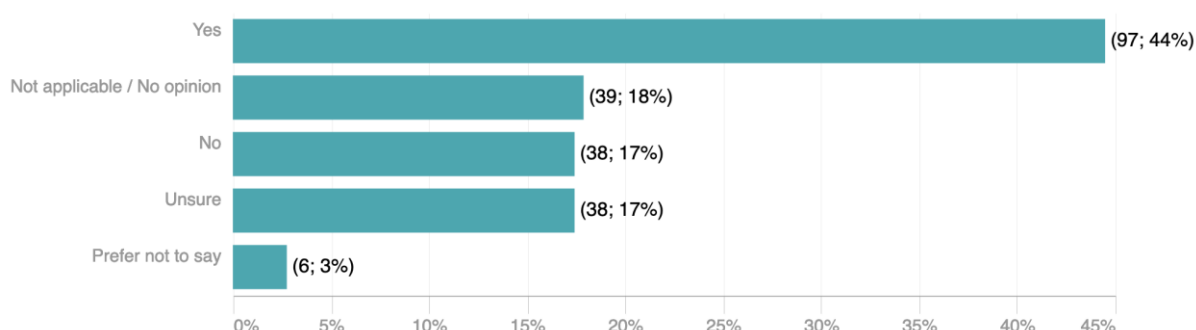


Figure 318: Latin American and Caribbean States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.

### 3.11.3.3.3 Open and Transparent – Open Data

Most respondents agreed on the importance of ensuring their research data was freely and publicly available ( $n = 186$ , 81%) (Figure 319)<sup>1846</sup>. Disagreement ( $n = 19$ , 9%) was expressed by a similar portion of respondents as for neutral responses ( $n = 20$ , 10%).

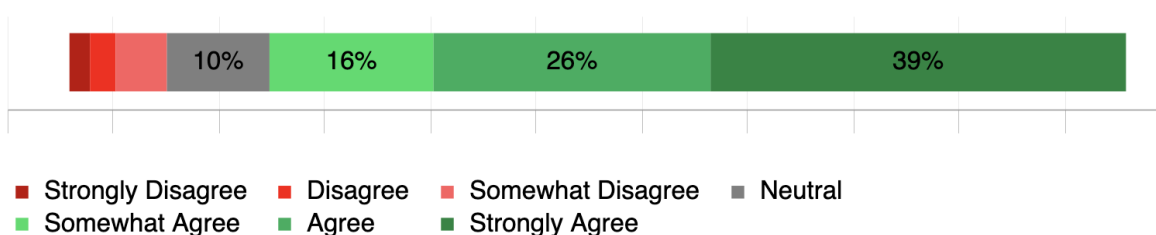


Figure 319: Latin American and Caribbean States - 'It is important to make data from my research and innovation activities freely available to the public'.

<sup>1845</sup> The total number of responses:  $N = 218$

<sup>1846</sup> The total number of responses:  $N = 206$

More respondents answered with 'Yes' ( $n = 76$ , 35%) than 'No' ( $n = 53$ , 24%) (Figure 320)<sup>1847</sup>, resulting in a value-action gap of 59%. This indicates there are diverging practices with a slight tendency for taking practical steps toward making data freely and publicly available.

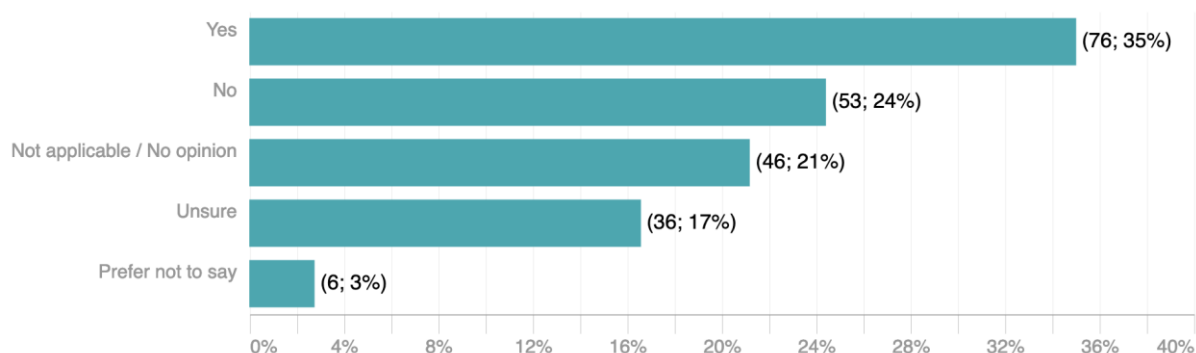


Figure 320: Latin American and Caribbean States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.

### 3.11.3.4 RRI DIMENSION – RESPONSIVE AND ADAPTIVE TO CHANGE

There was agreement regarding being responsive to societal needs. This was the case on both an attitudinal and practical level. Importantly, this measure showed a small value-action gap compared to other RRI measures.

#### 3.11.3.4.1 Responsive and Adaptive to Change – Societal Needs

The majority of respondents agreed that it is important to ensure their work addressed societal needs ( $n = 179$ , 84%). More than half of respondents agreed at the strongest level ( $n = 109$ , 51%), some explicitly disagreed ( $n = 18$ , 9%), and fewer responded neutrally ( $n = 15$ , 7%) (Figure 321)<sup>1848</sup>.

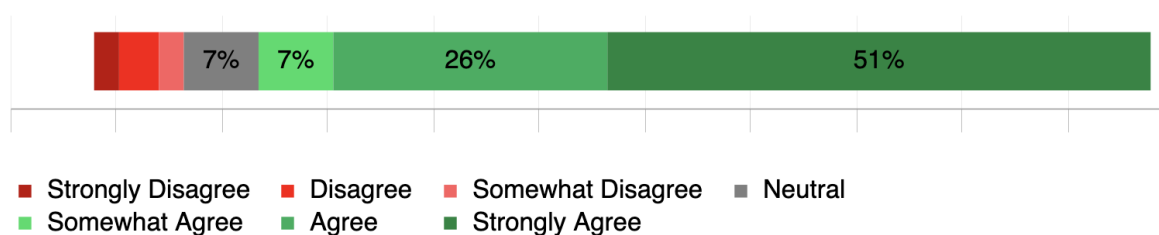


Figure 321: Latin American and Caribbean States - 'Research and innovation should address societal needs'.

This agreement clearly translated into practical action for the majority who confirmed taking practical steps ensuring their work addressed societal needs ( $n = 101$ , 49%) (Figure 322)<sup>1849</sup>.

<sup>1847</sup> The total number of responses:  $N = 217$

<sup>1848</sup> The total number of responses:  $N = 212$

<sup>1849</sup> The total number of responses:  $N = 218$

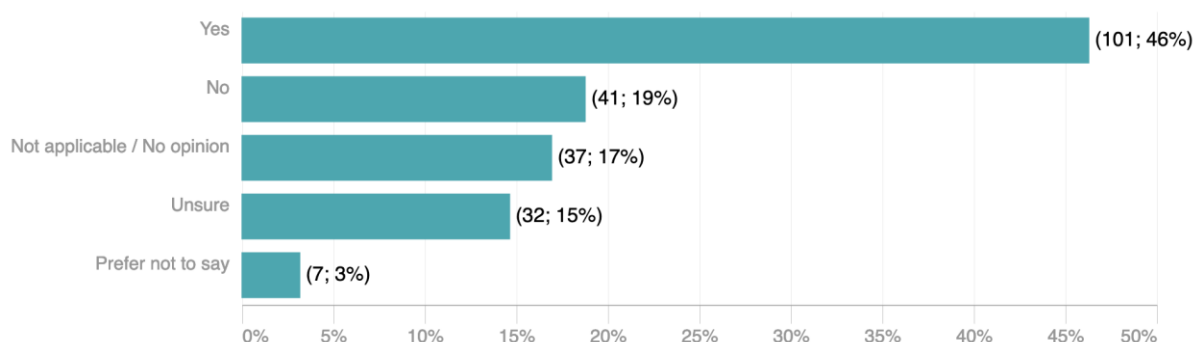


Figure 322: Latin American and Caribbean States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.

### 3.11.3.4.2 Regulatory Frameworks Relevant to Social Responsibility

The most respondents indicated that regulatory frameworks covering relevant aspects of social responsibility did not apply or had no opinion ( $n = 38$ , 23%) (Figure 323)<sup>1850</sup>. Equally large portions reported their work was 'Rarely' ( $n = 24$ , 15%), 'Usually' ( $n = 24$ , 15%), or 'Always' ( $n = 24$ , 15%) guided by such frameworks. This is followed by 'Sometimes' ( $n = 17$ , 10%), 'Usually' ( $n = 17$ , 10%), 'Never' ( $n = 13$ , 8%), and 'Occasionally' ( $n = 8$ , 5%).

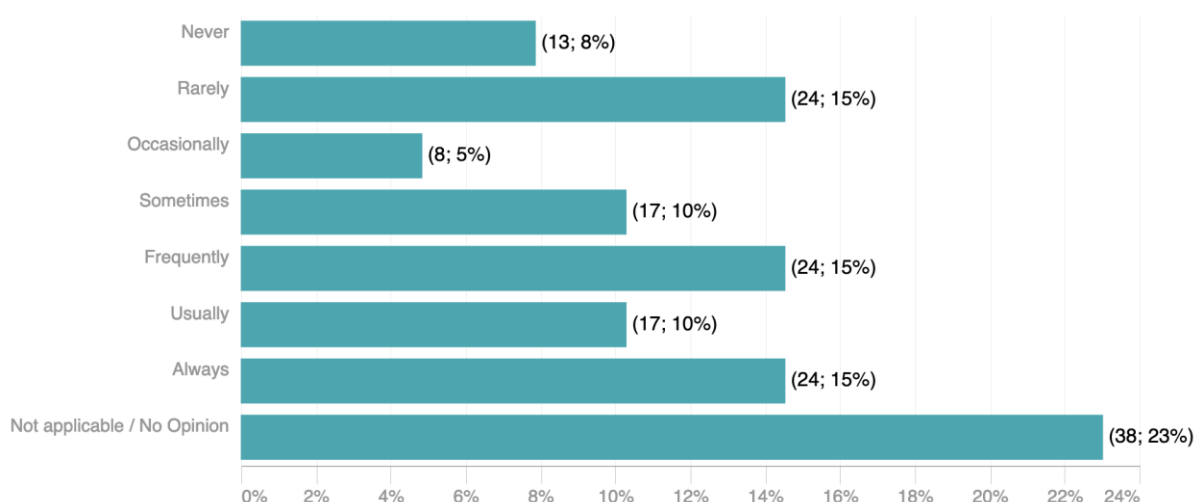


Figure 323: Latin American and Caribbean States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.

### 3.11.3.4.3 Crosscutting Findings

Overall, there were positive attitudes towards all RRI dimensions, although responses to one particular variable were comparatively negative. Disagreement with the importance of research including ethnic minorities was considerably higher, and more respondents explicitly indicated

<sup>1850</sup> The total number of responses:  $N = 165$

they had not taken any steps to ensure accessibility. For all other questions regarding application of the attitudinal measures, most participants indicated steps had been taken.

Within each RRI dimension, there were considerable discrepancies between generally supportive attitudes and their translation into action. This was most notable for the ‘*anticipative and reflective*’ dimension, followed by *diverse and inclusive*’ and ‘*open and transparent*’ dimensions. In contrast, the smallest discrepancy was found for the ‘*responsive and adaptive to change*’ dimension.

### 3.11.4 RESULTS BY STAKEHOLDER CATEGORIES

#### 3.11.4.1 STAKEHOLDER CATEGORY 1 – RESEARCH PERFORMING ORGANISATIONS / ACADEMICS / RESEARCHERS

Respondents indicated a substantial level of engagement with this category compared to others ( $Mdn = 10$  h/w) (Figure 324)<sup>1851</sup>. This was also the stakeholder type most engaged with for over ten hours in the last seven days ( $n = 65$ , 31%). A handful of respondents ( $n = 18$ , 8%) indicated high levels of interaction (i.e., over 30 hours in the last week). RPOs were also the stakeholder type with the most ‘71+ hours’ interaction responses ( $n = 2$ , 1%) compared to the other stakeholder categories.

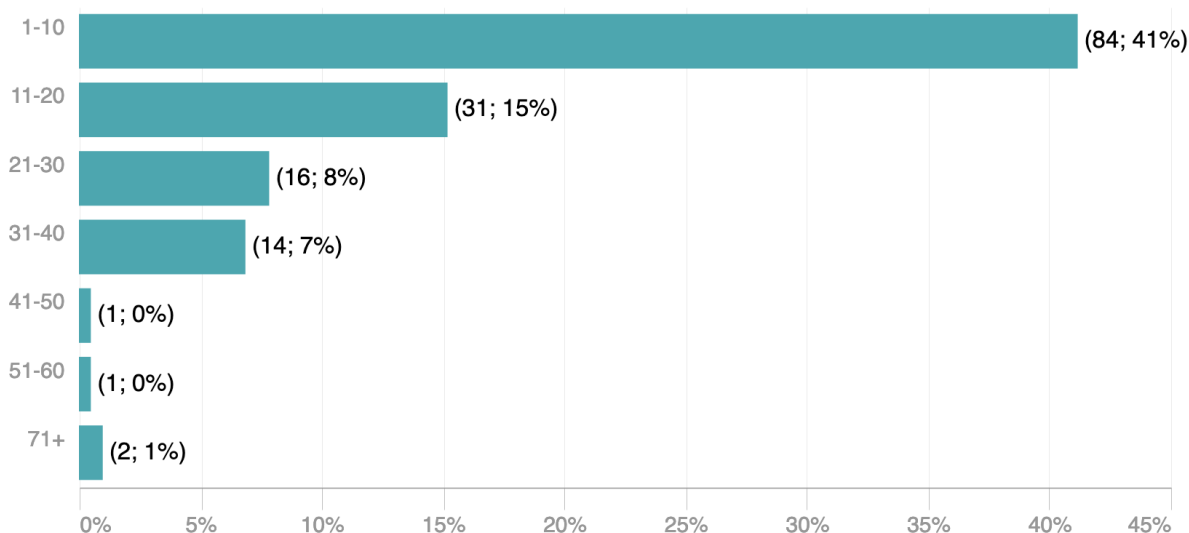


Figure 324: Latin American and Caribbean States - Hours interacting with research performing organisations/academics/researchers in the last 7 days.

<sup>1851</sup> The total number of responses:  $N = 149$

### 3.11.4.2 STAKEHOLDER CATEGORY 2 – RESEARCH FUNDING ORGANISATIONS

On average, engagement with RFOs was low ( $Mdn = 5$  h/w) (Figure 325)<sup>1852</sup>. The minority of respondents ( $n = 8$ , 3%) indicated medium to high levels of engagement (i.e., between 11 and 40 hours in the last week), reflecting the tendencies present in the SME and NGO categories.

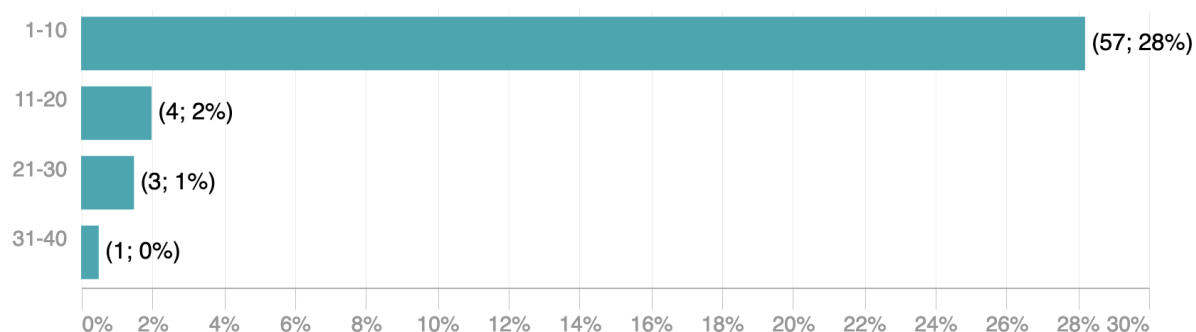


Figure 325: Latin American and Caribbean States - Hours interacting with research funding organisations in the last 7 days.

### 3.11.4.3 STAKEHOLDER CATEGORY 3 – INDUSTRY / SMALL- AND MEDIUM-SIZED ENTERPRISES

Similar to engagement levels with RFOs and NGOs, respondents spent a small amount of time interacting with this category ( $Mdn = 5$  h/w) (Figure 326)<sup>1853</sup>. Few respondents ( $n = 18$ , 8%) indicated a medium to high level of engagement (i.e., between 11 and 40 hours in the last week), and only one respondent ( $n = 1$ , 0%) indicated a high level of interaction (i.e., over 40 hours in the last week).

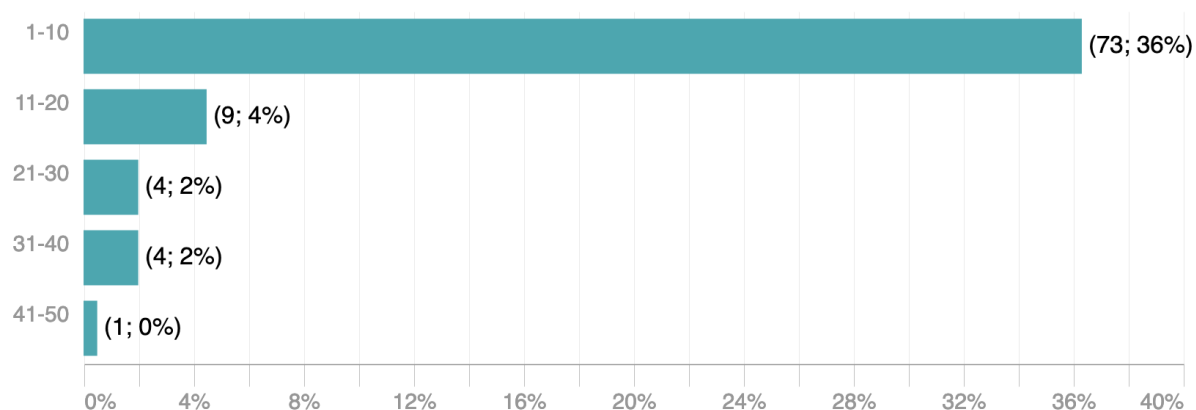


Figure 326: Latin American and Caribbean States - Hours interacting with industry/small- and medium-sized enterprise in the last 7 days.

<sup>1852</sup> The total number of responses:  $N = 65$

<sup>1853</sup> The total number of responses:  $N = 91$

### 3.11.4.4 STAKEHOLDER CATEGORY 4 – CIVIL SOCIETY / CITIZENS

There was a high level of engagement with this category and the second highest level relative to the other categories (Figure 327)<sup>1854</sup>. Overall, the most respondents ( $n = 84$ , 41%) spent some time engaging with this category ( $Mdn = 7$  h/w). A notable proportion indicated medium to high levels of interaction time (i.e., between 11 and 40 hours in the last week) ( $n = 37$ , 16%).

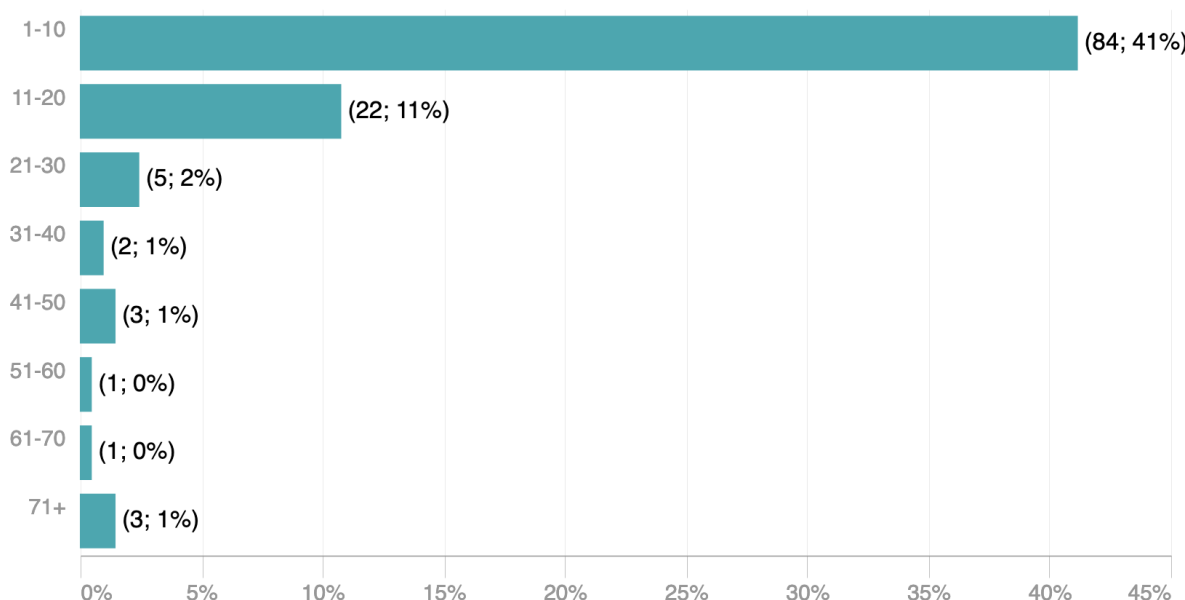


Figure 327: Latin American and Caribbean States - Hours interacting with civil society/citizens in the last 7 days.

### 3.11.4.5 STAKEHOLDER CATEGORY 5 – POLICY MAKERS

Policy makers was the stakeholder category which respondents tended to engage with the least ( $Mdn = 4$  h/w) (Figure 328)<sup>1855</sup>. When time was spent, many ( $n = 42$ , 21%) indicated the least amount (i.e., between 1 and 10 hours in the last week). Few respondents had at least medium levels of engagement (i.e., over 11) ( $n = 8$ , 3%).

<sup>1854</sup> The total number of responses:  $N = 121$

<sup>1855</sup> The total number of responses:  $N = 50$

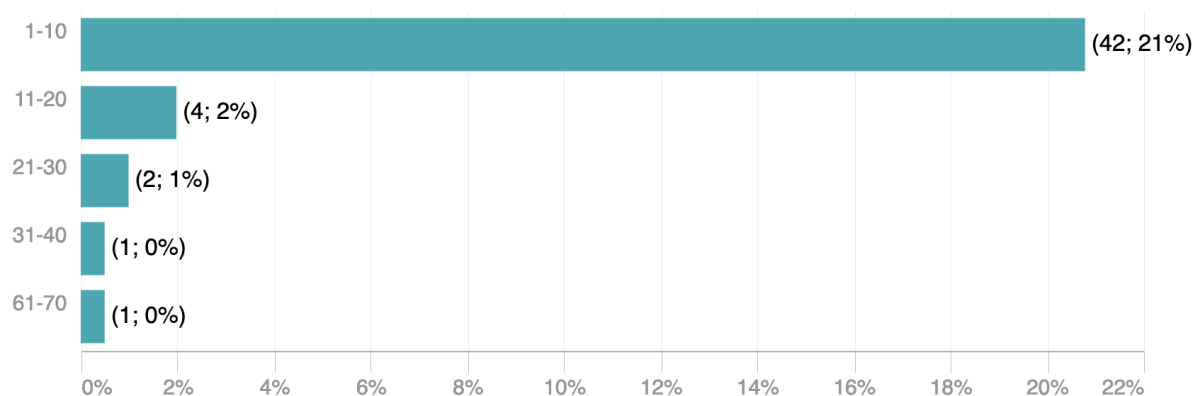


Figure 328: Latin American and Caribbean States - Hours interacting with policy makers in the last 7 days.

### 3.11.4.6 STAKEHOLDER CATEGORY 6 – NON-GOVERNMENTAL ORGANISATIONS

Engagement with this category tended to be low ( $Mdn = 5$  h/w), similar to RFOs and SMEs (Figure 329)<sup>1856</sup>. A minority of respondents ( $n = 5$ , 2%) indicated a medium level of engagement (i.e., between 11 and 40 hours in the last week). This indicates there are similar levels of interaction with the NGO, SME, and RFO categories.

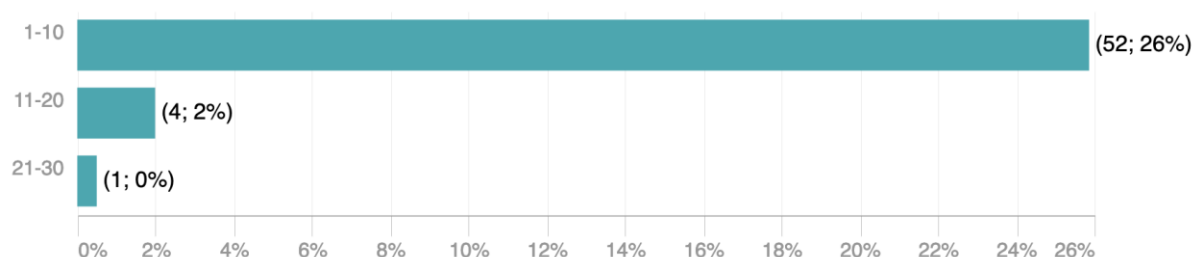


Figure 329: Latin American and Caribbean States - Hours interacting with NGOs/international organisations in the last 7 days.

### 3.11.4.7 OVERVIEW AND COMPARISON OF FINDINGS ACROSS STAKEHOLDER CATEGORIES

Participants engaged disproportionately more frequently with *RPOs*, *academics* and *researchers* ( $Mdn = 10$  h/w) and '*Civil society / citizens*' ( $Mdn = 7$  h/w) (Figure 330). Engagement with all other categories was moderate, as the median weekly interaction was close to five hours.

<sup>1856</sup> The total number of responses:  $N = 57$

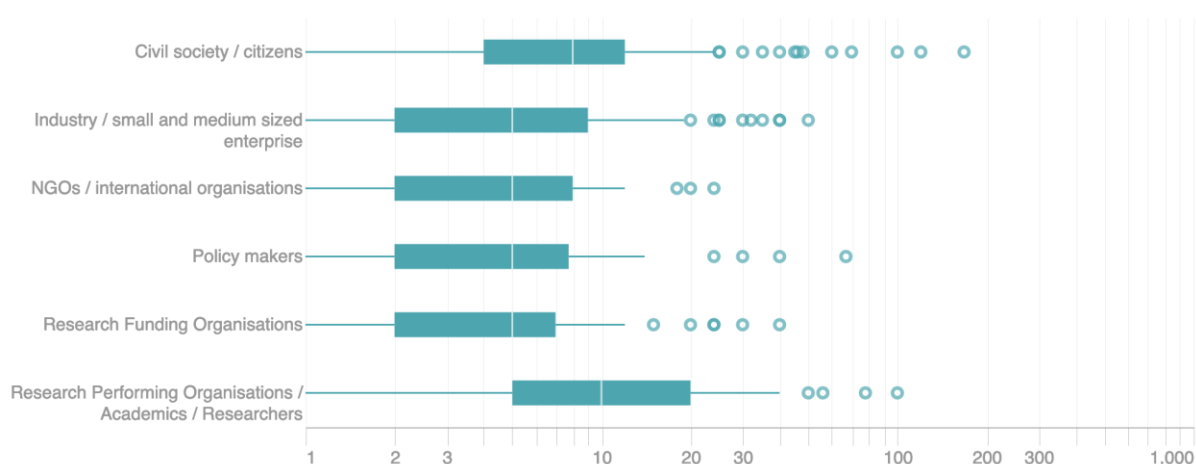


Figure 330: Latin American and Caribbean States - Hours interacting with different stakeholders in the last 7 days (log scale).

### 3.11.5 RESULTS SPECIFIC TO THE UN SUSTAINABLE DEVELOPMENT GOALS

This section explores respondents' level of exposure, attitudes towards, and detailed perspectives about the UN SDGs.

More respondents indicated they are familiar with the UN SDGs ( $n = 120$ , 59%) (Figure 331)<sup>1857</sup>. In contrast, close to half were 'Not at all Familiar' ( $n = 82$ , 41%). Few respondents expressed slight familiarity ( $n = 13$ , 6%), while more indicated being 'Somewhat Familiar' ( $n = 22$ , 11%), 'Extremely Familiar' ( $n = 32$ , 16%), 'Moderately Familiar' ( $n = 53$ , 26%).

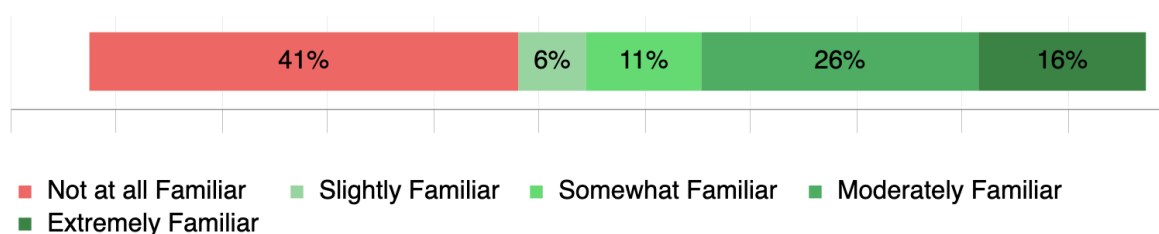


Figure 331: Latin American and Caribbean States - Participants' familiarity with the UN SDGs.

The majority of respondents ( $n = 94$ , 77%) heard or read about the UN SDGs in the last month (Figure 332)<sup>1858</sup>. Among the frequencies, '2-3 times' ( $n = 29$ , 24%) represented the largest group, followed by 'Once' ( $n = 26$ , 21%), 'Not at all' ( $n = 23$ , 19%), 'Once per week' ( $n = 19$ , 16%), 'Daily' ( $n = 11$ , 9%), '4-6 times per week' ( $n = 5$ , 4%), '2-3 times a week' ( $n = 4$ , 3%), and 'Unsure' ( $n = 6$ , 4%).

<sup>1857</sup> The total number of responses:  $N = 202$

<sup>1858</sup> The total number of responses:  $N = 121$

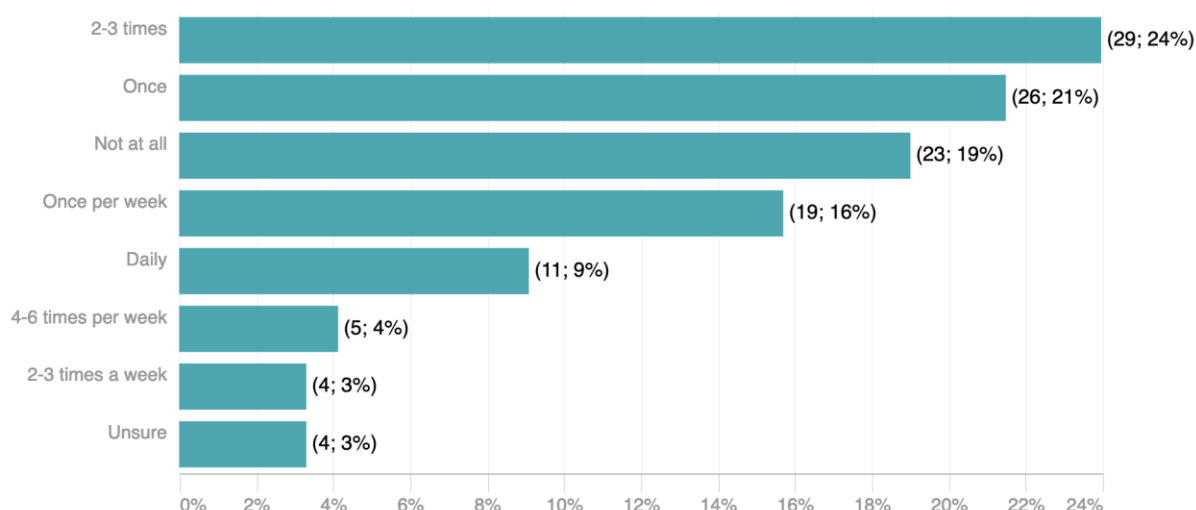


Figure 332: Latin American and Caribbean States - Heard or read about the UN Sustainable Development Goals in the last 30 days.

Most respondents ( $n = 91$ , 75%) thought about the UN SDGs in the last month (Figure 333)<sup>1859</sup>. Among the frequencies, '2-3 times' ( $n = 26$ , 21%) represented the largest group, followed by 'Not at all' ( $n = 20$ , 17%), 'Daily' ( $n = 19$ , 16%), '2-3 times a week' ( $n = 15$ , 12%), 'Once' ( $n = 13$ , 11%), 'Once per week' ( $n = 12$ , 10%), 'Unsure' ( $n = 10$ , 8%), and '4-6 times per week' ( $n = 6$ , 5%).

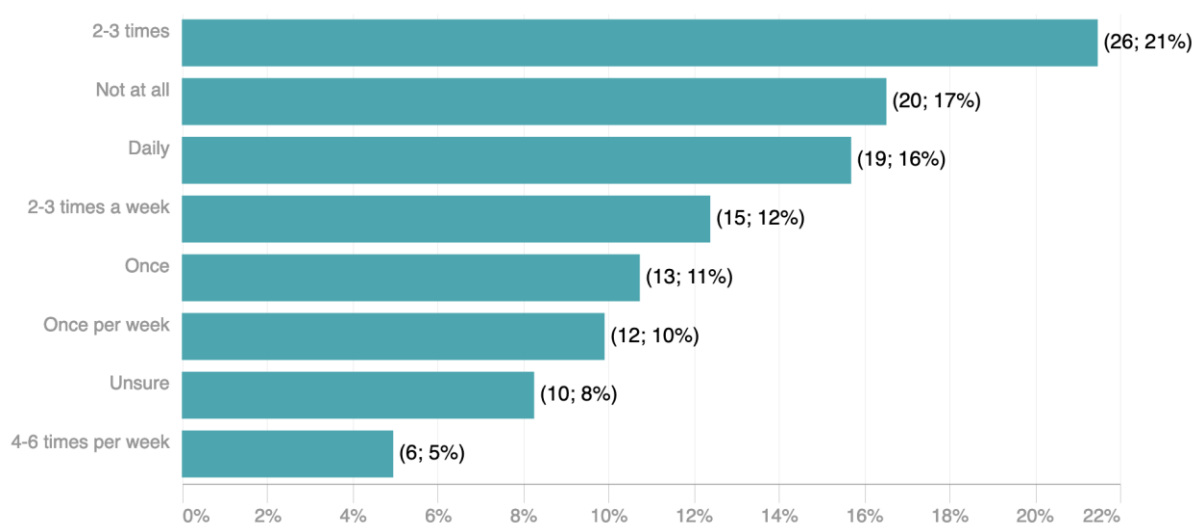


Figure 333: Latin American and Caribbean States - Thought about the UN Sustainable Development Goals in the last 30 days.

Respondents held mostly positive attitudes about the UN SDGs (Figure 334). Respondents most frequently perceived them as 'Beneficial' ( $n = 112$ , 94%)<sup>1860</sup>, 'Important' ( $n = 112$ ,

<sup>1859</sup> The total number of responses:  $N = 121$

<sup>1860</sup> The total number of responses:  $N = 119$

94%)<sup>1861</sup>, ‘*Relevant*’ ( $n = 111$ , 93%)<sup>1862</sup>, ‘*Essential*’ ( $n = 109$ , 92%)<sup>1863</sup>, ‘*Useful*’ ( $n = 108$ , 91%)<sup>1864</sup>, and ‘*Valuable*’ ( $n = 106$ , 89%)<sup>1865</sup>. Some respondents had neutral associations, and fewer respondents perceived the UN SDGs as ‘*Worthless*’ ( $n = 8$ , 7%).

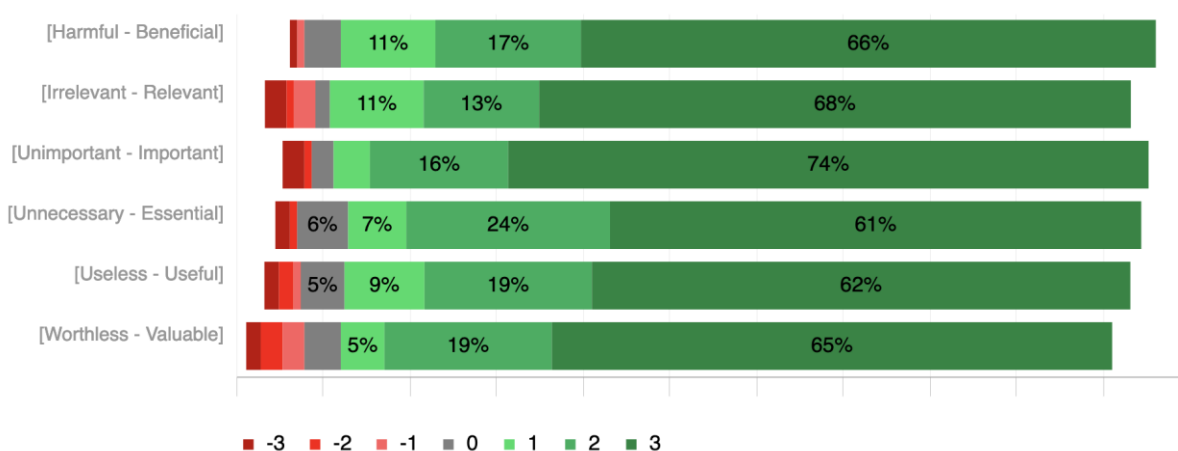


Figure 334: Latin American and Caribbean States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

Similar, but more varied, numbers of respondents had mostly positive attitudes about the UN SDGs related to their work (Figure 335). Respondents less frequently perceived them as ‘*Useful*’ ( $n = 105$ , 88%)<sup>1866</sup>, ‘*Relevant*’ ( $n = 104$ , 87%)<sup>1867</sup>, ‘*Important*’ ( $n = 103$ , 87%)<sup>1868</sup>, ‘*Beneficial*’ ( $n = 102$ , 86%)<sup>1869</sup>, ‘*Essential*’ ( $n = 102$ , 86%)<sup>1870</sup>, and ‘*Valuable*’ ( $n = 99$ , 83%)<sup>1871</sup>.

<sup>1861</sup> The total number of responses:  $N = 119$

<sup>1862</sup> The total number of responses:  $N = 120$

<sup>1863</sup> The total number of responses:  $N = 119$

<sup>1864</sup> The total number of responses:  $N = 161$

<sup>1865</sup> The total number of responses:  $N = 119$

<sup>1866</sup> The total number of responses:  $N = 119$

<sup>1867</sup> The total number of responses:  $N = 119$

<sup>1868</sup> The total number of responses:  $N = 119$

<sup>1869</sup> The total number of responses:  $N = 119$

<sup>1870</sup> The total number of responses:  $N = 119$

<sup>1871</sup> The total number of responses:  $N = 119$

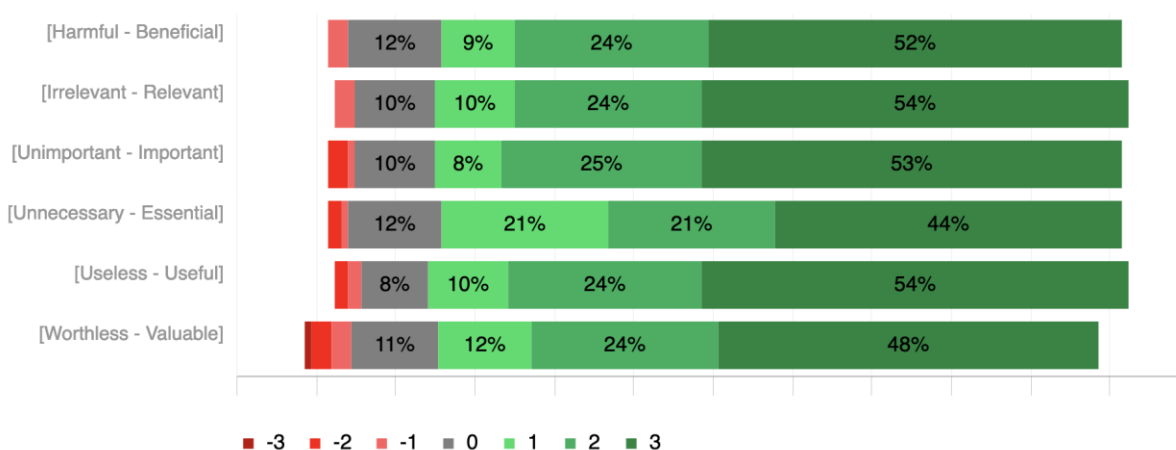


Figure 335: Latin American and Caribbean States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

Most respondents held positive perceptions on the UN SDGs (Figure 336). Most agreed with the statement *'The UN Sustainable Development Goals should be a priority for my professional field.'* ( $n = 98, 85\%$ )<sup>1872</sup>, followed by *'The UN Sustainable Development Goals represent legally binding international treaties to protect the environment.'* ( $n = 89, 81\%$ )<sup>1873</sup>, although they are not legally binding. Fewer respondents reported that *'The UN Sustainable Development Goals are a priority for [them].'* ( $n = 89, 78\%$ )<sup>1874</sup>. Results were varied but still positive for *'I follow stories in the news about the UN Sustainable Development Goals.'* ( $n = 59, 54\%$ )<sup>1875</sup> and a large portion disagreed with the statement *'The UN Sustainable Development Goals are focussed only on long-term financial development.'* ( $n = 29, 26\%$ )<sup>1876</sup>.

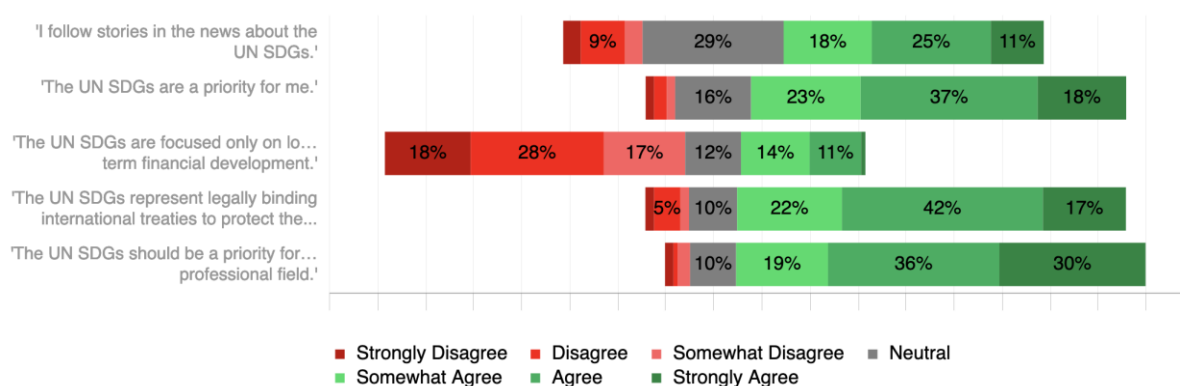


Figure 336: Latin American and Caribbean States - Detailed perspective on UN SDGs.

<sup>1872</sup> The total number of responses:  $N = 115$

<sup>1873</sup> The total number of responses:  $N = 110$

<sup>1874</sup> The total number of responses:  $N = 114$

<sup>1875</sup> The total number of responses:  $N = 109$

<sup>1876</sup> The total number of responses:  $N = 112$

### 3.11.6 OPEN-ENDED CONTENT ANALYSIS RESULTS

This section sets out results of the content analysis conducted on the qualitative data obtained through the RRING Research and Innovation Global Survey.

#### 3.11.6.1 DIVERSE PERSPECTIVES

This section explores the range of responses given to the question *‘Please list the steps you have taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning your research and innovation work.’*

A moderate portion of respondents indicated they had reached out to diverse stakeholders ( $n = 24$ , 30%), with more indicating this engagement in a *‘general’* way ( $n = 16$ , 20%). Few respondents specified the steps they had actually taken ( $n = 8$ , 10%) (Figure 337)<sup>1877</sup>. Respondents referred to having engaged with diverse stakeholder types.

Large proportions of respondents indicated involvement in *‘In-reach to other disciplines, researchers, academics, experts or students’* ( $n = 22$ , 28%) and *‘Meetings, workshops, focus groups and ‘Consultations’* ( $n = 19$ , 24%). This indicates that respondents had included diverse perspectives from within their academic or professional environment.

A small number of respondents referred to *‘General dissemination/broadcasting/dissemination of information about the research/innovation work’* ( $n = 11$ , 14%), or indicated taking *‘Steps for building collaboration/teams/consortia with no connection to diversity per se’* ( $n = 8$ , 10%). This category was assigned when respondents indicated one-way dissemination, rather than including external views.

A notable proportion ( $n = 16$ , 20%) answered with *‘Non-specific, vague, platitude or virtue signalling response’*.

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<sup>1877</sup> The total number of responses:  $N = 161$

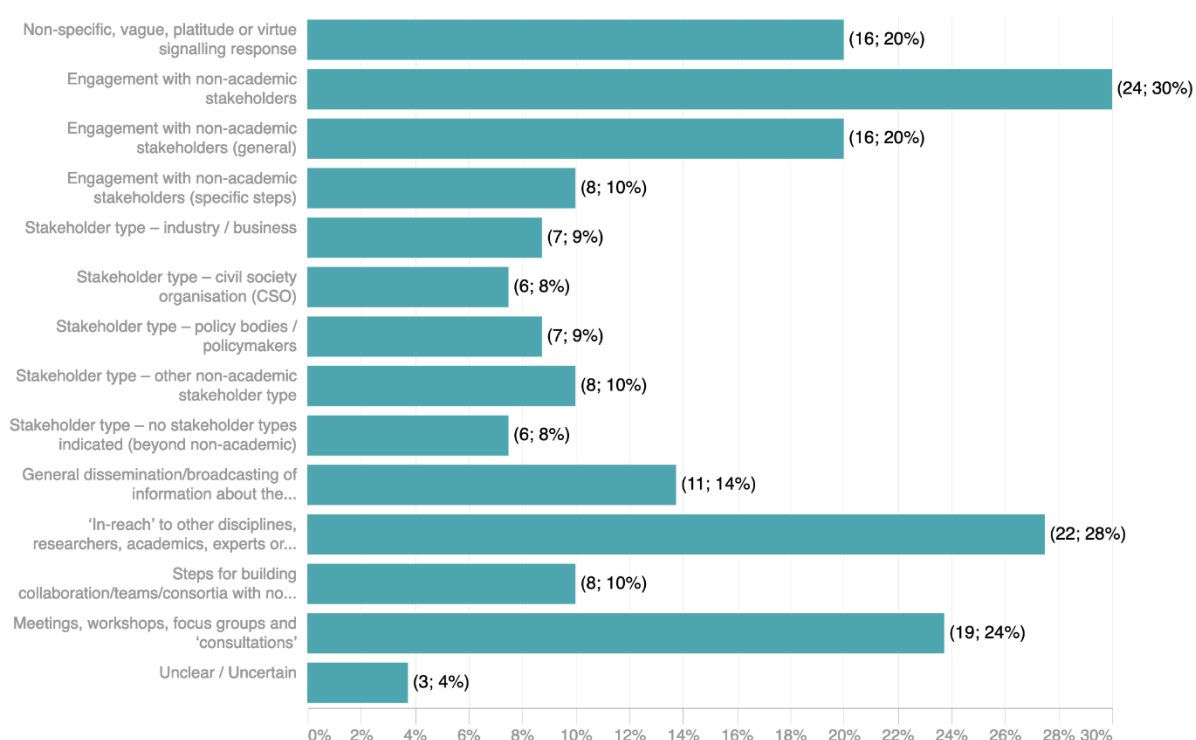


Figure 337: Latin American and Caribbean States - Steps taken to involve individuals/organisations with a diverse range of perspectives and expertise in planning research and innovation work.

### 3.11.6.2 GENDER EQUALITY

This section explored the range of responses given to the question *'Please list the steps you have taken to promote gender equality in your research and innovation work.'*

A majority of respondents ( $n = 54$ , 77%) indicated they had promoted gender equality. More respondents referred to taking *'specific steps'* ( $n = 33$ , 47%), over a smaller proportion promoting gender equality in a *'general'* way ( $n = 21$ , 30%) (Figure 338)<sup>1878</sup>.

The most frequent responses were *'Other gender equality promotion step[s]'* ( $n = 27$ , 39%), followed by *'Fostering gender equality in research/innovation teams/workforce'* ( $n = 15$ , 21%). Whereas fewer responded *'Promoting gender equality through delivering or attending training'* ( $n = 9$ , 13%) or *'Integrating gender as a substantive dimension/focus of R&I content/practice'* ( $n = 8$ , 11%). Few respondents indicated *'Integrating gender equality in research participant selection'* ( $n = 4$ , 6%), *'Participation in or engagement with equality committees'* ( $n = 3$ , 4%), *'Promotion/mentorship of female researchers'* ( $n = 2$ , 3%), *'Promoting women in R&I decision-making roles and senior positions'* ( $n = 1$ , 1%), or *'Compl[ie]d with rules, regulations and legal obligations'* ( $n = 1$ , 1%).

<sup>1878</sup> The total number of responses:  $N = 194$

A considerable proportion of respondents gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 14$ , 20%). This indicated they had promoted or supported gender equality without mentioning the steps they had taken.

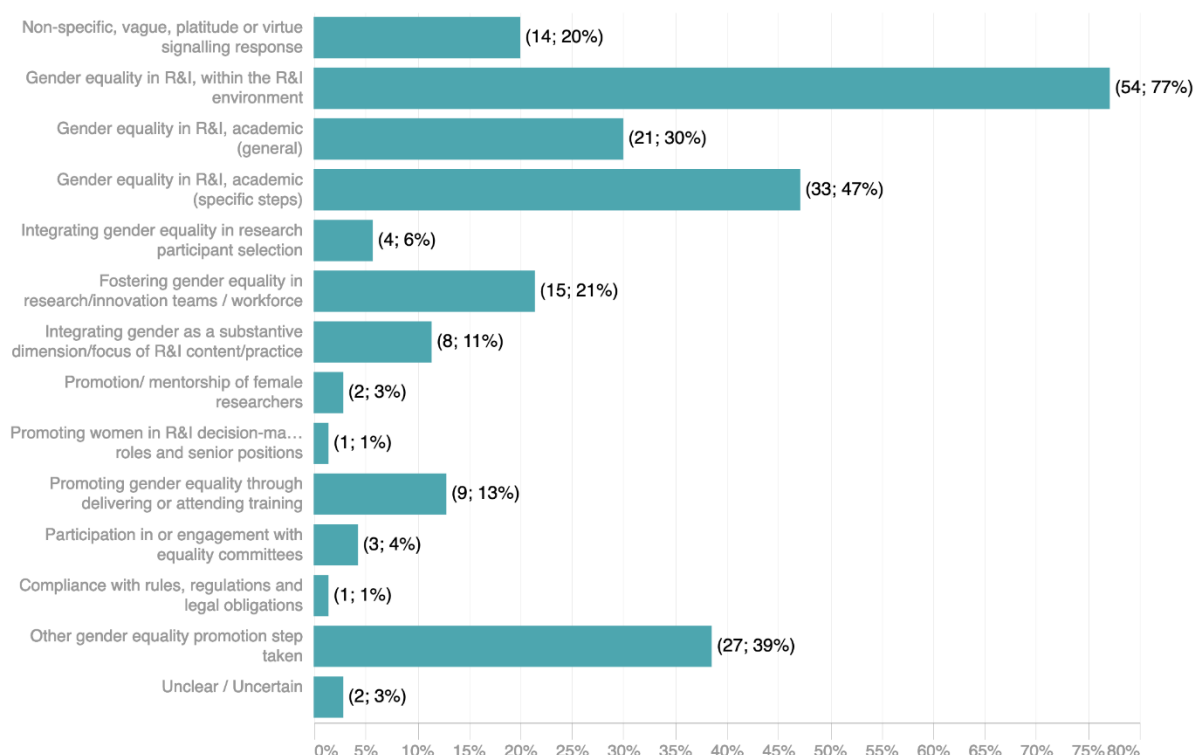


Figure 338: Latin American and Caribbean States - Steps taken to promote gender equality in research and innovation work.

### 3.11.6.3 ETHNIC MINORITIES

This section explored the range of responses given to the question ‘*Please list the steps you have taken to include ethnic minorities in your research and innovation work.*’.

The majority of respondents ( $n = 41$ , 77%) indicated they had promoted diversity of ethnic minorities, with more indicating ‘*general*’ views ( $n = 26$ , 50%), over ‘*specific steps*’ ( $n = 15$ , 29%) (Figure 339)<sup>1879</sup>. The most common step was ‘*Integrating race/ethnicity as a substantive dimension/focus of R&I content/practice*’ ( $n = 17$ , 33%), followed by other steps ( $n = 10$ , 19%). Fewer indicated ‘*Integrating racial/ethnic equality in research participant selection*’ ( $n = 6$ , 12%) or ‘*Fostering racial/ethnic equality on research participant selection*’ ( $n = 6$ , 12%). Fewest reported ‘*Promotion/mentorship of ethnic minority researchers/innovation teams/workflow*’ ( $n = 3$ , 6%), ‘*Ensuring racial/ethnic equality in process of recruitment and selection of R&I staff*’ ( $n = 1$ , 2%), ‘*Promoting racial/ethnic equality through delivering or attending training*’ ( $n = 1$ , 2%), or ‘*Compliance with rules, regulations and legal obligations*’ ( $n = 1$ , 2%).

<sup>1879</sup> The total number of responses:  $N = 137$

Some respondents ( $n = 9$ , 17%) provided ‘*Non-specific, vague, platitude or virtue signalling response[s]*’, indicating they supported equality of ethnic minorities without listing practical steps.

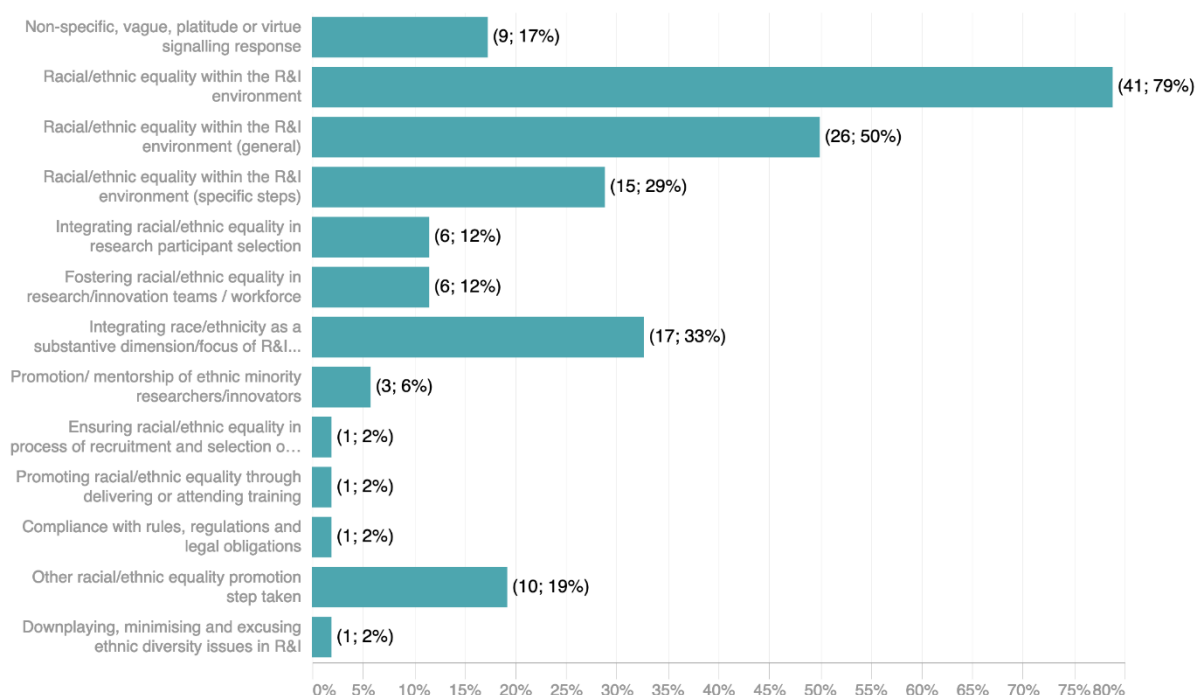


Figure 339: Latin American and Caribbean States - Steps taken to include ethnic minorities in research and innovation work.

### 3.11.6.4 ETHICS OF RESEARCH

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to ensure ethical principles guide your research and innovation work?*’.

Many respondents ( $n = 53$ , 73%) indicated they ‘*Integrat[ed] ethics in [their] R&I work*’, although most provided ‘*general*’ responses ( $n = 40$ , 54%) rather than ‘*specific steps*’ ( $n = 13$ , 18%) (Figure 340)<sup>1880</sup>.

The most common ways respondents ensured ethical working practices were through ‘*Participation in or engagement with ethics committees*’ ( $n = 15$ , 20%) and ‘*Compliance with rules, regulations, and legal obligations*’ ( $n = 11$ , 15%). This indicated respondents either contributed to or sought advice from ethical committees, while complying with internal rules and legal obligations. Other steps were similarly less present.

A considerable proportion of respondents ( $n = 22$ , 30%) indicated a general commitment to ethical principles but did not mention any steps, providing a ‘*Non-specific, vague, platitude or virtue signalling response*’.

<sup>1880</sup> The total number of responses:  $N = 196$

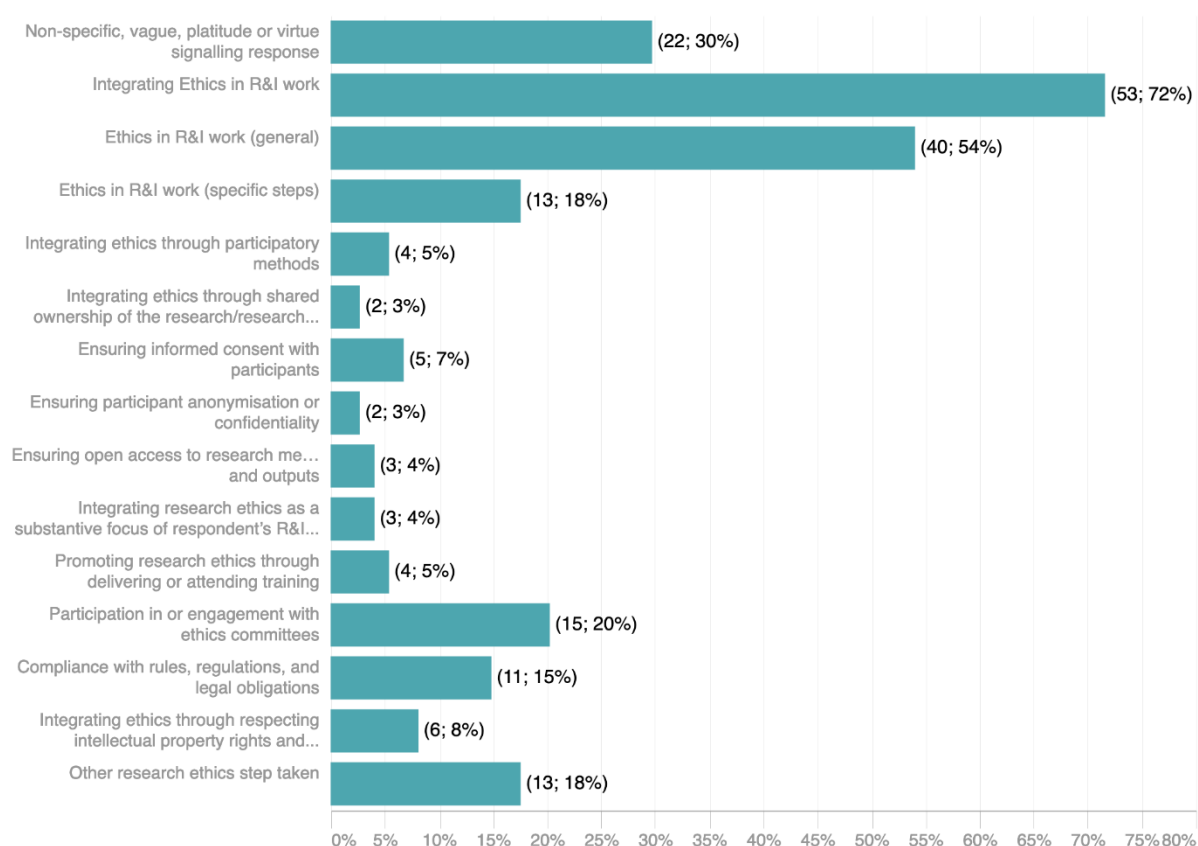


Figure 340: Latin American and Caribbean States - Steps taken to ensure that ethical principles guide research and innovation work.

### 3.11.6.5 TRANSPARENCY

This section explored the range of responses given to the question ‘*What steps have you taken to ensure your research and innovation methods/processes are open and transparent?*’.

Many respondents indicated they carried out ‘*One way dissemination with no reference to research methods/processes*’ ( $n = 38$ , 48%) without specifying how they ensured transparency (Figure 341)<sup>1881</sup>. A similar portion of respondents ( $n = 40$ , 50%) indicated having taken ‘*Pathways to open and transparent R&I methods and outputs*’. Fewer respondents provided ‘*general*’ steps ( $n = 15$ , 19%), in comparison with those who indicated having taken ‘*specific steps*’ ( $n = 26$ , 32%).

Most respondents indicated taking the practical step of ‘*Document[ing]/report[ing] research and decision-making processes*’ ( $n = 23$ , 29%) in at least a semi-public form that allowed for scrutiny of methods and decision-making. Other common steps were ‘*Disclosing research data, raw data, codes, and statistics*’ ( $n = 9$ , 11%) and ‘*Seeking upstream academic/researcher feedback on research ideas or plans*’ ( $n = 7$ , 9%). Fewer respondents selected ‘*Other step taken to ensure R&I openness and transparency*’ ( $n = 6$ , 8%), ‘*Seeking upstream feedback on*

<sup>1881</sup> The total number of responses:  $N = 190$

*research ideas/plans from non-academics/non-researchers*’ ( $n = 4$ , 5%), or *‘Seeking approval for methods/processes in research applications’* ( $n = 3$ , 4%). Only one respondent indicated *‘Participation in or engagement with relevant committees’* ( $n = 1$ , 1%).

Only a few respondents ( $n = 9$ , 11%) provided answers coded as a *‘Non-specific, vague, platitude or virtue signalling response’*.

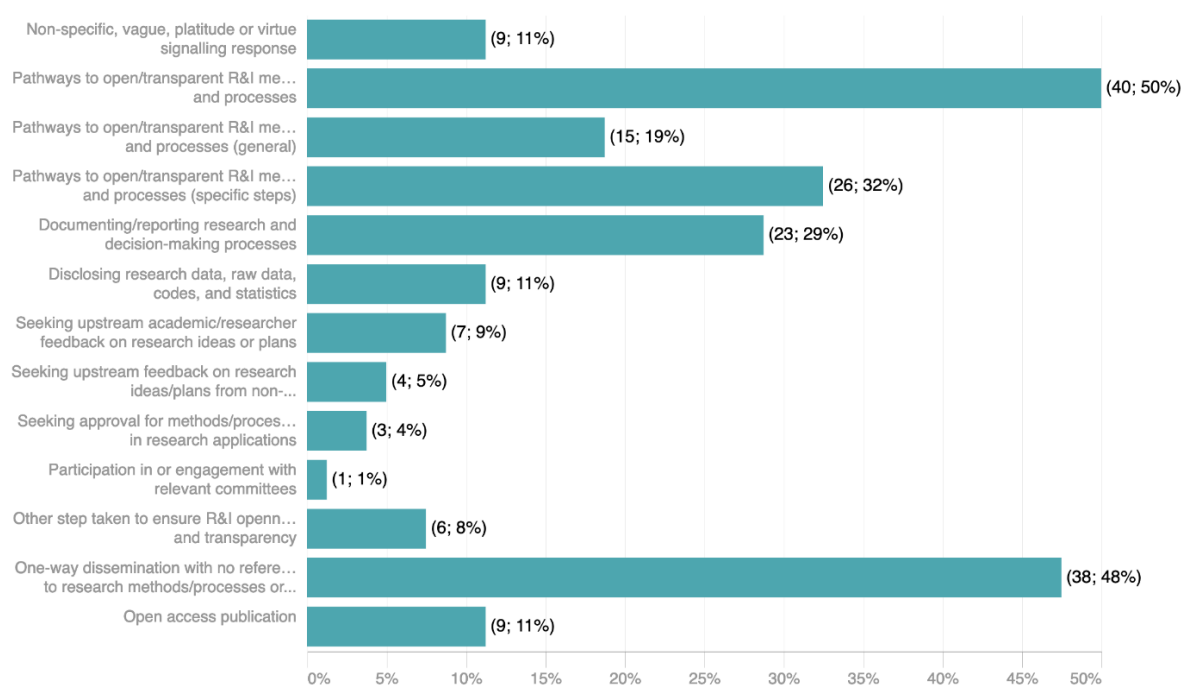


Figure 341: Latin American and Caribbean States - Steps taken to ensure research and innovation methods/processes are open and transparent.

### 3.11.6.6 PUBLIC ACCESSIBILITY

This section explored the range of responses given to the question *‘What steps, if any, have you taken to make the results of your research and innovation work accessible to as wide a public as possible?’*.

A considerable proportion of respondents described steps on *‘Sharing R&I work within professional R&I stakeholder environments’* ( $n = 48$ , 55%). This indicated they had not made their research results available to the general, non-academic public (Figure 342)<sup>1882</sup>.

A similar number ( $n = 46$ , 52%) indicated they had shared their findings with the public. More respondents ( $n = 45$ , 51%) reported taking *‘specific steps’* towards public accessibility of R&I results, compared to an exceedingly small proportion who referred to a *‘general’* compliance ( $n = 2$ , 2%).

The second most common step was *‘Engaging with non-academic/public stakeholders through outreach activities after research is completed’* ( $n = 18$ , 20%), followed by *‘Personally*

<sup>1882</sup> The total number of responses:  $N = 217$

*publishing/disseminating R&I outputs to the public outside of scholarly publishing*’ ( $n = 12$ , 14%). The least common steps were *‘Institutional- or project-based/supported publishing of research’* ( $n = 2$ , 2%) and *‘Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research’* ( $n = 2$ , 2%).

A few respondents provided answers which were coded as a *‘Non-specific, vague, platitude or virtue signalling response’* ( $n = 10$ , 11%).

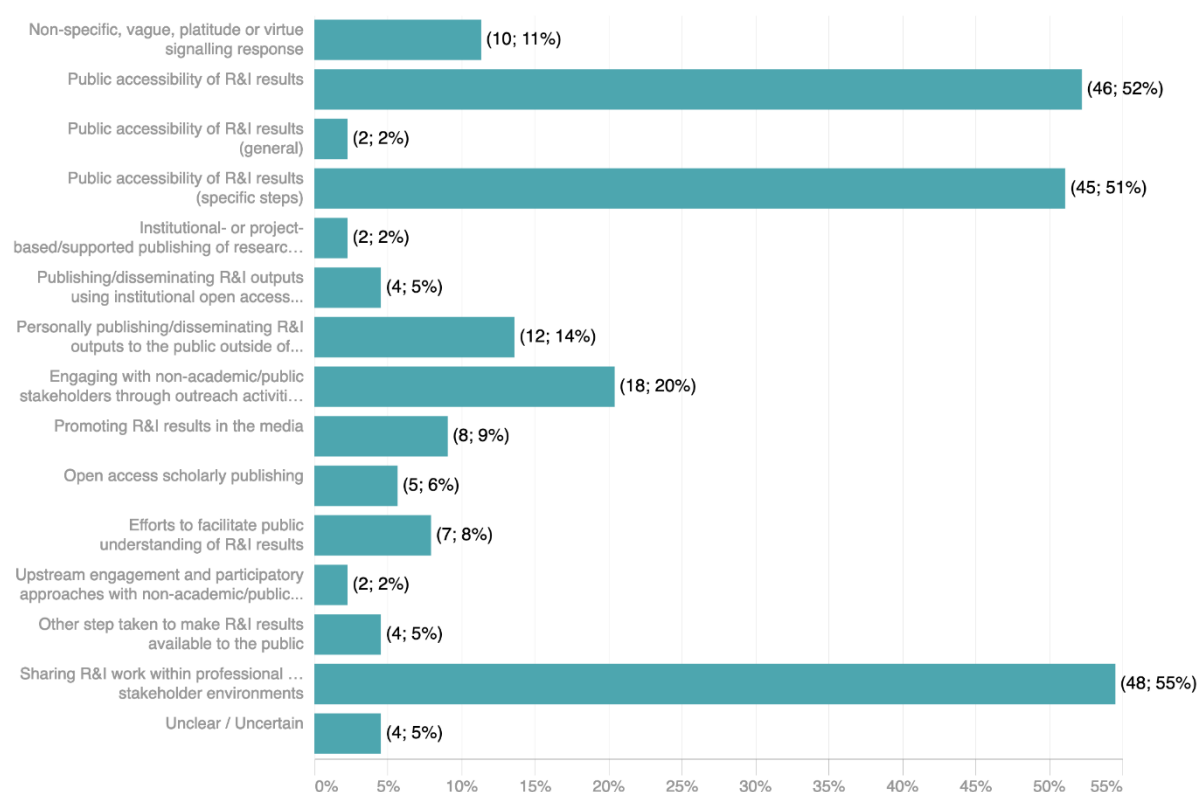


Figure 342: Latin American and Caribbean States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.

### 3.11.6.7 OPEN DATA

This section explored the range of responses given to the question *‘What steps, if any, have you taken to make the data from your research and innovation activities freely available to the public?’*.

Relative to the other categories, most respondents were *‘Confusing open access to research findings and open data’* in their responses ( $n = 37$ , 58%). They described making their research findings or outputs freely available, but not the data used to generate them (Figure 343)<sup>1883</sup>.

A higher proportion gave *‘general’* information ( $n = 7$ , 11%) as opposed to having listed *‘specific steps’* ( $n = 5$ , 8%). Fewer respondents explicitly referred to making data available to the public or non-academic stakeholders, which were categorised as *‘Public availability of R&I*

<sup>1883</sup> The total number of responses:  $N = 89$

*data*' ( $n = 11$ , 17%). Most commonly, respondents indicated taking other steps ( $n = 8$ , 12%), while predefined steps were least common ( $n = 1$ , 2%).

A considerable proportion of respondents ( $n = 15$ , 23%) gave a '*Non-specific, vague, platitude or virtue signalling response*'. This applied to responses indicating respondents had made their data or generic '*work*' freely available, without specifically indicating how.

Only one respondent negated the necessity for open access. This was categorised as '*Resisting/delimiting open data or supporting closed data*' ( $n = 1$ , 2%).

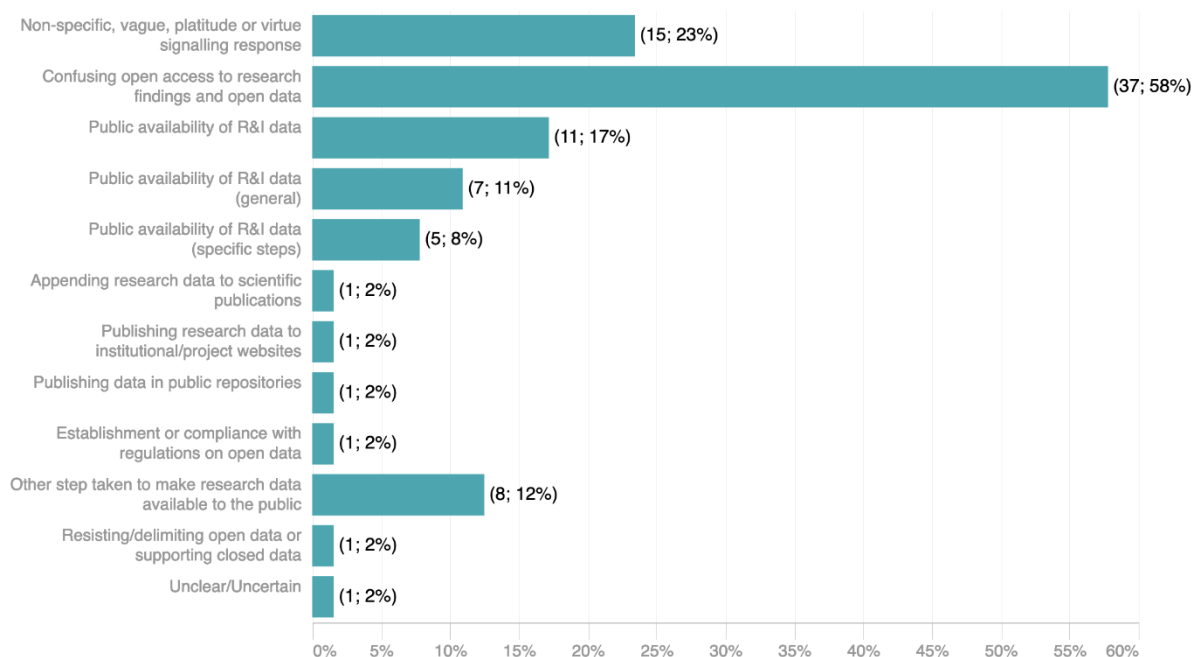


Figure 343: Latin American and Caribbean States - Steps taken to make the data from research and innovation activities freely available to the public.

### 3.11.6.8 SOCIETAL NEEDS

This section explored the range of responses given to the question '*What steps have you taken to ensure your research and innovation work addresses societal needs?*'.

The majority of respondents ( $n = 78$ , 90%) indicated they had taken steps toward '*Addressing societal needs in R&I work*' (Figure 344)<sup>1884</sup>. More respondents gave '*general*' information ( $n = 49$ , 56%), as opposed to listing '*specific steps*' ( $n = 32$ , 37%).

The most common specific step was '*Selection of research topic/problem defined by researchers' perceptions of societal needs*' ( $n = 27$ , 31%). Other steps were less common, such as other steps ( $n = 14$ , 16%), '*Communicating R&I work/activities to public/non-academic stakeholders*' ( $n = 14$ , 16%), and '*Societal issues as a substantive dimension in R&I content/focuses*' ( $n = 12$ , 14%). Fewer indicated their research design or methodological

<sup>1884</sup> The total number of responses:  $N = 259$

approach was informed by societal needs, which was coded as ‘*Participatory process: research design/approach defined by societal needs*’ ( $n = 9$ , 10%), ‘*Reflecting on/evaluating R&I impact on societal needs*’ ( $n = 8$ , 9%), or ‘*Participatory process: research design/approach defined by societal needs*’ ( $n = 7$ , 8%).

Few respondents ( $n = 9$ , 10%) gave a ‘*Non-specific, vague, platitude or virtue signalling response*’.

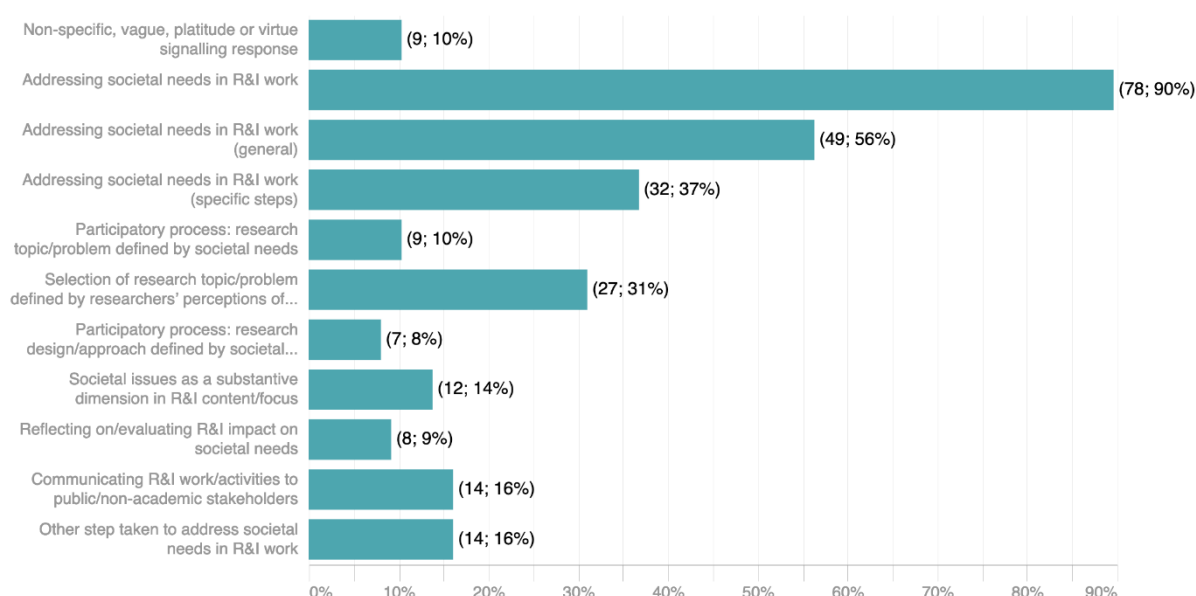


Figure 344: Latin American and Caribbean States - Steps taken to ensure research and innovation work addresses societal needs.

### 3.11.6.9 SOCIETAL CONCERNS

This section explored the range of responses given to the question ‘*What steps, if any, have you taken to ensure that the way you do your work does not cause concerns for society?*’.

A large proportion of respondents ( $n = 38$ , 75%) indicated ‘*Addressing societal concerns about implementation of R&I work*’, meaning they were taking measures to ensure their work did not cause concerns for society, or integrating societal views and perspectives (Figure 345)<sup>1885</sup>. More provided ‘*general*’ answers ( $n = 21$ , 41%), as opposed to listing ‘*specific steps*’ ( $n = 16$ , 31%). The most common practical steps included ‘*Compliance with rules, regulations or legal obligations*’ ( $n = 12$ , 24%), ‘*Seeking upstream feedback from non-R&I stakeholders on R&I ideas/plans*’ ( $n = 8$ , 16%), and ‘*Making the research directly responsive to societal needs or concerns*’ ( $n = 7$ , 14%). Smaller proportions of respondents indicated ‘*Ensuring integrity in R&I processes involving human participants*’ ( $n = 5$ , 10%) or named other steps ( $n = 5$ , 10%). Some respondents ( $n = 10$ , 20%) reported addressing societal concerns in a ‘*Non-specific, vague, platitude or virtue signalling*’ way.

<sup>1885</sup> The total number of responses:  $N = 134$

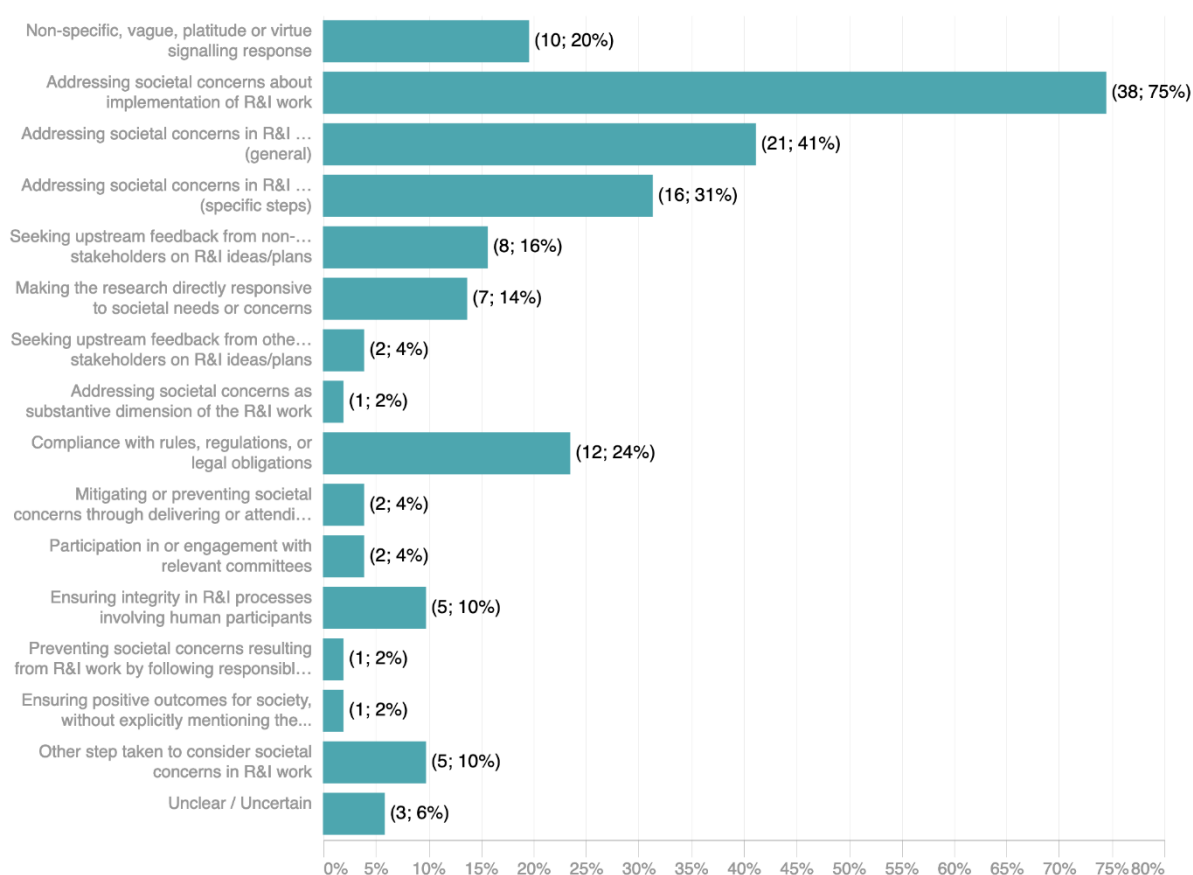


Figure 345: Latin American and Caribbean States - Steps taken to ensure that the way work is done does not cause concerns for society.

### 3.11.6.10 ASSOCIATIONS WITH RRI

This section explored the range of responses given to the question “What comes to mind when you think of ‘responsible research and innovation’?”.

The majority of respondents referred to ‘*Ideas, practices or policies associated with RRI*’ ( $n = 90$ , 69%) (Figure 346)<sup>1886</sup>. Generally, the associations were diverse and varied. Most respondents associated it with ‘*Protecting the environment, preventing negative impacts of research and innovation on the environment*’ ( $n = 30$ , 23%). The next most common associations were ‘*Other association with RRI*’ ( $n = 16$ , 12%) and ‘*Do no harm to people/society/participants with R&I*’ ( $n = 13$ , 10%). Fewer respondents associated RRI with ‘*Ensuring ethical procedures and approvals are completed in R&I work*’ ( $n = 11$ , 8%), ‘*Engaging / communicating with non-academic stakeholders or publics about research and innovation activities*’ ( $n = 10$ , 8%), or ‘*Ethical self-assessment: Conducting informal analysis or reviews to fulfil ethical duty*’ ( $n = 8$ , 6%).

<sup>1886</sup> The total number of responses:  $N = 307$

A notable proportion gave a ‘*Non-specific, vague, platitude or virtue signalling response*’ ( $n = 38, 29\%$ ). This applied to responses effectively repeating the term ‘*responsible research and innovation*’ in different ways, in particular using abstract terms that were not linked to a sense of responsibility or included generic mentions of research standards and societal issues without referring to ‘*responsibility*’ as such.

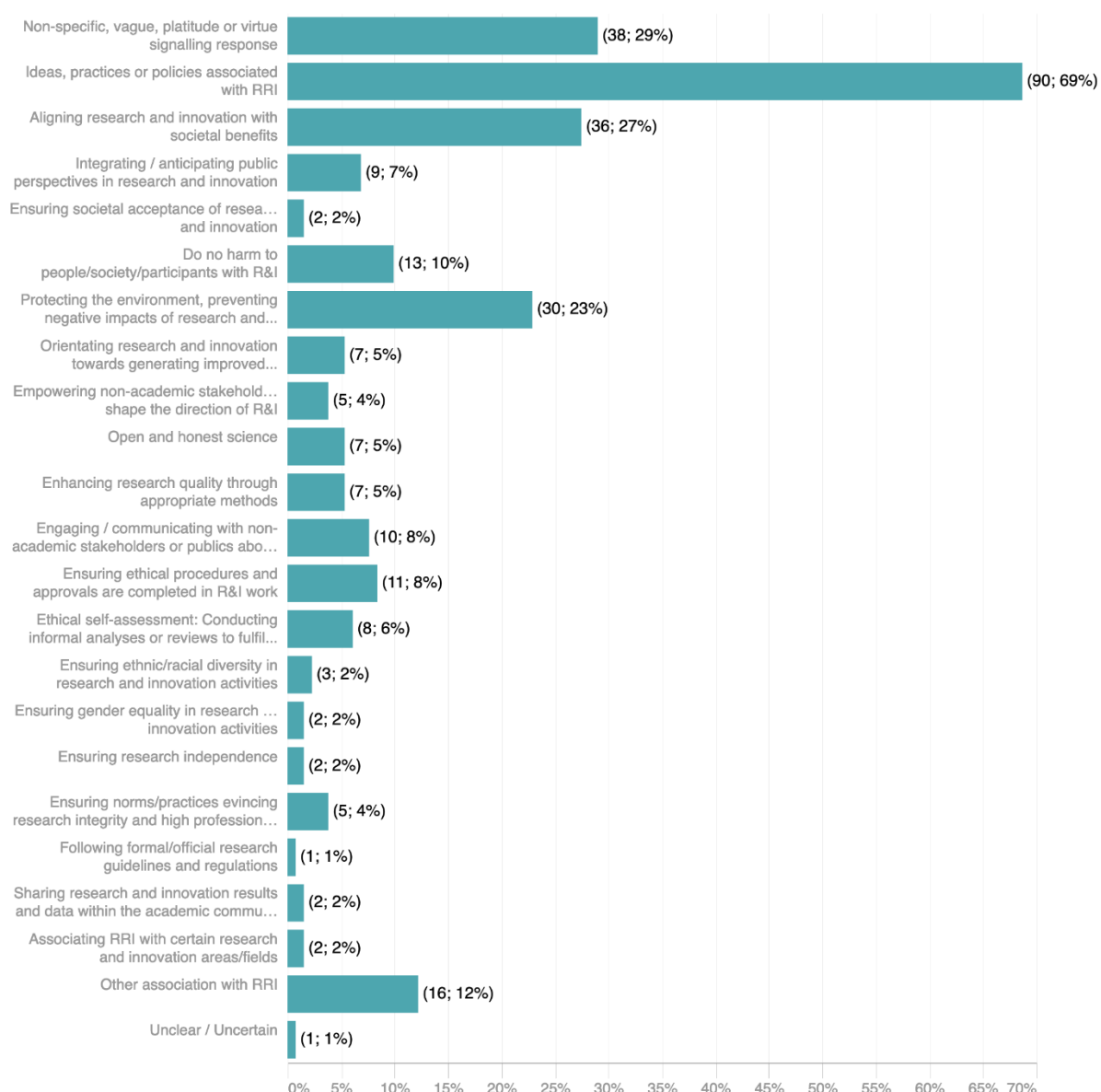


Figure 346: Latin American and Caribbean States - What comes to mind when you think of ‘responsible research and innovation’?

### 3.11.6.11 ASSOCIATIONS WITH UN SDGS

This section explored the range of responses given to the question ‘*What comes to mind when you think of the UN Sustainable Development Goals?*’.

A major portion of respondents more specifically ‘*Definin[ed] sustainable development*’ ( $n = 56, 53\%$ ), as entailing social, economic, and environmental aspects, such as associations with

health, natural resources, and climate change (Figure 347)<sup>1887</sup>. ‘*Economic aspects of sustainable development*’ were indicated by most respondents ( $n = 29$ , 27%), followed by ‘*Diversity/inclusion aspects of sustainable development*’ ( $n = 26$ , 25%), and ‘*Preserving natural resources*’ ( $n = 25$ , 24%). Many respondents referred to ‘*Governance dimensions of SDGs*’ ( $n = 17$ , 16%), and therefore did not actually define them. This was applied when respondents mentioned international and/or national governance issues or drivers related to sustainable development or the UN SDGs. This included national, multi-national or global geopolitical dynamics, transnational collaboration, as well as challenges or shared targets at this level. A handful of respondents referred to ‘*Achieving the SDGs*’ in terms of specific implementation steps for successful delivery ( $n = 5$ , 5%).

A notable proportion of respondents responded in ways that were ‘*Non-specific, vague, platitude or virtue signalling response[s]*’ ( $n = 29$ , 27%). Respondents may have indicated they had heard of the UN SDGs, or referred to sustainability in general, but did not give any further relevant details about them.

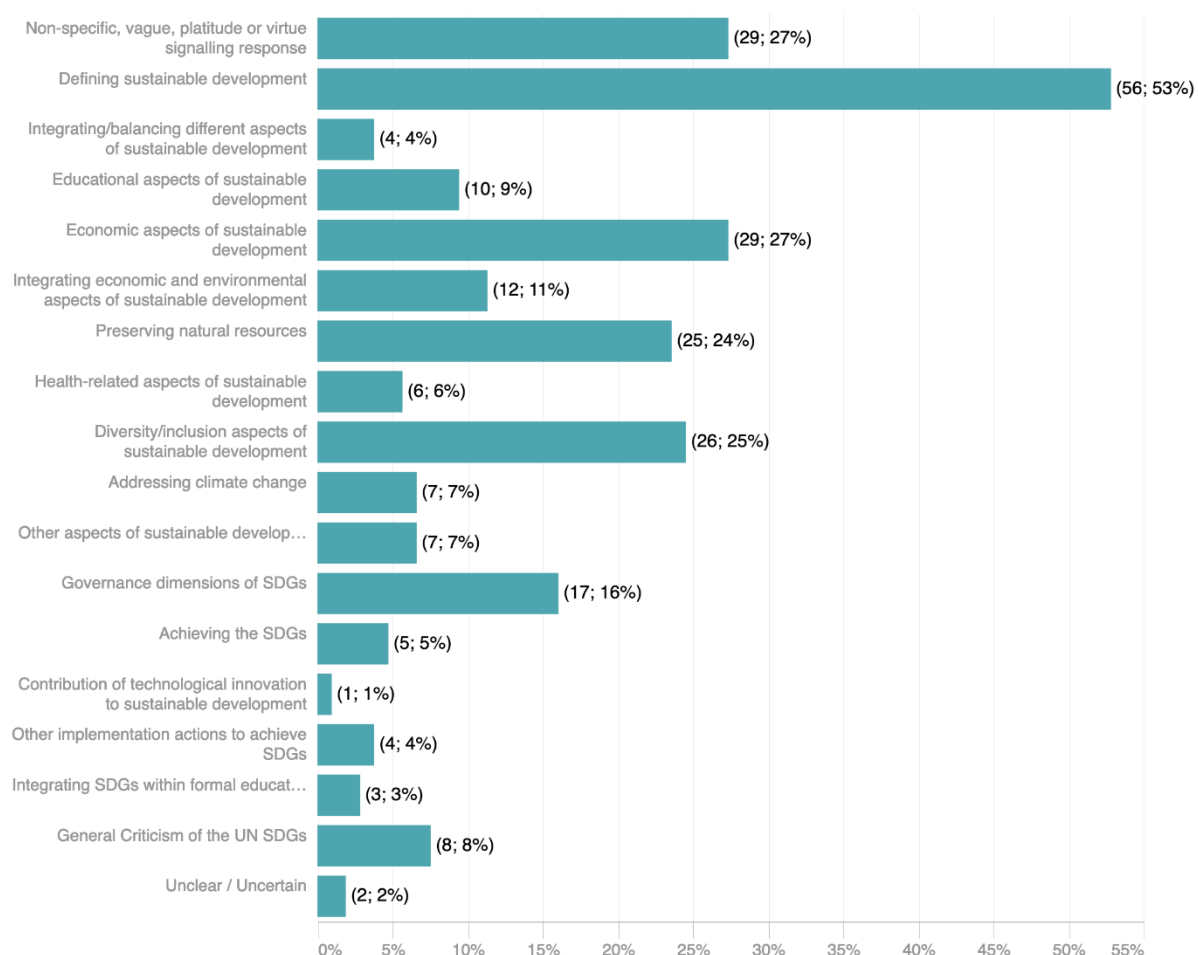


Figure 347: Latin American and Caribbean States - What comes to mind when you think of the UN Sustainable Development Goals?

<sup>1887</sup> The total number of responses: N = 251

### 3.11.7 SUMMARY OF FINDINGS

Socio-demographic results from the Latin American and Caribbean regions revealed the sample's gender distribution was slightly skewed towards men, with most working in a *'University or similar research performing organisation'* within the fields of *'Natural sciences, mathematics and statistics'*.

Results by dimension of Responsible Research & Innovation (RRI) showed overall agreement on an attitudinal level, with value-action gaps for all measures. The gap was strongest for the inclusion of ethnic minorities, which displayed the lowest level of total agreement on an attitudinal level. Generally, most respondents indicated steps taken. However, within each RRI dimension, there were considerable discrepancies between the generally supportive attitudes and the behavioural components (i.e., putting their attitude into practice). This was most notable for the *'anticipative and reflective'* dimension, while the closest alignment was for the *'responsive and adaptive dimension'*.

Results by stakeholder categories indicated higher engagement with research performing stakeholders, such as RPOs, academics and researchers. This is most likely due to academic collaborations and joint research projects. The second most frequent engagement reported was with civil society, while much lower levels of engagement were present for all other categories.

Measuring diverse perspectives, as part of RRI, related to researchers and innovators reaching out beyond academia to diverse stakeholders. Results for *'Diverse Perspectives'* showed that respondents most commonly connected with policy bodies and policy makers, and industry and business. The most frequently reported practical steps for reaching out were through *'Meetings, workshops, focus groups and "consultations"'*. Engagement with civil society organisations (CSOs) scored lowest, although respondents indicated frequent weekly interaction with this stakeholder category. Many respondents indicated they diversified their perspectives by approaching other researchers, academics and experts, which suggests this is a common practice of many research processes.

Measures relating to *'Gender Equality'* identified a shift towards monitoring equality within research teams. This common step was taken rather than, for example, complying with rules and regulations or through supporting female researchers' publications. Results showed its perceived importance by respondents corroborated with their mention of specific steps, such as ensuring equality within research teams, promoting equality through training, or integrating it as a substantive focus of R&I practice. A similar trend emerged in the *'Ethnic Minorities'* results, as promoting researchers from ethnic minorities was slightly lower as for the gender equality measures. However, integrating ethnicity as a substantive dimension of R&I work was still the most frequently indicated step.

Results for *'Ethics of Research'* indicated respondents had adopted practical steps to ensure the integration of ethical principles. The specific steps described indicated normative approaches widely embedded in RPOs through ethics committees, as well as rules, regulations, and legal obligations. Integrating ethics through respecting intellectual property rights and academic referencing, as well as ensuring informed consent with participants, were also

frequently reported. Those tendencies might be explained by the high number of respondents working in health-related areas of study in the Latin American and Caribbean sample.

The measures applied to identify ‘openness and transparency’ revealed respondents mostly shared perspectives related to conventional research processes. Results for ‘*Transparency*’ indicated that a high portion of respondents assumed one-way dissemination as a viable pathway for open and transparent methods and processes. Fewer respondents reported to document and report their research and decision-making processes or disclosed research data and statistics.

Results for ‘*Public Accessibility*’ showed that sharing R&I work within the respondents’ professional field, and sharing them with non-academic and public stakeholders, were equally valued. Respondents who only indicated publications were not included in the data, although it was frequently mentioned. This suggests that respondents from the Latin American and Caribbean sample associate dissemination and outreach activities with public accessibility. This trend became clearer when looking at the respondents’ comprehension of making data publicly available. Results for ‘*Open Data*’ revealed that respondents confused open data with open access by describing processes of making their research findings or outputs freely available. This could imply that ensuring open access is the predominant step respondents associated with research findings and open data, and that this RRI measure is not considered a normative approach to research and innovation.

Addressing societal needs in R&I predominantly related to finding a relevant research and innovation topic, rather than empowering relevant groups of people to decide how the process is shaped. However, results for ‘*Societal Needs*’ showed that most respondents selected research topics based on their own perceptions of societal needs. Considerably fewer respondents indicated public or non-academic engagement and consultation processes to define their research and innovation focus. This could imply top-down thinking. Focussing on the ‘anticipative and reflective’ dimension of R&I processes, results for ‘*Societal Concerns*’ showed respondents mentioned diverse aspects. The categories reflected associations with societal concerns, such as complying with rules, regulations and legal obligations, which were referred to most often. Also mentioned were seeking upstream feedback and in turn making it a direct response to societal needs.

Identifying common associations with responsible research and innovation and the global blueprint on sustainable development showed respondents were familiar with some of these concepts’ main ideas. Most respondents associated RRI with a general idea of protecting the environment and fewer doing no harm to society. This might be due to the high portion of respondents working in areas of natural sciences and engineering. Results from ‘*Associations with RRI*’ showed that some respondents referred to engagement with non-academics and ensuring ethical procedures to equal parts.

Results from ‘*Associations with UN SDGs*’ showed that most respondents related sustainable development to economic and diversity aspects or preserving natural resources. Governance dimensions were frequently mentioned, suggesting respondents were familiar with the idea

underlying the UN SDGs to build relationships, collaborations and addressing geopolitical dynamics on national, multinational and global levels.

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## 5 APPENDIX

### 5.1 APPENDIX I: INTERVIEW RESEARCH COUNTRY SELECTION

GERD is gross domestic expenditure on R&D. This is a UNESCO measure. For more details, see <http://uis.unesco.org/en/glossary-term/gross-domestic-expenditure-rd-gerd>

Table 14: RRING Country and regional selection with GDP and GERD rankings

Region	GERD or GDP ranking	Country	Alternate country
Latin America	High GDP	Uruguay	Panama
Latin America	Low GDP	Bolivia	Paraguay
Latin America	High GERD	Brazil	Jamaica
Latin America	Low GERD	Guatemala	Dominican Republic
Sub-Saharan Africa	High GDP	Gabon	Botswana
Sub-Saharan Africa	Low GDP	Malawi	Mozambique
Sub-Saharan Africa	High GERD	South Africa	Angola
Sub-Saharan Africa	Low GERD	Madagascar	Sierra Leone
Arab World	High GDP	Qatar	UAE
Arab World	Low GDP	Egypt	Morocco

Arab World	High GERD	Israel	Turkey
Arab World	Low GERD	Oman	Jordan
Asia	‘Must select’ country	India	(no alternate but can be used as alternate to other low ranking Asia countries)
Asia	‘Must select’ country	China	(no alternate but can be used as alternate to other low ranking Asia countries)
Asia	High GDP	Singapore	Australia
Asia	Low GDP	Tajikistan	Kyrgyzstan
Asia	High GERD	Japan	Malaysia
Asia	Low GERD	Myanmar	Laos
N America / Europe	High GDP	Ireland	UK
N America / Europe	Low GDP	Italy	Lithuania
N America / Europe	High GERD	United States	Germany
N America / Europe	Low GERD	Serbia	Ukraine

## 5.2 APPENDIX II: PROJECT REVIEW METHODOLOGY

This is an edited version of the original methodology, with references which are internal to the project removed or clarified.

### **Protocol Task 3.2.2.2: Literature review**

*Table 15: Suggested division of labour per region*

<b>Short partner name</b>	<b>Long Partner name</b>	<b>Region(s) to cover</b>
UNESCO & CEDLA	United Nations Educational, Scientific and Cultural Organization Centro de Estudios y Documentación Latinoamericanos (Centre for Latin American Research and Documentation)	Latin America + Caribbean
MEIJI & SFFRU	MEIJI University, Tokyo, Japan State Fund for Fundamental Research, Ukraine	Asia
ARU & CPN	Angela Ruskin University, UK CPN, Centre for the Promotion of Science, Serbia	Europe & North America
SAASTA-NRF	South African Agency for Science and Technological Advancement (part of National Research Foundation)	Africa
UniBrad	University of Bradford, UK	Arab Countries

### **Guide for applying T3.1 methodology**

Task: to analyse literature on RRI in the regions covered by the project and appropriate domains. This reconnaissance of literature (grey/white) on RRI-like approaches, frameworks and initiatives around the world is meant as a qualitative probe what is out there. It does not focus on statistic validity nor completeness, since elucidating global RRI-type parameters is the aim of this review, rather than being its departure point.

For this scope, we suggest aiming for a selection of texts that is informed by, but not limited by the project's overall country selection. For this review, the focus is on the following stakeholder groups:

- RPOs
- RFOs
- Industry large
- SME
- Civil society
- Policy makers
- National and international bodies
- NGOs
- Researchers

### **Method of analysis**

We opt for a streamlined discourse-analysis approach. The general WP 3 methodology provides a lens through which the RRI discourse can be analysed. Each retrieved document has to be analysed with this framework in mind. The set of all these document analyses (one large matrix) should then be used to present a report for the region in question, with sub specification per country were called for. The WP3 methodology document only gives guidance: the report can also discuss aspects that arose from the documents that were not included in the general WP 3 methodology.

Seen the fact that RRI is a specifically European concept, HSRW has kindly provided us with the following more generic list of keywords that fits with the generic WP3-methodological approach. It might be used to elucidate the RRI-dimensions of the literature listed, as well as for extension of our literature review, (although the below list is restricted in terms of language):

- Action Research
- Participatory Design
- Participatory Action Research
- Participatory Research & Innovation
- Participatory Technology Assessment
- Service Learning
- Scientific Culture
- Social Communication
- Social Innovation
- Citizen Science (Ciancia Ciudadana has a bit of a different connotation)

- Community Based Research
- Public consultation
- Science dialogue
- Technology dialogue
- Public involvement
- Patient involvement
- (Upstream) public engagement
- Science communication
- Anticipatory governance
- Public participation
- Sustainable development
- ELSI (Ethical, Legal and Social Implications of science)
- "consulta ciudadana" (citizen consultation)
- "diseno participativo" (participatory design)
- "metodología horizontal" (horizontal methodology).
- "apropiación social de la ciencia y la tecnología" (social appropriation of science and technology)
- "Participación Publico" (public participation)
- "Envolvimiento del público" (public involvement)
- "Desarrollo sustentable" or "desarrollo sostenible" (sustainable development)
- "Mecanismos participativos" (participative mechanisms)
- "Bosques pedagógicos" (Pedagogical Forests) (mix of public participation and environmental projects)

### **Country selection**

For the selection of relevant countries, please take the country selection into account (see Appendix I). If there are other countries of relevance, however, please include these. Some initiatives might be bound to specific geographical regions, whilst not being restricted to specific countries.

## Document selection

Given the scale of the project, we cannot include all available documents on RRI in the analysis: for instance, each company might have a specific gender and diversity policy. Analysing all these documents is unfeasible. Hence, we have to make a selection of the documents we consider representative.

For scholarly literature, there are numerous databases to consult: these will differ per country and per region. In essence, we are looking for literature in the area of research/innovation policy & governance, but also ethics of science, bioethics etc. might be useful. Many journals are international, and have global ambitions, but only some have a global scope. Regional journals (e.g., Asian journal of bioethics) should be an important source of information. Google Scholar might work as a generic search engine, but national and regional academic databases should also hold important potential.

For the other types of literature, we locate representatives (i.e., examples in region or in country) of each stakeholder and collect all possible RRI -related documents from that source (stakeholder). Ideally, we would aim at the following spread:

- RPOs:
  - 3 leading universities from a country, 3 leading private/non-university RPOs
- RFOs:
  - 3 top leading RFOs of the country.
- Industry large:
  - 2 leading companies from each of the 4 domains.
- SME:
  - 2 representatives from each of the 4 domains.
- For Civil society, Policy makers, National and international bodies, NGOs, Researchers
  - One each (though method does not specify whether this is per country or per region)

## 5.3 APPENDIX III: DATA ENTRY FORM EXAMPLE

Name organization: original (translation)

Year of publication:

Number of pages:

Language: NL

Source: <http://>

Format: pdf

Authors:

### **Summary**

This section should provide a detailed summary of the document

### **About the authors**

This section should describe the background of those who created this document and/or the background of the organization responsible for the document.

### **About the document**

This section should describe the background of this document (academic literature or grey literature based on working groups, etc.)

### **Key Domains**

This section describes the key domains involved.

### **Stakeholders**

This section should describe the stakeholders involved.

### **Regions**

This section should describe the region this document applies for.

## Article related keywords

This section should be a list of keywords from this document relating to the notion RRI and the specific content of that document.

## Dimensions

<b>Ethics</b>
<p>Aim:</p> <p>Role of stakeholders:</p> <p>Explicit relevance for domains:</p> <p>Implementation:</p>
<b>Gender and equality</b>
<p>Aim:</p> <p>Role of stakeholders:</p> <p>Explicit relevance for domains:</p> <p>Implementation:</p>
<b>Governance</b>
<p>Aim:</p> <p>Role of stakeholders:</p> <p>Explicit relevance for domains:</p> <p>Implementation:</p>

### **Open Access**

Aim:

Role of stakeholders:

Explicit relevance for domains:

Implementation:

### **Public engagement**

Aim:

Role of stakeholders:

Explicit relevance for domains:

Implementation:

### **Science education**

Aim:

Role of stakeholders:

Explicit relevance for domains:

Implementation:

### **Region specific keys**

Aim:

Role of stakeholders:

Explicit relevance for domains:

Implementation:

## Implementation

<b>Striking similarities and differences with EU-RRI-policy</b>
Aim: Role of stakeholders: Explicit relevance for domains: Implementation:

<b>RRI-type aspects relevant for but not yet captured by the framework</b>
Aim: Role of stakeholders: Explicit relevance for domains: Implementation:

## 5.4 APPENDIX IV: SUMMARY OF THE REVIEWED PROJECTS

### 5.4.1 PROJECTS IN ARAB STATES

#### 5.4.1.1 UNESCO INTERNATIONAL INITIATIVE ON WATER QUALITY (IIWQ)

##### **Brief description of the project**

In the framework of UNESCO-IHP's International Initiative on Water Quality (IIWQ) case studies on emerging pollutants in water and wastewater, UNESCO carried out a case study on Household Pharmaceutical Waste (HPW) management in Kuwait, focusing on its impact on water resources.

The case study, completed in 2016-2018, stresses the need to raise awareness about safe disposal methods as HPW can have a great impact on the public's health as well as the environment. The reduction of generation of HPW, thus the disposal of waste into the environment has also an economic impact. This field of science is another domain present in this study. The case study promotes sustainable and green practices by advocating for a 'green chemistry' and 'green pharmacies' in the health care sector and pharmaceutical industry and 'responsible consumption' among consumers and the general public.

##### **Stakeholders**

The outcomes of this study target three types of stakeholders: policymakers; researchers, water and health care professionals; and the general public (consumers). First, the case study informs decision-makers, who have a say concerning inputs of HPW into the environment, on the impact of HPW. This group includes policy makers, manufactures of pharmaceuticals, the Environmental Protection Agency of Kuwait, Ahmadi Hospital Kuwait, as well as the private sector. Secondly, the study seeks to reduce the generation of HPW. Hence, pharmacists; physicians; researchers as well as health care personals have a concern in this matter. Lastly, the study raises the public awareness about safe disposal of HWP and by doing so targets the consumers and the broad public.

##### **Sources**

- UNESCO-IHP International Initiative on Water Quality (IIWQ)<sup>1888</sup>

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<sup>1888</sup> <http://en.unesco.org/waterquality-iiwq>

- International Initiative on Water Quality: promoting scientific research, knowledge sharing, effective technology and policy approaches to improve water quality for sustainable development<sup>1889</sup>
- IIWQ Series of Technical and Policy Case Studies<sup>1890</sup>
- Draft Report: UNESCO International Initiative on Water Quality (IIWQ) Case study on Integrated Environmental Assessment (IEA) of Household Pharmaceutical Waste (HPW) in Kuwait and its potential impact on wastewater reuse (*to be published late 2019*)

## Method

This study looked at the impact of HPW on the environment, water resources and on human health. It also put forward recommendations for the actions that need to be developed for appropriate management and disposal of HPW, including effective regulatory and policy frameworks (such as specific laws and regulations).

Different types of information sources, including interviews, surveys, reports and published research findings, were used in the preparation of this case study. The study included two awareness campaigns, conducted in 2013 and 2014 in the Health Sciences Center (HSC) of Kuwait University. It also conducted a survey among pre-professional year students at the HSC in 2015. The survey focused on practices and opinions of the broad public vis-à-vis the disposal of expired and unused medications in Kuwait.

The analysis of the household pharmaceutical waste management in Kuwait was conducted using the DPSIR framework, based on the IEA methodology.

This methodology consisted in answering the following five questions:

- What is happening to the HPW in Kuwait and why?
- What are the consequences of HPW on the environment and humanity? (Impacts)
- What is being done regarding HPW and how is it effective? (Policy Analysis)
- Where are we heading? (less HPW/capita)
- What actions could be taken to manage the HPW in a sustainable manner in Kuwait?

## Project selection: What is RRI about the project?

The study promotes scientific and participatory research with the aim of reducing the generation and disposal of HPW and monitoring better pharmaceuticals at the national level. It

<sup>1889</sup> <https://unesdoc.unesco.org/ark:/48223/pf0000243651>

<sup>1890</sup> <https://en.unesco.org/emergingpollutants/strengthening-scientific-research-and-policy/case-studies>

also raises the importance of effective wastewater management. The study involved public participation, with a very high rate of women participation. The majority of the participants involved in the survey were women (93.7%) and Kuwaitis (88.7%).

Results of the study are under preparation to be published in UNESCO Emerging Pollutants in Water Series<sup>1891</sup>. The topic of Emerging Pollutants is a relatively new area of study in the fields of environmental sciences. Only few research studies have been conducted on this subject in developing countries, notably in Africa and Arab states.

## **Domain**

Waste management

## **5.4.2 PROJECTS IN ASIAN AND PACIFIC STATES**

### **5.4.2.1 CENTRE FOR ADVANCED INTELLIGENCE PROJECT (CAIP)**

#### **Description**

A project within RIKEN (a large national research institute on physical sciences), funded by the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) (2016-2021). This is a large project (Approx. \$30m p.a. funding for five years) into a wide set of target areas including underlying technology development, application area investigation and development, and ethical, social and legal issues.

#### **Stakeholders**

Researchers, the Public, Research Funding Agencies.

#### **Domains**

ICT (AI)

#### **Sources**

The project home page.<sup>1892</sup>

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<sup>1891</sup> <https://en.unesco.org/emergingpollutants>

<sup>1892</sup> <http://www.riken.jp/en/research/labs/aip/>

## **Regions**

Japan, East Asia

## **Dimensions**

- **Ethics:** One of the key elements of the project is an examination of the ethical issues raised by recent and current developments in AI, and consideration of the philosophical underpinnings of how AI and humans can ethically interact.
- **Public Engagement:** One of the project teams is called “Science, Technology and Society”, which seeks to identify the cultural responses (across East Asia as well as Japan and encompassing other regions as well) to the concept of artificial intelligence and how this impact on public understanding of AI research and public explanation of AI research outcomes and AI deployments.
- **Gender:** not considered in this project.
- **Equality:** Part of the Ethics investigations mentioned above is the implications of AI for social equality.
- **Social Harmony:** The Science, Technology and Society team include social harmony as one of their concerns.
- **Risk:** The AI, Security and Privacy team consider specific risks in the deployment of AI in terms of the disclosure of private information and interference by bad actors in deployed AI systems.
- **Open Access:** not considered in this project.
- **Science Education:** not considered in this project.

## **Other Remarks**

This is an ongoing project and a target for Task 3.3 interviews. As a major project of RIKEN, which is a very large research institute in Japan covering all fields of physical sciences, RIKEN projects in the other domains of Waste, Bioeconomy and Energy will also likely become targets for interview.

### **5.4.2.2 CO-CREATION AND COMMUNICATION FOR REAL-TIME TECHNOLOGY ASSESSMENT (CORTTA)**

#### **Description**

Funded by RISTEX, the funding agency part of the Japan Science and Technology Agency (JST) (2017-2020). The project aims to provide detailed methods and electronic communication tools to improve public engagement in research projects in IT (particularly

Artificial Intelligence) and Molecular Robotics (aka Nanobots). The goal is to enable research projects in these areas to be guided into improving the “Ethical, Legal and Social Issues (ELSI)” aspects of their projects. The approach involves development of a discussion and co-creation platform (called NutShell) through which researchers can be informed of the concerns of expert and non-experts outside the project about the capabilities, potential misuses/abuses, and other potential negative consequences of their research development.

### **Stakeholders**

The Public; Civil Society; Researchers; Research Funding Organisers.

### **Domains**

ICT

### **Sources**

- Shineha (2018)
- Yoshizawa et al (2018)

### **Regions**

Japan; Global

### **Dimensions**

- Ethics: a key focus of this project.
- Public Engagement: a key focus of this project.
- Gender: not considered in this project.
- Equality: one of the underpinning elements in the social aspect of the project is equality in influencing the direction of research.
- Social Harmony: as one of the guiding principles of much RRI-style research in Japan, particularly projects involving public engagement, this is a target of the social influence element.
- Risk: an underpinning element of the legal aspect of the project is the identification of risk and the appropriate regulations to avoid the consequences of negative outcomes of the research.
- Open Access: not considered in this project.

- Science Education: not considered in this project.

### Other Remarks

This is an ongoing project with so far limited outputs, one in each of the target fields (AI: Shineha (2018); and molecular robotics: Yoshizawa (2018)). The AI one considers the role of standardization in the embodiment of ELSI considerations in the AI sub-field of autonomous vehicles, a key Japanese target research area (given the importance of vehicle manufacture to Japan's industrial economy, not surprising). The other draws on the background of related fields to molecular robotics (such as genetic engineering and synthetic biology) and their successes and failures in dealing with ELSI aspects of policy and specific research outcomes. The approach reported on forms the basis for the projects main goal: a real-time technology assessment process and tool to guide research outputs into being socially beneficial rather than socially risky, as well as providing early identification of areas in which regulation is the appropriate approach to gaining the benefits of a technological development while minimising negative consequences.

### 5.4.2.3 GLOBAL ETHICS IN SCIENCE AND TECHNOLOGY (GEST)

#### Description

Funded by the EU under Framework 7, 2011-2014. The project used a comparative approach across a number of European countries, India and China to consider how ethics were involved in STI policy and projects, particularly with regards to public engagement in ethical issues.

A brief overview of the open access book (see sources below) which brings together the primary outputs of the project, and its relevance for RRING has been included in the Task 3.2.2.2 Document review. This project review includes more detail.

The project, referencing key RRI thinkers such as Stilgoe et al. (2014), considers ethics as a public debate not an expert definition. As such, the book focusses to a great extent on the inclusion of public engagement in defining the direction of travel of STI, the appropriateness of modes of research, and the evaluation of outcomes, including regulation of resulting products and technologies.

Early on, the comparative nature of the results from this project become evident as the issues that make up an “ethical” approach to STI differs in both content and meaningfulness. The content of ethical debates in Europe, India and China includes (and vary with respect to their relative importance) questions of “justice, equity, autonomy, human dignity and social harmony” (Ladikas et al. (2015), pp.10). These differences are given specific form in three regional study chapters in the book: Chapter 5: Science and Technology Governance and European Values; Chapter 6: The Values demonstrated in the Constitution of the People's Republic of China; Chapter 7: Science and Technology for Socio-economic Development and Quest for Inclusive Growth: Emerging Evidence from India. The tone of the debates in each

region includes consideration of how much the ethical debate is meaningful in determining funding, limitations on methods, outcomes and exploitation, and regulation of usage, and how much it is merely lip-service meant to reassure the public that science and innovation are not riding roughshod over the public good. These tone differences are explored in three research area case studies: Chapter 9 New Food Technologies in Europe, India and China; Chapter 10 Discourses on Nanotechnology in Europe, China and India; Chapter 11 Discourses on Synthetic Biology in Europe, India and China.

### **Stakeholders**

- The Public and Civil Society groups as sources of ethical debate.
- STI Policymakers as promoters and recipients of input from public engagement and as regulators/decision-makers in respect of research and innovation targets
- RPOs and Researchers, as practitioners engaged in obtaining and interpreting public input, and as researchers carrying out relevant R&I activities.
- RFOs as the conduits through which policy is channelled and regulations are applied.

### **Domains**

Bioeconomy. All three case studies (New Food Technology, Nanotechnology, Synthetic Biology) are mentioned in the RRING definition of Task 3.3's approach to bottom-up exploration of the bio-economy domain and RRI-like activity.

### **Sources**

The main results of the project can be found in the Open Access book published by Springer (Ladikas et al., 2015).

### **Regions**

Europe; China; India.

### **Dimensions**

- Ethics: a key focus of this project.
- Public Engagement: a key focus of this project.
- Gender: a major element of some elements is the inclusion of women in public engagement.

- Equality: inclusion of non-majority/low power voices in public engagement is a key consideration; the conclusions also explicitly discuss power relations and STI policy.
- Social Harmony: a key emergent concept in both Chinese and Indian examples, also emerges in Japanese social background.
- Risk: the distribution of risk and benefit as related to power conceptions is a key focus of the conclusions of this project, usually considered a part of ethics, but it needs to be given more prominence.
- Open Access: not considered in this project.
- Science Education: not considered in this project.

### Other Remarks

The international comparative methodology presented in Chapter 2 (Institutionalizing Ethical Debates in Science, Technology and Innovation Policy: A Comparison of Europe, India and China) should be useful in aiding the methodological considerations in RRING Work package 4. The approach starts with a descriptive consideration of the different ways similar issues are dealt with (or sometimes ignored) in the different geographic areas of study, with careful attention paid to the internal diversity in each of the large regions studied. Europe of course is highly diverse politically but India and China each have twice the population of the EU and contain multitudes of competing approaches despite their apparent political unity. The comparison of institutional approaches is particularly useful for RRING. Given that both China and India are targets for subcontracted elements of RRING, the approaches presented in this book can inform the comparative and synthesis aspects of RRING's geographic targets.

Chapter 9 (New Food Technologies), and to some extent Chapter 11 (Synthetic Biology), will be useful in the SoA consideration for the Bio-Economy domain in RRING.

The conclusions reported in Chapter 12 (Conclusions: Incorporating Ethics into Science and Technology Policy) contains an overview of each of the three topical case studies from Chapters 9-11. As such, they should be the starting point for consideration of their utility to the Bio-Economy domain SoA review. In addition, the sections on “State of the Art of Debates in the Three Regions” and “Mainstreaming Socio-ethical Analysis in the Three Regions” will be very useful background for RRING Work package 4 in considering the results of the detailed interview data from RRING Work package 3 (Task 3.3) and how to compare and synthesize useful outputs from such a heterogeneous set of sources (in terms of geography, domains and types of research and innovation studied).

China and India are still economically regarded as development economies, despite their rapid comparative rise in total size in recent years, they remain relatively low in GDP per capita. However, the descriptions in Ladikis et al.(2015) of the focus of the STI policy on economic development still mirrors the dominant discourse seen in Japanese government STI policy, see the lack of attention paid to most ethical considerations in the Cross-Ministerial Strategic

Innovation Promotion Program (SIP) (2017) (see the RRING Task 3.2.2.2 Document Review) which despite referring to “social problems” as the source of its goals, more or less ignores the social problems the outcomes of its research and innovation activity might create, and the issues of how to improve its process in areas such as gender equality.

#### **5.4.2.4 FRAMEWORK FOR BROAD PUBLIC ENGAGEMENT IN STI POLICY (PESTI)**

##### **Description**

Funded by RISTEX, the funding agency part of the Japan Science and Technology Agency (JST) (2012-2015). In response to the Fukushima nuclear power plant disaster in 2011, the question of engaging the public in STI policy decision-making gained greater prominence in Japan. This project aimed to provide a new framework for such engagement.

##### **Stakeholders**

- The Public, both those a priori interested in STI issues and those without a stated interest.
- STI Policymakers, receiving input from the public.
- Researchers and related professionals, helping to interpret public input for policymakers, and as subjects of the resulting policy (separate groups).

##### **Domains**

Not specific to a particular domain, but generic to STI policy broadly.

##### **Sources**

- Framework for Broad Public Engagement in STI Policy (PESTI), the project website, includes a list of project-related publications.<sup>1893</sup>
- Akiya et al. (2014)
- Kano (2014)

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<sup>1893</sup> <http://en.pesti.jp/home/publications>

## Regions

- Japan. This is specifically a Japanese project, focused on Japanese public engagement, STI policymakers and structures.

## Dimensions

- Ethics: a background element of the need to include public opinion in forming STI policy.
- Public Engagement: the key focus of this project.
- Equality: some of the outcomes focus on the identities of participants and how to ensure that all voices are heard for their content rather than dismissed due to their source.
- Risk: a significant element of the project was about communicating both ways (to and from the public) about risk.
- Open Access: not considered in this project.
- Science Education: formal science education was not considered in the project, but informal science education such as “science cafes” are a significant element.

## Other Remarks

The project is related to a larger set of projects funded by the Japanese Ministry of Education (MEXT) and JST/RISTEX in public engagement in STI policy under the term “PEST” (Public Engagement in Science and Technology, in English). The other projects to its date of publication are described in Kano (2014).

This project compares (Kano, 2014) their approaches to the UK’s Public Attitudes to Science metrics (Castell et al., 2014) and Australia (Victorian Department of Innovation, Industry and Regional Development, 2011). The comparative approach to public engagement used in this report may be useful to RRING in the comparative and synthesis work of Work package 4.

### 5.4.2.5 THEORETICAL AND PRACTICAL STUDY FOR NEW RRI FRAMEWORK (TPSRRIF)

#### Description

Funded by the Japanese Society for the Promotion of Science (JSPS – the main Japanese research funding council) (2017-2020). This project considers how much RRI, and related approaches are involved in Japanese research funding and practice, the barriers to improvement of such approaches, and lessons for researchers and policymakers for how to overcome those barriers. It is an ongoing project and has produced limited publications so far.

## **Stakeholders**

Researchers, The Public, Research Funding Agencies, Research Policymakers.

## **Domains**

ICT, Bioeconomy

## **Sources**

- Shineha, et al. (2018a)
- Shineha, et al. (2018b)

## **Regions**

Japan

## **Dimensions**

- Ethics: a background element of the project which is focused on the practical implementation in general of RRI approaches in Japan.
- Public Engagement: a key focus of the project, albeit in science communication rather than public input into specific research areas or projects.
- Gender: a background element of the project which is focused on the practical implementation in general of RRI approaches in Japan.
- Equality: a background element of the project which is focused on the practical implementation in general of RRI approaches in Japan.
- Social Harmony: not considered in this project.
- Risk: a background element of the project which is focused on the practical implementation in general of RRI approaches in Japan.
- Open Access: not considered in this project.
- Science Education: not considered in this project.

## **Other Remarks**

The project focuses on academic research in both technical fields (so far, the papers published have been in regenerative medicine [stem-cell based]) and social science fields (public understanding of science, public concerns about scientific/medical research and processes). The main research to date has looked at the social environment of scientific researchers

including the role of their scientific societies but also of the funding bodies and the broader regard of their peers within their field and more broadly in academia, and how that impacts how they conduct their research and the goals of their research. The focus on regenerative medicine (stem cell research) is clearly influenced by the Obokata scandal in Japanese stem cell research. The clear outputs so far are that scholarly societies and the academic community more broadly, are highly influential in both providing the impetus for academic research to be conducted with more responsibility, and in providing the mechanisms by which suitable inputs (from the public for social considerations and from social scientists for expertise in two-way communication with the public but also in identifying ethical and legal issues) can instantiate RRI approaches in their research.

#### 5.4.2.6 INTERNATIONAL SOLAR ALLIANCE

##### **Brief description of the project**

The International Solar Alliance (ISA) was launched on 30th November 2015 with a shared vision to undertake collaborative efforts to reduce the cost of finance and the cost of technology and to mobilize investments for massive deployment of solar energy and pave the way for future technologies suiting the needs of the member countries. ISA is headquartered in India. ISA is the first international body to have a secretariat in India.

The ISA is premised on the recognition of the immense potential of solar energy enjoyed by the solar resource rich countries located around the Tropics of Cancer and Capricorn, which gets maximum solar heat. The Alliance of these countries paves tremendous opportunities to bring sustainability, wealth and energy security for the peoples of these countries. The ISA has set a target of 1 TW of solar energy by 2030, which would require \$1 trillion to achieve.

The vision of ISA is that solar rich countries will act in a collaborative manner, with common objectives, strong political impulse and resolve. This will create a better harmonized and aggregated demand for solar finance, technology, innovation and capacity building across countries. The initiative will bring affordable, higher quality and reliable solar energy which has access to one and all.

India and France have been the forerunners in the formation of the ISA and hold the positions of Chair and Co-Chair of the Steering Committee, respectively. ISA is proposed to be a multi country partnership organization with membership from solar resource rich countries between the two tropics. ISA's proposed governance structure would consist of an Assembly and a Secretariat.

ISA is unique in its approach for its collaborative approach, its participatory governance structures, public access and its focus on Sustainable development. The strong presence of these elements in ISA makes it a relevant initiative in locating Responsible Research and Innovation (RRI) [and RRI like] projects in India.

## Stakeholders

The International Solar Alliance has been formed with a multi-pronged objective of not just advocating and lobbying for clear solar energy initiatives but also to bring a range of countries together to work collaboratively towards mutual development of solar resources, solar technologies for affordable, higher quality solar energy, easily accessible to one and all.

In its very structure, the ISA is a multi-stakeholder program and comprises primarily of the following stakeholders:

- National Governments of respective member counties
- Regulators
- Policy Makers
- International networks and organizations
- Research Institutes
- Business and Industry
- Researchers
- Multilateral/Bi-Lateral agencies
- Higher Education Institutions
- Civil Society organizations
- Financing Agencies and Banks

## Sources

The following sources have been used for the review of International Solar Alliance:

- Official Website: <http://isolaralliance.org/>
- ISA Documents including:
  - Joint Declaration between the International Renewable Energy Agency (IRENA) and ISA for the promotion of Solar energy globally
  - UK Collaboration with the International Solar Alliance
  - Cooperation Arrangement between Asian Development Bank and ISA for the promotion of Solar Energy in Asia
  - Headquarters Agreement between The Government of The Republic of India and The International Solar Alliance (ISA)
  - Several Other Joint Declarations
- ISA Programs Documents
- ISA Publications (Journals and Activity Reports)

- Media Reports on International Solar Alliance

## Method

International Solar Alliance uses a number of methods for its operations. Some of them are elucidated as follows:

- Multi stakeholder Collaborations:** ISA has created multiple avenues of participatory collaborations. It promotes collaboration for joint research, development and demonstration, sharing information and knowledge, capacity building, supporting technology hubs and creating networks. ISA also creates an expert group for development of common standards, test monitoring and verification protocols. It also creates partnerships amongst country specific technology centres and promote cross country knowledge exchange. The other major strategic collaboration principle of ISA involves collaborating with multilateral bodies like International Renewable Energy Agency(IRENA), International Energy Agency(IEA), Renewable Energy Policy Network for the 21st century (REN), UN bodies, bilateral organizations, corporates, industries and other important stakeholders who could contribute towards the bigger vision of the ISA.

A joint declaration also came out between ISA and Green Climate Fund (GCF) for the promotion of Solar Energy globally. The mandate of this declaration included joint mobilization of funds towards solar energy development; create local and international synergies between other similar initiatives, organizing regular visits/meetings/forums with other important stakeholders for continued dialogue and advocacy.

Similarly, a joint declaration was signed between the United Kingdom and ISA to not just contribute towards resource mobilization and project development but also to develop **next generation solar innovation**. For e.g., UK Research and Innovation and India's Department of Science & Technology have collaborated to research new forms of solar cells, and together launched the **India-UK Clean Energy Centre** bringing together experts on solar technology, electricity networks and energy storage to develop integrated solutions. Innovate UK, UK Research and Innovation and DfID have also brought together business and academic expertise together through the Energy Catalyst.

- ISA Programs:** The ISA is currently running five programs namely:
  - Scaling solar applications for Agricultural Use.
  - Affordable finance at Scale.
  - Scaling Solar mini grids.
  - Scaling rooftop solar.
  - Scaling Solar E-mobility and Storage

All these programs are long term, cross-country projects with specific objectives contributing to the overall mandates of ISA. Major activities of each of these programs relate to building a network of countries towards a defined objective and to find newer and more innovative solutions for solar energy use which can contribute to the development and growth of the solar energy regime in the respective member countries.<sup>1894</sup>

- c. **Training Program:** The ISA conducts several training programs of effective use of solar energy. One of such programs was the ‘**ITEC programme on “Renewable Energy and Energy Efficiency”**’ organized jointly by ISA and The Energy and Resources Institute (TERI), which is one of the leading research institutes of energy and climate in India.

ISA is also running a bigger training program called Indian Technical and Economic Cooperation (ITEC) Training Program in Solar Energy for master trainers from ISA member countries. This is a cross country specialized training program for individuals working in the fields of energy.

ISA also designs training programs for students/engineers/ policy makers, etc. and organizes workshops, focused meetings and conferences.

- d. **Innovative Transfers Experts Visits and Workshops:** In order to foster cross country research and knowledge transfers on solar energy, the ISA has created multiple avenues for expert visits, transfers and workshops. These workshops are related to the programmatic themes of ISA but also cover a range of other topics which relates to solar energy. A Solar Task Force has been created in this lead. Additionally, ISA also runs several pilot projects to strengthen research and innovation in solar energy. These forums also help in exchanging best practices across countries.
- e. **Case Studies and Video Resources:** The ISA through its range of operations have been to generate some valuable knowledge of solar energy and its implication. To take those findings at a larger level, the ISA team often releases case studies and video resources which are open access and are meant to be used and circulated by the public at large. For e.g., the **Compendium of Global Success Stories in Solar Energy** made jointly by ISA and YES Bank is a useful resource on solar energy and is available freely on their website for public access. There are similar outputs available on themes like solar PV Off-Grid applications, solar in agriculture use etc.
- f. **Open Communication:** ISA’s work is often openly communicated through their regular journals, monthly activity reports, social media presence and media reports. They also hold regular events like ISA SUN-meet; Global Re-Invest event and many more.

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<sup>1894</sup> Specific details about each of these projects are available at: <http://isolaralliance.org/Programmes.aspx>

## What is RRI about the Project

Some of the prominent RRI like characteristics of International Solar Alliance are:

- **Governance:** Deputation Policy provides opportunities for mid-level Government Officials from member countries to join the International Solar Alliance (ISA) for a fixed tenure as mutually agreed to contribute to the ISA's work program. The objectives of this deputation are to provide opportunities for capacity building, knowledge sharing, skill development and most importantly to foster innovation and cross-culture learning into the alliance Programme proposals are designed through open consultations among all National Focal Points, with the assistance of the Secretariat, and based on information shared by Members. A Programme can be proposed by any two Members or group of Members, or by the Secretariat. The Secretariat ensures coherence among all ISA Programmes. The ISA Governance in that sense is fairly open, transparent and participatory and thus exhibits RRI like characteristics.
- **Multi-stakeholder collaboration** is present at all stages and activities of ISA. Multiple examples have been cited above to showcase multi-stakeholder partnerships present at multiple levels of ISA. There is a constant exchange of research and technologies by the member countries to foster all round growth and development. Their policy on partnerships clearly mentions: 'ISA fully understands partnerships as mutually empowering relationships, which are focused on mutual growth, organizational development, institutional strengthening and above all, on achieving the impact of its actions aimed at promoting ISA objectives at various levels.' which is a clear display of their intent to promote mutual collaborations and partnerships. There is also a very strong element of **Participatory Technology Assessment** in the ISA framework where knowledge exchange is frequent, effective and rigorous.
- **Public Access:** All the reports, research, workshops, declarations and proceedings are available for free access by the public. The ISA has mentioned well defined sections in their website and upload all the documents for access to people by multiple countries. This exhibits a strong element of RRI.
- **Social Innovation:** An alliance like International Solar Alliance is a noteworthy social innovation, especially so because it has been pioneered by a developing Asian country like India and has a huge international base of operation. As much as ISA is in synchronization with international declarations and frameworks like the Paris Declaration, it is equally rooted in acknowledging individual strengths of the member countries in contributing to clean and green energy. Solar Energy is a trunk of tremendous potential and an alliance like ISA can prove to be path breaking in the years to come and set a great example and precedent for other such networks.
- **Sustainable Development:** The very premise of ISA is directed towards the idea of green future and sustainable development. Countries which are situated around the Tropics of Cancers and Capricorn are naturally bestowed with abundant solar resources. If they develop their technologies further and adopt a mutual partnership model of not

just advancing the technical research and resources but also shoulder responsibilities toward other countries who have not entirely explored the potentials and applications of solar energy. ISA is futuristic in its vision and definitely exhibits prominent traits of sustainable development.

## Domain

The International Solar Alliance (ISA) fits into the Energy domain of the RRING Project.

## Any other remarks

ISA at the outset might not exhibit explicit elements of RRI but its very structure and governance patterns are premised on participation and collaboration. It is innovative and unique and is a commendable initiative by the India government receiving international attention and applause.

### 5.4.2.7 5G TESBED PROJECT

#### Brief description of the project

In order to enhance the national capability in telecom technology and manufacturing and create Intellectual Property (IP) and to develop the ecosystem for 5G Mobile technology, the Department of Telecommunication (DoT), Govt. of India has come forward in funding the 5G Testbed project which is a large-scale project involving top Indian institutes namely IISc Bangalore, IITM, CEWiT, IITD, IITK, IITH and SAMEER. This project will create a 5G prototype and testing platform for developing innovative baseband algorithms under the guidance of ECE faculty at IISc. The project will deliver an end-to-end 5G testbed comprising of 5G BS and UE nodes that support enhanced mobile broadband (eMBB), Ultra low latency communication (URLLC), and massive MTC including NB IoT services. The operating frequency includes both sub 6 GHz and mm wave frequencies. The project has a time frame of 3 years (2018-2021) and involves a total budget of over Rs. 224 crores.<sup>1895</sup>

Test beds play an important role in providing insight into the technology, its use cases and deployment challenges. The Department of Telecommunications (DoT) has funded a large-scale 5G testbed project to encourage Indian start-ups and the industry to take an early lead in 5G. The goal of the project is to build a test bed that closely resembles a real-world 5G deployment. The project will deliver an end-to-end 5G testbed comprising 5G BS and UE nodes that support enhanced mobile broadband (eMBB), Ultra low latency communication (URLLC) and massive MTC including NB IoT services. This testbed could become a basis for

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<sup>1895</sup> [https://economictimes.indiatimes.com/articleshow/63515620.cms?](https://economictimes.indiatimes.com/articleshow/63515620.cms?from=mdr&utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)

[from=mdr&utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/articleshow/63515620.cms?from=mdr&utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)

many commercial deployments. The outcome of this project will be an end-to-end 5G-NR testbed comprising of 5G Base Station and User Equipment that support the 5G use cases like enhanced mobile broadband (eMBB), Ultra reliable and low latency communication (URLLC), and massive Machine Type Communication (MTC) including NB IoT services.

## Stakeholders

5G Test Bed stakeholders comprise of the following :

- Academic Institutes for research & validation of algorithms and experiential learning tool for 5G
- Mobile Network Operators
- Equipment companies for R&D of their product and stack developments
- Application/Solution Developers for end-to-end test bed to demonstrate applications and understand integration issues with 5G Network
- Telecom Start-ups for having experience on end-to-end perspectives for starting point for product/solution development
- Regulators
- Government Department of Telecom
- Policy Makers
- Industry
- Researchers

## Sources

The information about the 5G Testbed Project has been obtained from the following sources:

- Indian Institute of Science Website<sup>1896</sup>
- Indian Institute of Madras(IIT-M) Website<sup>1897</sup>
- The Centre of Excellence in Wireless Technology (CEWiT) website<sup>1898</sup>
- IIT Delhi<sup>1899</sup>

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<sup>1896</sup> <https://ece.iisc.ac.in/~5G-Testbed/index.html>

<sup>1897</sup> <http://www.ee.iitm.ac.in/5g/>

<sup>1898</sup> <https://cewit.org.in/testbed/>

<sup>1899</sup> <http://iitd.ac.in/content/indias-first-5g-massive-mimo-radio-iit-delhi>

- IIT Kanpur<sup>1900</sup>
- IIT Hyderabad<sup>1901</sup>
- Society for Applied Microwave Electronics Engineering & Research (SAMEER) website<sup>1902</sup>
- 5G India 2020 Forum website and Reports<sup>1903</sup>

## Method

The major activities involved under the 5G Testbed Project are:

- **Research and Development:** In order to advance the understanding and application of 5G technology in India, all these seven institutes are undertaking rigorous research and development initiatives under the 5G Testbed Project. Institutes like IIT Kanpur have set up a separate 5G Testbed Lab. The Lab activities involve coming up with cutting edge, replicable research processes which can be disseminated far and wide to several stakeholders involved in 5G technology. A lot of these research are directed towards developing algorithms, software and hardware. Other major areas of research include: Massive MIMO & mm Wave, baseband algorithm for 5G, V2X communication, visible light communications,
- **Prototype Testing:** This involves setting up End to End Open 5G Test Bed for Indian companies and academia. Each of these research institutes sets in place their own research focus areas and test real time applications of 5G technology. A more detailed account of the specificities of the prototypes is available on the above state websites.
- **Industry Linkages:** A major fraction of the Project involves developing and fostering linkages of academia with industries and corporates. Since 5G is a highly booming market and has high levels of international competition and standardization, the insistence is on developing indigenous expertise and striking useful collaborations between research and practice. A number of these research institutes are already running collaborations with industries. For e.g., IIT Delhi in collaboration with Ericsson has launched **5G for India** program where the objective is to fast-track realization of Digital India initiatives and aid application development for Indian start-ups and industries. Ericsson will set up a Centre for Excellence and Incubation Centre with a 5G test Bed at IIT Delhi and use this centre to create an ecosystem for the

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<sup>1900</sup> <http://home.iitk.ac.in/~rohitbr/projects.html>

<sup>1901</sup> <http://5g.iith.ac.in/>

<sup>1902</sup> <http://5gindia.co.in/img/5GTestBedWriteUp.pdf>

<sup>1903</sup> <http://5gindia.co.in/img/Roadmap-for-5G-in-India-ONLINE-14-MAY-18.pdf>  
<http://5gindia.co.in/img/5G-Report-14-MAY-18-Online.pdf>

development of 4.5G and 5G ecosystems. On the other hand, IIT Delhi will be given the task of conducting research and development and exploring how mobile technologies can lead up to further advancement of 5G.<sup>1904</sup>

- **Product Design and Manufacturing:** The ensuing research and industry linkages will further boost and promote product design and manufacturing for advancement of 5G business models. The Project also encourages 5G Telecom start-ups in India and envisions development of commercial ICT markets in the country. These products and newer mobile technologies will be aimed at demonstrating solutions for rural network deployment (through Low Mobility large Cell), smart city applications, dense urban broadband connectivity.
- **5G India Forum:** Having well acknowledged the potential of 5G technology in India, Government has constituted High Level 5G India 2020 Forum with three Secretaries of key Ministries/Departments Telecom, Meity and Dept. of Science and Technology (DST), and also comprising of renowned experts like Dr. A. Paulraj, Professor Emeritus, Stanford University, USA, Mr Gururaj Deshpande - Chairman of Sycamore Networks, Sandstone, USA, Indian industry led by CEOs of ICT industry, Telecom Standard Development Organisation of India (TSDSI), Professors from IIT Madras, IIT Mumbai, IIT Delhi, IIT Hyderabad, IISc Bengaluru, IT industry and stakeholders from industry associations. The goal of the forum is to ensure early deployment of 5G in India and to create a globally competitive ecosystem for product development and manufacturing targeting Indian as well as global market in the years to come. The forum facilitates 5G Demo/Use Case Labs, Technology Trials, International webinar/conferences/workshops etc. to promote knowledge exchange.

### What is RRI about the Project

Some of the prominent RRI like characteristics of BLiSC are:

- **Multi stakeholder collaboration and Governance:** It is the first step of a collaborative effort of a pan-Indian multi-institutional team which will enhance national capability in telecom technology, develop indigenous IP and give fillip to Indian telecom manufacturers. It's a rare sight to research institutes of such high repute coming together and working collaboratively with an inclusion of not just academia but also other stakeholders like industry, government and regulators. The RRI element of participatory approach is very evident in the case of 5G testbed Project.
- **Open Interface:** Since the 5G Testbed Project is still in its nascent stages, it hasn't entirely been opened to the public, but the technology promises a flexible and open interface once developed fully. At the moment, the knowledge and research exchange

<sup>1904</sup> More details are available here: <http://www.iitd.ac.in/content/ericsson-and-iit-delhi-launch-%E2%80%985g-india%E2%80%99-program>

between the research institutes is fairly open and inclusive and exhibits resonance to the RRI framework.

- **Science and Society:** In the past, compared to other developing countries like China, there has been little participation of Indian academia and industry in the standardization, R & D and manufacturing of 2G/3G/4G telecommunication equipment (e.g., base station). This is one reason why the telecom operators in India have to import equipment from foreign vendors at very high cost. This cost is ultimately borne by the end user who ends up paying a high tariff. If cellular telecommunication equipment is manufactured in India, then it will also be financially viable for the operators to provide broadband access in rural areas, which has been an important agenda of the Digital India program. 5G Testbed is crucial in that regard as it is the first step towards the technology easily accessible for people in the country.
- **Science Innovation:** 5G is the budding technology in a number of advanced economies. In India, more often than not, the reliance has been on international service providers to access telecom services. The 5G Testbed Project is thus an indigenous approach in this stride and is an innovation with scientific niche and social mandate. A successful implementation of indigenous 5G Technology will aid the final users and make telecom services affordable to a much larger share of population in India. The other innovation in this project is the grand collaboration between several technology research institutes and simultaneous connections with industry to develop the science as well its scalability and saleability hand in hand.

### Domain

The 5G Testbed Project fits into the ICT domain of the RRING Project.

### Any other remarks

Even though the 5G Testbed Project is still underway the process of completion, it exhibits several features which can make it an RRI endeavour. A lot can be commented only upon the competition of the project, but it is certainly one of the most unique ICT research projects which is currently being undertaken in India.

## 5.4.2.8 BANGALORE LIFE SCIENCES CLUSTER

### Brief description of the project

Bangalore Life Science Cluster (BLiSc) is one of its kind initiatives in biological sciences and research in India. Aimed at developing best practices for inter-institutional collaborations, BLiSc is established through a partnership between three premier institutes of biological research in India. Nucleated by the National Centre for Biological Sciences (NCBS), a premier

centre for cutting edge biological research and training in India, the Bangalore Life Science Cluster includes two other research institutions in Bangalore:

- **Institute for Stem Cell Biology and Regenerative Medicine (inSTEM):** InSTEM is an autonomous institute funded by the Department of Biotechnology, Government of India. A state-of-the-art research institute based out of Bangalore, India; InSTEM is dedicated to the study of stem cells and regenerative biology. It emphasizes greatly on collaborative research in stem biology and promotes cross cutting, multi-disciplinary approach to research and studies. It links the divide between clinical and laboratory research in stem cell biology. InSTEM seeks to redefine the paradigm of research institutes and make innovations without barriers and across disciplines.<sup>1905</sup>
- **Centre for Cellular and Molecular Platforms (CCAMP):** Based out of Bangalore and supported by Department of Biotechnology, Ministry of Science and Technology, Government of India; CCAMP is a research institute established with the objectives of **developing and establishing new high-end technologies** via research based collaborations in Bangalore cluster and elsewhere: catering scientific technologies and **expertise to researchers** in academia/industry; providing **education/training to generate technology expert** pool in Cellular and Molecular technology platforms and **promoting entrepreneurship** with strategic development of bio industry and making available new and innovative platforms.<sup>1906</sup>
- **National Centre for Biological Sciences (NCBS):** A part of the Tata Institute of Fundamental Research(TIFR), NCBS is a premier research institute based out of Bangalore. They aim to understand biology at the levels of molecules, cells and organisms to advance an integrated view of life processes. Apart from having their own institutional identities and scientific mandates, these three institutes create a conducive environment to foster biological research of prominence. It is envisioned that synergistic associations at the Cluster will have a far greater impact on life sciences research than the sum of individual contributions from each institution. NCBS being the host institute is providing an exceptional seeding platform for the other two institutes which are relatively new. The overall objective of the cluster is to have an integrated, interactive and multi-disciplinary biosciences and technology research initiative which will give way to phenomenal discoveries and practical technological advances.<sup>1907</sup>

## Stakeholders

<sup>1905</sup> For more details: <https://www.instem.res.in/who-we-are>

<sup>1906</sup> <http://www.ccamp.res.in/>

<sup>1907</sup> <https://www.ncbs.res.in>

Since the cluster is an amalgamation of 3 premier RPOs, it constitutes of a multi-stakeholder model. Some of the prominent stakeholders are:

- Research Performing Organizations (RPOs)
- Research Funding Organizations (RFOs)
- Regulators
- Higher Education Institutions (e.g., Indian Institute of Science)
- Civil Society Organization
- Business and Industry
- Researchers
- Multilateral/Bi-Lateral agencies

## Sources

Information about the Bangalore Life Sciences Cluster have been obtained primarily from the following sources:

- Official Website of National Centre for Biological Sciences (NCBS)
- Official Website of Centre for Cellular and Molecular Platforms (CCAMP)
- Official Website of InSTEM
- Official Website of Department of Biotechnology
- Research Papers
- Media Reports
- Social Media updates<sup>1908</sup>

## Method

Apart from the core academic research and teaching, there are a number of other factors which make BLiSC unique. Some of these factors are:

- **Establishing common Infrastructure to promote research and innovation:** The Overall goal of the Bangalore Life Sciences Cluster is to build the necessary infrastructure, human resources and to enable research and innovation activities across life sciences and biotechnology domains by leveraging the existing resources in the Bangalore Life Science Cluster (InStem, NCBS, C-CAMP) and its partner campuses [Institute of Bioinformatics and Applied Biotechnology (IBAB), Indian Institute of

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<sup>1908</sup> <https://www.facebook.com/BLiSc>

Sciences, etc.) and build on them. Several new facilities of accessory laboratories, Neuroinformatic resources etc. are constantly in addition in the cluster and adds up to the advancement of the infrastructure of these 3 three institutions. These resources are being used collaboratively by multiple groups.

- **Multi stakeholder Collaborations:** The Cluster hosts a wide variety of stakeholders for numerous collaborative enterprises. Due to its insistence on opportunities of entrepreneurship and innovation, the cluster has created an atmosphere of openness and flexibility and is welcoming of collaborative efforts. Their lab facilities like electron microscopes have been used by more than eighteen groups from different parts of the country. Their policy mentions the following: *The common instruments/equipment are available for use by any students of any research group in NCBS/INStem installed at NCBS & CCAMP building. All the students have equal priority for all the Common equipment on first come first use basis. The instruments are accessible to anyone who has been trained by the company representative/ Instrumentation Team. Users from outside NCBS and collaborators may use the facility with prior permission of Dean/Head Academic/Head TRSC.* The cluster also has a range of other national and international collaborations with multiple other institutes of repute. This includes higher education institutes, civil society organizations, research organizations, think tanks, regulatory bodies etc.
- **Training Program:** Several training programs under a variety of technical and non-technical themes are organized in the cluster. For e.g., a training program to industry for use of the resources in drug discovery was organized. Similarly, trainings are organized on Science communication, women in science, science and society, research ethics and policy and many more such themes.
- **Enabling research and Entrepreneurship at the Bio cluster:** It is envisioned that synergistic associations at the Bio cluster will have a far greater impact on life sciences research than the sum of individual contributions from each member institution. All the three institutes are engaged in cutting edge research on various themes of biosciences. Advanced, flexible and open in their approach, the Cluster also fosters the spirit of entrepreneurship through its various platforms and incubation centres.
- **Science Communication:** NCBS is running an important initiative called IndiaBioscience aimed at catalysing outreach in life science research in the country.

### What is RRI about the Project

Some of the prominent RRI like characteristics of BLiSC are:

- **Multi stakeholder collaboration and Governance:** This element has been explained in detail in the previous section. Since the cluster is an amalgamation of 3 research institutes, it is in its very structure multi collaborative and shares a unique governance structure. The governance is inclusive, open and participatory and gives way to

innovation and entrepreneurship in development of bio sciences. The collaborations of all the three institutes are panned out nationally and internationally and include a wide variety of stakeholders. InSTEM has also an interesting program of **Collaborative Science Chairs (CSC)** which consists of accomplished leaders in their field of research and permanent faculty at institutions elsewhere in the world. CSCs work on collaborative projects with scientists at InStem, which extend the scope of the host laboratories current work significantly. This program has attracted senior leading scientists to the environment for a collaborative engagement that covers 5 years of periodic visits and joint projects at InStem. The cluster has also received some corpus funding from industry and CSOs to promote global connectivity in scientific research.<sup>1909</sup>

- **Science Dialogue:** The cluster through its 3-partner institute promotes and support science communication. These three research institutes are funders for India Bio Science which is an organization formed with the objective of increasing the visibility of science in society, by being a hub for policy discussions, science communication, and as an aggregator of information.<sup>1910</sup> This organization actively organizes workshops/trainings/symposiums etc. on science communication and attempts to make all science citizen science. Their website is also a useful resource in understanding the various developments, discussions and discourses on Bio Sciences in India.
- **Science and Society:** At NCBS, efforts are being put to give structure to already initiated programs which navigate between science and society. Their ‘Science and Society’ programme will fund and host projects and events that both dovetail science and the humanities and could potentially stimulate a dialogue between each other. One of the aims of this venture is to extend the research sponsored by the programme beyond the confines of academia and **make it accessible to the larger community**. To this end, events such as lectures, workshops and exhibitions will be hosted periodically, enhancing the exchange of ideas and knowledge between scholars involved with the programme and the community at large.<sup>1911</sup>
- **Science Innovation:** The cluster institutes, especially C-CAMP has special emphasis on Science innovation and has institutional provision for multiple platforms to promote not just science-based innovation but also science-based entrepreneurship in the fields of Bioeconomy. The cluster has multiple platforms like incubation centres, seed funding, mentoring programs, collaboration with government funding agencies, and specialized thematic centres to foster path breaking innovations in the research.

<sup>1909</sup> <https://www.infosys.com/newsroom/features/Pages/global-connectivity-scientific-research.aspx>

<sup>1910</sup> <https://indiabioscience.org/about>

<sup>1911</sup> A detail of many initiatives under Science and Society program can be accessed here: <https://www.ncbs.res.in/HistoryScienceSociety/>

- **Ethics Framework:** Since this cluster is an initiative of 3 partner institutions, they are guided by the ethical practices of all the three research institutions. A number of positive commonalities can be found in the Ethics framework of these institutes. The NCBS, InSTEM and CCAMP; with its strong ethics component have well laid policies on Good Research Practice, Misconduct in Research, Intellectual Property rights, Conflict of interest and Stem Cell Research Policy.<sup>1912</sup> In crux, the respective centres and the Cluster have well defined and strictly adhered policies on issues of ethics in science. The Cluster ensures not just compliance of these respective issues but also awareness and trainings around these issues on a regular basis. The Cluster is also encouraging of entrepreneurship spirit and commercialization of technology but with particular caution towards potential clash of interests that might arise. Any misconduct in research is seriously dealt with through due investigation by formal committees.

In addition to these technical policies on research-based ethics, the Cluster also has in place policies on Harassment, communications and Women's Cell. These policies are reflective of the **gender sensitivity** and ethic compliance by the Cluster and have relevant resonance with RRI.

### Domain

The Bangalore Life Sciences Cluster fits into the Bioeconomy domain of the RRING Project.

### Any other remarks

BliSc is a very unique initiative in the field of Bio Sciences in India. It is one of the very few collaborative institutional models and has great resonance with the principles of RRI.

## 5.4.2.9 CENTRE FOR SCIENCE AND ENVIRONMENT (CSE)\_WASTE

### Brief description of the project

Centre for Science and Environment (CSE) is a highly reputed public interest research and advocacy institute based out of New Delhi, India. CSE research into, lobbies for and communicates the urgency of development that is both sustainable and equitable.

The institute has a dedicated programme on waste management which addresses institutional structures involved in waste management, treatment and disposal; helps build regulatory and technical capacities of Indian cities in waste management and emphasizes on the role of informal sector in India and global south through in-depth research and advocacy.

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<sup>1912</sup> A detailed version of these guidelines is available here: <https://www.ncbs.res.in/policies>

The Waste programme at CSE has multiple parallel trajectories of operations. The primary task relates to conducting in-depth, scientific research on various facets of waste management. This is followed by strategic advocacy initiatives with different actors including the government functionaries to improve the life and status of not just the issue but also of communities, especially informal labour, involved in this enmeshed process of waste management in India.

## Stakeholders

The Waste programme at CSE comprises of the following stakeholders :

- Civil Society Organization
- International Networks/coalitions on issues of Waste
- Academic Institutions
- RPOs
- RFOs
- Regulators (Urban Local Bodies, district officials etc.)
- Policy Makers
- Researchers

## Sources

The project information has been primarily obtained from the following sources

- <https://www.cseindia.org/work-overview-8651>
- Down to Earth Web Edition<sup>1913</sup>
- Forum of Cities that segregate<sup>1914</sup>
- Video Resources
- Social Media resources
- Media Coverage
- CSE Publications<sup>1915</sup>
- India Environment Portal<sup>1916</sup>

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<sup>1913</sup> <https://www.downtoearth.org.in/>

<sup>1914</sup> <https://www.cseindia.org/forum-of-cities-that-segregate-8331>

<sup>1915</sup> <https://www.cseindia.org/charting-the-future-of-city-compost-9270>

<sup>1916</sup> <http://www.indiaenvironmentportal.org.in/>

- CSE Newsletters
- CSE Press Release

## Method

- a. **Research Work:** CSE's influential publication in 2016 on solid waste management, '*Not in My Backyard*', highlighted the growing problem of waste in urban areas and carried in-depth case studies from cities following good solid waste management practices, as well as enabling policies and regulations. Similarly, under the Waste Programme at CSE, other prominent books namely '*Charting the Future of City Compost*', '*TO burn or not to burn- Feasibility of Waste-to-Energy Plants in India*' etc. have been published which is a leading source of information on different aspects of Waste Management in India.<sup>1917</sup> These publications are however not open Source and are available on a paid basis. In addition, the institutes also produce multiple research reports on themes such a decentralized waste management, model framework for segregation, Critical review of Waste Management Policies and Legislation and several other similar themes. These reports, unlike the books, are open access and are available to all.
- b. **Projects:** As part of its Waste initiative, CSE supports implementation of various waste related legislations in India. The team has signed a memorandum of understanding (MOU) with the city of Muzaffarpur in Bihar to develop an enabling framework for solid waste management which can be replicated in other cities and towns of India. The team launched 'Forum of Cities that Segregate' in December 2017 with 20 cities in India to create a knowledge exchange platform and to achieve effective and affordable waste management in Indian cities.
- c. **Advocacy Initiatives:** The programme has a strong insistence on various advocacy measures. A range of on-field and off-field advocacy initiatives are carried out by CSE. Some of the prominent activities include research audits of government reports and initiatives, opinion pieces on various issues related to waste and environment in numerous media platforms, workshops/trainings with state functionaries, publication of model case studies from different Indian regions, press releases and various other initiatives.
- d. **Education and Training:** The team also provides technical support to various stakeholders of waste management. CSE has helped in building capacities of Urban Local Bodies and concerned government officials in the states of Bihar, Punjab, Haryana, Delhi, Uttar Pradesh, Rajasthan and from South and the Northeast India. The team is on a constant lookout for best practices in this field and encourages other cities/communities to adopt them by tweaking it according to their terrain and different

<sup>1917</sup> <https://www.cseindia.org/topics/waste?type=reports>

requirements. The institute also conducts regular trainings/workshops on issue specific themes for various other stakeholders including civil society organizations, researchers, academic institutes, community members etc.

- e. **Collaborations:** The team is also engaged with two countries- Zanzibar and Swaziland in Africa for implementing a source segregation model for decentralized waste management, and with policymakers in other African nations for adoption of policy on integrated waste management. Similarly, CSE through its multiple projects strikes active collaboration with a wide range of individuals, interest groups, organizations, government departments, international organizations etc. who have similar mandates and interest in issues of waste management.
- f. **Knowledge Portal:** CSE runs active knowledge portals which acts as a useful compendium of information on Waste and other related resources on Environment. One of their important publications is *Down to Earth*, a fortnightly journal on various pressing issues of environment and sustainability. The aim of Down to Earth is to bring news, perspective and knowledge that will facilitate change in the world. It is one of the leading journals on Environment and Sustainability in India and is known for its cutting-edge research and sharp advocacy on pressing issues of environment.

In addition, they also run a web portal called *India Environment Portal* which is a portal for over 4,000,000 contextual, curated, cross-tagged specialised research reports and government documents. The India Environment Portal is initiated and managed by the Centre for Science and Environment (CSE) promoted by the National Knowledge Commission (NKC), Government of India. The portal is **open-Source Platform** and is a repository of useful research resources for multiple sources, both national and international.<sup>1918</sup>

## What is RRI about the Project

Some of the prominent RRI like characteristics are:

- **Sustainable Development:** At the very premise of any initiative or activities of the Centre for Science and Environment, the overarching goal is that of sustainable development and immediate recourse of pressing environmental issues. While their research is of high quality, their equal insistence of advocacy sets them in a unique position making them one of the few organizations in the country undertaking some commendable work in the domains of environment and sustainability.
- **Multi stakeholder collaboration and Governance:** CSE's work on waste is a collaboration from multiple stakeholders. Their Forum of Cities that segregates are a unique platform witnessing participation and collaboration from Urban Local Bodies, Civil Society Organization(CSOs), researchers for the cause of waste management. Their similar efforts with international authorities like Zanzibar Environmental

<sup>1918</sup> <http://www.indiaenvironmentportal.org.in/>

Management Authority (ZEMA) exemplifies cross country collaborations and governance and resonates the principles of Responsible Research and Innovation (RRI).

- **Open Access:** Even though Down to Earth Magazines and several other CSE publications and books are not available through open source, their India Environment Portal is an Open-Source Platform and is a very useful resource on a range of research reports and publications on various thematic categories of Environment and Sustainability. The portal is fairly known and is used by a number of interest groups for specialized information on Science and Environment.
- **Social Communication/Education:** Even though CSE's work deals with scientific aspects of issues of environment, waste, energy, climate etc. their insistence on making science accessible and understandable to the common public too. Their education material and various conferences and workshops simplify the science and take them to people in a way which is relatable to their everyday lives. Their aspect of Social communication as well as awareness is commendable. CSE also undertakes multiple awareness campaigns and science education activities in schools and colleges which engages with adolescents and youth and makes the initiative highly sustainable. They also have online courses and video resources in place which are openly accessible to the general public for education and awareness. The content is mostly bilingual and is available in English as well as Hindi.
- **Science Communication:** CSE's tools for raising awareness are periodicals, publications, films/short spots, briefing papers, exhibitions, posters and other products. CSE's informational products reach people in more diverse ways such as features service, website and e-news bulletins which showcases multiple innovative possibilities to communicate science to specialized as well as general audiences.

## Domain

The Waste Programme of Centre for Science and Environment (CSE) fits into the Waste Management domain of the RRING Project.

## Any other remarks

It is difficult to locate core research-based projects on Waste Management in India. Most of the ongoing projects on Waste Management is a mix of Research and Advocacy model. It is even more difficult to locate RRI elements in these projects which are already fairly broad in their mandate and operation.

### 5.4.2.10 THE WELLCOME TRUST/DBT INDIA ALLIANCE

The Wellcome Trust/DBT India Alliance, a public charity funded by the Department of Biotechnology, Govt. of India and Wellcome Trust, UK, aims to build a strong biomedical

research ecosystem in India that nurtures scientific talent and drives innovations to tackle health challenges. This alliance has completed its 10 years in the year 2018 and is successfully undertaking fascinating and useful projects of science and innovation in the fields of biomedical research.

The launch of the Wellcome Trust/DBT India Alliance, 10 years ago, was a novel experiment in funding and engagement in India—one that aimed to **identify the best researchers**; nurture them as **future leaders**; and thus, build excellence in biomedical research. The highlight of India Alliance’s 10 years of operations has been its flexible **fellowship programme** that supports researchers at different career levels under the tracks of basic biomedical and clinical and public health research. Apart from the traditional research fellowships, the Alliance is also running fellowship in Science Communication.

Over the years, India Alliance has undertaken the role from a funder to an influencer working towards establishing a **research ecosystem** of international standards in India. Its sphere of action, in addition to research funding, now includes capacity building for researchers through workshops, training researchers for leadership roles, informing science and health policy, facilitating international and interdisciplinary collaborations, improving research assessment policies, making science accessible, and bridging the gap between science and society through public engagement. This span of ten years can rightly be called a decade of discovery—discovery of the role that India Alliance will play in the Indian research enterprise in its coming phases.<sup>1919</sup>

## Stakeholders

The Wellcome Trust/DBT India Alliance stakeholders comprise of the following:

- Research Performing Organizations (RPOs)
- Research Funding Organization (RFOs)
- National Government Ministry
- Regulators
- Policy Makers
- Research Institutes
- Bi-Lateral/ Multilateral Agencies
- Business and Industry

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<sup>1919</sup> <https://www.indiaalliance.org/>

## Sources

The major information about the Alliance has been obtained from the following sources:

- Official Website of the India Alliance<sup>1920</sup>
- 10-year Alliance Journey<sup>1921</sup>
- Decade of Discovery special Issue on research highlights.
- India Alliance Bookzine (An Art and Science Collaboration)
- Video Resources/ Testimonials of India Alliance Fellows
- Briefs and Program Design of Various initiatives at India Alliance
- Newsletters
- <https://www.indiaalliance.org/funded-areas>
- Social Media Handles of India Alliance

## Method

- a. **Fellowships:** The scope of the fellowships offered by India Alliance ranges from high-quality basic science to clinical research and public health interventions with far-reaching translational impacts. Researchers funded by India Alliance have been carrying out remarkable work to improve both human and animal health. Notably, the relative citation ratio of India Alliance-funded publications is considerably higher when benchmarked against national comparators; this illustrates the quality of science funded by India Alliance.
- b. **India Research Management Initiative:** In order to improve institutional ecosystems in India and assist in attaining global competency standards, the **India Research Management Initiative (IRMI)**, was launched by the Wellcome Trust/DBT India Alliance (India Alliance) in February 2018. The objective is to enhance the strategic research competencies of research institutes and universities to be able to drive scientific innovation and development. IRMI arose in response to streamlining research support systems that could reduce the amount of time spent by Indian researchers on administration and enable Indian researchers and institutions make the best use of international collaborative funding opportunities. IRMI is presently being implemented as a pilot, with a focus on creating awareness about research management in India,

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<sup>1920</sup> <https://www.indiaalliance.org/>

<sup>1921</sup> <http://10years.indiaalliance.org/>

initiating dialogues between institutions and the India Alliance, and identifying gaps in the system.<sup>1922</sup>

- c. **Workshops and Seminars:** India Alliance hosts and organizes a variety of workshops under various thematic clusters. From leadership workshops to Research methodology workshops to science communication workshops, the alliance engages in timely and continuous engagements of a variety of stakeholders with an objective of increasing skills and competencies as well as in facilitation dialogue and collaborations.
- d. **Newsletter:** The Alliance has in place a regular and very informative newsletter which highlights the key activities of the quarterly operations of the Alliance. These newsletters are a very useful source of information in understanding the recent development and additions in the work of India Alliance

### What is RRI about the Project

Some of the prominent RRI like characteristics of India Alliance are:

- **Public Engagement:** Having well acknowledged at the outset itself that science in isolation with people is of little use, the Alliance made special insistence on public engagement throughout its engagement. In addition to the Fellowship Program, the Alliance is invested in increasing the public understanding of science in India. They believe that it's important that scientists engage with the public to increase the awareness of science, technology and medicine (STM) research. In a one of its kind approach, the India Alliance aims to '*bring the scientific community and the public together to share, debate and deliberate on important scientific and human health issues that have implications on the society at large.*' To ensure this public engagement systematically and institutionally, the India Alliance runs several initiatives like Public Engagement Competition Awards for Science Fellows, Public lecture series, collaborations with civil society organizations, Art & Science Residency programs, awareness events, panel discussions and many more.<sup>1923</sup>
- **Science Communication:** The Alliance has an unparalleled insistence on Science communication in their programmatic initiatives. The Alliance runs Science Media Fellowship in collaboration with Nature India. The selected fellows receive a sum of money as a support to publish or broadcast stories focussing on life sciences, biomedicine, application-based or basic biological research, and health. This fellowship was launched recently on National Science Day, 2019 and aims to boost the coverage of science in the Indian media and consequently enrich public understanding of and engagement with science and related policy issues. The fellowship is designed to support Indian journalists to build a body of science-based journalistic work. The

<sup>1922</sup> More details are available here: <https://www.indiaalliance.org/India-Research-Management-Initiative>

<sup>1923</sup> Details of these exciting initiatives is available here: <https://www.indiaalliance.org/public-engagement>

fellowship also connects them to experts in Science and Communication and teaches them the nuances and dynamics of impactful science reporting. In addition, the India Alliance also hosts and organizes regular workshops on Science Communication throughout the year. In order to make these workshops interactive, and focussed, they generally take a limited number of students for training. Some of their signature workshops include SciComm101 and 2 Days Sci-Communication workshops.

- **Science Innovation:** Just like Engagement, India Alliance has strong insistence on Science Innovation too. In order to increase the relevance of science for people and make them not just understand but also apply it in their day to day lives, the India Alliance undertakes multiple initiatives to highlight innovative science practices. India Alliance has collaborations with several civil society organizations where they fuse art and science to make it interesting and experiential for people. The Alliance supported an Art and Science Residency workshop organized by Khoj Studios New Delhi. The Residency brought together sketch artist, photographer, visual journalist, contemporary artists, designer with some of India Alliance Fellows and other STM practitioners. The participants along with their collaborators explored the intersecting fields of art, science, health and technology and developed novel connections between these areas.<sup>1924</sup> They have also been making use of more engaging mediums like photographs, videos, installations etc. to explain scientific concepts of Biomedical Research to the general public. These methods are very innovative and de-mystify science for the masses.
- **Gender Equality:** Several mandates of the India Alliance exhibit the quality of Gender sensitivity. Having acknowledged the gender challenges in the field of science, they promote and motivate the active participation of women scientists in the Alliance, in principle as well as in practice. Their policy of one-year full cost extension to Fellows on maternity leave during their fellowship term is a commendable lead in this regard.
- **Science Policy Advocacy:** Since the Indian side of the Alliance is The Department of Biotechnology, Government of India; the India Alliance has a major responsibility in undertaking policy advocacy in the field of BioSciences. A number of policy pushes are already being made by this alliance and it is changing the horizons of Biotechnology space in India by making it innovative and publicly accessible.
- **Community Based Research:** A number of the research supported by the India Alliance involves participation and betterment of traditional and indigenous communities. A number of health research projects have been implemented in rural parts of the country and have brought out results which have tremendously helped the communities in solving their issues. The knowledge generated is translated into action and practice and thus exhibits an RRI Like focus in operations.

<sup>1924</sup> [https://www.indiaalliance.org/uploads/files/Art%20&%20Science%20residency\\_write-up.pdf](https://www.indiaalliance.org/uploads/files/Art%20&%20Science%20residency_write-up.pdf)

- **Collaborations:** The India Alliance fosters interdisciplinary and collaborative science by promoting scientific endeavours which are cross cutting through themes and methods. They also promote international collaborations. A number of their initiatives exhibit cross country and cross discipline partnership and exhibit strong elements of RRI.

## Domain

The India Alliance fits into the Bioeconomy of the RRING Project.

## 5.4.3 PROJECTS IN AFRICAN STATES

### 5.4.3.1 EVAMAB

EVAMAB stands for “Economic valuation of ecosystem services in Man and Biosphere reserves: testing effective rapid assessment methods in selected African MABs”. It is a research project on the economic valuation of ecosystem services (ES) in African biosphere reserves.

MAB is short for UNESCO’s Man and the Biosphere Programme, an Intergovernmental Scientific Programme that aims to establish a scientific basis for the improvement of relationships between people and their environments. It combines the natural and social sciences, economics and education to improve human livelihoods and the equitable sharing of benefits, and to safeguard natural and managed ecosystems, thus promoting innovative approaches to economic development that are socially and culturally appropriate, and environmentally sustainable.

The EVAMAB project focuses on four biosphere reserves from four countries in Africa: Benin, Ethiopia, Tanzania, Uganda. The expected results are to contribute to the transition to green economy in Africa. The project started in January 2017 and goes until December 2019. It is financed in the framework of a Memorandum of Understanding between Belspo (Belgian Science Policy) and UNESCO to support research activities in Biosphere Reserves.

The general objective of the project is to further test and develop existing methods and tools for rapid assessment of ecosystem services and to perform evaluation of the economic value of ecosystem services in African biosphere reserves for a better appreciation of the potential for management and socio-economic integration, in order to better protect biosphere reserves for their biodiversity for future generations.

## Stakeholders

- local scientific institutes,
- government and local policy makers and managers,
- local populations,

- global donors and scientific community at large, and UNESCO-MAB in particular

## Sources

- <http://www.biodiv.be/evamab/>
- [Policy brief: Ecosystem services in Pendjari Biosphere Reserve \(Benin\)](#)
- [Presentation of EVAMAB at the AfriMAB Meeting, Nigeria \(September 2017, by Koen Vanderhaegen\)](#)
- [Poster: Critical evaluation of rapid ecosystem services assessment tools in African Man & Biosphere Reserves](#)
- [Article about EVAMAB workshop in Benin](#)

## Method

The project focuses on four biosphere reserves. Biosphere reserves are nominated under the “[Man and Biosphere Programme](#)” of UNESCO. They are “‘Science for Sustainability support sites’ – special places for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity”.

The project is organized around [four work packages](#)

- **Work package A:** Literature survey of rapid assessment methods and tools for ecosystem services related to MAB sites.
  - An in-depth literature survey of rapid assessment methods for carbon, water and biodiversity
  - Analysis of literature survey to explore the main frameworks, tools, methods and valuation metrics and proxies for ecosystem services (ES) or most pertinent information enabling to assess it.
  - Exploration of literature about MAB sites and especially AfriMAB to estimate the importance of certain ecosystem services for the local stakeholders.
- **Work package B:** Rapid assessment of ES in four selected MAB sites.
  - Rapid assessment tools test for application on four selected UNESCO-MAB sites.
  - Sites were chosen as a function of their representativeness for different ecosystems, biomes and relative weights of ecosystem services and stakeholders, as well as based on the track record of the consortium members to optimally capitalise on their expertise and existing networks and projects concerning these sites

- Work package is subdivided into the three clusters of assets analysed, being (B1) biodiversity and agro-biodiversity, (B2) hydrology, (B3) carbon storage. Sub-package B4 handles specifically on economic assessment of these asset clusters on the four sites.
- **Work package C:** Science-policy interface
  - Second round of multi-stakeholder workshops at the 4 sites to test results of WP B in order to validate them in the field
  - Validation phase through the application of the Delphi approach informed by international experts' opinions
  - Formulation of recommendations for managers, decision- and policy makers and community leaders (through multi-stakeholder workshops and other media such as radio, posters, social media)
  - Involvement of local governance of the BR, end users, decision makers as much as possible in order to:
    - scope as much diversity of opinion as possible,
    - inform in a capacity building mode as much target groups as possible and
    - raise awareness, ownership and active involvement of the process with key players, creating a 'critical mass' of informed stakeholders which add motivation to national authorities and international donors to take action in specific management and governance decisions of MAB areas.
- **Work package D:** Economic valuation of Ecosystem Services and guidelines for reward mechanisms.
  - Development of value transfer functions to support the rapid assessment of the four MAB sites
  - Willingness-to-pay data gathered in the rapid assessment and tested in the stakeholder workshops
  - Rapid assessment for the 4 sites using benefit transfer valuation
  - In-depth valuation using contingent valuation for Lake Tana to:
    - Assess the quality of the rapid approaches using slower, but higher quality methods through the VLIR IUC project in the Lake Tana site
    - Test the robustness and to complement the benefit transfer valuation
  - Application of WP D throughout the different phases of WPs B and C
  - Invitation of three experts in the field of ecological economics to complement the biological, ecological, biodiversity, hydrological and carbon stock expertise.

**What is RRI about the project**

The EVAMAB project contributes to the transition to green economy in Africa. Particularly, Work Package C has RRI characteristics. Capacity-building, public engagement and governance are all included throughout the project. Additionally, as this project is carried out in UNESCO biosphere reserves, the participation of women is always promoted as appropriate.

**Domain**

Bioeconomy.

**5.4.3.2 COMMUNITY BRIQUETTE PROJECT**

Solid waste management is one of the major challenges in many Sub-Saharan cities. At the time of the project, Nairobi generated over 2000 tonnes of solid waste daily of which only 40% was collected and disposed. Another major problem is inaccessibility of affordable cooking fuel and numerous studies have found that the majority of people depend on charcoal for cooking.

Soweto Youth in Action (SOYIA) youth group, in collaboration with Urban Harvest and Kenya Green Towns Partnership Association (Green Towns), developed an action research initiative on making fuel briquettes from urban solid waste generated from the neighbourhood and environs with the objective of generating income and providing employment while contributing to environmental management. More partners, such as TERRA NUOVA, the private sector and the University of Nairobi joined the over the course of the project to provide specified technical expertise. This action research project was the follow-up to a larger study on solid waste management carried out in 2003-2004 by Urban Harvest and partners where SOYIA youth group was one of the community-based organisations (CBOs) that played a key role to the success of that project.

The fuel briquette-making project was implemented from February 2007 to February 2008 at Kahawa Soweto village when a pilot briquette production pilot plant was established. Gender responsive diagnostic studies on sources of raw materials and market opportunities were carried out in the village and its environs. Training courses on governance including issues of leadership, conflict resolution and gender, project management with networking, advocacy and resource mobilization components including the technical side of fuel briquette production and marketing were conducted. During the training, gender responsive subcommittees on resource mobilization, production and sale and marketing were formed and developed the rules and regulations for governing their enterprise and a business plan using participatory methods. The fuel briquettes were made from common waste materials and their quality was evaluated in a participatory manner.

## Stakeholders

The project was carried out by local and national NGOs (SOYIA, Green Towns) in cooperation with the private sector, University of Nairobi and international NGOs (Urban Harvest, Terra Nuova). The main beneficiaries are civil society.

## Sources

- [Urban Harvest-CIP working paper](#)

## Method

The study objectives were to (i) develop innovative partnerships and a sustainable organization for fuel briquette enterprise development, (ii) establish opportunities for potential sources of raw materials and markets and (iii) evaluate quality of fuel briquettes produced by SOYIA and improve their skills.

A literature review was carried out on briquette production, utilization and marketing and this information contributed to the design of the baseline survey which was applied to 160 households and 99 institutions/business enterprises. The baseline survey aimed to gain an understanding of existing community-based waste management strategies, including reuse practices and to document types of cooking fuel used. The idea was to identify potential sources of raw materials as well as the potential market for the fuel briquettes made by SOYIA. The total sample of 160 randomly selected households was divided into forty households from each of four study locations. Ninety-nine questionnaires were administered to institutions and business enterprises that either produces sawdust, charcoal dust or wastepaper and or those that used wood charcoal for cooking within the study area.

An appropriate briquette making machine was identified through collaboration with TERRA NUOVA and a private equipment manufacturer. The Kahawa Soweto village was identified as an appropriate location for pilot testing this briquette machine, and the Soweto Youth in Action group (SOYIA) took leadership of the process, backstopped by an expert from Kenya Green Towns Partnership Association (Green Towns).

Community capacity building courses were provided to the SOYIA members on community organizational development and institutional strengthening (CODIS) and in briquette production and marketing using training modules developed by Greens Towns, Urban Harvest and TERRA NUOVA. SOYIA youth group constructed the briquette making shed and a store, sourced raw materials and produced the briquettes.

The 4 Department of Chemistry, University of Nairobi, carried out the characterization of the different types of briquettes compared to wood charcoal for calorific value, ash content, moisture content and smoke. Members of the Kahawa Soweto community, including students, were involved in participatory evaluation and demonstrations of the cooking quality of the briquettes. The parameters recorded were: time taken to light; amount of smoke produced;

flame characteristics; length of time taken to cook the meal; and length of time taken for the briquettes to burn completely into ashes. Some other types of briquettes were compared with wood charcoal.

A market survey was conducted with 50 respondents comprised of 26 males and 24 females who were customers at supermarkets and charcoal trading places in an attempt to generate information on potential market opportunities. Information was collected on preferred packaging units, preferred market outlets and consumers' willingness to pay. Another short survey was conducted using a random sample of 10 charcoal dealers in Kahawa Soweto village to establish their willingness to incorporate fuel briquettes as a commodity in their business. Two supermarket managers were also interviewed about potential outlets for sale of the briquettes.

Enumerators, some of whom were from SOYIA youth group with secondary school education, were trained and exposed to a pre-testing exercise. Quality control of the filled questionnaires was carried out by the University of Nairobi and data entry and analysis was handled by Urban Harvest. Data collected from the survey and laboratory analysis was analysed using software called Statistical Package for Social Scientists (SPSS).

### **What is RRI about the project**

The project included aspects of gender equality, science education and public engagement

Application of participatory approach to the entire project cycle meant that members of SOYIA youth group were involved in all the activities of the project such as project designing, planning and management, awareness raising, baseline surveys, testing of the cooking qualities of the briquettes and demonstration. The group was able to link to other organizations to access expertise and advice in various components of the project when need arose.

Paying attention to gender needs was noted to be integral part of the process to succeed in adapting high-cost briquette making technology to local conditions. SOYIA itself applies a gender responsive governance structure. Additionally, the Energy Briquette Making Pilot Structure aimed to achieve gender equality throughout its implementation of the project (one example is that a metal press was designed to be more gender friendly, making it easier for women to use).

A Technical Training in Briquette Production and Marketing introduced the concepts of environmental conservation and management and the need for recycling appropriate waste materials as sources of energy.

Several stakeholders (civil society, private sector) were involved in the process.

### **Domain**

Waste management, energy, Bioeconomy

**Any other remarks**

The project is from 10 years ago, though I still found it interesting as it incorporates a lot of RRI characteristics.

**5.4.3.3 STEM AND GENDER ADVANCEMENT (SAGA)**

The SAGA project aims to contribute to improving the situation of women and reducing the gender gap in science, technology, engineering and mathematics (STEM) fields in all countries at all levels of education and research. To achieve these objectives, it determines, measures and assesses sex-disaggregated data, as well as supports the design and implementation of science, technology and innovation (STI) policy instruments that affect gender equality in STEM. Moreover, SAGA aims to analyse how policies affect the gender balance in STEM, undertake inventories of STI gender equality policies, develop new and better indicators to provide tools for evidence-based policymaking, build capacity in Member States for data collection on gender in STEM, and prepare methodological documents to support the collection of statistics.

**Stakeholders**

- RPOs
- RFOs
- civil society
- policy makers
- national and international bodies
- researchers

**Sources**

- [SAGA Science, Technology and Innovation Gender Objectives List \(SAGA STI GOL\)](#) (pdf)  
*Working paper 1*
- [Measuring Gender Equality in Science and Engineering: the SAGA Toolkit](#) (pdf)  
*Working paper 2*
- [Measuring Gender Equality in Science and Engineering: SAGA survey of gender equality in STI policies and instruments](#) (pdf)  
*Working paper 3*
- [Measuring Gender Equality in Science and Engineering: The SAGA survey of drivers and barriers to careers in science and engineering](#) (pdf)  
*Working paper 4*

- [Telling SAGA: Improving measurement and policies for gender equality in science, technology and innovation](#) (pdf)  
*Working paper 5*

## Outputs/deliverables generated

**Working papers series published:** A methodological approach and tools to support policymakers worldwide in setting up, implementing and monitoring gender equality in STI policies were developed and were published in five working papers as part of the SAGA Measuring Gender Equality in Science and Engineering Working Paper series. These papers are:

- **Working Paper 1:** The *SAGA Science, Technology and Innovation Gender Objectives List* (STI GOL) was launched in June 2016 and provides a holistic approach to support policymakers worldwide in setting up, implementing and monitoring gender equality policies in STI. It constitutes the framework around which all SAGA tools are grounded and provides a complete overview of all aspects of gender equality in STI.

The STI GOL is based on seven different areas of objectives or policy impacts:

1. Change perceptions, attitudes, behaviours, social norms and stereotypes towards women in STEM in society
2. Engage girls and young women in STEM primary and secondary education, as well as in technical and vocational education and training
3. Attraction, access to and retention of women in STEM higher education at all levels
4. Gender equality in career progression for scientists and engineers (S&E)
5. Promote the gender dimension in research content, practice and agendas
6. Promote gender equality in STEM-related policymaking
7. Promote gender equality in science and technology-based entrepreneurship and innovation activities

Each of the seven gender objectives are broken down into sub-objectives for more in-depth coverage of policies. In order to assess the achievement of each objective, corresponding indicators are suggested in the SAGA Indicators Matrix, found in the SAGA Toolkit (Working Paper 2).

- **Working Paper 2:** The *SAGA Toolkit* was launched during the World Science Forum in Jordan in November 2017 and builds upon the SAGA STI GOL (Working Paper 1). It contains tools for the implementation of the SAGA methodology at the country or institutional levels. It sets out a conceptual and methodological framework and provides a series of tools to integrate, monitor and evaluate gender equality in STEM. It also assists in the design of gender-sensitive and evidence-informed policies to strengthen the gender policy agenda. It also proposes various data sources, which can be used in

the assessment of gender equality in STEM. The SAGA Toolkit introduces two surveys developed by the SAGA team: the SAGA Survey of Gender Equality in STI Policies and Instruments (Working Paper 3), and the SAGA Survey of Drivers and Barriers to Careers in Science and Engineering (Working Paper 4). It is currently published in two official United Nations languages: English and French.

- **Working Paper 3:** *The SAGA Survey of Gender Equality in STI Policies and Instruments* (STI Policy Survey) is a tool to gather information from national institutions, agencies and universities, on gender equality among STI policies and instruments. It is a valuable instrument to review and plan for the development of national STI policies or plans to support country's strategic initiatives.
- **Working Paper 4:** the *SAGA Survey of Drivers and Barriers to Careers in Science and Engineering* (D&B Survey) addresses the lack of knowledge on the leading factors of women's participation in S&E through a questionnaire on the drivers and barriers to S&E careers. The access to adequate information will serve as evidence for policymakers to assess and adjust policies and programmes to promote equal participation of men and women in S&E careers. The D&B Survey consists of modules users can select based on their priorities and needs.
- **Working Paper 5:** *Telling SAGA: Improving Measurement and Policies for Gender Equality in Science, Technology and Innovation* illustrates the current situation of women in science at the global scale. It also includes chapters on the work of UNESCO to bridge the existing gaps in gender equality in STI, the benefits of reducing gaps, and how it can be accomplished using the SAGA methodology and tools. It also gives an overview of the outcomes of the implementation of the project in all the pilot countries.

*Overall assessment:* The SAGA methodology is an in-depth series of documents which has been revised by international experts in STI and gender and presents outcomes from the various SAGA pilot countries. It is currently used by all pilot countries and several other international organizations, such as the Inter-American Development Bank through the project Gender Gaps in Science, Technology and Innovation in Latin America and the Caribbean countries and ISCU's project "Global Approach to the Gender Gap in Mathematical, Computing, and Natural Sciences. How to Measure It, How to Reduce It?"

The working papers are among the most downloaded UNESCO publications; As of November 2018, the series has been downloaded over 10,000 times in more than 120 countries. More than 600 hard copies of the publication have been distributed during international conferences, UN and UNESCO events. At least 200 press articles referenced SAGA and the working papers series.

**What is RRI about the project**

This project has a strong focus on gender equality in STEM but there are also components of science education, open access and governance. It has been implemented in 9 countries, including in Africa and SIDS. Furthermore, two sub-regional workshops were conducted in West Africa with 8 further participating countries as well as in the Arab States (in Jordan, where 11 countries participated).

**Domain**

Not necessarily linked to any of the four domains but could be relevant for RRI in general.

**5.4.3.4 THE AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES (AIMS)**

The African Institute for Mathematical Sciences (AIMS) is Africa's first network of centres of excellence in mathematical sciences. This organization enables the continent's youth to shape the continent's future through Science, Technology, Engineering and Maths (STEM) education- training Africa's next generation of leaders. AIMS South Africa is one of the centres of excellence for training, research and public engagement in Cape Town, South Africa. AIMS South Africa was established in 2003 as a partnership project of the following 6 universities: Cambridge, Cape Town, Oxford, Paris Sud XI, Stellenbosch, and Western Cape. AIMS is a call to action to:

- Empower Africa's youth to shape its future
- Solve global challenges
- Drive economic self-sufficiency

AIMS is incubating mathematical sciences to address global challenges. It offers a structured Master's in mathematical sciences and is focused on scientific training, cutting- edge research and public engagement. The first AIMS centre opened in Cape Town, South Africa in 2003. Since then, through the AIMS Next Einstein Initiative (AIMS-NEI), AIMS centres have opened in Sénégal (2011), Ghana (2012), Cameroon (2013), Tanzania (2014) and Rwanda (2016). AIMS also has centres in North America (Canada), Europe (UK and Germany). But AIMS Research Centres are only located in three African countries. The goal is to have 15 AIMS centres of excellence in operation across Africa by 2023.

**Stakeholders**

AIMS works in collaboration with outstanding researchers and RPOs (Research Performing Organizations). AIMS students and alumni are also given the opportunity to interact with researchers through research projects, post-AIMS bursaries and research-related workshops.

Each AIMS research centre develops areas of specialization in collaboration with local government and university partners. These research agendas advance local capabilities and opportunities.

AIMS research centres are dynamic environments where visiting and staff scientists thrive, and where young scientists find exciting opportunities as they learn to become critical thinkers.

Researchers work in close collaboration with local universities and other research institutions to build pan-African networks and partnerships. AIMS also collaborates with industry partners to ensure relevance and application of research advances.

### Sources Websites:

<https://aims.ac.za/> <https://www.nexteinstein.org/research/?lang=en> Method

AIMS runs its projects using these methods.

- Action Research
- Participatory Action Research
- Participatory Research & Innovation
- Scientific Culture
- Public consultation
- Science dialogue
- Technology dialogue
- (Upstream) public engagement
- Science communication
- Sustainable development

### Project selection

The goals of AIMS are:

- To promote mathematics and science in Africa.
- To recruit and train talented students and teachers; and
- To build capacity for African initiatives in education, research, and technology.

### What is RRI about the project?

Some of the activities at AIMS include:

**TRAINING:** AIMS South Africa provides a one-year structured master's program in Mathematical Sciences that is enabling a critical mass of African academics, researchers and entrepreneurs on the cutting-edge of science, technology, engineering and mathematics (STEM). There are intakes in August and January. AIMS South Africa also offers specialised

courses as part of regular honours and master's degree programs at South African universities. AIMS South Africa hosts research and training workshops.

**RESEARCH:** The AIMS South Africa Research Centre was launched in 2008 and its mission is to conduct and foster outstanding research and learning in the mathematical sciences thus contributing to the next generation of pan-African leaders in many spheres and the advancement of African science and academia within a multicultural environment.

**PUBLIC ENGAGEMENT:** AIMS South Africa through the AIMS Schools Enrichment Centre (AIMSSEC) is building the capacity of Africa's teachers through training programs to increase the pipeline of math and science students. AIMS South Africa hosts and participates in events and exhibitions to promote mathematical sciences in general. AIMS South Africa also has a public lecture series.

Among these listed above, AIMS fulfils the learning outcomes listed in RRI, which are engaged publics, responsible actors and responsible institutions. All these actors play a responsible role in empowering societies, also, these create opportunities and support, ensuring the sustainability of the organization and various projects. Aims engages all actors at all levels of their projects. AIMS Research Centers also pay careful attention to the Diversity and Inclusion clause. The researchers and various actors are sensitive to research biases and include diverse voices, one way they do this is by ensuring gender equality, diverse racial representation and diverse class representation, thus levelling the playing fields, enabling diverse people the opportunity to participate and be involved and thus making results which are beneficial to the wide community. This is a case whereby Africa is taking charge and is playing an active role in solving its own problems. AIMS came about as a response to the call to empower Africa's youth to shape its future, solve global challenges and Drive economic self-sufficiency, thus, the clause Responsiveness and Adaptive Change fits perfectly with their objectives as the organisation is responsive to changes and external inputs, adapting research plans to changing social values and expectations.

The main Domain for the AIMS Research Centre is Science Education. AIMS places a strong on cutting-edge topics which are most relevant to African development, especially in fields where scientists in Africa have a competitive advantage and can do world-leading research. Focusing on enhancement of the current education processes to better equip citizens with the necessary knowledge and skills to participate in R&I debates, and thus increase the number of researchers.

The second domain is Public Engagement. Some of the main features of the AIMS Research Centre are:

- Close involvement with local universities and other research institutions thus widening the pool of available expertise and serving to initiate long-term research programmes in the local academic community
- Collaboration with institutions all over Africa to ensure strong pan-African participation in all the Research Centre's programmes, stimulating the growth of pan-African research networks and partnerships

- Participation of top international researchers and institutions keen to work with African academics and students on cutting edge projects
  - Close ties with industry by running programmes associated with particular industrial needs, assisting in capacity building and collaboration on innovative projects

This fosters R&I processes that are collaborative and multi actor, all these societal actors work together during the whole process in order to align its outcomes to the values, needs and expectations of society.

Through the various collaborations with different actors and stakeholders, the organisation/project also covers aspects of the Domain Open Access because through these collaborations issues of accessibility to and ownership of scientific information is addresses, this then could result in the improvement in the quality of scientific research and thus facilitate in fast innovation, constructive collaborations among peers and productive dialogue with civil society.

## **Domain**

Multi-domain; including energy, ICT and others.

### **5.4.3.5 TEACHER EDUCATION IN SUB-SAHARAN AFRICA (TESSA)**

TESSA is a network of teachers and teacher educators stretching across Sub-Saharan Africa. At the heart of the network is a bank of open educational resources (OER), linked to the school curriculum, and designed to support teachers and teacher educators in developing active approaches to learning. The network is coordinated by The Open University, UK.

This is a collaborative network to help teachers and educators improve in their work. This is done by providing quality resources that support the educator's national curriculum and also helps teachers and educators plan lessons that engage, involve and inspire.

TESSA's large bank of materials is available to enhance and improve the quality of and access to local school-based education and training for teachers. This is to ensure that teachers and teacher educators use these resources. If they do, their teaching will be more interactive; children will enjoy school more; children will learn more; and pre-service teachers will experience the sort of approaches they are being encouraged to adopt. These materials are Open Educational Resources (OERs), have been produced in partnership with local African educational experts. They are free to everyone to use and adapt, under a creative commons license. They are being used by communities located in individual schools and by institutions with a national reach.

The TESSA units have been adapted to ten country contexts and are available in four different languages on the TESSA website: Arabic, English, French and Kiswahili. In addition, these

materials are also available in generic versions in English and French, so are applicable to all individuals, regardless of wherever they are based in sub-Saharan Africa.

All TESSA units contain a series of activities that teachers can carry out in their classrooms. They are not an intervention; they are designed to be used flexibly according to local needs. Handbooks for teachers and teacher educators help them to integrate and make effective use of the resources in their classrooms and in their courses.

TESSA materials can be used by any teacher or teacher educator. They are often integrated into pre-service teacher training programmes or to enhance and strengthen them, or into Government training programmes. They are also used independently by practicing teachers to help develop an individual teacher's professional skills and enliven their lessons.

## Stakeholders

TESSA is a civil society which manifests interests and will of citizens in Sub-Saharan Africa, particularly in the advancement of education, with the aims of making teacher education relevant in the 21st century. This organization functions independently of government, and rather forms partnerships with different stakeholders in the education sector across the different countries. The Teacher Education in Sub-Saharan Africa (TESSA) consortium is working within institutional and national policy systems to support school-based teacher professional development.

## Sources

The sources used to learn about the TESSA project are:

- The TESSA website<sup>1925</sup>.
- Journal article:
  - Thakrar J, Zinn D, Wolfenden F (2009), 'Harnessing open educational resources to the challenges of teacher education in sub-Saharan Africa', *International Review of Research in Open and Distance Learning*, 10 (4): 15. DOI: <http://dx.doi.org/10.19173/irrodl.v10i4.705>
- Formative Evaluation Report:
  - Professor Harley K, Professor Barasa FS (2012), 'TEACHER EDUCATION IN SUB- SAHARAN AFRICA', Accessed from: [http://www.tessafrica.net/sites/www.tessafrica.net/files/TESSA\\_Formative\\_Evaluation\\_Report\\_October\\_2012.pdf](http://www.tessafrica.net/sites/www.tessafrica.net/files/TESSA_Formative_Evaluation_Report_October_2012.pdf)

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<sup>1925</sup> <http://www.tessafrica.net/>

## Method

The TESSA project is conducted through incorporating these methods:

- Service Learning
- Social Communication
- Public consultation
- (Upstream) public engagement
- Public participation
- Sustainable development

## What is RRI about the project?

This project engages various actors, namely, educators, civil society organizations, institutions and government through the integration of their policy systems to support school- based teacher professional development. The objectives and functions of this organisation align with the values, needs and expectations of the wide public, particularly in the education sector. Education being the most important basis for any society's advancement and development. The organisation further aims to create inclusive, innovative and reflective societies, which is actually included ad one of the Grand Challenges, as formulated by the EU, thus ensuring a solid education structure, thus empowering the people and equipping them to be better role players in their lives and the wider communities.

TESSA provides an opportunity and a much-needed service or product which is very much socially desirable, as it benefits everyone in the society. This project fulfils the learning outcomes indicated by RRI, which is Engaged publics, Responsible actors and Responsible institutions. TESSA leads to empowered and responsible actors and stakeholders, as well as the beneficiaries. It also creates opportunities for the educators and various stakeholders to interact with each another, thus developing and supporting each other across the different institutions in which they are based, this then ensures a solid and continuous reality with positive impact in our societies and the wider public.

The main domain in which TESSA functions is Education, which includes Science Education. The main focus is on enhancing the current education process to better equip citizens with the necessary knowledge and skills so they can participate in R&I debates and thus increase the number of researchers and empowered individuals who are equipped with the knowledge and skills to play a more positive and active role in the world.

The other domain is Public Engagement. TESSA engages with various actors across different levels, that is, educators, Educational institutions, policy makers, etc. this ensures that various societal actors work together during the whole process in order to align to the outcomes to the values, needs and expectations of the society. This inclusivity also ensures that the project remains sustainable.

Gender Equality is also one of the domains which the TESSA project incorporates. There is on specific project which currently runs in Sierra Leone, which is titled, Sierra Leone Improving Girls' Learning Outcomes. The Improving Girls' Learning Outcomes project aims to break the cycle by improving learning outcomes for girls, particularly those in upper primary/ lower secondary classes, and creating new role models for girls. This was done to motivate and encourage more girl children to improve their marks, and introduce them to the teaching profession, which in the country, is a profession that is lacking female teachers and thus resulted in the younger girls not believing they also can be in that profession. So, this project ran as an Education Awareness, which ensured more and more girls get into teaching professions in the country.

### **Domain**

Other

### **Other remarks**

This project possesses many characteristics which are RRI like, hence the selection

### **5.4.3.6 TRUST**

'TRUST' (short for: creating and enhancing TRUSTworthy, responsible and equitable partnerships in international research), the three-year project aims to foster adherence to high ethical standards in research globally and to counteract the practice of 'ethics dumping' or the application of double standards in research. This project has been running since October 2015. The Bio-economy team has been part of a global consortium working towards achieving equity in international research. It plans to do this by developing tools and mechanisms for the improvement of research governance structures.

It combines long-standing, highly respected efforts to build international governance structures with network opportunities in Europe, India, Sub-Saharan Africa, China and Russia.

The project is funded by the European Union's Horizon2020 research and innovation programme under grant agreement No 664771.

### **Stakeholders**

TRUST is an interdisciplinary collaboration between the following stakeholders from a range of disciplines, namely.

- multi-level ethics bodies,
- policy advisors/makers,
- civil society organisations,

- funding organisations,
- industry and
- academic scholars

## Sources

- Web-pages: <http://bio-economy.org.za/projects/trust/>

## Method

- Action Research
- Social Communication
- Social Innovation
- Community Based Research
- Public consultation
- Public involvement
- Science communication
- Sustainable development
- ELSI (Ethical, Legal and Social Implications of science)

## What is RRI about the project?

The TRUST Project is a contribution of cases of ethics dumping in agricultural research brought together by the Bio-economy team; therefore, the main RRI like characteristics of this project is the focus on ethics and integrity in research and innovation, especially in the domain of Bio- economy. Listed below are the TRUST objectives and they indicate the exact ways the project aims to tackle this RRI pillar. The TRUST objectives are.

- Create an international network on global research ethics governance with relevant key actors to identify generic risks of exporting non-ethical practices.
- Identify paradigmatic case studies of exporting non-ethical practices and report on lessons learnt.
- Develop a global code of conduct that can be used by the European Commission and funders world-wide to foster ethical research and equitable partnerships.
- Develop a tool that gives power to vulnerable populations under non-ideal conditions (fair research contract).
- Develop a compliance and ethics follow-up tool for conditions of high vulnerability.
- Develop a strategy for fostering the convergence of global ethical research governance to improve adherence to high ethical standards in the longer term.

The guiding vision of the TRUST project also states the aims to collaborate with international researchers and the market in the quest to promote ethical behaviour, as well as promote responsible research and innovation in all collaborations

## Domain

Bio-economy

## 5.4.4 PROJECTS IN LATIN AMERICA AND CARIBBEAN STATES

### 5.4.4.1 SCIELO PROJECT

SciELO (Scientific Electronic Library Online) is a cooperative electronic publishing database and an advanced Latin American-designed model of open access journals. The platform is the first international database to offer full texts in open access without any restrictions (Packer et al. 2014). This pioneering platform allows multidisciplinary and multilingual publications independently managed either by scientific societies or academic institutions, with the rare presence of commercial publishers. SciELO is an innovation addressing the limited access to publish and to published academic material in the Global South. The need for inclusive open access platforms on research and innovation is indisputably valid. Established in Brazil in 1997, the digital library was specially conceived to meet the scientific communication needs of developing countries (Packer 2000). Regarding access to scientific and technical information, there is no differentiation between developed and developing countries, both follow the pathway of scientific journals publication. However, structural dissemination barriers limit the extent to which scientific journals from developing countries contribute to knowledge production, by limiting the access to research and innovation produced locally at the cost of US-Europe mainstream publication flows. Given the above, Gibbs (1995) coined the term ‘lost science’, making reference to the inaccessible scientific production of ‘developing’ or ‘emerging’ nations, and subsequent lack of communication between scientists of both South-South and North-South communities. It is within this context that SciELO has established an over 20 years-old solid and pioneering practice of scientific dissemination. Table 1 summarizes the currently SciELO’s figures:

*Table 16: SciELO in numbers*

SciELO in numbers <sup>1926</sup>	
<b>Active journals</b>	1.285
<b>Issues</b>	52.356
<b>Published articles</b>	745.182

<sup>1926</sup> Retrieved from: <http://www.scielo.org/php/index.php>

<b>Citations</b>	16.943.454
<b>Countries</b>	15

## Goals and Structure

Although initially aimed at increasing the visibility of Brazilian knowledge production and constructing an evaluation database of domestic scientific work, SciELO has throughout its more than 20 years expanded not only its network but also its goals. Even though the challenge of overcoming publication barriers is still present, on the task of fostering scientific dialogue and meeting scientific communication needs of developing countries, it's fair to argue that SciELO has contributed to pushing forward inclusive and innovative practices on research, increasing visibility and access to global-South scientific literature.

Meneghini (2003) points out that SciELO's methodology is being adopted by open-source initiatives in a variety of countries. However, SciELO's current network structure is not limited to Latin America. The initiative started by two Brazilian RFOs - [São Paulo Research Foundation](#) (FAPESP) and the [National Council for Scientific and Technological Development](#) (CNPq) - along with the [Latin American and Caribbean Center on Health Sciences Information](#) and has evolved into a cross-continental scientific community of 15 countries, including European and African countries (Table 2). Mantell (2002) points out that networks like SciELO goes beyond promoting visibility on a regional scale and generates international impact. Unsurprisingly, such network expansion seems to have fulfilled the scope of scientific dissemination and non-mainstream or English language-based publication flows, by unlocking a remarkable 'unknown' flux of information among the scientific community.

*Table 17: List of countries with journal collections within SciELO's network by continent*

<b>List of countries with journal collections within SciELO's network by continent</b> <sup>1927</sup>	
<b>Latin America</b>	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Mexico, Paraguay, Peru, Uruguay, and Venezuela
<b>Europe</b>	Portugal and Spain
<b>Africa</b>	South Africa

SciELO is structured under the same format regardless of the country. First, SciELO establishes one SciELO National Collection and one National Coordinating agency per country. All National Collections throughout SciELO network are related to a local RFO and must maintain a formal relationship with SciELO Brazil, which is the entity responsible for the maintenance of the methodologies and the technologies of SciELO's Network (Packer et al. 2014).

<sup>1927</sup> Retrieved by: [SciELO website](#)

## Stakeholders

SciELO main focus is on open data access to academic knowledge. The project comprises an inclusive platform in which a wide range of stakeholders can freely make use of technical and scientific material. Key stakeholders are:

- Researchers are the main beneficiaries but civil society organizations, policy makers, and NGO's have also free access to its content.
- RFOs ([FAPESP](#), [CNPq](#), [BIREME](#)) as major financial supporters of this initiative
- Universities as providers of content as most of the journals and book publishers are held by public universities

## Sources

- Published papers
  - Packer, A., et al., eds. SciELO – 15 Years of Open Access: an analytic study of Open Access and scholarly communication. Paris: UNESCO, 2014, 186 p. ISBN 978-92-3001-237-3. Available from: <http://dx.doi.org/10.7476/9789230012373>
  - Gibbs, W. W. Lost science in the Third World. *Science*, 1995, 2. (273), 76-83.
  - Mantell, K. Electronic network bolsters Southern science. *SciDev.Net* [online]. Jan 2002 [viewed 20 April 2002]. Available from: <http://www.scidev.net/global/capacity-building/news/electronic-network-bolsters-southern-science.html>
  - Packer, A. (October 2000). "[SciELO - a Model for Cooperative Electronic Publishing in Developing Countries](#)". *D-Lib Magazine*. Vol. 6 no. 10. ISSN 1082-9873
- These publications have been crucial to review SciELO's open access development and practices throughout its trajectory. First, Gibbs (1995) highlights an overall perception of 'academic periphery' across research centres outside English-speaking countries. Second, Packer (2014) reflects on the fact that this same 'isolation', ultimately, has been one of the main factors that motivated SciELO's initiative. Once the language barrier obstacle has been foreseen as a permanent element, one could argue that RRI elements of anticipation could be noticed. Furthermore, once SciELO's network has now evolved to include three continents and numerous countries, there is indeed a strong case for the RRI inclusiveness dimension.
- Blogs & social media
  - <https://twitter.com/RedeSciELO>
  - <https://blog.scielo.org/>
  - <https://www.facebook.com/SciELONetwork/>
- Open access social network to engage broader civil society and researchers in discussion on, dissemination and feedback for improvement of the platform.

## Method

SciELO's methodology is mainly based on open access publication platform (<http://www.scielo.org/php/index.php>), a blog for discussion on academic publishing in the South (<https://blog.scielo.org/en/#.XBztILB7nt4>), and a twitter to communicate with registered members. Furthermore, SciELO also includes scientific diffusion magazines such as [Science & Culture](#), [With Science](#), [Revista Pesquisa FAPESP](#). This combination explicitly fosters science and social dialogue, communication and innovation. A participatory perspective and elements of ELSI (Ethical, Legal and Social Implications of science) are also present within the project, being not only a key tool to the expansion of the SciELO network but also contributing on taking the initiative impact beyond the regional level. However, the centralized role played by SciELO's Brazil regarding project's normative, maintenance and updates, although logistic and historically sound, has the potential to limit the scope of the project.

## What is RRI about the project

SciELO's project are closely connected to RRI four dimensions of inclusion, anticipation, reflexivity, and responsiveness as described by Stilgoe et al. (2013). First, its inclusive nature can be described by the way how SciELO links up different scientific communities and bridges knowledge production across different platforms. Second, the project is a pioneer in its field and promotes not only a critical reflection and analysis of the State of Art of scientific communication but also on Southern academic perspectives. Third, the ethical concern present at SciELO is a key link between an overarching bridging practice amongst different scientific communities and quality. SciELO counts with a unified ethical [guideline](#) applied to all publications within the platform. At last, but not least, by overcoming scientific journals dissemination barriers, opening up unknown fluxes of knowledge-exchange amongst scientists and civil society, and positioning research literature as a *public good* (Vessuri et. al 2013), SciELO does not only fits into the RRI model but can also provide experience-based lessons and practices to the European RRI approach.

## Domain

SciELO is strongly related to ICT. In addition to its innovative character as the first international open access platform to provide full texts with no pay-walls or any kind of restriction, the project has public engagement and ethics at the core of its structure. In the light of public engagement, SciELO offers a wide range of online available tools such as scientific magazines (e.g. [Science & Culture](#), [With Science](#), [Revista Pesquisa FAPESP](#)) and bibliometric indicators by categories of [publication](#), [collection](#) and [citation](#). Additionally, users can also filter and access reports on the origin, topics, date and field of science of all material that is published by SciELO. Furthermore, in the realm of ethical concerns, SciELO make use of a uniform guideline on best practices aimed at strengthening ethics in a scientific publication that is applied to all publications within the open access platform. The SciELO guideline on ethics

([link](#)) follows mixed international and national ethical standards such as [COPE](#), [CSE](#), [Equator Network](#), [ICMJE](#), [CNPq](#), [FAPESP](#).

### Any other remarks

Although this “good practice” in LAC countries can be an important lesson for Europe, it is important to take into account the different context in both regions. Reliance on governmental RFOs and academic publishing mainly held by public universities are the two pillars of SciELO. This context is quite different in Europe where private publishers are controlled by private companies and support to open access platforms are still in its infancy. Ironically, while academic knowledge generated by the Southern scholars are made freely available, the struggle to make knowledge generated by the Northern scholars is still in place. This structural problem only adds to the North-South inequality in access to academic knowledge.

#### 5.4.4.2 URSULA

The Union of Latin American for University Social Responsibility (URSULA) is a network of academic education actors engaged in deep discussion about the role of the university in society, and a space for development of good practices and innovative and sustainable management models. Founded in 2016, URSULA follows a trend in the region where University Social Responsibility (USR) has evolved become a key agenda in LAC universities in order to bring the research and higher education closer to help solve societal challenges. As described in their mission letter, USR addresses “student massification; educational quality; regional and global internationalization; social inclusion; financing and commodification of higher education; ethical challenges of globalization and unsustainability of current development; technological innovations and changes in cultural patterns; social and environmental risks induced by scientific activity; ecological transition of the economy; etc.” In particular, URSULA aims at moving beyond ‘University Outreach Programs’ and develop better inter-institutional and international coordination, broad coverage and territorial resonance, and positively impacting and transforming higher education in order to achieve truly sustainable human development.

URSULA’s main goal is to develop a common agenda and shared vision on University Social Responsibility among the LAC countries based on a network that promotes university self-reflection in open spaces of mutual learning for the continuous improvement of the institution's ethical performance and its solidarity with its territory, respecting the necessarily pluralistic and autonomous approaches of each institution, knowing the specificity of its own context. In this vein, the network addresses university governance issues, both at the institutional level and everyday practices in order to more effectively address contextual societal challenges. The network encompasses 128 universities of 12 LAC countries with more 20 universities currently in process to be included. URSULA members must collaborate in joint proposed activities respecting the differences but seeking consensus and innovations, in a spirit of transparency,

generosity and solidarity; produce and disseminate knowledge and practices of RSU in an open and collaborative way, between URSULA members and beyond; and to produce an annual report on the initiatives and results achieved with respect to the RSU and disseminate it among the URSULA members.

## Stakeholders

URSULA members include Latin American RPOs, public or private, officially recognized by its competent national authorities, as well as university networks, associations and observatories, or institutions dedicated mainly to higher education or social responsibility (research centres, think tanks, NGOs), and individual researchers. Finally, URSULA is supported by a few RPOs and RFOs.

RPOs and researchers: Currently URSULA comprises of 128 members; however, 80% of the members are from four LAC countries - Peru, Mexico, Argentina and Colombia. It is unclear how many individual researchers are member of the network.

In addition, four RPOs are part of the key institutional support of the network:

- Centro de Liderazgo, Etica y Responsabilidad Social (CLERS), Universidad del Pacifico, Peru - <http://www.up.edu.pe/>
- UTEM – Universidad Tecnologica Metropolitana, Chile - <http://www.utem.cl/>
- Uniminuto, Colombia - <http://www.uniminuto.edu/>
- Universidad Cooperativa de Colombia - <https://www.ucc.edu.co/Paginas/inicio.aspx>

These organizations give institutional support to the network such as administration and organization of events

URSULA is supported by a few other organizations:

- CAF – Banco de Desarrollo de America Latina – <https://www.caf.com/es/temas/i/innovacion-social/>
- CLERS - <https://www.up.edu.pe/investigacion-centros/centros-up/centro-liderazgo-etica-responsabilidad-social-clers/Paginas/default.aspx>
- ERF – The Education Relief Foundation - <http://www.educationrelief.org/index.php/en/>
- Funacion Avina - <http://www.avina.net/avina/>
- AUSJAL - Asociacion de Universidades confiadas a la Compania de Jesus en America Latina <http://www.ausjal.org/menu-superior.html>
- OMERSU – Observatorio Mexicano de Responsabilidad Social Universitaria
- Barefoot College - <https://www.barefootcollege.org/>
- CLAYSS – Centro Latinoamericano de Aprendizaje y Servicio Solidario - <http://www.clayss.org/>

These organizations collaborate in URSULA initiatives through financial support,

## Sources

- Videos
  - Several videos on URS <http://unionursula.org/videos/>
  - Por qué la Responsabilidad Social Universitaria no es Extensión Social
  - <https://www.youtube.com/watch?v=OZ38uf47QR4>
  - Videos address various aspects of University Social Responsibility related to gender, social inclusion, ethics, education and governance.
- Literature
  - Several articles on URS in LAC: <http://unionursula.org/bibliografia-especializada/>
  - Vallaeys, F. 2016. Introduccion a la Responsabilidad Social Universitaria. Ediciones Universidad Simon Bolivar, Barranquilla, Colombia  
<http://unionursula.org/wp-content/uploads/2016/11/Libro-introduccion-a-la-rsu-francois-vallaeys.pdf>
  - Fernandez, I.A. et al. 2015. Experiencias Iberoamericanas en Responsabilidad Social Universitaria. Medellin, Fuulam. 472pp.  
[https://www.fundacionamigo.org/wp-content/uploads/2016/04/books\\_gratis-Experiencias-iberoamericanas-en-responsabilidad.pdf](https://www.fundacionamigo.org/wp-content/uploads/2016/04/books_gratis-Experiencias-iberoamericanas-en-responsabilidad.pdf)
  - Book on conceptual debate, methods and actions to measure, foment and govern University Social Responsibility in Latin America, to promote USR in the region
- Presentations
  - Preliminary results: State of the Art on RSU in Latin America by Francois Vallaeys and David Solano, 28/09/18 <http://unionursula.org/wp-content/uploads/2018/10/presentacion-primeros-resultados-investigacion-continental-rsu-2018.pdf>
  - Analysis of the state of the art of USR in Latin America based on a framework including: governance, cognition, training and inclusion. The preliminary results revealed the need to incorporate the following issues: gender, indicators of impact, empowerment, and interculturality.
- Conference Programs
  - First Forum URSULA - <http://unionursula.org/en-la-utem-se-desarrollo-el-foro-latinoamericano-de-innovacion-social-y-responsabilidad-social-universitaria/>
  - Second Forum URSULA – <http://unionursula.org/2do-foro-ursula-2017/>
  - Third Forum URSULA - <http://unionursula.org/3er-foro-ursula-2018/>

- The Conference program focused on the discussion on the social role of the university in responding to societal demands, locally and nationally, through training, action and governance

## Methods

URSULA organizes four key initiatives:

- 1) Database: URSULA's site includes a database of over 300 entries of general USR literature in LAC, and a small selection of key USR readings in which two documents on RRI are included. In addition, a database on USR good practice cases has been created but the site is not active yet. This database is directly related to open access (ICT) to promote reflexivity, responsiveness and inclusiveness in university activities.
- 2) Annual Forum: URSULA organizes annual forum on USR in Latin America which attracts approximately 300 participants. The first Forum in 2016 focused on the Consolidation of the USR Network in LAC; the second Forum in 2017 focused on Challenges for Collective Knowledge Building; the third Forum in 2018 focused on Public Policies and Social Innovation. The Fora provides space for reflexivity on the role of the university and promotion of a network
- 3) Research: State of the Art of RSU in LAC 2018: Standardized self-assessment of fulfilment of 12 goals of integral management of University Social Responsibility (RSU), divided into four components – social participation, curriculum, administration, cognition. Currently, 60 universities in 9 countries are participating in this project. This participatory research promotes inclusiveness and reflexivity on how the university can improve its impact on society.
- 4) ERIS: Itinerant Chair on Ethics, Responsibility and Social Innovation: a space in which the ethical challenges of today's society will be analysed and a close link between ethical inspiration and social innovation will be promoted. ERIS is aimed at teachers, students, academics, social and business leaders interested in building a more inspiring ethic for innovation in their organizations and for the world. ERIS was launched in Dec 10<sup>th</sup>, 2018, when the objectives, themes and goals that will guide the call and activities of the ERIS Chair in 2019 was presented. This chair promotes the dissemination of ethical values to different actors by the mean of training courses and seminars.

## What is RRI about the project

URSULA is in line with key RRI principles as it focuses on ethics, participation, and reflexivity. Their direct engagement with RRI debate is illustrated by two articles on RRI made available as part of their set of key USR literature database. Their mission to include all different actors engaged in higher education and social responsibility in LAC reflects their ethical and inclusive components. Although the current composition of the network is biased

towards a few countries, the number of new countries in process to join the network and their activities (forum, self-assessment, database) indicates their efforts to attract new members.

Reflexivity is another key component of URSULA as the structure and organization of higher education in LAC, their role in society, and the public policies for social innovations are part of their debated and context-based solutions are explored. In particular, SDGs are closely related to their mission as social justice and environmental conservation are re-current elements in these debates.

### **Domain**

URSULA's main domain is higher education. However, as University Social Responsibility is transversal as it directly addresses the role of the university in developing research and innovations to solve societal problems.

### **Any other remarks**

URSULA's current directory is composed by four male members. Despite the large number of universities, the current president and his affiliated university seem to be the main active member in the network. The database lacks more information on each member and the level of their engagement in USR. Perhaps this information will be added to the (still inactive) page for cases database will go live. Finally, the lack of an annual report describing their activity limits an analysis of the progress of the network since its foundation. However, as a relatively new initiate, the accomplishments reveal a promising future.

### **5.4.4.3 NATURA**

Natura is a Brazilian-based manufacturer and marketer of cosmetics with business in over 70 countries. Established in 1969, the company ranks as one of the largest cosmetic enterprises of Latin America. Amongst the range of products, beauty, personal care, perfume and skin care are the top-sellers spread in over 3.200 stores throughout Latin America, and recently, a new boutique in Paris as the company aims to access the European market. As a founding member of the Union for Ethical Biobased Trade, Natura has pioneering biodiverse agroforestry initiatives and a transversal sustainability foundation within its bioeconomy policies in the company's different departments. Natura's products are based on natural resources from high social and biodiversity ecosystems such as the Amazon and the Savanna in Brazil. Natura's innovation research is well known among researchers, business and consumers. Ethics, sustainable production and social inclusion are key elements in their business model. Natura has innovation labs in three locations: The Innovation Center in Cajamar which is the most complete and advanced research and technology in cosmetics in South America, the Research and Development Lab and The Amazon Innovation Center in the Amazon articulating scientific networks with a permanent team of researchers in the region. Natura's main focus is on landing a sustainable open access innovation platform into the company's creation process by

increasing the number of stakeholders involved and creates a shared value chain. The company uses a methodology that works on several research challenges organized on four central innovation themes which are (a) wellbeing and science of relations, (b) sustainability, (c) open and collaborative innovation and (d) cosmetic innovation.

## Stakeholders

Natura's main focus within its open innovation programmes is to widen the scope of shareholders involved in the creation and feedback process of the companies' product development by building its own research network. Overall, within different levels of interaction exchanging skills, risks and know-how, Natura's innovation partners network corresponds to over 180 associates divided amongst government, institutions of science and technology, companies, NGOs, cooperatives and communities.

RPO - In order to achieve a wider result in academic research, Natura develops projects not only in its own research centres but collaborates with RPOs in Brazil and abroad ([http://www.naturacampus.com.br/cs/naturacampus/sobre?lang=en\\_US](http://www.naturacampus.com.br/cs/naturacampus/sobre?lang=en_US)). Several research centres are partners with Natura in development of sustainable supply chain. Abroad, Nature holds a partnership with the Massachusetts Institute of Technology in the MIT Sloan Sustainability Initiative (<http://mitsloan.mit.edu/sustainability/>) where Natura has participated in Sustainable Business Lab (S-Lab) and Leading Sustainable Systems Lab (L-Lab) courses.

RFO – In addition to Natura's average investment on innovation of 3% of its annual revenue (BRL 158 million in 2012), major investments have been accounted for private-public partnerships with governmental agencies. For example, USAID (<https://www.usaid.gov/brazil/our-work/public-private-partnershipsh>) as for the first time granted research funds to a private company to support the ambitious goal to become worldwide reference for research in sustainable palm oil production in agroforestry system.

Producers – Natura holds close relationship with their suppliers comprised of, among others, small-scale farmers. They collaborate directly with local communities, farmers cooperatives and other grassroots organization in co-creation and co-production of sustainable supply chain. One key innovation with suppliers have been production of raw material in agroforestry systems. In particular, Natura has been engaged in the development of an agroforestry system to cultivate oil palm in order to overcome the socioecological impacts of oil palm monoculture.

Consumers – Natura's open innovation process relies on continuous communication with its consumers in order to improve sustainable production (e.g., seasonality of raw material) as well as to receive their input (open innovation platform).

## Sources

- Natura Annual Report year 2017<sup>1928</sup>
- Webpages, Blogs & social media

The pages below refer to how Natura conducts its strategy of continuous communication and co-creating process with consumers. This is a key element on the innovation process of the company. Consumers are invited to provide feedback and suggestions in various ways throughout social media, blogs and other platforms.

- CoCriando Natura<sup>1929</sup>
- CoCriando (Co-creating) Natura which started in 2015, is an initiative that brings consumers into the development, innovation and re-thinking stages of the companies' products and practices. It is built on its strong post-sales and social media presence, and on 1.8 million consultants in the sales channels of the cosmetics on a door-to-door basis to. CoCriando invites Natura consumers to an inside-out perspective on tackling challenges posed by sustainable innovation needs through co-creation of alternatives. CoCriando speaks to the RRI elements of inclusiveness, openness and reflexivity.
- Natura Campus<sup>1930</sup>
- Natura Campus, established in 2003, focuses on the development of research challenges and innovation partnerships with universities, research centres and entrepreneurs promoting hackathons, workshops, mostly online based, aiming at stimulating scientific dissemination and articulating an innovation ecosystem. Natura Campus relates to the RRI elements of inclusiveness and innovation focused on a multi-stakeholder approach.

## Method

Throughout its concept of 'onlife', which refer to online feedback on a wide range of consumer-company relational aspects, open innovation platforms promotes social and scientific dialogue, public participation, community-based research and social innovation offering alternatives to pressing market challenges, strongly based upon elements of ethical, legal and social implications of science. Under the Gestão de Redes e Inovação (Networks and Innovation Management), Natura develops two bottom-up inclusive initiatives - Natura Campus and CoCriando Natura - to foster innovation within both academia and civil society.

<sup>1928</sup> <https://natu.infoinvest.com.br/publications-and-documents/reports/2017>

<sup>1929</sup> <http://cocriando.natura.net/cs/cocriando/comofuncionacocriando>

<sup>1930</sup> <http://cocriando.natura.net/cs/cocriando/blogcocriando>

**What is RRI about the project**

By collaborating closely with academia, suppliers and consumers into a co-creative environment of research and innovation, Natura reflects the RRI dimensions of anticipation, reflexivity, inclusion and responsiveness. Ethical concerns consist of the foundation of Natura's efforts on adding shared value to communities surrounding its ecosystem anticipating and reflecting on the need for long-term plans regarding a sustainable bioeconomy model. Development of sustainable supply chain through production in agroforestry system has been a unique aspect of inclusiveness in Natura's business model. In addition, Natura has contributed to science education through partnerships with research centres have allowed graduate students and scholars to engage in participatory research with producers. In addition, co-production of knowledge and sustainable development has found new pathways through Natura Campus and CoCriando Natura. Finally, open access has been promoted through the open innovation platform. Whether taking place online throughout social media, blogs and websites or contributing to agroforestry practices that increase livelihood options to communities in the areas where extraction of resources takes place, Natura's positioning advances the debate on the practices of RRI principles by the private sector on an inclusive and responsive manner.

**Domain**

Natura's major domain relates to bioeconomy and the ethical dimensions of its extractive activities considering environmentally sound practices and community-based co-production of knowledge. Undoubtedly, the company has a consolidated RRI-profile integrated into its *modus operandi* and business model.

**Any other remarks**

Natura's business models illustrates the relevance of social innovation in development of new products and of sustainable supply chain. In particular, in socially and environmentally sensitive areas, social innovations play a key role as mechanisms to support a sustainable, inclusive bioeconomy.

**5.4.5 PROJECTS IN EUROPEAN AND NORTH AMERICAN STATES****5.4.5.1 NUCLEUS**

NUCLEUS is a 4-year (2015-2019) project funded by EU-Horizon 2020 that aims to understand the DNA of RRI, by identifying the institutional barriers that prevent universities and research institutions from engaging with their stakeholders to align research with society's needs. NUCLEUS is composed by a consortium of 24 organisations, mostly located in Europe, representing 14 countries in 3 different continents. The project, which focuses on public engagement in research and innovation, is divided into two stages. First, it promotes the

development of an *Implementation Roadmap for Responsible Research*, in which challenges in bridging RRI practices and social needs are identified, and examples of good practices are described. Second, an *Evaluation of the Roadmaps' performance in practice*, composed of six field trips are carried out in order to gain insights and recommendations from RRI practitioners outside the academia. The objective of each field trip is to gather local case studies, understand local barriers to RRI and identify best practices and recommendations.

The main goals of the project are:

- Development of practical recommendations for leaders of research institutions on how to implement RRI developed with an understanding of academic culture and perspective tested in real academic environments
- Establishment of a sustainable “NUCLEUS Living Network” where partners can monitor, sustain and work on RRI topics, ensuring an ongoing ‘energy-transfer’ not only during but also beyond the project timeline.

NUCLEUS sees RRI as the process in which societal actors (researchers, citizens, policy makers, business, third sector organisations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society. Furthermore, the project departs from an academic understanding of the challenges to bring RRI to life, by interviews with leading researchers, to the inclusion of a growing number of stakeholders. In a responsive manner, the project advances the debate on RRI by embedding public engagement, policy-making, media, studies of funding policies and economy. The project addresses not only the European context but takes also into account the contextual diversity and cultural adaptation by including field trips to China and South Africa, respectively. Altogether, the insights from academia and civil society will be then tested - 10 Embedded Nuclei - for two years and the results evaluated within the annual conferences will contribute to the development of tested RRI guidebooks and methods - 20 Mobile Nuclei - with recommendations on the implementation of RRI.

## Stakeholders

NUCLEUS main focus is on the uncovering of the key principles of RRI, and subsequent experience-proven recommendations expressed through methodologies that have been tested within academia, civil society and policy-making settings. As a result, the main focus of the project is how RPOs and researchers engage with societal actors, business sector and policy-makers. The projects consist of key organizations related to the first and second stages. Within the first stage - *Implementation Roadmap for Responsible Research* - **RPOs** have taken a central role on designing surveys, conducting interviews and elaborating the State of the Art of RRI. Research institutions such as [Bielefeld University](#), [University of Edinburgh](#), [Rhine-Waal University of Applied Sciences](#), Lyon and [University of Malta](#). Moving onto the field trips scenarios, the range of stakeholders taking part considerably expands from RPOs to *civil society* and *policy-making* bodies. For instance, the fieldwork taken in Pretoria - South Africa,

aimed at exploring the role of civil society in the practice of responsible research and innovation, involved the [South African Agency For Science And Technology Advancement](#), the [South African Institute for Aquatic Biodiversity](#) and other science centres, community groups, education governance officials, teachers, businesses, museums and zoos. Other examples of policy making and civil society working alongside academia can be identified within the field trips of Nottingham ([Nottingham City Council](#), [Nottingham Trent University](#)), Beijing ([Beijing Association for Science and Technology](#), [China Research Institute for Science Popularization](#)) and the Annual Conference in Hannover hosted by [Science City Hannover](#). Finally, stakeholders have been involved in the second stage - *evaluation of the Roadmaps' performance in practice* - of the project in the Hannover Conference, 2017. 'The NUCLEUS annual conference in Hannover from 4-6 October 2017 gathered 86 participants from Europe, Georgia, China, South Africa and Japan. Among the attendees were members of the NUCLEUS consortium plus external experts representing other European RRI projects, keynote speakers with a proficiency in RRI policies and practice, and interested international guests from the field of RRI' ([Nucleus, 2017](#)). Performing a bed-testing approach on the embedded or mobile *Nuclei* events, actants such as [Delft University of Technology](#), [Ruhr-University of Bochum](#), [City of Bochum](#), [European Science Engagement Association](#) and [University of Twente](#), amongst others, have facilitated the implementation and development process of NUCLEUS initial findings.

## Sources

The following consists of a non-exhaustive list of documents used to analyse and review NUCLEUS project:

- Project documents like deliverables
- Field trip reports ([Edinburgh](#), [Beijing](#), [Pretoria](#), [Nottingham](#), [Dublin](#))

These documents have provided insights into identifying context-bound challenges within and outside the 'global North'. To that extent, a comparative analysis of the reports corroborates Schoeder and Latridis (2016) perspectives of a narrow RRI approach on accounting for cultural differences. For instance, the lack of consideration for indigenous knowledge and ethnic concerns in South Africa, and structural obstacles for researchers in China.

- Project guidelines and Annual Conference Reports
- NUCLEUS implementation roadmap ([link](#))
- 2015 Annual Conference Report ([link](#))
- 2016 Annual Conference Report ([link](#))
- 2017 Introduction to Annual Conference ([link](#))
- 2018 Annual Conference Report: From evidence to impact ([link](#))
- Blogs and social media (<https://www.facebook.com/NucleusRRI>)

- [Videos](#)
- Survey conduct report ([link](#))

Overall, these documents provided a better overview of the NUCLEUS project. The information has been made publicly available (open access) and widely published on the project webpage and social media. Explanatory videos were also produced. All in all, it can be said that a greater contribution has been the inclusion of debated topics within a broader public.

## Method

NUCLEUS collaborative and co-designed methodology consists of a stakeholder-sensitive adaptable set of RRI-tested formats. Despite the fact that it relates to an ongoing construction of good practices on RRI guideline, the project is embedded in a wide range of RRI-like methodologies since its first stage.

- 1) *Implementation Roadmap for Responsible Research*. In an early stage of the project, throughout 100+ qualitative interviews with academic leaders (RPOs) on the academic challenges of RRI implementation, **participatory research & innovation** and **scientific culture** becomes evident. [Bielefeld University](#) and [University of Bochum](#) have been key actants on performing this theoretical step.
- 2) Field trip reveals an enriching epistemological diversity based on both **action research** and **social innovation**. For instance, while the second field trip in Edinburgh (December, 2015) aimed at exploring how can we ensure that RRI is embedded in the cultures of universities and research institutions through qualitative interviews, the last field trip in Beijing (September, 2016) focused on the topics of public engagement in the practice of RRI involving representatives from various Chinese universities, science popularization organisations (such as [China Research Institute for Science Popularization](#)) and the third sector through workshops. Furthermore, in the light of **public participation** and **social communication**, NUCLEUS third field trip in Pretoria, South Africa (February, 2016), aimed at a cross-cultural analysis of the role of civil society in the practice of RRI interviewed members of NGOs, science centres ([South African Agency For Science And Technology Advancement](#)), community groups, education governance officials, teachers, businesses, museums, zoos amongst others.
- 3) *Evaluation of the Roadmaps' performance in practice - at an advance stage of the project*, it is possible to conceive within the annual conferences of Hannover (2017) and Malta (2018) the **community-based research**.
- 4) *Mobile Nuclei* concept consists of a replicable event methodology to test - try and error - innovative approaches which bring together different actors into the RRI arena, sometimes in the format of a **science dialogue** (or science cafes), RRI training, open talks or hackathons, once more, reaffirms NUCLEUS **participatory design** structure. [Rhine-Waal University of Applied Sciences](#) and the [University of](#)

[Lyon](#) have hosted institutional NUCLEI and test-bed events aimed at sharpening the practice of the RRI good practices findings.

Overall, these methodologies reinforce the correlation of a backbone of the project which is the concept of excellence and RRI as a process that goes beyond ground-breaking discoveries and includes openness, responsibility and the co-production of knowledge.

### What is RRI about the project

By making use of academic and civil society tested methodologies, NUCLEUS project reflects RRI characteristics of **anticipation, inclusion, reflection and responsiveness**. The main RRI-like characteristic of the project is the way how it was structured toward elements of **inclusive** research and innovation aimed at societal capacity building. Named ‘cells’ by the project, these elements consist of six initial stakeholders to be considered when discussing RRI: media, economy, public engagement, civil society, public policy and university. By aiming to open up and to broader dialogues in research and innovation in an inclusive way, NUCLEUS fares quite well its assessment of science and technology by means of **reflexivity** and **responsiveness**, beyond simply **anticipating** risks and market benefits. Although the project has not been finished, through careful analysis of its reports and deliverables such as the Mobile Nuclei concept it is possible to identify the project’s close link with RRI definition of widening engagement and collaborative forms of knowledge to solve societal challenges. Mobile Nuclei is a concept developed throughout the first two years of the project - Implementation Roadmap for Responsible Research - and consists of a replicable event methodology to test innovative approaches bringing together different actors into the RRI arena.

Furthermore, throughout its inclusive dialogue format, Mobile Nuclei events allows for the development of institutional capacities within different stakeholders. Having that said, is about right to say that NUCLEUS project enables science and innovation endeavours to enlarge its potential while adopting an overarching approach in terms of inclusiveness and reflection on the motivations for and potential implications of research.

### Domain

Although NUCLEUS main domain is characterized by a strong focus on co-production of knowledge and on how do different stakeholders apply RRI to societal challenges, to some extent, the project can be directly related to ICT practices. For instance, open access & data-driven methodologies has been a key element on participatory research & innovation throughout the project. As an example, the workshops and interviews organized in the field trips of Beijing (public engagement) and Dublin (economy), as the location where some of the *Mobile Nuclei* took place were mainly led by technology-based institutions (such as [Beijing Association for Science and Technology](#), [Science View](#), [South African Agency For Science And Technology Advancement](#) and [Delft University of Technology](#)). Hackathons, a unique platform for collaborative societal-based problem solving in which stakeholders such as senior

researchers, social enterprise, policy makers and industry struggle together over, in this case tech-based and data-driven solutions, to a common issue, was the methodology used in the Irish case. One of the finding at the end of Dublin's field trip was that ICT industry works at a much faster pace than academia, and Industry might have the willingness, knowledge and skills to deliver societal focused projects, but it must make business sense to engage. Moreover, the guidelines published and the NUCLEUS living RRI network both takes place on a co-production online setting. Nevertheless, as a general approach to RRI, NUCLEUS methodology can be applied to all four domains of RRING as far as societal engagement is concerned.

### Other remarks

One particular innovative element of NUCLEUS is its. Such a perspective is useful to develop a better understanding of RRI in practice and to identify barriers and synergies such as cultural differences across stakeholders. However, this issue seems to be touched rather superficially by the project. While the project structure clearly reflects RRI-like characteristics and a cross-cultural analysis has been taken place through field trips outside the European realm, the reference of '3 continent project' should be contextualized. Apart from a few days field trip to China and South Africa, NUCLEUS seems to be heavily focused on UK and Germany where most of the partners are based and most of the meetings take place. Furthermore, the selection of China and South Africa, BRICS' members with emerging economies, leaves out the possibility of further analysis of RRI concepts within poorer societies with more pressing challenges of socio-economic and urban development than science-based innovation.

#### 5.4.5.2 COMPASS

The COMPASS<sup>1931</sup> project is one of EU-funded projects that supports Small and Medium-sized Enterprises (SMEs) in three emerging technology industries (biomedicine, cybersecurity and nanotechnology) to manage their research, development and innovation activities in a responsible and inclusive manner, and to equip SMEs with tools and services for applying Responsible Innovation (RI) in different industries and innovation processes. There is considerable overlap in the domains of RRING project and COMPASS, which can be useful in further analyses and for studying RRI-aspects of various EC projects.

The implications of novel products, processes or business models for society and the environment are often difficult to anticipate. Dealing with the uncertainties in the field of emerging technologies in a responsible manner is key to staying competitive and bringing innovations to market. Responsible Innovation aims to better align both the process and outcomes of research and innovation with the values, needs and expectations of society. Implementing RI principles can deliver innovation that responds much better to consumer

<sup>1931</sup> <https://innovation-compass.eu/about/>

needs. For private businesses this can also mean improving the market uptake of their innovations.

The main output of the project is an interactive online platform, the Responsible Innovation Compass, aimed to provide guidance and orientation tailored towards the needs of innovative enterprises, in particular SMEs. A bottom-up call for case studies of successful examples of RRI is integrated into the project in order to contribute to research. COMPASS has already determined 5 winners from the case-study competition that was launched in September 2016, and they published these stories about responsible innovation - <https://innovation-compass.eu/cases/>

COMPASS investigates the applicability of the EU pillars for the European industry concluding that the industry might have other priorities regarding responsible innovation. One deliverable (Antoniou, 2017<sup>1932</sup>) investigates several potential RRI aspects important for SMEs: social innovation; open innovation; environmental considerations; ethical considerations; codes of conduct; gender and workplace equality.

In another deliverable, that aimed to assess the integration of the RRI approach into collaborative R&D&I and SMEs in European funded research, authors selected as main dimensions of RRI the ones specified in the EU framework (gender, open access, public engagement, ethics, science education), to which they added sustainable development and corporate social responsibility (CSR) (Nwafor, et al., 2017<sup>1933</sup>) Among the projects reviewed, the majority seems to address RRI in a holistic way, although many still pursued only one aspect of RRI at times. The most popular dimension addressed by these projects was public engagement, while the least popular was gender.

COMPASS has brought together exceptional experts, who have been working on the Responsible Innovation issues in the areas of healthcare, ICT, and nanotechnology, as well as on ethics, gender, and competitiveness issues as members of the Advisory Board. COMPASS is committed to participating in the European Open Data Management Pilot and will ensure that all project results are publicly available. They will also make all COMPASS project deliverables open to the public as soon as they are finalized.

The project focuses on three countries - one per sector-: Spain (Catalonia region) - biomedicine, United Kingdom - cybersecurity, and Belgium – nanotechnology. 150 innovation support organisations reaching over 1500 entrepreneurs, start-ups and SMEs.

### Stakeholders:

**RPOs** - The Responsible Innovation COMPASS project is a team of 24 researchers, innovation support professionals and research funders – all dedicated to advancing Responsible Innovation

<sup>1932</sup> [https://innovation-compass.eu/wp-content/uploads/2017/04/COMPASS\\_D1.1.pdf](https://innovation-compass.eu/wp-content/uploads/2017/04/COMPASS_D1.1.pdf)

<sup>1933</sup> [https://innovation-compass.eu/wp-content/uploads/2017/09/D1.4-Benchmark-Report\\_Integration-of-the-RRI-approach-into-collaborative-Research-Development-Innovation-.pdf](https://innovation-compass.eu/wp-content/uploads/2017/09/D1.4-Benchmark-Report_Integration-of-the-RRI-approach-into-collaborative-Research-Development-Innovation-.pdf)

(RI) in industry. The project is implemented by 7 consortium partners from across Europe - The Institute for Managing Sustainability <https://www.wu.ac.at/sustainability>, The Centre for Computing and Social Responsibility (CCSR) at De Montfort University (DMU) <https://www.dmu.ac.uk/home.aspx>, University of Central Lancashire in Cyprus (UCLan CY) <https://www.uclancyprus.ac.cy/>, “la Caixa” Banking Foundation (FBLC) <https://obrasociallacaixa.org/es/home>, European Business and Innovation Centre Network (EBN) <https://ebn.eu/>, B Lab Europe <https://bcorporation.eu/>, Strategic Design Scenarios <https://www.strategicdesignscenarios.net/>. As a consortium they are linked to more than 150 innovation support organisations reaching over 1500 entrepreneurs, start-ups and SMEs.

**SMEs:** The main target of the project are European SMEs from Spain, Denmark, United Kingdom, Germany and Italy, working in sectors of nanotechnology, health and biomedicine, and disability. The five winning cases in a case study competition have an excellent geographical spread across Europe. The cases are: in the field of nanotechnology (Spain, Denmark) - BioGAS+<sup>1934</sup> and Organic solar<sup>1935</sup>; in health and biomedicine (UK, Germany): The Rehab Angel<sup>1936</sup> and GlucoTel<sup>1937</sup>; and in the field of inclusion of people with disabilities (Italy): “On my own ... at work”<sup>1938</sup>.

A reduced number of SMEs played a critical role in the project, actively participating in the online and face-to-face RI Labs and pilots where the roadmaps, recommendations and implementation examples were produced.

**Supporting organizations to SMEs:** These stakeholders had a key role in connecting with, engaging and incentivizing SMEs. The group includes networks, professional associations, government organizations, chambers of commerce, clusters, incubators, accelerators, innovation parks, investors, and organizations that provide SMEs with information and training, networking, and funding opportunities. By contacting these organizations, the project had an easier, more direct contact to targeted SMEs. Also, COMPASS benefited from the ample experience of these organizations to craft their messages and elaborate further the kind of incentives more appealing for the SMEs. Supporting organizations also acts as multipliers of the project’s activities and outcomes. National Contact Points (NCPs) are both focused on the Science with and for Society (SwafS) program (thus knowledgeable of the RI approach), on one of the three sectors covered by the project, or on industrial programs.

**Policy makers** This group of stakeholders are involved in the project Final Conference <https://innovation-compass.eu/final-conference/>. The target was mainly at the European level, but some national or regional policy makers are also considered as potential targets.

**Civil Society Organizations (CSOs)** CSOs play an increasing role in research and innovation through approaches like RRI. In this spirit, COMPASS aimed at engaging them through the

<sup>1934</sup> <https://innovation-compass.eu/wp-content/uploads/2017/04/AppNPs-Final.pdf>

<sup>1935</sup> [https://innovation-compass.eu/wp-content/uploads/2018/03/Case-Study-5\\_Organic-solar.pdf](https://innovation-compass.eu/wp-content/uploads/2018/03/Case-Study-5_Organic-solar.pdf)

<sup>1936</sup> [https://innovation-compass.eu/wp-content/uploads/2017/11/Case-Study-3\\_Rehab-Angel.pdf](https://innovation-compass.eu/wp-content/uploads/2017/11/Case-Study-3_Rehab-Angel.pdf)

<sup>1937</sup> [https://innovation-compass.eu/wp-content/uploads/2017/09/Case-Study-2\\_GlucoTel-Karsten-Bolz-Final.pdf](https://innovation-compass.eu/wp-content/uploads/2017/09/Case-Study-2_GlucoTel-Karsten-Bolz-Final.pdf)

<sup>1938</sup> [https://innovation-compass.eu/wp-content/uploads/2018/01/Case-Study\\_4-On-my-own...at-work.pdf](https://innovation-compass.eu/wp-content/uploads/2018/01/Case-Study_4-On-my-own...at-work.pdf)

project initiatives, including the Final Conference. Participation at other steps of the projects, such as the RI Labs, were decided based on the results of the country and sector exploratory analyses carried by the partners in charge of the labs.

### Sources:

COMPASS is committed to participating in the European Open Data Management Pilot and is ensuring that all project results are publicly available. All COMPASS project **deliverables** (reports, roadmaps, case studies, reviews, papers, strategies etc.) are open to the public (through their [website](#)) as soon as they are finalised<sup>1939</sup>:

**Project outcomes** - three main outputs of the COMPASS project:

- 1) the online self-check tool <https://innovation-compass.eu/self-check/>; A learning instrument that guides a company through the most important responsible innovation practices, and helps you identify company strengths and areas of opportunity. Each question asks about a particular company practice and gives you good practice examples as answer options.
- 2) the co-creation method for roadmap development <https://innovation-compass.eu/compass-crash-course/>; The method kit contains the co-creation method booklet, describing the method step-by-step, and a webinar, including a concise introduction to the co-creation process, followed by experience-based advice for facilitators. This co-creation method booklet is for the use of Business Support Organisations or others keen to support companies in designing Roadmaps towards RI ; and
- 3) roadmaps towards responsible innovation<sup>1940</sup>
  - i. **in nanotechnology**<sup>1941</sup>: This report and roadmap does not go into detail regarding the risks around nanotechnologies, but it is an ethical ‘given’ that appropriate action must be taken to mitigate those risks at all stages – from design, through manufacture, marketing and usage. The importance of this document is that it relates to the design, production and usage of nanomaterials.
  - ii. **in cyber security**<sup>1942</sup>: The document gives emphasis to the responsibility that is particularly pertinent to cybersecurity and the ethical issues and imperatives that apply. It only lightly touches on more general issues of governance. Also, it tackles some of the issues related

<sup>1939</sup> <https://innovation-compass.eu/deliverables-2/>

<sup>1940</sup> [https://innovation-compass.eu/wp-content/uploads/2018/08/D4.1\\_Piloting-and-Demonstration-Strategy\\_FINALcda.pdf](https://innovation-compass.eu/wp-content/uploads/2018/08/D4.1_Piloting-and-Demonstration-Strategy_FINALcda.pdf)

<sup>1941</sup> [https://innovation-compass.eu/wp-content/uploads/2018/10/D2.3-Responsible-Innovation-Lab-Report-and-Roadmap-2-BE\\_FINAL.pdf](https://innovation-compass.eu/wp-content/uploads/2018/10/D2.3-Responsible-Innovation-Lab-Report-and-Roadmap-2-BE_FINAL.pdf)

<sup>1942</sup> [https://innovation-compass.eu/wp-content/uploads/2018/10/D2.2-Responsible-Innovation-Lab-Report-and-Roadmap-1-UK\\_FINAL.pdf](https://innovation-compass.eu/wp-content/uploads/2018/10/D2.2-Responsible-Innovation-Lab-Report-and-Roadmap-1-UK_FINAL.pdf)

to the rapid pace of parallel developments in ICT and the defences against cyber-crime.

- iii. **and in biomedicine**<sup>1943</sup>: The exploration of challenges for biomedicine draws on secondary sources as well as the outcomes of direct work with a variety of healthcare companies in interviews and workshops with key staff. All were involved in the research, development and/or provision of healthcare technologies and/or services (biomedicine). ‘Responsibility’ in relation to innovation in the healthcare sector is strongly influenced by the particular (ethical) concern to ‘do no harm’.

This report<sup>1944</sup> presents five **case studies** to demonstrate how Responsible Research and Innovation (RRI) can work in industry.

Responsible Innovation COMPASS features real industry cases on how implementing responsible innovation can kick-start innovation and contribute to competitiveness of SMEs in key innovation fields. BioGAS+<sup>1945</sup> is the first ready to use additive based on safe and sustainable engineered iron nanoparticles directed to the optimization of anaerobic digestion processes, which increases the production of biogas from organic waste. (RRI - Sustainable and safe use of new technologies). The RehabAngel<sup>1946</sup> is an evidence based adjustable incline device which has a flat and 5 degree inverting wedged surface, which gives greater control and safety for patients requiring lower limb exercises. (RRI - Broad stakeholder engagement and scientific knowledge sharing with industry). GlucoTel<sup>1947</sup> is a sensor for telemedical blood glucose monitoring and diabetes management and is used for automatic, continuous documentation of all blood glucose levels. (RRI - Healthy ageing (inclusion) and stakeholder involvement). Organic solar<sup>1948</sup> is a periodic ultrathin gold nanowire, which provides an alternative nanostructure for indium thin oxide in organic solar cell devices. (RRI - Sustainable and safe use of new technologies). “On my own ... at work” app<sup>1949</sup> supports trainees with Down Syndrome and other intellectual disabilities during their traineeship in the hospitality industry to make them more independent of their tutors. (RRI - Inclusion)

The **peer-reviewed paper** “Implementing Responsible Research and Innovation Practices in SMEs: Insights into Drivers and Barriers from the Austrian Medical Device Sector”, written by WU team members Alexander Auer and Katharina Jarmai, was successfully submitted to a high-profile journal, Sustainability (impact factor of 1.789), in a Special Issue on Responsible Research and Innovation (RRI). The paper addresses the question of how RRI can be

<sup>1943</sup> [https://innovation-compass.eu/wp-content/uploads/2018/10/D2.4-Responsible-Innovation-Lab-Report-and-Roadmap-3-ES\\_FINAL.pdf](https://innovation-compass.eu/wp-content/uploads/2018/10/D2.4-Responsible-Innovation-Lab-Report-and-Roadmap-3-ES_FINAL.pdf)

<sup>1944</sup> [https://innovation-compass.eu/wp-content/uploads/2017/07/Deliverable-1\\_3-Compass-Case-Study-Descriptions.pdf](https://innovation-compass.eu/wp-content/uploads/2017/07/Deliverable-1_3-Compass-Case-Study-Descriptions.pdf)

<sup>1945</sup> <https://innovation-compass.eu/wp-content/uploads/2017/04/AppNPs-Final.pdf>

<sup>1946</sup> [https://innovation-compass.eu/wp-content/uploads/2017/11/Case-Study-3\\_Rehab-Angel.pdf](https://innovation-compass.eu/wp-content/uploads/2017/11/Case-Study-3_Rehab-Angel.pdf)

<sup>1947</sup> [https://innovation-compass.eu/wp-content/uploads/2017/09/Case-Study-2\\_GlucoTel-Karsten-Bolz-Final.pdf](https://innovation-compass.eu/wp-content/uploads/2017/09/Case-Study-2_GlucoTel-Karsten-Bolz-Final.pdf)

<sup>1948</sup> [https://innovation-compass.eu/wp-content/uploads/2018/03/Case-Study-5\\_Organic-solar.pdf](https://innovation-compass.eu/wp-content/uploads/2018/03/Case-Study-5_Organic-solar.pdf)

<sup>1949</sup> [https://innovation-compass.eu/wp-content/uploads/2018/01/Case-Study\\_4-On-my-own...at-work.pdf](https://innovation-compass.eu/wp-content/uploads/2018/01/Case-Study_4-On-my-own...at-work.pdf)

implemented in Small and Medium Sized Enterprises (SMEs). It builds on existing knowledge about RRI in business as well as on insights into motivations, drivers and barriers from the related fields of eco-innovation and sustainability innovation.<sup>1950</sup>

Two opportunities for future publications were chosen. The first opportunity is a chapter in a Routledge book on Responsible Research and Innovation Assessment Practices. The second opportunity is a peer-reviewed paper on the topic of ICT.<sup>1951</sup>

## Methods:

The project uses wide range of RRI methodologies, targeted primarily to stakeholders, by involving the approach of responsible innovation practices, social and science communication between stakeholders. The project provided participation and participatory research and innovation through engaging RPOs, SMEs, policy makers and CSOs in the dialogue within the RI labs, online and offline trainings, through calls for inspiring case studies in the areas of healthcare, ICT, and nanotechnology. Also, project enabled co-creation of new practices through technology and scientific dialogue, online and offline interactive workshops, as well as by creating and launching the self-diagnostic and learning tool, and by providing access to training materials

Engagement strategies were directed towards communicating the benefits of RI during the entire project. These incentives provided answers to key challenges that SMEs usually encounter. Engagement of the target audiences provided specific visions for RI across the different fields. It also provided key information to know how companies assess where they are along the path towards RI and what methods are useful in realising such path. Throughout the project selected stakeholders and multipliers were engaged in face-to-face activities such as interviews, RI labs and pilot applications of the developing tools, as well as digital platforms to keep them informed and engaged during the length of the project.

COMPASS project organized **Interviews** on the practical evidence and benefits of RI in industry and interviews with reputed experts on the matter in each country and sector. Through **open call** (closed in October 2016) practical examples of RI application were collected and gained contact with potential RI champions behind these cases. **RI Labs** included a combination of online webinars, face-to-face workshops and scoping interviews. **Pilots** were the practical application of the lessons learnt during the project. **Trainings** were the co-creation method kit tested with a selected group of innovation support organizations in a train-the-trainer style demonstration workshop. **Final Conference** was a dissemination event aimed at publicizing the main outcomes of COMPASS, delivering them to specific target audiences (mainly policy makers and CSOs).

<sup>1950</sup> <https://innovation-compass.eu/wp-content/uploads/2018/08/D5.7-Peer-reviewed-paper-on-implementation.-of-RRI-in-SMEs.pdf>

<sup>1951</sup> <https://innovation-compass.eu/wp-content/uploads/2019/02/D5.6-Peer-reviewed-paper-Final.pdf>

External events include regular conferences and congresses; regular awards and prizes, such as those organized annually by B Lab, the European Foundations Award on RRI (EFARRI). Related-project events: workshops, conferences or other events organized by projects with interests similar to those of COMPASS. Training events organized by supporting organizations (like those frequently arranged by EBN). In combination with the face-to-face events, COMPASS used a number of digital channels to keep stakeholders informed and engaged throughout the project: the project's website (<http://innovation-compass.eu>) as the reference site for up to date information on the project; Newsletter; stakeholders directly involved in the project's activities received sporadic, specific communications by e-mail, whether from the coordination team (WU) or from the partners in charge of each of the sectors (DMU, FBLC, and SDS), with targeted information regarding the next steps of the RI Labs, the Self-Check tool or the piloting phase of the project; Online RI labs and webinars for the stakeholders; Online survey(s); social media for the project.

### **Project selection:**

COMPASS covers almost all RRI pillars, and it is in accordance with the RRI pillars of the RRING project. The Domains in which COMPASS is involved are ICT and Bio-Economy.

### **What is RRI about the project:**

RRI topics of the COMPASS project are: Sustainable research; open access; ethics integrity; gender equality; inclusive public engagement; social innovation; open innovation; environmental considerations; ethical considerations; codes of conduct; gender and workplace equality; open access; public engagement; ethics; science education.

### **Domains:**

The COMPASS project focuses on the key innovation fields of ICT, nanotechnology and healthcare. More specifically, it aims to provide support of SMEs in the three emerging technology industries (health and biomedicine, cybersecurity and nanotechnology). These areas and industry sectors fall broadly into the RRI domains of **ICT** and **Bio-Economy**.

Information & Communications Technologies (ICT) includes all technologies that enable the collection and handling of information to facilitate different forms of communication and use for societal benefit; research/innovations that focus on enhanced connectivity for societies, as well as advancements that are possible through e.g., artificial intelligence or the internet of things. Technological development in these areas is the basis for innovations in various industrial sectors, which may yield further solutions in solving societal challenges.

COMPASS project recognizes a close link between RRI aspects in **healthcare and ICT**, which has emerged via a range of projects focusing on ICT applications for healthcare purposes. A strong link between ICT and healthcare becomes apparent, as several projects address ICT-for-

healthcare, focus on both innovation fields, or work on cross-cutting issues, such as healthy ageing or advanced therapeutics. COMPASS aim to promote socially responsible ICT-related research.

COMPASS directly supports and promotes several projects and SMEs dealing with **sustainable and safe use of new technologies / nanoparticles**. Bio-Economy domain covers enabling and converging technologies ('Nano-Bio-Info-Cogno'). This domain also includes **nano biotech** (nanomaterials, nanoelectronics, nanometrology, molecular self-assemblies, nanorobotics, etc.).

#### 5.4.5.3 NEWHORIZON

The Project “Excellence in science and innovation for Europe by adopting the concept of Responsible Research and Innovation (NewHoRRIZon)” sets out to promote the acceptance of RRI in Horizon 2020 (H2020) and beyond. It will work out the conceptual and operational basis to fully integrate RRI into European and national research and innovation (R&I) practice and funding. In order to accomplish this goal, NewHoRRIZon will establish altogether 18 Social Labs that cover all sections of H2020. Together with a wide-ranging group of R&I stakeholders, in these Social Labs, NewHoRRIZon will co-create tailor-made pilot actions that will stimulate an increased use and acceptance of RRI across H2020 and each of its parts. These pilot actions will address a variety of R&I actors such as academia, business, non-university research institutes, research funding organisations, policy-makers on European, Member State and global level, civil society organisations (CSOs) and the general and specific public(s) as they arise from technological controversies. Ultimately, the pilot actions to be developed and tested in the Social Labs will contribute to R&I projects that fully recognise the significance of RRI. NewHoRRIZon will stimulate learning about how to accomplish RRI in H2020 and beyond in its Social Labs, in two cross-sectional workshops and two transdisciplinary conferences. It will conceptualise and operationalise a Society Readiness Level (SRL) for R&I that focuses on the alignment between the processes and products of R&I on the one hand, and broader societal demands and expectations on the other. Finally, NewHoRRIZon will use a variety of target-group specific strategies to disseminate best practices to promote acceptance of RRI across H2020 and generate long-term impact. For that it will use existing spaces and networks as well as create new ones.

A global scope and expertise on RRI are provided by truly large consortium consisting of 19 partners from 12 different countries, 17 partners are from ten European countries (Austria, Netherlands, Germany, Czech Republic, Estonia, France, Denmark, Norway, Finland, Spain) while there are two partners from Central and Latin America (from Jamaica and Colombia respectively). Majority of partners are coming from universities and research institutes, but there are several public entities, professional associations and NGOs.

Six project objectives:

1. foster the integration of RRI into European, national and local Research and Innovation practice and funding,
2. organise 19 Social Labs and co-create pilot actions and activities and develop narratives and storylines based on the experience from these pilots,
3. develop and disseminate a concept of Societal Readiness of Technology (Societal Readiness Levels),
4. raise awareness on Responsible Research and Innovation and mainstream RRI best practices and NewHoRRIZon results,
5. provide results on how to better integrate RRI into the next European Framework Programme,
6. create an RRI Network including the national funding agencies and develop an RRI community starting with an RRI Ambassadors programme.

## Stakeholders

NewHoRRIZon is giving special emphasise in reaching the research funding organisations (RFOs). However, the project is set with a goal to communicate and involve variety of R&I actors such as academia, business, non-university research institutes, policymakers on EU, European and global level, civil society organisations (CSOs) and the general and specific public(s).

Therefore, its goal towards diverse groups of stakeholders is complex and multifaceted:

- RFOs: foster the integration of RRI into European, national and local Research and Innovation practice and funding (egg. NewHoRRIZon recommendation: the design of FP9 could place increased and strategic emphasis on excellence in terms of transparent, and socially robust knowledge that is inclusive of stakeholder and citizen perspectives),
- policymakers on the EU/European level: egg. NewHoRRIZon recommendation: investments in the development of “Key Performance Indicators” or other methods of monitoring and evaluating RRI implementation could provide vital tools and instruments that can be implemented and learned from at a greater scale across Commission R&I programming,
- RPOs and academia: 150 experts interviewed through the initial data collection phase (egg. NewHoRRIZon recommendation: existing resources across Europe could be leveraged to raise awareness and build capacity of RRI in researcher and stakeholder communities),
- CSOs and citizens: (egg. NewHoRRIZon recommendation: in-person citizen consultations could be organised to complement online citizen consultations at key points in work programme development; commissioned inputs from conventional stakeholder committees of the EC could be supplemented with broader, more diverse stakeholder groups),

- all: establishment of 19 Social Labs (illustration below), spanning all H2020 programmes, with a goal to identify opportunities to evaluate the status quo and suggest improvements to further the implementation of RRI (egg. NewHoRRizon finding/recommendation: research shows that criteria-changing policies work best with additional investments in capacity building and training of programme officers, evaluators, researchers, innovators, and stakeholders to learn more about ways that science and technology are embedded in society and about the benefits of building more inclusive approaches to R&I).

## Sources

- Project website: [newhorizon.eu](http://newhorizon.eu)
- Policy Brief no. 1: [newhorizon.eu/policy-brief-1/](http://newhorizon.eu/policy-brief-1/)
- General presentation: [ifz.at/Media/Dateien/Downloads-IFZ/News/RRI/New-Horizon](http://ifz.at/Media/Dateien/Downloads-IFZ/News/RRI/New-Horizon)
- CORDIS: [cordis.europa.eu/project/rcn/210048/factsheet/en](http://cordis.europa.eu/project/rcn/210048/factsheet/en)
- Twitter: [twitter.com/rri\\_eu](https://twitter.com/rri_eu)
- Facebook: [facebook.com/RRI.eu](https://facebook.com/RRI.eu)

The NewHoRRizon project has started in May 2017 and since it spans over full four years, it didn't yet reach its mid-term. Therefore, just a minor amount of (re)sources is available in definite form and most of processes, materials and reports are in dynamic progress. Only one project's policy brief is published so far (assumption is that No2 would be shortly available) and only initial deliverables from five key work packages are presented, summarising data collection process and opening analyses: [newhorizon.eu/deliverables/](http://newhorizon.eu/deliverables/). Five available deliverables (April 5, 2019) are as follows:

- D1.3: Current status of RRI
- D2.1: Diagnosis: RRI in Excellent Science
- D3.1: Diagnosis in Industrial Leadership
- D4.1: Diagnosis: RRI in Societal Challenges
- D5.1: Diagnosis: RRI in Widening Participation

Even from such a limited perspective, it is clear that the NewHoRRizon shares many identical approaches and ideas as the RRING, and that its further developments and findings will be relevant and valuable contributions for latter's goals and final results.

## Method

The Social Labs are at the core of the project and they're containers of social experiments for addressing complex ground-breaking social challenges on a systemic level. Their goal is to provide a socially based, experimental and systematic approach for addressing complex social challenges related to RRI. Each Social Lab is dedicated to a different H2020 section. For every section different stakeholders will gather in a Social Lab to define the social challenges at stake

and develop social experiments (= pilot actions and activities) to overcome them. This process will eventually produce storylines and narratives which will be shared as widely as possible to mainstream RRI.

The NewHoRRIZon project runs 19 Social Labs. Each Social Lab focuses on a different theme of H2020, for example, Future and Emerging Technologies (FET), Leadership in Enabling and Industrial Technologies (LEIT) and Smart, green, and integrated transport (TPT). Social Labs consist of a team, a process and space(s) supporting social innovation and experimentation. The team is made up of societal actors invited into the Social Lab to work together on the Social Lab process. The process consists of three interdependent, iterative activities:

- diagnosis of the current RRI practices with H2020. This results in an understanding of barriers and enablers of embedding of RRI.
- designing & implementing of social experiments to test overcoming the barriers
- reflect on the outcomes of the experiments & to learn lessons for further experimenting and future embedding of RRI into R&I policies & funding programmes.

Social Labs offer spaces that facilitate this process. They enable diagnosis, observation and experimentation to take place at the same time and as part of the same intertwined process.

### **Project selection**

NewHoRRIZon is one of the biggest, active RRI project with total budget of around 6,8 million euros. It is a four-year project that aims at further integrating Responsible Research and Innovation in the research and innovation systems on national and international levels. In this frame, multiple stakeholders (from research, business, policy making, education and civil society) are involved in research and innovation on the project and system level to better align its processes and outcomes with the values, needs and expectations of society.

### **What is RRI about the project**

NewHoRRIZon is a pure, transversal RRI project which is relevant for all scientific disciplines, including RRING's four scientific domains. It offers (possible) methodology for addressing RRI as a concept or its individual pillars/keys/values in almost any scientific and research context. Its approach and vision are currently passing through a series of test pilots/ prototypical activities, called "social labs" (illustration above), with a goal to identify RRI perspective and potentials from socially better defined and more humanistic position. 19 created social labs were foreseen as "social experiments for addressing complex ground-breaking social challenges on a systemic level", therefore established against H2020 "Societal Challenges" pillar (NewHoRRIZon was funded under SWAFS call "Moving from constraints to openings, from red lines to new frames in Horizon 2020").

Nineteen social labs are devoted to nineteen major scientific areas/disciplines/approaches, as defined by the H2020's initial structure. They are divided in four groups – excellent science,

industrial leadership, societal challenges, diversity of approaches – with each of them bringing in single or multiple scientific domain(s) or addressing specific challenges. They are as follows:

- SL1: European Research Council
- SL2: Future and Emerging Technologies
- SL3: Marie Skłodowska Curie Actions
- SL4: Research Infrastructures, incl. e-infrastructures
- SL5: Leadership in Enabling Industrial Technologies
- SL6: Access to Risk Finance & Innovation in SMEs
- SL7: Health, Demographic Change and Wellbeing
- SL8: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
- SL9: Secure, Clean and Efficient Energy
- SL10: Smart, Green and Integrated Transport
- SL11: Climate Action, Environment, Resource Efficiency and Raw Materials
- SL12: Europe in a changing world □ Inclusive, innovative and reflective societies
- SL13: Secure societies □ Protecting freedom and security of Europe and its citizens
- SL14: Spreading Excellence and Widening Participation
- SL15: Science with and for Society
- SL16: European Institute of Innovation and Technology
- SL17: Non-Nuclear direct actions of the JRC
- SL18: Instruments of H2020
- SL19: EURATOM

## Domain

RRI in general, but with an idea to produce real ‘operationalisation’ of RRI into the following six key elements: ethics, gender equality, governance, public engagement, science education and open access. It could be easily linked to any scientific discipline and any related research practice and approach. It also aims global recognition thus involving partners outside Europe. Out of nineteen social labs, seven of them are dedicated to the Societal Challenges, a concept set by European Commission and partly linked to the RRI as a R&I policy. Therefore, three are partly responding to RRING’s four domains, tackling complex set of issues related to energy, bioeconomy and waste management.

## Any other remarks

The NewHoRRizon project published its first policy brief in May 2018 on the status of RRI in H2020.

The policy brief aims at offering evidence-based policy recommendations □ informed by the first inputs of NewHoRRizon research efforts across 19 social labs □ to policy makers,

journalists and interested researchers on the state of play of Responsible Research and Innovation (RRI) in Horizon (H2020) and proposing immediate actions to consider for mainstreaming RRI in the next framework program, FP9.

The early research highlights steps that the EU has already initiated to advance RRI in H2020 programming, such as including commitments in the founding regulation of the programme and establishing devoted activities through the Science with and for Society programme. However, findings also point to numerous challenges for widespread and sustained implementation across H2020 programming and projects. First results indicate a range of policies that could be pursued to build capacity of the European R&I enterprise to realize RRI.

#### 5.4.5.4 HEIRRI

The aim of HEIRRI project (Higher Education Institutions and Responsible Research and Innovation) is to start the integration of RRI within the formal and informal education of future scientists, engineers and other professionals involved in the R+D+i process. RRI (Responsible Research and Innovation) is a transformative emerging principle of research and innovation policy. The RRI concept emerges from scholarly research that is critical of the status quo of the science – society interface.

HEIRRI mainly works around the six RRI «key aspects» identified by EC (societal/public engagement, gender equality, open access, science education, ethics and governance in R&I), but above all those six “keys”, HEIRRI wants to stress the potential of RRI as a transformative, critical and radical concept.

HEIRRI has created and shared on OA a stock-taking inventory constituted by a State-of-the-Art Review and a Data Base. The inventory provides results of other EU funded RRI projects, good cases and practices of RRI and RRI Learning. Also, different stakeholders involved and/or affected by R&I participated in a debate and reflection process on RRI Learning through online and offline Forum actions.

Results from the inventory have represented the basis for RRI Training programs and formative materials, offering the students knowledge and skills to develop viable solutions to specific problems related to R&I, integrating theory and practice. They were designed for the different HEI educational levels (undergraduate, MD and PhD, summer courses and MOOC), mainly based on Problem Based Learning methodology, and supported by multimedia materials (videos and micro-videos, 2.0 materials, etc). All results and products elaborated by HEIRRI are uploaded at RRITools Platform.

A global scope and expertise on RRI were provided by the HEIRRI consortium consisting of 9 partners from 6 different countries – Spain, Belgium, Germany, Denmark, Norway and Croatia. Five are European HEIs (Universitat Pompeu Fabra, Universitetet I Bergen, Aarhus Universitet, Institut Für Höhere Studien und Wissenschaftliche Forschung, University of Split). Other four are representing different aspects of professional environment: European network of science centres and museums – Ecsite, “la Caixa” Foundation, a network of

universities (Associació Catalana d'Universitats Públiques – ACUP) and a private company specialized in R&I (Innovate). Therefore, it appears that Northwestern Europe was mostly represented + Croatia as a partner from Southeastern Europe.

In addition, three advisory boards supervised whole process; each one with specific aims and tasks, has contributed to the decisions about some parts of the HEIRRI activities:

- the Multidisciplinary Contents Council (MCC),
- the Business & Entrepreneurship Advisory Board (BEAB),
- the Science Communication & Internationalization Advisory Board (SCIAB).

## Stakeholders

Major stakeholders for the HEIRRI project are coming or are linked with the higher education institutions. Those are, not exclusively, RPOs, researchers and industry/SME (business and entrepreneurship). HEIRRI network is, therefore, composed of professors, researchers, CSO and industry representatives and many others, gathered together with the goal of the integration of RRI into HEIs. The project involved a variety of actors as well, somehow connected with higher education institutions, who gave insights in RRI from a teaching, learning and other contexts. HEIRRI Consortium and the three Advisory Boards played an active role in the conference and also acted as multipliers in its dissemination.

To the limited extent, also in the areas of higher education. HEIRRI project might be useful for policymakers and national and international bodies.

## Sources

**HEIRRI project website:** [heirri.eu](http://heirri.eu) is one of the tools for dissemination activities. Website contains information about the consortium, HEIRRI conferences, questionnaire for joining the HEIRRI community, list of international Pilot institutions, HEIRRI Training programmes, All Deliverables, Online Forum, Newsletter, Pressroom, Videos, news section. Objectives of the website as well as all online sources are: to raise the awareness and knowledge of RRI; to contribute to the co-development of Open Access specific instruments that stimulate the integration of RRI in professional careers, with a global perspective; to contribute to the integration and institutionalization of a debate, within everyday HEI routines, for discussion, deliberation and negotiation of RRI aspects. Project website seems to be inactive since October 4, 2018 (last post).

**HEIRRI Training Programmes** and formative materials designed for different educational levels (bachelor's, master's, PhD, MOOC, Summer schools, train-the-trainer, secondary school teachers), mainly based on innovative and participative methodologies (following a “Problem-based learning” approach) and presented in multimedia formats available at <https://www.rri-tools.eu/heirri-training-programmes>

Available online documents are mainly **project outcomes**: all **deliverables** are available online at <http://heirri.eu/deliverables-all/>.

The Forum Guide of Work details the strategy for the HEIRRI Forum activities. First Conference Report details the organisation and development of the 1st HEIRRI conference. The main objective of the Inventory Guide of Work is to outline the work done in Inventory Guide of Work and its interrelatedness with the other work components of the HEIRRI project. The results of the State-of-the-Art review of RRI and RRI learning gives a background for the development and piloting of training programmes and materials, provides a review of RRI in teaching contexts as well as a database of relevant examples of existing practices. HEIRRI database contains the evidence collected during the State-of-the-Art review and provides open access to its contents. Training Programs Design Guide of Work states the specific protocol of work, criteria and mechanisms of decision-taking as well as the points and processes for interaction between WP leaders, Advisory Boards and Forum. Training Programs Design presents the final HEIRRI training programmes and the process of developing them. Training Materials Protocol states the specific guide of work and processes for interaction between WP leaders, Advisory Boards and Forum of Training Materials Protocol, and the materials created. Internationalisation Plan establishes the exact terms and details of WP6 and the instruments of coordination with the rest of WPs, RRITools and the 3 Advisory Boards. Communication and Dissemination Plan establishes the terms and details of Communication and Dissemination and the instruments of coordination with the rest of WPs. Evaluation Protocol explains the specific strategy and the methodology to guide the internal evaluation of the HEIRRI project. Coordination and Management Plan of the HEIRRI project presents development regarding these tasks.

Several project publications and one published paper:

- HEIRRI publication policy document where principles of group and individual authorship for publications (scientific papers and project reports) arising from HEIRRI are explained<sup>1952</sup>
- HEIRRI booklet “Teaching and Learning RRI” document presents the teaching resources of the European project HEIRRI (Higher Education Institutions & Responsible Research and Innovation) and explains how to use them in the endeavour of teaching Responsible Research and Innovation (RRI) in universities and higher education institutions (HEI)<sup>1953</sup>
- Teaching Responsible Research and Innovation: A Phronetic Perspective. This paper focuses on RRI teaching at higher education institutions. On the basis of interviews and reviews of academic and policy documents, it highlights the generic aspects of teaching aimed at evoking a sense of care and societal obligation and provides a set of exemplary cases of RRI-related teaching.<sup>1954</sup>

<sup>1952</sup> [http://www.guninetwork.org/files/images/imce/heirri\\_authorship\\_protocol.pdf](http://www.guninetwork.org/files/images/imce/heirri_authorship_protocol.pdf)

<sup>1953</sup> [http://www.guninetwork.org/files/heirri\\_teaching\\_and\\_learning\\_rri.pdf](http://www.guninetwork.org/files/heirri_teaching_and_learning_rri.pdf)

<sup>1954</sup> <https://link.springer.com/article/10.1007%2Fs11948-018-0029-1>

## Method

HEIRRI project is tackling all related RRI parameters due to its transversary, overarching role as the attempt for setting RRI concept and its political agenda inside higher education institutions. Since all RRI elements/keys/pillars are here, it might be seen either as a starting point in reviewing RRI position inside four key domains' practical implications, or as a useful tool for the integration of RRI core values (for post-RRI EC R&I policies) into practical segments of scientific projects, whenever we're speaking of RRI or any other related global context.

HEIRRI project offers designed and tested training programmes for teaching and learning RRI in higher education. The project obtained insights from consulting higher education stakeholders, which led to the main conclusions for the final design of the training programmes.

The State-of-the-Art Review included a 'scan' of a sample of very broad literature with the intention of identifying evidence relating to 'teaching' about Responsible Research and Innovation. The sample of papers consisted of documents directly targeting the RRI concept as well as papers relating more indirectly to the notion of responsibility in RI. A total of 334 documents constituted the sample for the scan.

A collection of projects on RRI were scanned for relevance to HEIRRI objectives. The review focused on perspectives relevant to the 'teaching and learning context' emphasis of HEIRRI by targeting the results of these projects as communicated in deliverables and other registered project outputs. A total of 55 European projects were scanned.

The review also involved a set of consultative procedures aimed specifically at harvesting 'RRI teaching' resources. One consultation component was a series of qualitative interviews with key educators and scholars in educational research, who have had extensive experience with bringing aspects of responsibility into education in higher education institutions. The informants were selected through an internal procedure, where members of the consortium from Barcelona, Bergen, and Aarhus nominated informants. The interviews were explorative and were carried out as loosely structured conversations. A total of 17 interviews were conducted.

The members of the advisory boards and the Forum around HEIRRI constitute a separate source of information for the review. The review has probed the members of the advisory boards and the Forum around HEIRRI about information on 'RRI in teaching' resources.

Furthermore, the review consulted a broader range of scholars and practitioners engaged in teaching and learning activities related to responsibility in research and innovation.

Finally, presentations and activities at the 1st and 2nd HEIRRI Conferences were considered as part of the review. First Conference was organised in Barcelona on March 18, 2016. A special workshop at the end of the conference day had the particular purpose of summarising main messages from the conference tracks as well as collecting examples of specific courses or materials relating to RRI. The conference established dialoguing within university: a

transdisciplinarity as the key for RRI learning; co-creating transformative learning by open design.

The 2nd HEIRRI Conference, organised in Vienna, on April 27, 2018, presented the results of nearly three years of project activities designed to promote the integration of RRI within the education of scientists, engineers and other professionals involved in the R&D process. Participants, including high-level education representatives, academics, industry, international associations and other stakeholders, had the opportunity to discuss the HEIRRI training programmes and their piloting, to join debates on the future of RRI in Europe and beyond, to discover other initiatives on RRI training, and to engage in multidisciplinary sessions.

**Keywords:**

- Action Research
- Science dialogue
- Technology dialogue
- Sustainable development

**Project selection**

HEIRRI project is a balanced initiative targeting one specific group – higher education system – with clear agenda, goals and outcomes. As such, it deserves deeper recognition and related analysis of RRI community and relevant stakeholders, although it shares same, unfortunate destiny as almost any other large RRI endeavour after EC policy shift in 2015. However, it may offer crucial recommendations and insights regarding, for instance, integration of RRI learning modules into all levels of higher education system (BA, MA, PhD). Therefore, it could serve as a starting point for creating a faculty programs tackling one or more key domains, where this context is applicable.

**What is RRI about the project**

Pure RRI project, which is relevant to all scientific disciplines, including RRING's four scientific domains. It was funded under Horizon 2020 SWAFS call "Make scientific and technological careers attractive to young students, and foster sustainable interaction between schools, research institutions, industry and civil society organisations". Unfortunately, it stayed without a clear strong successor in project terms, while practically it became irrelevant on a wider scale due to the EC R&I policy U-turn.

**Domain**

RRI in higher education institutions; RRI training materials for PhD students and young researchers; researchers' professional development.

It could be easily linked to any scientific discipline and any related learning practice, including HR development at research institutions.

### **Any other remarks**

It would be beneficial to invite HEIRRI's key team members to participate at some of RRING's forthcoming events ((advocacy) meetings, workshops, interviews, conferences...) for allowing them to share their experience, findings and recommendations with the consortium and involved practitioners.

### **5.4.5.5 RRI PRACTICE**

RRI-Practice is a 3-year project under Horizon 2020. Its aim is to understand the barriers and drivers to the successful implementation of RRI both in European and global contexts; to promote reflection on organisational structures and cultures of research conducting and research funding organisations; and to identify and support best practices to facilitate the uptake of RRI in organisations and research programmes. The project will review RRI related work in 22 research conducting and research funding organisations and will develop RRI Outlooks outlining RRI objectives, targets and indicators for each organisation.

The main aim of RRI-Practice is to analyse RRI related discourses and pathways to implementation, including barriers and drivers, in 22 research conducting and research funding organisations, in 12 European and non-European countries, in order to identify, understand, disseminate and promote RRI implementation best practices that can be scaled up at European and global levels.

- i. To develop an analytic framework for analysing organisations' operationalisation of responsibility and RRI, and associated barriers and drivers, allowing for the design of well-targeted RRI objectives, measures and indicators.
- ii. To conduct 12 national case studies, containing in total 22 organisational RRI reviews and Outlooks, as well as an internal RRI report for the project.
- iii. To analyse and compare barriers to and drivers for successful implementation of RRI for each of the EC RRI policy keys, as well as on other interpretations of RRI provided by the organisations studied.
- iv. To identify, disseminate and promote RRI implementation best practices that can be scaled up at European and global levels.

### **Stakeholders**

RRI Practice has a range of stakeholders who are assigned different roles. Some of the stakeholders act as internal stakeholders, in this case the project partners. These stakeholders

are actively involved in the day-to-day activities and running of the project. Among them, there are universities, research institutes or research performing organization such as Oslo Metropolitan University, Ostfole Research and The Institute for Technology Assessment and Systems Analysis (ITAS) at the Karlsruhe Institute of Technology to mention a few. Also, some of the internal stakeholders include industry representatives and policy institutes that work in partnership with many other research bodies, local authorities and universities including collaborative projects with a large number of industrial partners.

Further, RRI practice has Non-Governmental Organisations (NGOs) such as the Applied research and communication Fund (ARC Fund) from Bulgaria. ARC is an NGO active in the field of research and innovation policy with the aim of supporting the knowledge-based economy. One important thing about the internal stakeholders of the project is that they are not from one region of the world but includes partners from other parts of the world such as China, USA, Brazil, Australia and India.

## Sources

The type of sources used for the review of the project included any of the following:

- **Project outcomes**
  - National workshop reports: The aim of the national workshops was to explore how RRI and responsibility in science and innovation is understood across different national cultures and were attended by different stakeholders identified above.
- **Published reports**
  - RRI-Practice Policy Briefs provide short and most relevant information about the concept of Responsible Research and Innovation, about the RRI-Practice project, and about the most relevant and interesting findings from the national case studies.
  - National Case Study Reports on findings from the research on the status and implementation of Responsible Research and Innovation in 12 RRI-Practice countries. The National Case Study Reports present the findings from the research on the status and implementation of Responsible Research and Innovation in 12 RRI-Practice countries. The reports examine the national RRI context, and then present the findings from two detailed organisational case studies – a research funding and a research performing organisation. The reports also bring forth a set of policy recommendations
- **Published articles**
  - Ferri, F. et al. (2018). Governance and Sustainability of Responsible Research and Innovation Processes. Cases and Experiences. Springer International Publishing.

- Catherine Egeland, Ellen-Marie Forsberg & Tatiana Maximova-Mentzoni (2019) RRI: Implementation as Learning
- Luis Reyes-Galindo, Marko Monteiro and Phil Macnaghten (2019) Opening up' Science Policy: Engaging with RRI in Brazil
- Ellen-Marie Forsberg, Clare Shelley-Egan, Miltos Ladikas and Richard Owen (2018) Implementing Responsible Research and Innovation in Research Funding and Research Conducting Organisations – What Have We Learned So Far?
- **RRI-Practice Newsletters**

## Method

RRI Practice involve a number of methods in its activities which include.

- Public consultation and public engagement: As part of the European RRI-Practice project, each partner organised a stakeholder workshop in order to assess the understanding of Responsible Research and Innovation (RRI) in the national Science, Technology. In total 12 workshops have been conducted (in Australia, Brazil, Bulgaria, China, France, Germany, India, Italy, the Netherlands, Norway, the United Kingdom and the United States.
- and Innovation (STI) debates and discuss the practice of RRI within their own national context.
- Case studies allowing for in depth studies of, and dialogue with, the included organisations for systematic analysis and comparison of drivers, barriers and best practices on each dimension of RRI
- Focus groups discussing organisational RRI Outlooks

## Project selection: What is RRI about the project

The project is about all the RRI pillars suggested by the EU such as engagement, gender. It is aimed at encouraging RRI practice in research. The RRI Practice project intends to advance European and global awareness of RRI, support its implementation in practice and provide a solid empirical knowledge base on RRI implementation. The main aim of RRI-Practice is to analyse RRI related discourses and pathways to implementation, including barriers and drivers, in 22 research conducting and research funding organisations, in 12 European and non-European countries, in order to identify, understand, disseminate and promote RRI implementation best practices that can be scaled up at European and global levels. The RRI-Practice project will contribute to the advancement of the governance framework of RRI.

## Domain

The project main domain is considered to be cross cutting across all the domains that the RRING project is interested in. There is a strong focus on, to some extent, the project can be directly related to practice in cross-domains.

### 5.4.5.6 MORRI

The Monitoring the Evolution and Benefits of Responsible Research and Innovation (MoRRI) project examined RRI in all EU countries over the course of three years. Responsible research and innovation (RRI) typically covers six areas: gender equality, science literacy and science education, public engagement, ethics, open access/open data and governance. MoRRI project set out to implement a monitoring system for RRI across those six areas. The project identified indicators for the evolution of RRI, as well as four benefits of RRI, namely: social, democratic, economic and scientific. Additionally, it conducted preliminary work for the development of impact indicators for RRI.

## Stakeholders

The monitoring project was led by RPOs and independent researchers. Academia, research and technology organisations, policy and industry, and experts of the European Commission participated in a visioning workshop. These RPOs performed case studies to examine RRI aspects of EU funded projects, the industry as well as of other RPOs. Additionally, surveys were sent out to:

- Science in society stakeholders.
- Research-funding organisations.
- Higher education institutions.
- Public research organisations.

The outcomes of the project, such as the country clusters based on RRI indicators can help Member States as well as the European Commission to identify areas for intervention and improvement, and the results can help nurture ideas for prioritisation in the Framework Programme.

Additionally, for researchers, RPOs and RFOs, the 11 sub-dimensions may provide a helpful framework for reflection and strategic decision-making towards cultivating RRI.

## Sources

- [Monitoring the evolution and benefits of Responsible Research and Innovation - Executive summary/Résumé](#)

- [Monitoring the evolution and benefits of responsible Research and Innovation - Report on the researchers' survey](#)
- [Monitoring the evolution and benefits of responsible Research and Innovation](#) - The evolution of responsible Research and Innovation : the indicators report
- [Monitoring the evolution and benefits of responsible Research and Innovation](#) - Report on the researchers' survey : annex 1, full breakdown of results
- [Monitoring the evolution and benefits of responsible Research and Innovation](#) - Report on the researchers' survey : annex 2, statistical analysis
- [Monitoring the evolution and benefits of responsible research and innovation in Europe – Summarising insights from the MoRRI project](#)

## Method

The Monitoring the evolution and benefits of Responsible Research and Innovation (RRI) project took three three-and-a-half years and included all EU countries. Efforts were made in terms of conceptual thinking, data challenges, pragmatic solutions, critical reflections. This ultimately led to substantial findings.

All RRI dimensions (Gender equality, Public engagement, Science literacy and science education, Open access, Ethics, and as overarching dimension Governance) underwent an initial scoping. This was done via an intensive collection of data through the collecting already existing data as well as launching various surveys - was complemented by qualitative research in the form of case study analysis and the identification of benefits.

Testing the data results for robustness and significance led to identification of core indicators and a clustering of EU countries. Conceptual ideas about the identification and measurement of benefits led to the development of impact pathways, which suggest that RRI dimensions are overlapping and self-reinforcing and creating a range of benefits.

## Project selection

This project was predetermined for review. It was funded by the EU to monitor and determine benefits of RRI, and all EU countries were included in the study. Its outcomes are referenced and implemented in the Horizon 2020 - Work Programme 2018-2020. As RRING project covers the same topic, the project is relevant from a theoretical standpoint and should be considered when researching RRI in the four domains, especially in Europe.

## What is RRI about the project

The project studied all six dimensions of RRI: gender equality, science literacy and science education, public engagement, ethics, open access/open data and governance.

The projects started with more than 36 indicators for the six RRI dimensions. Their relation to each other was analysed after which 11 RRI dimensions materialized empirically. 25 indicators emerged as particularly strong indicators for these 11 dimensions. Their purpose is to characterise individual countries, but also to explore similarities and differences between and within clusters of countries.

### ***Gender equality***

The gender equality dimension was examined by using indicators for these three sub-dimensions:

- Representation of women in research and innovation
- Promotion of gender equality
- Inclusion of gender in R&I content

### ***Science literacy and science education***

This dimension was defined in the conceptual phase as being generated through activities that aim to provide citizens with a deeper understanding of science, to shape their attitudes towards science, and to develop their abilities to contribute to science and science-related policy making. Concretely, this was examined via indicators for science curricula, RRI-related training, science communication culture and citizen science.

### ***Public engagement***

Conceptually defined as activities where there is a distinct role for citizens and/or societal actors in research and innovation processes. A defining characteristic is the complexity of objectives for public engagement and the variation in mechanisms for engagement.

### ***Open access***

This refers to the idea of making research results freely available to anyone that wants to access and re-use them. Indicator showed that shares of open access publications vary greatly across countries, from 20 to 40 % over the period 2012-2015.

### ***Ethics***

The MoRRI project defines ethics in the following way: *Ethics as a scientific discipline is concerned with normative rules for everybody. In the context of research and innovation, ethics is a common platform for deliberation and discussion of values in society, that are based on perceptions of right and wrong, influenced by cultural norms, and aiming at informing policy making.* Ethics is measured both for public research organisations and funding organisations and concerns to what degree ethics or research integrity committees are in place, and the strength and breadth of their influence on research activities. The project revealed there is a wide variation in the prevalence of research ethics committees across Member States.

**Governance**

Indicators here include the ‘use of science in policymaking’, ‘RRI-related governance mechanisms’ and ‘RRI-related governance mechanisms’ to determine this dimension for the MoRRI project.

**Domain**

The project does pertain to any of the four domains. However, it is entirely focused on RRI and therefore relevant for the RRING project.

**5.4.5.7 RESPONSIBILITY**

The project RESPONSIBILITY was a Coordination and support action, under FP7 Science in Society (2013-2016). The project’s overall aim was to improve an understanding of the then (quite newly) aspiring concept of Responsible Research and Innovation (RRI) and develop tools and mechanisms to facilitate the uptake of RRI across Europe and beyond. The projects main outcome has been the creation of an online Forum and a virtual Observatory, in order to facilitate a network of stakeholders to adopt and diffuse a common understanding in RRI. Hence, the underlying rationale was that RRI is assumed to be a somehow blurred and fragmented concept that required bottom-up stakeholder engagement in order to be brought to life.

Against this background, the project aimed to develop a model and provide a tool for international cooperation, the RESPONSIBILITY Observatory, involving the societal, policy and research stakeholders to these activities. It intended to provide practical means and structure interaction between society and research, providing a set of recommendations and tools to policy makers and active RRI stakeholders (as multipliers) in order to take the necessary measures to nest responsible research and innovation into products and services from the very beginning (“efficient RRI by design”).

The Observatory provides the medium (electronic space for interaction) for storage of knowledge (the repository and monitoring function of the Observatory), while the FORUM is supposed to provide knowledge-creation (participation and deliberation through the Forum) with regard to the notion of RRI.

Both structures, the FORUM and the OBSERVATORY were intended to allow tracing the developments in the field, identifying problematic issues and raising alert, but also creating the conditions for addressing the conceptual inconsistencies and insufficiencies with regard to both the RRI definition and RRI implementation.

The Forum and the Observatory as means of networking were supposed to enable the further development of the idea of RRI by providing a platform for the encounter and exchanges between various perspectives from different contexts around the world towards a co-construction mode of interaction while addressing the abovementioned challenges.

## Stakeholders

The main aim of the project was neither to provide direct theoretical reflection on the meaning and definition of RRI, nor to provide direct empirical research into the use and application of the concept. Rather, the aim was to provide a Forum and Observatory for other actors working in the field of RRI to discuss, develop and disseminate RRI as a concept (encouraging reflexive co-construction of norms related to Research and Innovation). RESPONSIBILITY intended to create structures to enable others to reflexively construct and implement recommendations according to their needs.

RESPONSIBILITY suggested a very broad stakeholder differentiation to be addressed in the Forum and the Observatory, assuming that their notions of RRI would vary according to their needs and interests:

- Policy-makers: national governments; regional governments; international governmental organizations
- Civil society organizations
- Research and Education Community (scientific research projects (those carrying out research relevant to RRI, regardless of whether they are aware of RRI), and policy researchers (those researching RRI as a policy tool, or those with an interest in similar concepts).
- Business and Industry

First, material in the *Observatory* has been gathered tailored to expected stakeholders' expectations and interests in RRI in so called pre-compiled RRI packages. The four pre-compiled packages are for "Policy Makers", "Research and Education Community", "Business and Industry" and "Civil Society". Thus, they are targeted at stakeholder groups according to the sorts of material that might be of interest or useful for that group.

Secondly, material is also available unpackaged and tagged which allows for individual self-compilation by users according to their interest ("custom made packages").

The *Forum* has been created as a space for the discussion of appropriate guidelines and overall approaches to RRI, in a manner which is inclusive to the four different stakeholder groups. The Forum was envisioned to be a central reference and contact point for those who wish to contribute to determining the meaning of RRI, in the assumption, different stakeholders would address specific issues and articulate different understandings of RRI.

In order to address the different stakeholders and provide spaces for a constructive RRI commitment the project decided to split the Forum into five functional areas which are dedicated to the different needs for discussion, deliberation or cooperation. These are the RRI Caucus, Partnership Initiatives, Open Spaces and the Caucus suggestion board. The fifth area, the RRI Government, is about the overall governance and management of the Forum and the RRI Caucus in particular.

**RRI Caucus:** The RRI Caucus is a virtual meeting place where experts from politics, society and industry meet in order to prepare tools and scenarios for current and future research and

innovation projects in a collaborative virtual environment called Dynamic Coalition. In order for the Forum to be a place for the public to deliberate on issues of RRI these tools and scenarios prepared in the Dynamic Coalitions will be assessed in regard to their desirability, ethical risks and chances within organized and moderated events which are called Innovation Cafés. The tools and scenarios prepared and assessed in the RRI Caucus are the main source of content created for the Observatory by the Forum. The RRI Caucus is governed on the one hand by the RRI Government (see below) whose duty is to monitor and steer the overall RRI Caucus process and on the other hand specific moderators who are familiar with the topics at stake in the individual Caucuses.

**Open Spaces:** The Open Space is a virtual meeting place in which all community members are able to deliberate on all RRI issues that fall outside the scope of the RRI Caucus Process. This might include, raising general questions about RRI, expressing once fears and hopes or opinions in regard to a certain research or innovation. The Format is envisaged as a simple online Forum in which participants can open new topics and reply to each other's responses. The Open Space complements the RRI Caucus by providing an easy to access, immediate place for participation. This implies that there is no specific organization to the discussion but the wisdom of the crowd.

**Caucus suggestion board:** The Caucus suggestion board, was intended to be a virtual meeting place for all members of the community to suggest future RRI caucus topics and thus to participate in the agenda setting on relevant RRI topics. By providing a platform that enables everybody to express, comment and rate on the need for new RRI Caucus processes, the Responsibility Forum offers a way to include public trends and concerns without putting the RRI Caucus at risk of getting occupied by one sided stakeholder perspectives. It is then up to the RRI Government to decide whether and in how far a certain topic will be taken as the next subject for an RRI Caucus process.

**Partnership Initiatives:** Based on the assumption to leverage RRI by practicing, the project intended to provide this space for support in any project and to enable stakeholders to find a professional expert with sufficient knowledge of the respective domain and RRI issues. Thus, the Partnership Initiative is the central reference and contact point to introduce projects proposals and to find partners. However, the Partnership Initiative is a place for all Forum members to get in contact with each other in order to facilitate collaboration and mutual learning in regard to the actual implementation of RRI related projects.

**RRI Government:** The RRI Government refers to the organisation responsible for running and maintaining the Responsibility Forum. The RRI Government was intended to consist of the board of RRI governors who have been provided with a government facility within the Forum architecture. This is the place where they can meet and discuss all issues regarding the progress of the Forum. The duty of the RRI Government is to identify the topics for upcoming Caucuses, to initiate the process and to monitor the quality of the outcome.

## Sources

The type of sources used for the review of the project included the following:

- Project website: <http://responsibility-rri.eu/>
- Project deliverables: all public Deliverables can be accessed on the project website<sup>1955</sup>
  - Deliverable 2.1: Network of Networks
  - Deliverable 5.2 Assessment Report
  - Deliverable 3.2 Forum implementation report
  - Deliverable 4.3 Observatory of RRI
- GO4 conference: Go4 Joint Final Conference<sup>14</sup> -15 January 2016; in February 2013, final event of the four EU-funded projects (FP7, SiS work programme 2011), the “Go4” comprised GREAT, Res-AGorA, ProGReSS, and RESPONSIBILITY. At the conference, the Go4 projects presented key results of their work.
- Conference paper
  - Ajami, Mohamad & Grabner, Louisa & Giambene, Giovanni & Le, Van & Luong, Doanh & Pearson, John. (2016). Online platform for conducting responsible research and innovations. 1-2. 10.1109/RCIS.2016.7549368.

## Method

RESPONSIBILITY involved a number of methods in its activities including Multi-stakeholder Workshops and Stakeholder consultation workshop on the Forum and the Observatory:

Two one-day workshops conducted in Brussels with a variety of stakeholders such as representatives from Science and academia, Policy maker (EU officers and DGs), and Civil Society representatives.

Large stakeholder consultation (2014) with representatives from Science, Politics and Civil Society environmental and social organisations) in Malaysia, “The First Asia Pacific Responsible Business Innovation 2014” to bring together various stakeholders from different background and business entities that directly or indirectly play a role in promoting, practicing or propagating Responsible Research and Innovation (RRI) in the context of Asia Pacific region. Through this workshop, the RESPONSIBILITY project aims to obtain views and positions regarding certain areas that the project could take action implementing its strategy, on the dissemination and integration of Responsible Research and Innovation. The invited participants were mostly attached with either industry, university, R&D institute or government agencies in Malaysia. The stakeholders were divided into four groups; R&D and Commercialization (Governance Policies and Procedures); Business Innovation and Application of RRI; RRI in Science, Technology and ICT (Design, Development and Application); and RRI Participation and Engagement.

<sup>1955</sup> <http://responsibility-rri.eu/the-project/overview/>

Large stakeholder workshop in Chile (2015): “Towards a critical analysis of RRI in the mining industry”, at Advanced Mining Technology Center (AMTC), Universidad de Chile. , the workshop included the contributions of different stakeholders from NGOs, Engineering Sciences, and Politics; particularly those that are dealing with social and environmental responsibility, as well as some case studies that explore the ethical responsibilities of mining industry along with the capability of mining exploitation to contribute in sustainable development. The workshop discussed challenges and recommendations for regulation of the mining industry in light of comprehensive stakeholder inclusion.

User studies to assess the usability of the Forum (to determine ease of use, willingness to use, features) and functionality, with:

**Focus Groups:** Focus groups (the recommendation was 5-8 people: Greenbaum, 1998) were used to allow participants to share perspectives regarding a particular tool. These were conducted following user studies where participants were allowed to interact with the Forum and Observatory; or in regard to the Analytic grid, where the reasoning behind the tool was discussed with participants, and they were able to share their perspectives on this, based on their own contextual and situated understanding of research and innovation in various domains.

**Task based user studies:** User based task studies of participants (the recommendation was three pairs of participants) were informed by the quasi-naturalistic experimental method (Luff et al, 2011; de la Flor et al, 2010), which has shown to be powerful in eliciting and suggesting implications for the design and development of prototype technologies. The user studies were to be conducted in pairs, so as to allow for a discussion of issues out-loud, to be captured for data collection and analysis. Given the distributed nature of the assessments, the studies were scaffolded by task-based activities which participants had up to an hour to complete, filling out task sheets as records of their undertaking. There was an observation of participants as they did this, and most partners who conducted the studies were able to also video record the studies for data analysis purposes. The importance of these user studies was to allow for participants to experience using the platform first-hand, and record views as they did this, and also for this to inform discussion in associated focus groups.

**Reflection:** The design of the assessments provided advantage in terms of allowing a broad range of stakeholders from multiple, geographically distributed institutions experience using the platform. However, designing assessment studies to be conducted over a three-year period, in many different cultural and institutional contexts did provide methodological challenges. For example, partners were requested to conduct focus groups following the conducting of task-based user groups, but not every partner has been able (for cultural and other reasons) to engage with the deliberative formats.

- Online Questionnaires (Likert scaling to determine users’ attitudes of the Forum): Online questionnaires were devised in order to allow for distributed participants to share their opinion of the platforms through a Likert Scale.
- Individual interviews with representatives from stakeholder groups and potential users of the Forum and Observatory.

### **What is RRI about the project?**

As one of the pilot projects on RRI, RESPONSIBILITY focused on basic conceptual challenges regarding ethics and participation/deliberation as implied in early RRI definitions, rather than addressing variations or conceptual manifestations such as the RRI pillars suggested by the EU.

The project involved a multi-stakeholder approach in dealing with R&I matters and tried to bring the different stakeholder perspectives into interaction in order to facilitate determination of RRI, and the development of common ethical norms of RRI. It discussed the challenges and pitfalls of mutual stakeholder interaction in the context of different epistemic backgrounds, norms and values and power imbalances, as well the potential of deliberation among very different stakeholder.

Moreover, RESPONSIBILITY addressed the lack of conceptualizations in the RRI theoretical field on the implementation conditions of RRI on the one hand and to the compartmentalized implementation instruction of the European Commission (the six separate “keys”) on the other (where restricts ethics to a separate component engaged with legal compliance considerations in research and governance – to government).

The project mainly contributed to an exploration of the status of ethics and the different notions of ‘Responsibility’ in Science and Innovation practice and governance. It discussed common approaches that place ethics as a complementary concern in the innovation process (post-factum ethical review, checking compliance with professional codes of conduct, adherence to the existing legal framing). Others try to integrate it through interdisciplinary consultations (ethics as specific expertise provided by the social sciences and humanities) or through attempts to take into account values held dear by the public into the innovation construction (value-sensitive design). RESPONSIBILITY took a critical account on the perception that ethics is a somehow independent, separate component (one pillar) and not a condition (implied throughout the process) of innovation governance.

### **Domain**

Other: The project does not relate to any specific domain of the RRING project, but is stakeholder related.

### **Any other remarks**

The project does not focus specifically on one of the allocated domains, we determined in RRING.

Also, as mentioned above, the project is special in being one of the pioneering RRI projects, hence dealing with rather general and conceptual issues.

The approach of the project to *align* various stakeholders' understandings of RRI can be questioned nowadays where research but also empirical practice within the realm of RRI implies a more differentiated view on RRI that is keen on opening up rather than closing down on a specific definition or narrow set of practice. Simultaneously, we can observe a growing emphasis on moving beyond Eurocentric concept of RRI, but to open up for other experiences and practices worldwide.

#### 5.4.5.8 PRINTEGER

Promoting Integrity as an Integral Dimension of Excellence (PRINTEGER) in Research is a project funded by the European Union in the framework of Horizon 2020. Its mission is to enhance research integrity by promoting a research culture in which integrity is part and parcel of what it means to do excellent research, and not just an external and restrictive control system. To promote such a culture, an improved governance of integrity and responsible research has to be informed by practice: the daily operation of researchers and the tensions of a complex research system.

PRINTEGER will provide concrete tools and advice to promote research integrity in Europe through four specific target groups:

- advice on an optimal policy mix and opportunities for harmonisation to research policy makers.
- best practice approaches to foster integrity for research leaders and managers.
- advice on the use of IT tools and organisational measures for research support organisations.
- Practice-informed educational tools for ethical training and reflection of early career scientists. PRINTEGER uses a unique approach that looks at procedures and guidelines, but also analyses how they operate in the context of daily research practice.

For this purpose, PRINTEGER gathers not only ethicists, but also very pertinent expertise that has barely informed integrity policy so far: legal studies, scientometrics, and social sciences, such as criminology and media studies; all flanked by intensive stakeholder consultation and dissemination activities to maximise impact.

Printeger is coordinated by Hub Zwart at Radboud Universiteit Nijmegen and includes a number of European partners. It is funded by the European Commission Science with and for Society programme and started September 2015.

#### Stakeholders

- RPOs,
- RFOs,
- Industry large and

- Policy makers,
- National and international bodies,
- Researchers.

## Sources

- Project documents like deliverables
- Overall PRINTEGER Documents and Results:
  - <https://printeger.eu/documents-results/>
  - <https://printeger.eu/wp-content/uploads/2016/02/Presentation-PRINTEGER-VUB.pdf>
- Web-pages <https://hioaresponsibleinnovation.wordpress.com/projects/printeger/>

## Method

- Action Research
- Participatory Design
- Participatory Action Research
- Participatory Research & Innovation
- Participatory Technology Assessment
- Service Learning
- Scientific Culture
- Social Communication
- Social Innovation
- Community Based Research
- Public consultation
- Science dialogue
- Technology dialogue
- Public involvement
- Patient involvement
- (Upstream) public engagement
- Science communication
- Anticipatory governance
- Public participation
- Sustainable development
- ELSI (Ethical, Legal and Social Implications of science)

## Project selection

- Overall PRINTEGER Documents and Results: <https://printeger.eu/documents-results/>

- Research/innovation policy & governance
- Policy brief for science policy makers and research managers <https://printeger.eu/wp-content/uploads/2018/08/D5.1.pdf>
- Policy brief for scientific and scholarly publishers: <https://printeger.eu/wp-content/uploads/2018/08/D.5.3.pdf>
- Ethics of science Codes and Legislation: <https://printeger.eu/wp-content/uploads/2018/04/D3.4.pdf>
- Report and proceedings of the European Conference on Research Integrity - <https://printeger.eu/wp-content/uploads/2018/06/D6.4.pdf>
- Report on the Multidisciplinary Reconnaissance of Research Integrity and Misconduct - [https://printeger.eu/wp-content/uploads/2018/06/DII.7.Final\\_.pdf](https://printeger.eu/wp-content/uploads/2018/06/DII.7.Final_.pdf)

### **What is RRI about the project?**

Some of the RRI characteristics practiced by PRINTEGER include Ethics, Science Education, Open Access & Data and Public Engagement. The summary below explains how PRINTEGER practices these characteristics.

PRINTEGER aims to contribute to improving adherence to high standards of integrity in research warranting high levels of public support for the sciences. In the short term, it will do so by improving integrity policies of national and international research organizations, but also by providing better tools for research leaders and managers. In the longer term, PRINTEGER will contribute to improve ethical awareness and reflection through the education of new generations of scientists with next generation educational tools.

Immediate contributions of PRINTEGER will include raised attention for realistic and effective integrity measures through dissemination, including a large conference, and immediate trial and use of much improved educational resources for teaching research ethics to future and young scientists.

### **Domain**

ICT and other

#### **5.4.5.9 RECODE**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768583 (RECODE project).

The project spans across a number of regions in Europe, namely, Italy, Netherlands, Greece, Belgium, Germany and Lithuania.

RECODE proposes a new technology platform fully compliant with this mandate and capable of contributing for a >20% reduction of CO<sub>2</sub> emissions in the medium to long term. This major impact will be achieved by:

- CO<sub>2</sub> capture, purification and conversion exploiting primarily REE which can be recovered from the waste heat (ORC)
- Substitution of additives entailing strong CO<sub>2</sub> generation in their current manufacturing routes (e.g., current FA production is generating 2.51 tons of CO<sub>2</sub> per ton of FA according to the ECOINVENT database against the -0.96 tons of CO<sub>2</sub> per ton of FA entailed by the adoption of only REE)
- Generation of nanofillers (CaCO<sub>3</sub>) whose CO<sub>2</sub> footprint is neutral (if marketed CaCl<sub>2</sub> is used) or even carbon negative (if CaCl<sub>2</sub> is prepared in house from CaO-containing rocks and HCl), as opposed to the current 0.21 tCO<sub>2</sub>/tCaCO<sub>3</sub> footprint (ECOINVENT database). However, most of the benefit in this case is indirect since these fillers: i) allow adoption of SCM in the cement paste to a larger extent counterbalancing their hydration- hindering effect; ii) enable 10-40% increase the mechanical resistance of cement, thereby allowing a significant decrease of the cement used in concrete (5 wt% can be considered as a cautionary estimation).

This project's main Domains include Bio economy and Waste management, and in fulfilment of its mandate, the RRI pillars identified include Open access, Sustainable research and Public engagement.

## Stakeholders

Category	Description
<b>Industry and/or commercial</b>	<ul style="list-style-type: none"> <li>• European industry</li> <li>• Cement industry</li> <li>• European chemical and energy industry</li> <li>• Biogas industry</li> <li>• Mineral/Fillers industries</li> <li>• Others as relevant</li> <li>• Financial institutions</li> <li>• Industrial Associations and other entities operating at EU and national level</li> <li>• Network associations for science, industry, politics and society</li> </ul>
<b>Policy making/institutional</b>	<ul style="list-style-type: none"> <li>• Institutional and political entities at EU level</li> <li>• Institutional/political entities at national/regional level:</li> <li>• National governments, line ministries (e.g., industry, environment etc.)</li> <li>• Regional governments, Research Energy and Clean Technology Clusters, etc.</li> <li>• Relevant European initiatives (e.g., SPIRE)</li> </ul>

<b>Research and scientific community</b>	<ul style="list-style-type: none"> <li>• Universities</li> <li>• Research centres</li> <li>• Research alliances/networks</li> </ul>
<b>Entities involved in related projects and initiative</b>	<ul style="list-style-type: none"> <li>• Consortium closed and ongoing relevant projects</li> <li>• Related external projects</li> <li>• EU wide initiatives</li> </ul>
<b>Civil society</b>	<ul style="list-style-type: none"> <li>• Non-profit organisations and foundations</li> <li>• Others</li> </ul>
<b>General public</b>	<ul style="list-style-type: none"> <li>• EU citizens and beyond</li> </ul>

Overall, it is expected that identified target stakeholders will play an important role by:

- Providing feedback on project activities and results
- Sharing knowledge and creating long term collaboration opportunities
- Supporting the identification of priorities and tailoring project activities to the needs of end-users
- Increasing the exploitation perspective of the project results
- Enhancing project visibility

## Sources

- Project documents like deliverables:
- D1.1 Project Quality Plan<sup>1956</sup>
- D8.3 Dissemination Plan (first release)<sup>1957</sup>
- Web-pages<sup>1958</sup>

## Method

- Participatory Design
- Participatory Action Research
- Participatory Research & Innovation
- Participatory Technology Assessment
- Scientific Culture
- Social Communication
- Social Innovation
- Citizen Science (Ciancia Ciudadana has a bit of a different connotation)
- Community Based Research
- Public consultation

<sup>1956</sup> [https://www.recodeh2020.eu/images/documents/RECODE\\_D1.1\\_ProjectQualityPlan\\_v1.0.pdf](https://www.recodeh2020.eu/images/documents/RECODE_D1.1_ProjectQualityPlan_v1.0.pdf)

<sup>1957</sup> [https://www.recodeh2020.eu/images/documents/RECODE\\_D8.3\\_Dissemination-plan\\_V1.0.pdf](https://www.recodeh2020.eu/images/documents/RECODE_D8.3_Dissemination-plan_V1.0.pdf)

<sup>1958</sup> <https://www.recodeh2020.eu/>

- Science dialogue
- Technology dialogue
- Anticipatory governance
- Public participation
- Sustainable development
- ELSI (Ethical, Legal and Social Implications of science)
- "Bosques pedagógicos" (Pedagogical Forests) (mix of public participation and environmental projects)

### **What is RRI about the project?**

The RECODE Project is a properly planned and carefully structured project, which in its implementation processes and planning ensures that Open Access is practiced. According to GA provisions (Art. 29.2), each beneficiary must ensure full open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its project results.

This means that people can freely access the data regarding the RECODE project through their main communication streams, namely, the website, (<http://www.recodeh2020.eu/>), which is a key tool for internal and external communication of information and knowledge transfer. To support the project communication, RECODE is also actively promoted through social media.

The sole RECODE Twitter account has been set up (<https://twitter.com/RecodeH2020>). Once more project results will be available and news will therefore be more appealing,

additional tools like Wikipedia, LinkedIn, Facebook, Slide Share, etc. will be considered to foster potential impact. This ensures that there is easy communication, visibility and access to information for everyone. This also involves aspects of Public Engagement as the general public is also one of the listed strategic partners for this project. Another RRI pillar clearly a by-product of this project is Sustainable research, as the research conducted here is sustainable, considering the many stakeholders involved, as well as how well it is documented. Even after the project closes, the results from the research conducted here will remain viable for the longest time.

### **Domain**

The main domain that the RECODE Project is focused on is the Waste Management and Bio economy domain. This is done by contributing for a greater than 20% reduction of CO<sub>2</sub> emissions from the environment.

#### **5.4.5.10 UNIVERSITY OF ARIZONA GARDENROOTS**

Extracted from project website: In partnership with community members, using a model of citizen science, Gardenroots aims to: evaluate environmental quality and the potential exposure

to contaminants of concern near active or legacy resource extraction and hazardous waste sites; successfully communicate the study results to all participating individuals and families; disseminate the results broadly in order to appropriately influence community prevention practices and environmental decision-making. Seed funded by the U.S. National Institutes of Health and the Environmental Protection Agency; the project focuses on sites in Arizona (the material below is based on the initial project). U.S. mining sites are linked to the generation of 45 billion tons of waste and are often encountered in arid and semiarid regions, such as Arizona where community gardens plus hazardous waste and legacy mining sites create the potential for comingling of the two.

## Stakeholders

Gardenroots involves the following stakeholders:

1. Citizens/Civil society
2. Researchers
3. RPOs
4. Industry (water suppliers)
5. Policy makers

## Sources

The project information has been primarily obtained from the following sources:

1. Project website: <https://gardenroots.arizona.edu/about>
2. Research article: Ramirez-Andreotta, M.D., Brusseau, M.L., Artiola, J., Maier, R.M. and Gandolfi, A.J. (2015a). Building a co-created citizen science program with gardeners neighbouring a superfund site: The Gardenroots case study. *International Public Health Journal*, : 7. PMID: 25954473<sup>1959</sup>

## Method

Extracted from Ramirez-Andreotta, MD (et al) (2015).A place-based, community-driven project was designed where academics and community members maintained a reciprocal dialogue, and together 1) defined the question for study, 2) gathered information, 3) developed hypotheses, 3) designed data collection methodologies, 4) collected environmental samples (soil, irrigation water, and vegetables), 5)interpreted data, 6) disseminated results and translated results into action, and 7) discussed results and asked new questions. For further details about the activities pursued, see ‘What is RRI about the Project?’

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<sup>1959</sup> Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4420190/pdf/nihms633688.pdf>

## Project Selection

Extracted from Ramirez-Andreotta, MD (et al) (2015). This project was selected as an effective example of citizen science seeded by government funding.

## What is RRI about the Project

The project design was based on the premise that environmental health issues are intricate and require capacity building, culturally sensitive strategies, and a trained population of scientists working at the local level. Representation is required for underserved communities if the decision-making process and lasting solutions are to be adequately shaped and developed.

**Research question determination:** the central question to be answered by the project at its initial stage was identified by the local community: “Is it safe to garden and consume vegetables from my home garden? And if so, how much can I eat from my garden?”

**Co-design and creation:** A transdisciplinary team was created involving the relevant communities and university researchers in the disciplines of environmental chemistry and microbiology, soils, hydrology, public health, and visual communications.

**Community engagement:** The recruitment and design of recruitment and educational materials was informed by the social context and community ecology. The majority of the recruitment was done via personal interaction at local community events through the following activities: handing out informational bookmarks at community festivals, EPA community meetings, and Town Council meetings; follow-up mailings, telephone calls and emails to community members; County Cooperative Extension Press Releases; an announcement in the relevant town newsletter; and online. Those who signed up for Gardenroots were asked to attend a 1.5-hour training session wherein they were provided information on how to properly collect soil, water, and vegetables samples from their home garden for laboratory analysis. Two trainings were formally offered and community members that participated in the training took home an instructional manual and a tool kit with all supplies required for sample collection from their home garden.

**Capacity building and continuity:** to properly and effectively manage community expectation and involvement throughout the project (from posing the research question to the final community report-back events), ongoing communication was maintained via phone, email and mail correspondence, and informal science education experiences were offered.

**Repatriation of knowledge and risk communication:** Once all community samples had been analysed, results were reported back to the participants. They were given an informal presentation on the: 1) methodologies used to prepare and analyse their household samples, 2) exposure assessment and risk characterization calculations used to interpret their data, and 3) an introduction to the format in which their results would be presented. Next, they were given tailored personalized booklets that contained the “raw” confidential data (i.e., milligrams of arsenic per kilogram of vegetable) as well as a table that outlined the quantity of vegetables they could consume at various target risk levels.

**Evidence-based decision making:** Gardenroots participants worked together to identify and notify additional households that were connected to the public water supply about the findings of the study. They also reported their test results to the relevant government authorities who acted upon them, for example, by issuing notices of violation to the municipal water supplier.

### **Domain**

The Gardenroots project fits the waste management domain of the RRING Project.

### **Any other remarks**

This project is one of multiple such projects that have received U.S. government support as part of an intentional push to encourage citizen participation in scientific research and the design of citizen science projects, in particular.

#### **5.4.5.11 HUMAN GENOME PROJECT (HGP)**

Begun formally in 1990, the U.S. Human Genome Project was a 13-year effort coordinated by the U.S. Department of Energy (DOE) and the National Institutes of Health (NIH). The project originally was planned to last 15 years, but rapid technological advances accelerated the completion date to 2003.

The overall project goals were to: identify all the approximately 20,000-25,000 genes in human DNA; determine the sequences of the 3 billion chemical base pairs that make up human DNA; store this information in databases; improve tools for data analysis; transfer related technologies to the private sector; and address the ethical, legal, and social issues (ELSI) that may arise from the project.

The goals specific to ELSI were to: examine issues surrounding the completion of the human DNA sequence and the study of human genetic variation; examine issues raised by the integration of genetic technologies and information into health care and public health activities; examine issues raised by the integration of knowledge about genomics and gene-environment interactions in non-clinical settings; explore how new genetic knowledge may interact with a variety of philosophical, theological, and ethical perspectives; and explore how racial, ethnic, and socioeconomic factors affect the use, understanding, and interpretation of genetic information; the use of genetic services; and the development of policy.

### **Stakeholders**

The Human Genome Project involved the following stakeholders:

- RPOs
- RFOs
- Industry (large)

- SMEs
- Citizens/Civil society
- Policy makers
- Judiciary
- National and international bodies
- NGOs and
- Researchers

## Sources

The project information has been primarily obtained from the following sources:

1. Project website: <http://www.genome.gov/>)
2. Archive site for historical purposes<sup>1960</sup>
3. Article: McEwen, J.E. et al, ‘The Ethical, Legal, and Social Implications Program of the National Genome Research Institute: Reflections on an Ongoing Experiment’, *Annual Review of Genomics and Human Genetics*. 2014. 15: 481-505.

## Method

In fulfilment of its ELSI mandate, the Human Genome Project adopted multiple strategies, including those outlined below:

**Education and training:** the HGP supported projects to engage the public, educate multiple communities, and providing training when appropriate in the science and implications of the HGP, including through the development of resources and hosting events at public libraries, introducing high school teachers and students to bioinformatics, training middle and secondary school science teachers to help students understand complex choices they may face as human genetics progress, educating judges on the basics of genomics and genetics, enlarging the pool of skilled public-radio science reporters and producers and increasing the number and accuracy of science reports, engaging clergy on genetics, and education of indigenous populations about the basics of genetics and related research.

**Guidelines and policy:** the HGP developed guidelines, proposed ethical frameworks, and, through the ELSI working group, had input into the parameters of the research grants program as studies were designed, to address issues such as informed consent, privacy, and discrimination. The ethical guidance developed addressed deriving the initial version of the complete human DNA sequence from multiple donors, ensuring that donors can make informed, unpressured decisions about DNA contributions, protecting donor privacy and confidentiality, obtaining IRB approved, and rapidly introducing new libraries constructed in accordance with this guidance. In specific guidelines related to worker studies, a book was

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<sup>1960</sup> [https://web.ornl.gov/sci/techresources/Human\\_Genome/project/index.shtml](https://web.ornl.gov/sci/techresources/Human_Genome/project/index.shtml)

developed addressing topics including the need for worker protection, foundations of an ethical framework, challenges in using genetic data, protection of privacy, stakeholder concerns and responsibilities and planning and implementing worker studies

**Public engagement:** efforts to engage the public to understand their concerns and perspectives as relevant to the development of the research and use of results, included hosting town hall meetings around the country and engaging specifically vulnerable groups, including indigenous groups to identify specific factors that influence perceptions of genetic research and use the information to inform HGP managers.

**Research:** A unique aspect of the U.S. Human Genome Project is that it was the first large scientific undertaking to address potential ELSI implications arising from project data. DOE and NIH Genome Programs set aside 3% to 5% of their respective annual HGP budgets for the study of these issues. Nearly \$1 million was spent on HGP ELSI research. The questions to be answered by the sponsored research were the following:

Fairness in the use of genetic information by insurers, employers, courts, schools, adoption agencies, and the military, among others. *Who should have access to personal genetic information, and how will it be used?*

Privacy and confidentiality of genetic information. *Who owns and controls genetic information?*

Psychological impact and stigmatization due to an individual's genetic differences. *How does personal genetic information affect an individual and society's perceptions of that individual? How does genomic information affect members of minority communities?*

Reproductive issues including adequate informed consent for complex and potentially controversial procedures, use of genetic information in reproductive decision making, and reproductive rights. *Do healthcare personnel properly counsel parents about the risks and limitations of genetic technology? How reliable and useful is fetal genetic testing? What are the larger societal issues raised by new reproductive technologies?*

Clinical issues including the education of doctors and other health service providers, patients, and the general public in genetic capabilities, scientific limitations, and social risks; and implementation of standards and quality-control measures in testing procedures. *How will genetic tests be evaluated and regulated for accuracy, reliability, and utility? (Currently, there is little regulation at the federal level.) How do we prepare healthcare professionals for the new genetics? How do we prepare the public to make informed choices? How do we as a society balance current scientific limitations and social risk with long-term benefits?*

Uncertainties associated with gene tests for susceptibilities and complex conditions (e.g., heart disease) linked to multiple genes and gene-environment interactions. *Should testing be performed when no treatment is available? Should parents have the right to have their minor children tested for adult-onset diseases? Are genetic tests reliable and interpretable by the medical community?*

Conceptual and philosophical implications regarding human responsibility, free will vs genetic determinism, and concepts of health and disease. *Do people's genes make them behave in a particular way?*

*Can people always control their behaviour? What is considered acceptable diversity? Where is the line between medical treatment and enhancement?*

Health and environmental issues concerning genetically modified foods (GM) and microbes. *Are GM foods and other products safe to humans and the environment? How will these technologies affect developing nations' dependence on the West?*

Commercialization of products including property rights (patents, copyrights, and trade secrets) and accessibility of data and materials. *Who owns genes and other pieces of DNA? Will patenting DNA sequences limit their accessibility and development into useful products?*

**Resource development:** the HGP supported projects to develop resources to be used by specific stakeholders in facilitating their activities related to genetics, including an interactive resource for instructing genetic counsellors about mental disorders believed to have a genetic basis, producing educational modules on bioinformatics and the HGP for high school audiences, as well as college teachers.

## Project Selection

This project was selected as possibly the strongest U.S. example of a multi-agency, well-funded, national strategy designed explicitly to incorporate consideration of the ethical, social and legal implications into an emerging area of scientifically and socially significant area of research.

## What is RRI about the Project

Some of the prominent RRI like characteristics are:

- **Multi stakeholder collaboration and Governance:** HGP's efforts were a collaboration from multiple stakeholders.
- **Social Engagement:** Success of and trust in the outcomes of the HGP relied on public involvement and engagement, including in identifying unique risks of specific segments of society and unique perspectives of specific communities as they may influence the success of the program and its long-term impacts.
- **Ethical guidance:** Building on the inputs derived from the social engagement and responsible scientific practice, guidance was developed to ensure adherence to minimum standards and awareness of ELSI considerations as the research was undertaken.
- **Public Education:** Success of and trust in the outcomes of the HGP also relied on public and policy maker understanding of the program, its implications and potential

impacts. As a result, concerted efforts were made to engage multiple publics, educate and training relevant stakeholders.

- **Science Communication:** As a component of the social outreach, deliberate efforts were made to foster and facilitate effective science communication on the program.
- **Open Access:** Whenever possible, the HGP strongly encouraged studies involving human data to use data generated from sources with participant consent for unrestricted access or for general research uses through controlled access and without restrictions on the types of users. The HGP acknowledged that that would not always be possible or appropriate.

## Domain

The Human Genome Project fits the bioeconomy domain of the RRING Project.

### 5.4.5.12 NATIONAL CITIZENS' TECHNOLOGY FORUM (NCTF)

In March 2008, the Center for Nanotechnology in Society at Arizona State University (CNS-ASU) together with collaborators at North Carolina State University held the “National Citizens’ Technology Forum” (NCTF), on the topic of nanotechnology and human enhancement. The organizers later described the NCTF at a congressional briefing, and there are indications that the NCTF may have influenced language mandating “deliberative public input in decision-making processes” within a 2009 Senate bill seeking to reauthorize the National Nanotechnology Initiative.

## Stakeholders

The NCTF involved the following stakeholders:

- RPOs
- Citizens
- Researchers
- Policy makers

## Sources

The project information has been primarily obtained from the following sources:

- a. National Citizens’ Technology Forum Report<sup>1961</sup>

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<sup>1961</sup> [https://cns.asu.edu/sites/default/files/library\\_files/lib\\_hamlettcobb\\_0.pdf](https://cns.asu.edu/sites/default/files/library_files/lib_hamlettcobb_0.pdf)

- b. Hamlett P., Cobb M.D., Guston D.H. (2013) National Citizens' Technology Forum: Nanotechnologies and Human Enhancement. In: Hays S., Robert J., Miller C., Bennett I. (eds) Nanotechnology, the Brain, and the Future. Yearbook of Nanotechnology in Society, vol 3. Springer, Dordrecht
- c. Sclove, Richard E. "Reinventing Technology Assessment." Issues in Science and Technology 27, no. 1 (Fall 2010). ([https://issues.org/p\\_sclove/](https://issues.org/p_sclove/))
- d. Bal, Ravtosh, "Public Participation in Science and Technology Policy: Consensus Conferences and Social Inclusion." Dissertation, Georgia State University, 2012<sup>1962</sup>

## Method

Note: This section is extracted from the Forum Report. The NCTF was organized under the auspices of the then Center for Nanotechnology in Society at Arizona State University (CNS-ASU) with funding from the National Science Foundation. The six sites participating in the NCTF represented six distinct regions of the country and were each university campuses. Each campus formed a facilitation team including a faculty leader and other assisting faculty and students.

**Panellists:** Each geographic site recruited its own panellists using newspaper and Internet advertising. While some sites attracted large numbers of volunteers and other sites attracted fewer each site endeavoured to create panels that were broadly representative of the communities from which they were drawn.

**Background materials:** The organizers prepared a 61-page background document and delivered it to each panellist prior to the first face-to-face meeting. The document, describing the emergence of NBIC technologies and the debates about their anticipated social impacts, was drafted and edited by many researchers across CNS-ASU.

**Pre-and Post-tests.** A pre- and post-test questionnaire was developed and administered to all panellists. The questionnaires assessed several possible impacts of participation by the citizens, including factual learning and shifts in attitudes about NBIC technologies, as well as qualities of the deliberative process itself, including the presence and strength of cognitive and affective pathologies of deliberation and the level of consensus among the participants.

**First face-to-face Weekend.** During the first weekend of the NCTF, citizens gathered for face-to-face discussions that were led by facilitators from each of the campuses. The panellists discussed the background materials, the structure and goals of the project, and began to raise whatever concerns or issues they found significant. While the background document provided substantial information and framed the inquiry, the panellists had significant control over what specific issues or concerns should be addressed.

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<sup>1962</sup>

[https://scholarworks.gsu.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1044&context=pmap\\_diss](https://scholarworks.gsu.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1044&context=pmap_diss)

**Internet Elements.** The panellists from all six sites joined together for nine, two-hour synchronous online discussion sessions. During these Internet sessions, panellists from all the sites were exposed to the concerns, interests, values, and perspectives of panellists at all the other sites. During some of these sessions, content experts joined the discussions to respond to follow-on questions developed by the panellists and to fill in any gaps in the background materials. The content experts included technical specialists, a philosopher, and a specialist in regulatory processes.

**Final face-to-face Weekend.** The panellists gathered for a second and final face-to-face weekend during which they reconsidered the issues, problems, and concerns they had expressed during the first weekend in light of the additional information and discussions provided by the Internet sessions. Working with a facilitator, they then deliberated toward a set of policy recommendations that all panellists could endorse. The panellists themselves then compiled these recommendations into each site's Final Report.

**Final Reports.** After each panel reached a consensus among its members about what recommendations to advance, the panellists at each site wrote a Final Report representing that consensus. Each site's Final Report contained the specific recommendations that each panel endorsed, along with a discussion of issues, concerns, and values the panellists believe should be important in the management of NBIC technologies.

While the panellists at each site had been exposed to the concerns and issues panellists at the other sites thought were important, there was no effort to reach a single consensus involving all six sites; thus, each Final Report represented concerns and issues specific to that site. Nevertheless, when the Final Reports were compared, there was found to be significant overlap among all six sites.

## Project selection

This project was exemplary of work occurring in select academic institutions to innovate in the area of public engagement in scientific research and development. Also relevant is that the project built on an existing model of public engagement developed in Europe, the source of or inspiration for multiple experimental approaches in this field in the U.S.

## What is RRI about the Project

Some of the prominent RRI like characteristics are:

- **Public Engagement:** this project focused on engagement in the public in an area of ongoing and rapidly evolving scientific research and policy development, doing so in such a way to allow for the possibility of public input into the research and policy development processes as they occurred.

- **Diversity, Equity and Inclusion:** the project was deliberate in its attempts to select a representative group of panellists, and in ensuring diversity among the experts who contributed to the project.
- **Public Education:** engagement of the participating public was built upon the creation of a shared knowledge base about the technology at issue.
- **Science Communication:** because need for sufficient understanding of the technology was the prerequisite for effective engagement in the process, translation of technical literature for a lay audience was vital to the success of the project.
- **Policy influence:** The organizers presented the NCTF and its findings at a congressional briefing. The suggestion has been made that the NCTF may have influenced language mandating “deliberative public input in decision-making processes” within a 2009 Senate bill seeking to reauthorize the National Nanotechnology Initiative.

### Domain

The National Citizens’ Technology Forum fits the bioeconomy domain of the RRING Project.

### Any other remarks

No.

### 5.4.5.13 PERVADE

The Pervasive Data Ethics for Computational Research (PERVADE) project is a collaborative, 4-year research project funded by a \$3 million grant from the U.S. National Science Foundation to study how diverse stakeholders – big data researchers, platforms, regulators, and user communities – understand their ethical obligations and choices related to computational research that relies on big, pervasive data sets about people. The goal of the project is to answer fundamental questions about the fairness and ethics of such research.

PERVADE brings together a multi-disciplinary team with expertise in computational science, research ethics, data practices, law and policy, health information, social computing, qualitative and quantitative research methods, and data privacy.

The aim of the project is to produce concrete guidance for pervasive data ethics and empowers researchers with actionable information about emergent norms and risks. Outputs, such as decision-support tools, guidance on measuring risk, public educational material and bibliographies, and reusable empirical data, are designed to support the wide range of stakeholders in data ethics (user communities, computing research communities, technical platforms, and regulations). The project is on-going.

## Stakeholders

PERVADE involves the following stakeholders:

- RPOs
- Citizens
- Institutional Review Boards
- Researchers
- Industry
- Media

## Sources

The project information has been primarily obtained from the following sources:

- Project website<sup>1963</sup>
- Award abstract<sup>1964</sup>

## Method

Note: This section is extracted from the project website.

**Technical Investigations.** Draw on empirical and mathematical assessments to develop clearer metrics for inference risk by reproducing three specific experiments under a variety of settings, quantify inference using entropy, and objectively compare how accuracy has changed over time, with the volume of data, and based on choice of algorithm. The experiments are (1) well-known inference demonstrations such as the Facebook “likes” study, (2) long-standing research problems such as inference of author gender from writing style, and (3) a representative set of Kaggle contests. Using the knowledge gained from the above exercises the team aims to develop a scientifically-rigorous framework for estimating and communicating the inference risks in common research scenarios. Also drawing on qualitative evidence, the team plans to uncover areas of divergence between the inference risks identified and the perception of those risks by both user and researcher communities.

**User Communities.** Investigate through surveys, focus groups, and interviews how those who create pervasive data – users of social media, fitness trackers, etc. – feel about their data being used in research. Assemble a large dataset of news articles related to social computing research as well as the comments on these articles, then conduct a content analysis focused on revealing attitudes and perceptions across media types.

**Computing Research Communities.** Data Ethics among Computational Researchers - (1) Conduct a content analysis of research publications from a set of relevant venues to determine

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<sup>1963</sup> <https://pervade.umd.edu/>

<sup>1964</sup> [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1704315&HistoricalAwards=false](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1704315&HistoricalAwards=false)

how data ethics is discussed, if at all, within formal dissemination of research that relies on pervasive data. (2) Analyse curriculum and degree requirements for computational and data science-related doctoral programs to determine the extent to which training in data ethics is present for new researchers in the field. (3) Conduct a survey of computational and pervasive data researchers to gain deeper insights into common data ethics training received and measure current attitudes and practices on ethical issues relevant to their work with pervasive data. Then use data collected from the survey to develop guidelines that clarify “best practices” for social computing researchers to ensure protection of individual users in a dataset.

**Ethics of Data Sharing Practices** - Explore how pervasive data researchers craft their data management plans, assess whether concerns of data ethics are reflected in the details of the plans, and determine how effectively the plans have been executed in terms of the ethical dimensions of sharing pervasive data sets. The project will analyse data management plans for U.S. National Science Foundation projects in Social, Behavioural and Economic scientists and Computer, Information Science and Engineering deal with pervasive data sets, and a subset of researchers who have shared datasets will be interviewed to obtain a richer understanding of their decisions and approaches to sharing data.

**Data Ethics Regulators.** Investigate through interviews, focus groups, and surveys the attitudes and practices of the professional staff of institutional review boards (IRBs)—the organizations that review and monitor human subjects research at U.S. universities—to understand their assessment of pervasive data research and build a web-based decision tool to help researchers, regulators, and policymakers predict and ameliorate the risks associated with pervasive research datasets. Also conduct a discourse analysis of corporate internal ethics review processes, soliciting internal documents as available from our advisory board members, public-facing documents shared by these companies, and interviews with corporate ethics actors to identify 1) In what ways corporations have adopted the values and interpretations of the general federal ethics rules? And 2) In what ways are corporations innovating on traditional review processes that may be informative for university-based IRBs?

## What is RRI about the Project

Some of the prominent RRI like characteristics are:

- **Public Engagement:** this project engages the public both directly and indirectly with the aim of understanding prevailing concerns and being responsive to them in the development of technologies, research and standards on the use of user-generated data.
- **Standards development:** this project aims to anticipate ethical questions that will arise in the context of technology development, assessment, and implementation and develop standards to guide developers and reviewers in advance of implementation of a new technology.
- **Responsible science:** by reproducing past experiments that relied on pervasive data and calculating inference risks, the project aims to contribute to the development of a

more robust science in the field, as well as clarity in the risks for the purpose of communication to stakeholder communities.

### **Domain**

PERVADE fits the ICT domain of the RRING Project.

### **Any other remarks**

No.

#### **5.4.5.14 AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE**

The project involves a global survey of scientists and engineers that will lead to generalizable data about the views of scientists and engineers regarding their social responsibilities. By social responsibilities, they are referring to those responsibilities aimed at the larger community, as opposed to internal standards of ethical practice in science and engineering. There is no consensus inside or outside the scientific and engineering communities about the nature, scope, or sources of such responsibilities — what they are, how they came to be, how they can be operationalized, to whom they are owed, and in what circumstances. Yet calls for scientists and engineers to accept and fulfil such responsibilities are widespread, both from within and outside science and engineering.

This project will result in the design, pre-test and subsequent fielding of a rigorous and robust international survey that is anticipated to be the most globally comprehensive effort to date to generate data that will advance knowledge and understanding in the fields of science policy, science and technology studies, and the history and philosophy of science and technology.

The project is on-going.

### **Stakeholders**

The global survey involves the following stakeholders:

- **Directly**
  - RPOs
  - RFOs
  - Industry (large)
  - SMEs
  - Researchers
  - Professional scientific societies
- **Indirectly**

- Citizens/Civil society
- Policy makers
- National and international bodies
- Institutional Review Boards

## Sources

The project information has been primarily obtained from the following sources:

- Project website<sup>1965</sup>
- Award abstract: The Social Responsibilities of Scientists and Engineers: Developing a Global Survey<sup>1966</sup>
- Award abstract: The Social Responsibilities of Scientists and Engineers: A Global Survey<sup>1967</sup>
- Mark S. Frankel (2015) An empirical exploration of scientists' social responsibilities, *Journal of Responsible Innovation*, 2:3, 301-310, DOI: 10.1080/23299460.2015.1096737<sup>1968</sup>
- Wyndham J. (et al.), *Social Responsibilities: A Preliminary Inquiry into the Perspectives of Scientists, Engineers and Health Professionals*, March 2015; doi: 10.1126/srhrl.aaa9798.)<sup>1969</sup>

## Method

The project is evolving in three-parts:

1. The first part involved launching an online questionnaire in April 2013, as a preliminary data-gathering initiative. Scientists, engineers and health professionals internationally were invited to complete the questionnaire, the aim of which was to learn how they view the nature and scope of their “social responsibilities” and to identify any apparent similarities or differences in perspectives according to multiple demographic variables. The survey produced 2,153 useable responses, but because it relied on convenience sampling, the results cannot be generalized beyond the study sample.
2. The second part of the AAAS effort was to design and pre-test a survey that would produce generalizable results about the views of scientists and engineers on their social responsibilities. Upon completion of a draft survey, it would be pre-tested on a subset of those we intended to survey more broadly. The deliverables for this project included the following: (1) a robust survey instrument, informed by adequate cognitive and

<sup>1965</sup> <https://www.aaas.org/programs/scientific-responsibility-human-rights-law/ethics-activities>

<sup>1966</sup> [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1540398](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1540398)

<sup>1967</sup> [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1835290&HistoricalAwards=false](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1835290&HistoricalAwards=false)

<sup>1968</sup> <https://www.tandfonline.com/doi/abs/10.1080/23299460.2015.1096737>

<sup>1969</sup> <https://www.aaas.org/resources/social-responsibility-preliminary-inquiry-perspectives-scientists-engineers-and-health>

usability pretesting and translated into the five UN languages beyond English; (2) development of a global sampling process; and (3) a clear plan for reaching the targeted sample, including commitments from various national and international collaborators.

3. The third part of the AAAS effort was to launch the survey. The survey was launched in 2019 in partnership with U.S.-based and overseas scientific and engineering membership organizations. The survey is designed to reach a global sample of approximately 12,500 scientists and engineers, with the aim of receiving 4,000 completed surveys.
4. The survey builds on previous work by AAAS that included a questionnaire using a convenience sample that generated preliminary data on how scientists, engineers and health professionals view the nature and scope of any social responsibilities they have, and that further generated data on identified similarities and differences in perspectives according to multiple demographic variables.

### **What is RRI about the Project**

Some of the prominent RRI like characteristics are:

**Defining RRI globally:** The project will advance knowledge and understanding about the following questions: (1) what do scientists/engineers identify as their responsibilities to society, if any; (2) what are the source(s) of their belief that they have/do not have special responsibilities to society; (3) what opportunities or challenges (e.g., institutional, cultural, and legal) do they believe affect their ability to fulfil their social responsibilities; and (4) in what ways are their responses to those questions different or similar based on field, job sector, age, gender, type of institution, the region where they work, and other demographic variables.

**Standards development for RRI:** The data and analyses generated by the project are expected to make the following contributions beyond generating new knowledge: (1) inform recommendations and the development of strategies for science and innovation governance; (2) inform the inclusion of the social responsibilities of scientists and engineers in professional codes of ethics and similar documents.

**Building RRI capacity:** The findings of the project are expected to help identify ways to integrate the consideration of social responsibilities into the education and training of scientists and engineers.

**Aligning scientists' views and public expectations:** The findings of the project may offer the opportunity to contribute to efforts to align the views of scientists and engineers with the priorities and expectations of the broader communities in which they work.

**Open access:** AAAS will create a public-use data file to be shared initially with collaborating partner organizations. In addition, AAAS will transfer the public-use data file, accompanied by a user's manual, to an external repository for its long-term retention and access.

**Domain**

The social responsibility survey is a general RRI-related initiative that is relevant across the domains of the RRING Project.

## 5.5 APPENDIX V: GLOBAL SURVEY RESEARCH INSTRUMENT

### 5.5.1 DEMOGRAPHIC INFORMATION

**Q1** In what year were you born? [Integer]

1. Prefer not to say

**Q2** Please indicate if you are... [Radio box]

1. Female
2. Male
3. Other
4. Prefer not to say

**Q3** What is your nationality? [Nationality]

*If you have more than one, please select the one that you most identify with.*

1. Other (please specify)
2. Prefer not to say

**Q4** What do you consider your native language? [Language]

*If you have more than one, please select the one that you most identify with.*

1. Other (please specify)

**Q5** Are you currently a student at school, college or university? [Radio box]

1. Yes
2. No
3. Unsure
4. Prefer not to say

**Q6** What is the highest level of formal education you have completed? [Dropdown]

1. Bachelor's (or equivalent) level
2. Master's (or equivalent) level
3. Doctoral (or equivalent) level

4. Prefer not to say
5. Other (please specify)

*Shown if **Doctoral (or equivalent) level** selected in Q6*

**Q7** Where did you complete your doctoral degree? [Country]

**Q8** Which general subject area(s) do you hold degrees in (at or above the bachelor's level)?  
[Checkbox (Button)]

*Please select all that apply.*

1. Education
2. Arts and humanities
3. Social sciences, journalism and information
4. Business, administration and law
5. Natural sciences, mathematics and statistics
6. Information and Communication Technologies (ICTs)
7. Engineering, manufacturing and construction
8. Agriculture, forestry, fisheries and veterinary
9. Health and welfare
10. Services
11. Prefer not to say
12. Other (please specify)

## 5.5.2 PROFESSIONAL BACKGROUND

**Q9** In what country have you spent most of your career? (Affiliation) [Country]

*(If you have spent equal time in more than one country, please select the one that you most identify with)*

**Q10** How many total years of professional experience do you have? [Integer]

1. Prefer not to say

*Shown if **Doctoral (or equivalent) level** selected in Q6*

**Q11** Do you have more than one year of professional experience since completing your doctoral degree? [Radio box]

1. Yes
2. No
3. Prefer not to say

*Shown if **Yes** selected in **Q11***

**Q12** How many years of professional experience do you have since completing your doctoral degree? [Integer]

1. Prefer not to say

**Q13** In what country have you spent most of your career? (Affiliation) [Country]

*(If you have spent equal time in more than one country, please select the one that you most identify with)*

**Q14** How many total years of professional experience do you have? [Integer]

1. Prefer not to say

*Shown if **Doctoral (or equivalent) level** selected in **Q6***

**Q15** Do you have more than one year of professional experience since completing your doctoral degree? [Radio box]

1. Yes
2. No
3. Prefer not to say

*Shown if **Yes** selected in **Q15***

**Q16** How many years of professional experience do you have since completing your doctoral degree? [Integer]

1. Prefer not to say

**Q17** In which field do you work? [Radio box]

1. Natural sciences, mathematics and statistics
2. Engineering and technology

3. Medical and health sciences
4. Agricultural sciences
5. Social sciences
6. Humanities
7. Prefer not to say
8. Other (please specify)

*Shown if **Medical and health sciences** selected in Q17*

**Q18** Which sub-field of medical and health sciences best encompasses the type of research and innovation activities you are involved in? [Radio box]

1. Basic medicine
2. Clinical medicine
3. Health sciences
4. Medical biotechnology
5. Prefer not to say
6. Other (please specify)

*Shown if **Engineering and technology** selected in Q17*

**Q19** Which sub-field of engineering and technology best encompasses the type of research and innovation activities you are involved in? [Radio box]

1. Civil engineering
2. Electrical engineering, electronic engineering, information engineering
3. Mechanical engineering
4. Chemical Engineering
5. Materials engineering
6. Medical engineering
7. Environmental engineering
8. Environmental biotechnology
9. Industrial biotechnology
10. Nano-technology
11. Prefer not to say
12. Other (please specify)

*Shown if **Natural sciences, mathematics and statistics** selected in Q17*

**Q20** Which sub-field of natural sciences best encompasses the type of research and innovation activities you are involved in? [Radio box]

1. Mathematics
2. Computer and information sciences
3. Physical sciences
4. Chemical sciences
5. Earth and related environmental sciences
6. Biological sciences
7. Prefer not to say
8. Other (please specify)

*Shown if **Agricultural sciences** selected in Q17*

**Q21** Which sub-field of agricultural sciences best encompasses the type of research and innovation activities you are involved in? [Radio box]

1. Agriculture, forestry, and fisheries
2. Animal and dairy science
3. Veterinary science
4. Agricultural biotechnology
5. Prefer not to say
6. Other (please specify)

*Shown if **Social sciences** selected in Q17*

**Q22** Which sub-field of social sciences best encompasses the type of research and innovation activities you are involved in? [Radio box]

1. Psychology
2. Economics and business
3. Educational sciences
4. Sociology
5. Law
6. Political science
7. Social and economic geography

8. Media and communication
9. Prefer not to say
10. Other (please specify)

*Shown if **Humanities** selected in Q17*

**Q23** Which sub-field of humanities best encompasses the type of research and innovation activities you are involved in? [Radio box]

1. History and archaeology
2. Languages and literature
3. Philosophy, ethics and religion
4. Arts (arts, history of arts, performing arts, music)
5. Prefer not to say
6. Other (please specify)

**Q24** In what type of organisation do you work (or have you most recently worked)? [Radio box]

1. Industry (large)
2. Small and medium-size enterprise [less than 250 employees]
3. Civil society/non-governmental organisation
4. Policy
5. National governmental organisation (including research/innovation funders)
6. International governmental organisation (including research/innovation funders)
7. University or similar research performing organisation
8. Prefer not to say
9. Other (please specify)

**Q25** What is your current employment status? [Radio box]

1. Employed full-time
2. Employed part-time
3. Unemployed (currently looking for work)
4. Unemployed (not currently looking for work)
5. Student only

6. Retired
7. Self-employed
8. Prefer not to say
9. Other (please specify)

**Q26** How many hours did you spend on the following activities in the last 7 days?

*If you do not and have not spent time with the following activities, please enter 0. Otherwise, please enter a value greater than 0.*

1. Research or innovation work [Integer]
2. Seeking or managing research/innovation funding [Integer]
3. Teaching or capacity building (including training) [Integer]
4. Public engagement (all types) [Integer]
5. Administration unrelated to research/innovation [Integer]
6. Management or supervision of staff/students [Integer]
7. Prefer not to say [Checkbox]

**Q27** Which of the following domains, if any, relate to your current (or recent) work?  
[Checkbox (Button)]

*(Tick all that apply)*

1. Digital (ICT)
2. Energy
3. Bio-economy
4. Waste Management
5. None of the above
6. Prefer not to say

**Q28** How many years were you (or have you been) in this role? [Integer]

1. Prefer not to say

**Q29** How many years, in total, have you worked as a researcher or innovator? [Integer]

*If you do not and have not worked as a researcher or innovator, please enter 0. Otherwise, please enter a value greater than 0.*

1. Prefer not to say

### 5.5.3 DIMENSIONS IN RESEARCH AND INNOVATION

#### Dimensions:

- 2.1. Gender equality
- 2.2. Individuals/organizations with a diverse range of perspectives and expertise
- 2.3. Ethnic minorities
- 2.4. R&I work results made available to as wide a public as possible
- 2.5. Data from R&I activities made freely available to the public
- 2.6. R&I should address societal needs
- 2.7. Ethical principles guide R&I work

**Q30** Please specify your level of agreement with the following statement:

Scale: *Strongly Disagree, Disagree, Somewhat Disagree, Neutral, Somewhat Agree, Agree, Strongly Agree, Not applicable / No Opinion, Prefer not to say*

- 'It is important to involve/promote {dimension} in my research and innovation work.'

**Q31** In the last 12 months, have you involved/promoted {dimension} when planning your research and innovation work? [Radio box]

1. Yes
2. No
3. Unsure
4. Not applicable / No opinion
5. Prefer not to say

*Shown if Yes selected in Q31*

**Q32** Please list the steps you have taken to involve/promote {dimension} in planning your research and innovation work. [Text area]

*(Please list each step)*

1. Prefer not to say

#### 5.5.4 SECTOR INVOLVEMENT

**Q33** What sectors (if any) have you involved in your research and innovation practice?  
[Checkbox (Button)]

*Please select all that apply.*

1. University or college
2. Primary / Secondary school education
3. Government agency
4. Industry / Commercial
5. Non-profit organization
6. Research organization
7. Research funding organization
8. Journalism / Media
9. General public
10. Prefer not to say
11. Other (please specify)

**Q34** What sectors (if any) have you involved in your research and innovation dissemination?  
[Checkbox (Button)]

*Please select all that apply.*

1. University or college
2. Primary / Secondary school education
3. Government agency
4. Industry / Commercial
5. Non-profit organization
6. Research organization
7. Research funding organization
8. Journalism / Media
9. General public
10. Prefer not to say

11. Other (please specify)

### 5.5.5 POLICIES AND REGULATIONS

**Q35** In the last 12 months, have government policies and regulations directly affected your research and innovation work? [Radio box]

1. Yes
2. No
3. Unsure
4. Not applicable / No opinion
5. Prefer not to say

*Shown if **Yes** selected in Q35*

**Q36** What government policies and regulations have directly affected your research and innovation work? [Text area]

*(Please list any policies or regulations that come to mind)*

1. Prefer not to say

**Q37** In the last 12 months, have institutional or organizational policies and regulations directly affected your research and innovation work? [Radio box]

1. Yes
2. No
3. Unsure
4. Not applicable / No opinion
5. Prefer not to say

*Shown if **Yes** selected in Q37*

**Q38** What institutional or organizational policies and regulations have directly affected your research and innovation work? [Text area]

*(Please list any policies or regulations that come to mind)*

1. Prefer not to say

## 5.5.6 ENGAGEMENT ACTIVITY

**Q39** How many hours did you spend interacting with the following types of people or organisations in the last 7 days?

*If you do not and have not interacted with the following types, please enter 0. Otherwise, please enter a value greater than 0.*

1. Research Performing Organizations / Academics / Researchers [Integer]
2. Research Funding Organizations [Integer]
3. Industry / small or medium sized enterprise [Integer]
4. Civil society / citizens [Integer]
5. Policy makers [Integer]
6. NGOs / international organizations [Integer]
7. Prefer not to say [Checkbox]

## 5.5.7 SDGS

**Q40** Scale: *Not at all Familiar, Slightly Familiar, Somewhat Familiar, Moderately Familiar, Extremely Familiar, Not applicable / No Opinion, Prefer not to say*

- How familiar are you with the UN Sustainable Development Goals?

*Shown if Slightly Familiar, Somewhat Familiar, Moderately Familiar, Extremely Familiar selected in Q40*

**Q41** What comes to mind when you think of the UN Sustainable Development Goals? [Text area]

1. Prefer not to say

*Shown if Not at all Familiar selected in Q40*

**Q42** You indicated that you are not familiar with the UN Sustainable Development Goals, sometimes also referred to as the SDGs. Have you ever heard of these? [Radio box]

1. Yes
2. No
3. Unsure

**Questions below shown if Slightly Familiar, Somewhat Familiar, Moderately Familiar, Extremely Familiar selected in Q40**

**Q43** In the last 30 days, how much have you heard or read about the UN Sustainable Development Goals? [Radio box]

1. Not at all
2. Once
3. 2-3 times
4. Once per week
5. 2-3 times a week
6. 4-6 times per week
7. Daily
8. Unsure

**Q44** In the last 30 days, how frequently have you thought about the UN Sustainable Development Goals? [Radio box]

1. Not at all
2. Once
3. 2-3 times
4. Once per week
5. 2-3 times a week
6. 4-6 times per week
7. Daily
8. Unsure

**Q45** For each pair of words below, please select the point between them that you think best describes the UN Sustainable Development Goals.

**In general, I think the UN Sustainable Development Goals are...**

	3	2	1	0	1	2	3	
Important								Unimportant

Useful								Useless
Valuable								Worthless
Essential								Unnecessary
Relevant								Irrelevant
Beneficial								Harmful

**Q46** For my research/innovation work, I think the UN Sustainable Development Goals are...

	3	2	1	0	1	2	3	
Important								Unimportant
Useful								Useless
Valuable								Worthless
Essential								Unnecessary
Relevant								Irrelevant
Beneficial								Harmful

**Q47** Using the response options below, please indicate the extent to which you agree or disagree with each of the statements.

Scale: *Strongly Disagree, Disagree, Somewhat Disagree, Neutral, Somewhat Agree, Agree, Strongly Agree, Not applicable / No Opinion*

- 'I follow stories in the news about the UN Sustainable Development Goals.'
- 'The UN Sustainable Development Goals are a priority for me.'
- 'The UN Sustainable Development Goals should be a priority for my professional field.'

- 'The UN Sustainable Development Goals are focused only on long-term financial development.'
- 'The UN Sustainable Development Goals represent legally binding international treaties to protect the environment.'

### 5.5.8 OPTIONAL QUESTION BLOCK (CONTINUATION)

**Q48** What is your country of origin? [Country]

**Q49** Scale: *Never, Rarely, Occasionally, Sometimes, Frequently, Usually, Always, Not applicable / No Opinion*

- To what extent is your research/innovation work guided by a regulatory framework that covers all relevant aspects of social responsibility?

*Shown if Occasionally, Sometimes, Frequently, Usually, Always selected in Q49*

**Q50** What regulatory framework(s) cover(s) all aspects of social responsibility relevant to your research or innovation work? [Text area]

*(Please list)*

1. Prefer not to say

For the following, please consider which professional associations, networks, organizations or publicly visible people in your nation or region are involved in ensuring that research and innovation are...

**Q51** ...diverse and inclusive: [Text area]

*(Please list any that come to mind)*

1. Prefer not to say

**Q52** ...shared in an open and transparent way: [Text area]

*(Please list any that come to mind)*

1. Prefer not to say

**Q53** ...not causing concerns for society: [Text area]

*(Please list any that come to mind)*

1. Prefer not to say

**Q54** ...addressing societal needs: [Text area]

*(Please list any that come to mind)*

1. Prefer not to say

**Q55** ...socially responsible: [Text area]

*(Please list any that come to mind)*

1. Prefer not to say

**Q56** Scale: *Strongly Disagree, Disagree, Somewhat Disagree, Neutral, Somewhat Agree, Agree, Strongly Agree, Not applicable / No Opinion*

- 'It is important to maintain an equal number of men and women in research and innovation teams.'
- 'I feel a professional responsibility to communicate findings from my research or innovation work to public audiences.'
- 'My primary organisation where I work discourages me from communicating the results of my research or innovation work to public audiences.'
- 'The best time to talk to public audiences about my research and innovation work is at the very end of the process after all the work has been completed.'
- 'My organisation encourages me to communicate findings from my research or innovation work to public audiences.'
- 'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals.'
- 'It is important to take gender into account when developing my research and innovation work.'
- 'It is important to take ethnic diversity into account when developing my research and innovation work.'
- 'Gender is irrelevant in my work.'
- 'Ethnic differences are irrelevant in my work.'

**Q57** What comes to mind when you think of 'responsible research and innovation'? [Text area]

1. Prefer not to say

**Q58** What else would you like to add relating to the topics covered in this survey? [Text area]

1. Prefer not to say

## 5.6 APPENDIX VI: GLOBAL SURVEY RESEARCH ICR

### 5.6.1 DIVERSE PERSPECTIVES

Table 18: Diverse Perspectives – ICR results

	K- Alpha	Percent Agreement	Not 0 (C1)	Not 0 (C2)	Not 0 Agreement
<b>VR - Valid Response</b>	1	100.0%	113	113	100.0%
<b>DP1 - Non-specific, vague, platitude, or virtue signalling response</b>	0.9	96.5%	26	26	85.7%
<b>DP2 - Engagement with non-academic stakeholders</b>	0.98	99.1%	36	35	97.2%
<b>DP2.1.1 - Engagement with non-academic stakeholders (general)</b>	0.93	97.3%	27	26	89.3%
<b>DP2.1.2 - Engagement with non-academic stakeholders (specific steps)</b>	0.88	98.2%	9	9	80.0%
<b>DP2.2.1 - Stakeholder type – industry / business</b>	0.81	96.5%	11	13	71.4%
<b>DP2.2.2 - Stakeholder type – civil society organisation (CSO)</b>	1	100.0%	7	7	100.0%
<b>DP2.2.3 - Stakeholder type – policy bodies / policymakers</b>	0.88	99.1%	5	4	80.0%
<b>DP2.2.4 - Stakeholder type – other non-academic stakeholder type</b>	0.87	98.2%	8	8	77.8%
<b>DP2.2.5 - Stakeholder type – no stakeholder types indicated (beyond non-academic)</b>	0.95	99.1%	12	11	91.7%
<b>DP3 - General dissemination/ broadcasting of information about the research/innovation work</b>	0.92	99.1%	7	6	85.7%
<b>DP4 - ‘In-reach’ to other disciplines, researchers, academics, experts or students</b>	0.91	95.6%	57	56	91.5%
<b>DP5 - Steps for building collaboration/ teams/ consortia with no connection to diversity per se</b>	1	100.0%	2	2	100.0%
<b>DP6 - Meetings, workshops, focus groups and ‘consultations’</b>	1	100.0%	22	22	100.0%
<b>DP7 - Unclear / Uncertain</b>	1	100.0%	1	1	100.0%

## 5.6.2 GENDER

Table 19: Gender – ICR results

	K-Alpha	Percent Agreement	Not 0 (C1)	Not 0 (C2)	Not 0 Agreement
<b>VR - Valid Response</b>	1	100.0%	79	79	100.0%
<b>GE1 - Non-specific, vague, platitude or virtue signalling response</b>	0.86	96.2%	13	12	78.6%
<b>GE2 - Gender equality in R&amp;I, within the R&amp;I environment</b>	0.83	94.9%	65	65	94.0%
<b>GE2.1.1 - Gender equality in R&amp;I, academic (general)</b>	0.84	92.4%	28	30	81.2%
<b>GE2.1.2 - Gender equality in R&amp;I, academic (specific steps)</b>	0.87	93.7%	38	37	87.5%
<b>GE2.2.1 – Supporting female researchers’ publications, co-authorship, academic citations</b>	1	100.0%	2	2	100.0%
<b>GE2.2.2 – Integrating gender equality in research participant selection</b>	0.79	98.7%	2	3	66.7%
<b>GE2.2.3 – Fostering gender equality in research/innovation teams / workforce</b>	0.83	92.4%	23	29	79.3%
<b>GE2.2.4 – Integrating gender as a substantive dimension/focus of R&amp;I content/practice</b>	1	100.0%	13	13	100.0%
<b>GE2.2.5 – Promotion/ mentorship of female researchers</b>	0.95	98.7%	11	10	90.9%
<b>GE2.2.6 – Promoting women in R&amp;I decision-making roles and senior positions</b>	0.9	97.5%	12	10	83.3%
<b>GE2.2.7 – Ensuring gender equality in process of recruitment and selection of R&amp;I staff</b>	0.86	97.5%	8	8	77.8%
<b>GE2.2.8 – Promoting gender equality through delivering or attending training</b>	1	100.0%	8	8	100.0%
<b>GE2.2.9 – Participation in or engagement with equality committees</b>	1	100.0%	2	2	100.0%
<b>GE2.2.10 – Compliance with rules, regulations and legal obligations</b>	1	100.0%	2	2	100.0%
<b>GE2.2.11 - Other gender equality promotion step taken</b>	0.96	98.7%	16	15	93.8%

<b>GE3 - Unclear / Uncertain</b>	1	100.0%	3	3	100.0%
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### 5.6.3 ETHNIC MINORITIES

Table 20: Ethnic Minorities – ICR results

	<b>K- Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	47	47	100.0%
<b>EM1 - Non-specific, vague, platitude or virtue signalling response</b>	0.91	97.9%	7	6	85.7%
<b>EM2 - Racial/ethnic equality within the R&amp;I environment</b>	0.87	95.7%	37	37	94.7%
<b>EM2.1.1 - Racial/ethnic equality within the R&amp;I environment (general)</b>	0.91	95.7%	20	20	90.5%
<b>EM2.1.2 - Racial/ethnic equality within the R&amp;I environment (specific steps)</b>	0.95	97.9%	17	18	94.4%
<b>EM2.2.1 – Supporting racial/ethnic minority researchers’ publications, co-authorship, academic citations</b>	1	100.0%	0	0	0.0%
<b>EM2.2.2 – Integrating racial/ethnic equality in research participant selection</b>	0.89	95.7%	12	12	84.6%
<b>EM2.2.3 – Fostering racial/ethnic equality in research/innovation teams / workforce</b>	1	100.0%	7	7	100.0%
<b>EM2.2.4 – Integrating race/ethnicity as a substantive dimension/focus of R&amp;I content/practice</b>	0.86	95.7%	8	10	80.0%
<b>EM2.2.5 – Promotion/ mentorship of ethnic minority researchers/innovators</b>	0.85	97.9%	3	4	75.0%
<b>EM2.2.6 – Promoting ethnic minorities in R&amp;I decision-making roles and senior positions</b>	1	100.0%	0	0	0.0%
<b>EM2.2.7 – Ensuring racial/ethnic equality in process of recruitment and selection of R&amp;I staff</b>	1	100.0%	3	3	100.0%
<b>EM2.2.8 – Promoting racial/ethnic equality through delivering or attending training</b>	1	100.0%	2	2	100.0%

<b>EM2.2.9 – Participation in or engagement with relevant equality committees</b>	1	100.0%	0	0	0.0%
<b>EM2.2.10 – Compliance with rules, regulations and legal obligations</b>	1	100.0%	0	0	0.0%
<b>EM2.2.11 - Other racial/ethnic equality promotion step taken</b>	0.92	97.9%	7	8	87.5%
<b>EM3 - Downplaying, minimising and excusing ethnic diversity issues in R&amp;I</b>	1	100.0%	3	3	100.0%
<b>EM4 - Unclear / Uncertain</b>	1	100.0%	0	0	0.0%

## 5.6.4 ETHICS

Table 21: Ethics – ICR results

	<b>K-Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not Agreement 0</b>
<b>VR - Valid Response</b>	1	100.0%	93	93	100.0%
<b>ER1 - Non-specific, vague, platitude or virtue signalling response</b>	0.97	98.9%	24	25	96.0%
<b>ER2 - Integrating Ethics in R&amp;I work</b>	0.92	96.8%	68	67	95.7%
<b>ER2.1.1 - Ethics in R&amp;I work (general)</b>	0.91	95.7%	47	47	91.8%
<b>ER2.1.2 - Ethics in R&amp;I work (specific steps)</b>	0.94	97.8%	22	20	90.9%
<b>ER2.2.1 - Integrating ethics through participatory methods</b>	1	100.0%	0	0	0.0%
<b>ER2.2.2 - Integrating ethics through shared ownership of the research/research outputs</b>	1	100.0%	1	1	100.0%
<b>ER2.2.3 - Ensuring informed consent with participants</b>	0.8	98.9%	3	2	66.7%
<b>ER2.2.4 - Ensuring participant anonymisation or confidentiality</b>	0.88	98.9%	4	5	80.0%
<b>ER2.2.5 - Ensuring open access to research methods and outputs</b>	1	100.0%	5	5	100.0%
<b>ER2.2.6 - Ensuring that R&amp;I outputs are used to deliver positive societal impact</b>	1	100.0%	4	4	100.0%

<b>ER2.2.7 - Integrating research ethics as a substantive focus of respondent's R&amp;I content/practice</b>	1	100.0%	3	3	100.0%
<b>ER2.2.8 - Promoting research ethics through delivering or attending training</b>	1	100.0%	10	10	100.0%
<b>ER2.2.9 - Participation in or engagement with ethics committees</b>	0.88	95.7%	19	23	82.6%
<b>ER2.2.10 - Compliance with rules, regulations, and legal obligations</b>	0.87	95.7%	20	18	81.0%
<b>ER2.2.11 - Integrating ethics through respecting intellectual property rights and academic referencing</b>	1	100.0%	8	8	100.0%
<b>ER2.2.12 - Reporting of unethical ethical conduct</b>	1	100.0%	1	1	100.0%
<b>ER2.2.13 - Other research ethics step taken</b>	0.59	91.4%	14	8	46.7%
<b>ER3 - Unclear / Uncertain</b>	1	100.0%	0	0	0.0%

## 5.6.5 TRANSPARENCY

Table 22: Transparency – ICR results

	<b>K-Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	113	113	100.0%
<b>RT1 - Non-specific, vague, platitude or virtue signalling response</b>	0.86	97.3%	12	11	76.9%
<b>RT2 - Pathways to open/transparent R&amp;I methods and processes</b>	0.93	96.5%	68	70	94.4%
<b>RT2.1.1 - Pathways to open/transparent R&amp;I methods and processes (general)</b>	0.88	95.6%	27	28	83.3%
<b>RT2.1.2 - Pathways to open/transparent R&amp;I methods and processes (specific steps)</b>	0.94	97.3%	44	45	93.5%
<b>RT2.2.1 - Documenting/reporting research and decision-making processes</b>	0.91	96.5%	34	32	88.6%
<b>RT2.2.2 - Disclosing research data, raw data, codes, and statistics</b>	0.93	98.2%	15	17	88.2%

<b>RT2.2.3 - Seeking upstream academic/researcher feedback on research ideas or plans</b>	0.87	97.3%	13	14	80.0%
<b>RT2.2.4 - Seeking upstream feedback on research ideas/plans from non-academics/nonresearchers</b>	0.87	98.2%	7	9	77.8%
<b>RT2.2.5 - Seeking approval for methods/processes in research applications</b>	1	100.0%	2	2	100.0%
<b>RT2.2.6 - Participation in or engagement with relevant committees</b>	1	100.0%	3	3	100.0%
<b>RT2.2.7 - Other step taken to ensure R&amp;I openness and transparency</b>	0.84	96.5%	14	14	75.0%
<b>RT3 - One-way dissemination with no reference to research methods/processes or transparency/openness per se</b>	0.8	90.3%	54	49	80.7%
<b>RT3.1 - Open access publication</b>	0.89	97.3%	17	14	82.4%
<b>RT4 - Unclear / Uncertain</b>	1	100.0%	2	2	100.0%

## 5.6.6 PUBLIC ACCESSIBILITY

Table 23: Public Accessibility – ICR results

	<b>K-Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	127	127	100.0%
<b>PA1 - Non-specific, vague, platitude or virtue signalling response</b>	0.89	99.2%	4	5	80.0%
<b>PA2 - Public accessibility of R&amp;I results</b>	0.96	98.4%	84	84	97.6%
<b>PA2.1.1 - Public accessibility of R&amp;I results (general)</b>	0.85	98.4%	8	6	75.0%
<b>PA2.1.2 - Public accessibility of R&amp;I results (specific steps)</b>	0.97	98.4%	79	79	97.5%
<b>PA2.2.1 - Institutional- or project-based/supported publishing of research findings (outside of scholarly publishing)</b>	0.8	99.2%	3	2	66.7%
<b>PA2.2.2 - Publishing/disseminating R&amp;I outputs using institutional open access repositories or external open access databases</b>	0.91	99.2%	6	5	83.3%

<b>PA2.2.3 - Personally publishing/disseminating R&amp;I outputs to the public outside of scholarly publishing</b>	0.95	98.4%	25	23	92.0%
<b>PA2.2.4 - Engaging with non-academic/public stakeholders through outreach activities after research is completed</b>	0.98	99.2%	25	26	96.2%
<b>PA2.2.5 - Promoting R&amp;I results in the media</b>	0.97	99.2%	16	17	94.1%
<b>PA2.2.6 - Open access scholarly publishing</b>	0.98	99.2%	27	28	96.4%
<b>PA2.2.7 - Efforts to facilitate public understanding of R&amp;I results</b>	1	100.0%	6	6	100.0%
<b>PA2.2.8 - Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research</b>	1	100.0%	4	4	100.0%
<b>PA2.2.9 - Other step taken to make R&amp;I results available to the public</b>	0.85	99.2%	3	4	75.0%
<b>PA3 - Sharing R&amp;I work within professional R&amp;I stakeholder environments</b>	0.94	96.9%	53	55	92.9%
<b>PA4 - Unclear / Uncertain</b>	0.92	99.2%	7	6	85.7%

## 5.6.7 OPEN DATA

Table 24: Open Data – ICR results

	<b>K-Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	78	78	100.0%
<b>OD1 – Non-specific, vague, platitude or virtue signalling response</b>	0.8	94.9%	12	12	71.4%
<b>OD2 – Confusing open access to research findings and open data</b>	0.9	94.9%	45	45	91.5%
<b>OD3 – Public availability of R&amp;I data</b>	1	100.0%	18	18	100.0%
<b>OD3.1.1 – Public availability of R&amp;I data (general)</b>	0.93	98.7%	8	7	87.5%
<b>OD3.1.2 – Public availability of R&amp;I data (specific steps)</b>	1	100.0%	11	11	100.0%

<b>OD3.2.1 – Appending research data to scientific publications</b>	1	100.0%	2	2	100.0%
<b>OD3.2.2 – Publishing research data to institutional/project websites</b>	1	100.0%	1	1	100.0%
<b>OD3.2.3 – Personally publishing/distributing R&amp;I data</b>	1	100.0%	2	2	100.0%
<b>OD3.2.4 – Publishing data in public repositories</b>	1	100.0%	2	2	100.0%
<b>OD3.2.5 – Promoting open data internally through delivering or attending training</b>	1	100.0%	0	0	0.0%
<b>OD3.2.6 – Establishment or compliance with regulations on open data</b>	1	100.0%	3	3	100.0%
<b>OD3.2.7 – Other step taken to make research data available to the public</b>	0.84	96.2%	12	9	75.0%
<b>OD4 – Resisting/delimiting open data or supporting closed data</b>	0.84	97.4%	7	7	75.0%
<b>OD5 – Unclear/Uncertain</b>	1	100.0%	0	0	0.0%

## 5.6.8 SOCIETAL NEEDS

Table 25: Societal Needs – ICR results

	<b>K-Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	105	105	100.0%
<b>SN1 - Non-specific, vague, platitude or virtue signalling response</b>	0.94	99.0%	10	9	90.0%
<b>SN2 - Addressing societal needs in R&amp;I work</b>	0.88	98.1%	96	96	97.9%
<b>SN2.1.1 - Addressing societal needs in R&amp;I work (general)</b>	0.81	90.5%	50	50	81.8%
<b>SN2.1.2 - Addressing societal needs in R&amp;I work (specific steps)</b>	0.83	91.4%	48	47	82.7%
<b>SN2.2.1 - Participatory process: research topic/problem defined by societal needs</b>	0.95	99.0%	12	13	92.3%
<b>SN2.2.2 - Selection of research topic/problem defined by researchers' perceptions of societal needs</b>	0.98	99.0%	43	42	97.7%

<b>SN2.2.3 - Participatory process: research design/approach defined by societal needs</b>	1	100.0%	3	3	100.0%
<b>SN2.2.4 - Societal issues as a substantive dimension in R&amp;I content/focus</b>	1	100.0%	20	20	100.0%
<b>SN2.2.5 - Reflecting on/evaluating R&amp;I impact on societal needs</b>	1	100.0%	8	8	100.0%
<b>SN2.2.6 - Compliance with institutional/funding requirements</b>	1	100.0%	2	2	100.0%
<b>SN2.2.7 - Communicating R&amp;I work/activities to public/non-academic stakeholders</b>	0.96	99.0%	14	13	92.9%
<b>SN2.2.8 - Other step taken to address societal needs in R&amp;I work</b>	1	100.0%	15	15	100.0%
<b>SN3 - Unclear / Uncertain</b>	1	100.0%	1	1	100.0%

## 5.6.9 SOCIETAL CONCERNS

Table 26: Societal Concerns – ICR results

	<b>K-Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	71	71	100.0%
<b>SC1 - Non-specific, vague, platitude or virtue signalling response</b>	0.88	97.2%	10	10	81.8%
<b>SC2 - Addressing societal concerns about implementation of R&amp;I work</b>	0.9	97.2%	60	58	96.7%
<b>SC2.1.1 - Addressing societal concerns in R&amp;I work (general)</b>	0.91	95.8%	28	29	90.0%
<b>SC2.1.2 - Addressing societal concerns in R&amp;I work (specific steps)</b>	0.91	95.8%	32	29	90.6%
<b>SC2.2.1 - Seeking upstream feedback from non-R&amp;I stakeholders on R&amp;I ideas/plans</b>	0.89	97.2%	11	11	83.3%
<b>SC2.2.2 - Making the research directly responsive to societal needs or concerns</b>	1	100.0%	5	5	100.0%
<b>SC2.2.3 - Seeking upstream feedback from other R&amp;I stakeholders on R&amp;I ideas/plans</b>	0.93	98.6%	7	8	87.5%

<b>SC2.2.4 - Addressing societal concerns as substantive dimension of the R&amp;I work</b>	0.9	98.6%	6	5	83.3%
<b>SC2.2.5 - Compliance with rules, regulations, or legal obligations</b>	0.93	97.2%	19	17	89.5%
<b>SC2.2.6 - Mitigating or preventing societal concerns through delivering or attending training</b>	1	100.0%	5	5	100.0%
<b>SC2.2.7 - Participation in or engagement with relevant committees</b>	0.88	98.6%	4	5	80.0%
<b>SC2.2.8 - Ensuring integrity in R&amp;I processes involving human participants</b>	0.93	98.6%	8	9	88.9%
<b>SC2.2.9 - Preventing societal concerns resulting from R&amp;I work by following responsible safety and waste practices to avoid damage</b>	1	100.0%	6	6	100.0%
<b>SC2.2.10 - Ensuring positive outcomes for society, without explicitly mentioning the prevention of societal concerns</b>	1	100.0%	2	2	100.0%
<b>SC2.2.11 - Other step taken to consider societal concerns in R&amp;I work</b>	0.86	97.2%	8	8	77.8%
<b>SC3 - Unclear / Uncertain</b>	0.88	98.6%	4	5	80.0%

## 5.6.10 ASSOCIATIONS WITH RRI

Table 27: Associations with RRI – ICR results

	<b>K-Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	126	126	100.0%
<b>RRI1 - Non-specific, vague, platitude or virtue signalling response</b>	0.9	95.2%	48	50	88.5%
<b>RRI2 – Ideas, practices or policies associated with RRI</b>	0.88	94.4%	76	75	91.1%
<b>RRI2.1 – Aligning research and innovation with societal benefits</b>	0.96	98.4%	29	29	93.3%
<b>RRI2.2 – Integrating / anticipating public perspectives in research and innovation</b>	0.85	98.4%	7	7	75.0%
<b>RRI2.3 – Ensuring societal acceptance of research and innovation</b>	1	100.0%	0	0	0.0%

<b>RRI2.4 – Do no harm to people/society/participants with R&amp;I</b>	0.93	98.4%	16	16	88.2%
<b>RRI2.5 – Protecting the environment, preventing negative impacts of research and innovation on the environment</b>	1	100.0%	19	19	100.0%
<b>RRI2.6 – Orientating research and innovation towards generating improved technologies/outputs</b>	0.89	99.2%	5	4	80.0%
<b>RRI2.7 – Empowering non-academic stakeholders to shape the direction of R&amp;I</b>	1	100.0%	2	2	100.0%
<b>RRI2.8 – Open and honest science</b>	0.79	97.6%	7	8	66.7%
<b>RRI2.9 – Enhancing research quality through appropriate methods</b>	0.89	99.2%	4	5	80.0%
<b>RRI2.10 – Engaging / communicating with non-academic stakeholders or publics about research and innovation activities</b>	1	100.0%	1	1	100.0%
<b>RRI2.11 – Ensuring ethical procedures and approvals are completed in R&amp;I work</b>	0.88	98.4%	9	9	80.0%
<b>RRI2.12 – Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty</b>	1	100.0%	5	5	100.0%
<b>RRI2.13 – Ensuring ethnic/racial diversity in research and innovation activities</b>	1	100.0%	3	3	100.0%
<b>RRI2.14 – Ensuring gender equality in research and innovation activities</b>	1	100.0%	2	2	100.0%
<b>RRI2.15 – Ensuring research independence</b>	1	100.0%	1	1	100.0%
<b>RRI2.16 – Ensuring norms/practices evincing research integrity and high professional standards</b>	0.79	98.4%	6	4	66.7%
<b>RRI2.17 – Following formal/official research guidelines and regulations</b>	1	100.0%	2	2	100.0%
<b>RRI2.18 – Sharing research and innovation results and data within the academic community</b>	0.74	98.4%	5	3	60.0%
<b>RRI2.19 – Ensuring ethnic diversity within the academic community or research teams</b>	1	100.0%	0	0	0.0%
<b>RRI2.20 – Ensuring gender equality within academic community</b>	1	100.0%	0	0	0.0%

<b>RRI2.21 – Associating RRI with certain research and innovation areas/fields</b>	0.8	99.2%	2	3	66.7%
<b>RRI2.22 – Other association with RRI</b>	0.81	97.6%	8	9	70.0%
<b>RRI3 – Associating RRI with the EU and Horizon 2020</b>	0	99.2%	0	1	0.0%
<b>RRI4 - Criticism related to RRI</b>	1	100.0%	2	2	100.0%
<b>RRI5 - Unclear / Uncertain</b>	1	100.0%	0	0	0.0%

## 5.6.11 ASSOCIATIONS WITH UN SDGS

Table 28: Associations with UN SDGs - ICR results

	<b>K- Alpha</b>	<b>Percent Agreement</b>	<b>Not 0 (C1)</b>	<b>Not 0 (C2)</b>	<b>Not 0 Agreement</b>
<b>VR - Valid Response</b>	1	100.0%	126	126	100.0%
<b>SDG1 - Non-specific, vague, platitude or virtue signalling response</b>	0.98	99.2%	30	31	96.8%
<b>SDG2 – Defining sustainable development</b>	1	100.0%	70	70	100.0%
<b>SDG2.1 – Integrating/balancing different aspects of sustainable development</b>	1	100.0%	2	2	100.0%
<b>SDG2.2 – Educational aspects of sustainable development</b>	1	100.0%	11	11	100.0%
<b>SDG2.3 – Economic aspects of sustainable development</b>	0.91	96.0%	41	38	88.1%
<b>SDG2.4 – Integrating economic and environmental aspects of sustainable development</b>	0.93	98.4%	17	15	88.2%
<b>SDG2.5 – Preserving natural resources</b>	0.95	98.4%	24	26	92.3%
<b>SDG2.6 – Health-related aspects of sustainable development</b>	0.94	99.2%	9	10	90.0%
<b>SDG2.7 – Diversity/inclusion aspects of sustainable development</b>	0.86	95.2%	24	28	79.3%
<b>SDG2.8 – Addressing climate change</b>	1	100.0%	11	11	100.0%
<b>SDG2.9 – Other aspects of sustainable development</b>	0.79	97.6%	9	6	66.7%
<b>SDG3 – Governance dimensions of SDGs</b>	1	100.0%	19	19	100.0%

<b>SDG4 – Achieving the SDGs</b>	1	100.0%	7	7	100.0%
<b>SDG4.1 – Contribution of technological innovation to sustainable development</b>	1	100.0%	0	0	0.0%
<b>SDG4.2 – Other implementation actions to achieve SDGs</b>	1	100.0%	7	7	100.0%
<b>SDG5 – Integrating SDGs within formal education</b>	1	100.0%	0	0	0.0%
<b>SDG6 – General Praise for the UN SDGs</b>	1	100.0%	0	0	0.0%
<b>SDG7 – General Criticism of the UN SDGs</b>	0.87	98.4%	8	8	77.8%
<b>SDG8 – Unclear / Uncertain</b>	1	100.0%	1	1	100.0%

## 5.7 APPENDIX VII: GLOBAL INTERVIEW RESEARCH: CODE FREQUENCIES

### 5.7.1 ARAB STATES: CODE FREQUENCIES BY DOMAINS

DOMAIN COUNTS	Arab States															
Codes	Energy				Waste				ICT				Bioeconomy			
	Total	Egypt	Morocco	Jordan	Total	Egypt	Morocco	Jordan	Total	Egypt	Morocco	Jordan	Total	Egypt	Morocco	Jordan
1 : Public engagement	24	11	8	5	27	6	9	12	26	14	5	7	25	20	1	4
2 : Organisational norms and practices	6	3	0	2	5	2	0	3	9	6	0	3	14	12	0	2
3 : Lack or uncertainty of public engagement policy	8	5	3	0	6	4	2	0	8	6	1	1	7	6	0	1
4 : Motives-Benefits of public engagement and collaboration	11	3	5	3	16	0	7	9	11	4	4	3	6	4	1	1
5 : Risks-Disadvantages associated with public engagement and collaboration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 : Types of stakeholders for engagement	94	42	27	25	110	37	35	38	67	46	7	14	119	76	10	33
7 : Government bodies, municipalities and regulatory authorities	27	12	6	9	26	9	6	11	12	9	1	2	31	18	2	11
8 : Professional bodies	2	0	1	1	4	0	3	1	1	0	0	1	6	2	1	3
9 : Research Funding organisations	4	2	0	2	4	2	0	2	3	2	0	1	6	4	0	2
10 : Scientific community	22	11	6	5	31	12	15	4	20	12	2	6	31	21	4	6
11 : Specialists-Experts	5	3	1	1	4	3	0	1	4	2	1	1	4	3	0	1

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12 : Civil society organisations	9	4	2	3	11	5	1	5	6	6	0	0	18	14	0	4
13 : Industry and Business	21	9	9	3	21	5	10	6	14	10	1	3	16	11	3	2
14 : Marketing and communication agencies- Public Relations Industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 : Celebrities	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
16 : Citizens or the general public	4	2	2	0	16	2	3	11	6	4	2	0	10	2	2	6
17 : Others	3	2	0	1	2	2	0	0	5	5	0	0	4	4	0	0
18 : Tools for engagement	24	7	4	13	24	4	2	18	24	8	6	10	19	8	1	10
19 : Information-based tools	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
20 : Training and workshops	7	5	0	2	12	3	2	7	6	6	0	0	10	5	0	5
21 : Conferences, symposiums, talks and exhibitions	7	2	3	2	8	2	4	2	2	1	0	1	10	5	0	5
22 : Research publications and policy reports	5	3	1	1	4	2	1	1	10	9	0	1	6	2	0	4
23 : Information centres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 : University open days	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 : Media	5	5	0	0	6	5	0	1	6	6	0	0	7	6	0	1
26 : Consultation tools	6	2	1	3	5	1	0	4	3	0	1	2	6	3	0	3
27 : Surveys	2	1	1	0	0	0	0	0	1	0	1	0	2	2	0	0
28 : Public-citizen consultations	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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29 : Feasibility studies- working groups	3	0	0	3	5	1	0	4	2	0	0	2	4	1	0	3
30 : Involvement tools	10	4	1	5	14	3	1	10	9	6	0	3	10	4	1	5
31 : Open public calls and funding initiatives, etc	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0
32 : Focus groups and discussions	4	1	0	3	6	0	0	6	3	0	0	3	4	1	0	3
33 : Competitions and awards	2	1	1	0	2	1	1	0	1	1	0	0	2	1	1	0
34 : Tie-ups with local schools	2	0	0	2	4	0	0	4	3	3	0	0	2	0	0	2
35 : Collaboration tools	7	1	2	4	1	0	0	1	10	2	4	4	2	0	0	2
36 : Social networks	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0
37 : University-based start-ups	7	0	2	5	0	0	0	0	9	0	4	5	0	0	0	0
38 : Applied research laboratories	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
39 : R&I matchmaking	1	0	0	1	1	0	0	1	2	1	0	1	0	0	0	0
40 : Empowerment tools	1	0	0	1	4	0	1	3	1	0	0	1	1	1	0	0
41 : Participatory management-approaches	1	0	0	1	2	0	0	2	1	0	0	1	1	1	0	0
42 : Campaigning-Lobbying	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	40	21	15	14	31	13	15	13	57	26	12	19	54	38	3	13

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46 : Level and limits of open access	6	0	0	6	6	1	0	5	13	5	0	7	10	7	0	3
47 : Data protection	8	0	7	1	4	0	3	1	7	0	6	1	1	0	0	1
48 : Data accessibility	3	0	1	2	5	0	5	0	3	0	0	3	4	4	0	0
49 : Organisational norms and practices	9	7	0	2	10	5	2	3	8	6	0	2	12	8	2	2
50 : Lack or uncertainty of policy	8	4	3	1	4	2	2	0	10	6	2	2	10	10	0	0
51 : Risks-Disadvantages associated with open data-access	10	9	1	0	8	5	2	1	12	10	1	1	14	8	0	6
52 : Motives-Benefits of open access and data	9	2	3	4	9	0	3	6	15	6	3	6	11	7	1	3
53 : Diversity and inclusion	43	16	12	5	45	12	14	19	38	22	8	8	44	32	2	10
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	1	1	0	0	4	0	0	4	1	1	0	0	8	6	0	2
55 : Organisational norms and practices	3	2	0	1	5	3	0	2	6	5	0	1	7	5	0	2
56 : Gender-Sexual diversity	14	3	9	2	18	2	9	7	12	5	5	2	14	9	1	4
57 : Ethnic and religious diversity	1	1	0	0	2	1	0	1	1	1	0	0	4	3	0	1
58 : Country-based representation	1	1	0	0	1	1	0	0	1	1	0	0	2	1	0	1
59 : Disability	2	1	1	0	3	1	1	1	2	1	0	1	1	1	0	0
60 : Academic diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 : Age diversity	1	1	0	0	3	1	0	2	1	1	0	0	1	1	0	0
62 : Socio-economic diversity and inclusion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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63 : Motives-Benefits of diversity and inclusion	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0
64 : Risks-Disadvantages associated with diversity and inclusion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65 : Discrimination and lack of diversity	0	0	0	0	2	0	0	2	7	3	3	1	2	2	0	0
66 : Lack or uncertainty of policy	7	5	1	1	7	3	2	2	10	8	0	2	10	7	1	2
67 : Discrimination- a non-issue	14	4	8	2	8	3	3	2	11	3	6	2	6	5	0	1
68 : Ethics	39	23	11	5	37	19	12	6	36	26	4	6	44	36	3	5
69 : Positioning ethics- where does the responsibility lie	5	3	1	1	4	4	0	0	6	5	0	1	9	8	0	1
70 : Disidentification with ethical responsibility	1	0	1	0	2	2	0	0	2	2	0	0	6	6	0	0
71 : Personal responsibility and morality	2	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0
72 : Organisational norms and practices	2	2	0	0	2	1	1	0	4	4	0	0	3	3	0	0
73 : Safety and security	1	1	0	0	1	0	0	1	1	0	1	0	1	0	0	1
74 : Justice and fair dealing	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0
75 : Quality assurance and testing	6	1	3	2	5	1	4	0	3	1	0	2	3	3	0	0
76 : Transparency	10	5	4	1	5	2	1	2	9	5	3	1	6	5	0	1
77 : Accountability	1	1	0	0	3	1	2	0	2	1	0	1	3	1	2	0
78 : Lack or uncertainty of ethical standards and policies	7	6	1	0	7	4	2	1	4	4	0	0	8	7	1	0

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79 : Protection of rights	11	7	3	1	12	7	3	2	11	9	0	2	16	13	0	3
80 : Meeting societal needs	39	12	12	15	60	18	19	23	38	13	8	17	55	33	2	20
81 : Demand-driven research and innovation	31	10	10	11	54	16	18	20	26	8	5	13	47	28	1	18
82 : Targeting critical societal challenges	16	5	6	5	29	4	12	13	12	2	4	6	21	10	1	10
83 : Benefiting specific groups	4	0	2	2	2	1	0	1	3	1	1	1	4	4	0	0
84 : Furthering research-developing policy or standards	6	3	2	1	12	5	6	1	6	3	0	3	7	7	0	0
85 : Organisational norms and practices	3	1	0	2	2	1	0	1	3	1	0	2	2	1	0	1
86 : Lack of consideration of societal benefits	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0
87 : Lack or uncertainty of policy for meeting societal needs	4	0	2	2	3	1	1	1	6	2	3	1	6	4	1	1
88 : Anticipation	20	5	8	7	31	6	15	10	17	6	3	8	18	14	0	4
89 : Future societal needs and challenges	3	0	1	2	3	0	2	1	3	1	0	2	1	1	0	0
90 : Environmental sustainability	4	0	2	2	16	1	10	5	0	0	0	0	4	3	0	1
91 : Responsive approach	5	0	3	2	5	2	0	3	6	0	1	5	8	6	0	2
92 : Organisational norms and practices	3	2	0	1	2	1	0	1	2	1	0	1	4	3	0	1
93 : Lack or uncertainty of anticipation policy and framework	5	3	2	0	5	2	3	0	6	4	2	0	2	2	0	0
94 : Enablers	17	10	1	6	41	8	7	26	24	15	3	6	22	13	1	8

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95 : Accounting for local contexts	5	3	0	2	14	3	4	7	8	4	2	2	9	5	0	4
96 : Importance of customisation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97 : Contextualising technology and innovation	1	0	0	1	2	0	1	1	1	0	0	1	1	0	0	1
98 : Importance of politics	0	0	0	0	3	0	3	0	1	1	0	0	0	0	0	0
99 : Accounting for geographic scale	3	3	0	0	6	3	0	3	5	3	2	0	4	4	0	0
100 : Evaluation	7	5	1	1	19	4	2	13	10	8	1	1	9	6	0	3
101 : Importance of feedback	4	1	2	1	4	0	4	0	4	2	1	1	1	0	1	0
102 : R&I Capacity Building	2	0	0	2	1	0	0	1	4	2	0	2	1	0	0	1
103 : Participation in upstream R&I	3	2	0	1	7	1	1	5	2	1	0	1	3	2	1	0
104 : Constraints	6	4	0	2	6	2	0	4	10	6	1	3	7	4	0	3
105 : Time frames and time constraints	1	1	0	0	1	1	0	0	1	1	0	0	2	2	0	0
106 : Financial constraints and considerations	4	3	0	1	3	1	0	2	8	4	1	3	5	2	0	3
107 : Lack of (perceived) interest of general public	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0
108 : Lack of (perceived) applicability of RRI	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0
109 : Conflicts between theory and practice	7	4	1	2	8	5	1	2	7	6	0	1	13	7	0	6
110 : Conflicts and tensions in R&I expectations	7	4	1	2	8	5	1	2	7	6	0	1	13	7	0	6

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111 : Collaboration	31	4	11	16	33	7	12	15	22	6	3	13	40	23	5	12
112 : Building support networks and strategic alliances	15	1	5	9	16	4	4	8	11	4	0	7	15	9	0	6
113 : Actor mapping	2	0	2	0	0	0	0	0	2	0	2	0	2	2	0	0
114 : Integration of different domains and stakeholders	7	1	1	5	12	1	7	4	6	1	1	4	11	2	5	4
115 : RRI frameworks for new cross disciplinary research	1	1	0	0	1	1	0	0	1	1	0	0	2	2	0	0
116 : Difficulties in collaboration and engagement	9	1	3	5	8	1	1	6	5	0	0	5	13	8	0	5

## 5.7.2 ARAB STATES: CODE FREQUENCIES BY STAKEHOLDER TYPES

STAKEHOLD ER COUNTS	Arab States																			
Codes	Research Organisation				Research Funding Organisation				Industry & Business				Civil Society Organisation				Policy body			
	Total	Egypt	Morocco	Jordan	Total	Egypt	Morocco	Jordan	Total	Egypt	Morocco	Jordan	Total	Egypt	Morocco	Jordan	Total	Egypt	Morocco	Jordan
1 : Public engagement	53	28	11	14	7	3		4	9	5	4		41	11	4	8	9	3	2	4
2 : Organisational norms and practices	22	18	0	4	1	0		1	3	3	0		12	8	0	0	2	1	0	1
3 : Lack or uncertainty of public engagement policy	12	6	3	3	4	3		1	2	1	1		8	1	2	1	2	1	0	1
4 : Motives-Benefits of public engagement and collaboration	23	8	8	7	2	0		2	5	2	3		23	4	2	7	5	1	2	2
5 : Risks-Disadvantages associated with public engagement and collaboration	0	0	0	0	0	0		0	0	0	0		0	0	0	0	0	0	0	0

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6 : Types of stakeholders for engagement	166	66	21	79	29	26	3	54	20	34	121	26	5	24	33	25	5	3
7 : Government bodies, municipalities and regulatory authorities	50	19	5	26	5	5	0	11	5	6	24	6	0	8	5	4	1	0
8 : Professional bodies	10	2	2	6	0	0	0	3	1	2	4	2	0	2	0	0	0	0
9 : Research Funding organisations	8	2	0	6	2	2	0	0	0	0	4	1	0	1	1	1	0	0
10 : Scientific community	35	14	7	14	11	9	2	15	2	13	36	7	1	4	12	8	2	2
11 : Specialists-Experts	3	2	0	1	2	2	0	1	0	1	4	0	0	0	2	1	1	0
12 : Civil society organisations	19	10	1	8	4	4	0	7	6	1	19	6	0	3	5	5	0	0
13 : Industry and Business	25	11	5	9	4	3	1	16	6	10	20	4	2	0	7	5	1	1
14 : Marketing and communication agencies- Public Relations Industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 : Celebrities	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0

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16 : Citizens or the general public	14	2	2	10	2	2	0	3	0	3	13	0	2	7	2	2	0	0
17 : Others	6	5	0	1	2	2	0	0	0	0	4	0	0	0	2	2	0	0
18 : Tools for engagement	40	12	6	22	3	3	0	7	3	4	22	3	1	10	4	3	1	0
19 : Information-based tools	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	1	0
20 : Training and workshops	14	3	2	9	3	3	0	2	2	0	12	1	0	3	4	4	0	0
21 : Conferences, symposiums, talks and exhibitions	18	5	4	9	1	1	0	5	2	3	5	2	0	3	0	0	0	0
22 : Research publications and policy reports	13	5	1	7	2	2	0	1	0	1	9	0	0	3	3	3	0	0
23 : Information centres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 : University open days	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 : Media	6	3	0	3	4	4	0	1	1	0	5	0	0	1	2	2	0	0
26 : Consultation tools	9	5	0	4	0	0	0	2	1	1	3	1	1	1	0	0	0	0
27 : Surveys	3	3	0	0	0	0	0	2	1	1	2	1	1	0	0	0	0	0

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28 : Public-citizen consultations	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 : Feasibility studies- working groups	5	1	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0
30 : Involvement tools	15	5	1	9	3	3	0	1	0	1	10	1	0	3	3	3	0	0
31 : Open public calls and funding initiatives, etc	0	0	0	0	2	2	0	0	0	0	4	0	0	0	2	2	0	0
32 : Focus groups and discussions	7	2	0	5	0	0	0	0	0	0	2	1	0	1	0	0	0	0
33 : Competitions and awards	1	0	1	0	1	1	0	1	0	1	2	0	0	0	1	1	0	0
34 : Tie-ups with local schools	7	3	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0
35 : Collaboration tools	13	1	4	8	0	0	0	3	1	2	3	0	0	3	0	0	0	0
36 : Social networks	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
37 : University-based start-ups	9	0	4	5	0	0	0	2	0	2	0	0	0	0	0	0	0	0

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38 : Applied research laboratories	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0
39 : R&I matchmaking	2	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0
40 : Empowerment tools	3	1	1	1	0	0	0	1	1	0	4	1	0	3	0	0	0	0
41 : Participatory management-approaches	2	1	0	1	0	0	0	1	1	0	3	1	0	2	0	0	0	0
42 : Campaigning-Lobbying	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	99	46	16	37	15	8	7	29	15	14	76	22	6	6	21	11	3	7
46 : Level and limits of open access	23	10	0	13	3	0	3	1	1	0	15	5	0	0	5	2	0	3
47 : Data protection	3	0	2	1	0	0	0	9	0	9	5	0	5	0	0	0	0	0

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48 : Data accessibility	12	4	5	3	1	0	1	4	4	0	6	4	0	0	1	0	0	1
49 : Organisational norms and practices	14	11	0	3	3	3	0	5	3	2	7	3	0	0	2	2	0	0
50 : Lack or uncertainty of policy	17	11	4	2	3	2	1	2	2	0	15	6	1	0	4	2	1	1
51 : Risks-Disadvantages associated with open data-access	25	10	3	12	4	3	1	3	3	0	20	1	0	5	7	6	0	1
52 : Motives-Benefits of open access and data	23	11	4	8	2	0	2	7	4	3	19	6	0	1	6	2	2	2
53 : Diversity and inclusion	65	33	12	20	13	9	4	20	9	11	67	17	8	8	17	12	1	4
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	9	6	0	3	0	0	0	5	5	0	7	6	0	1	0	0	0	0
55 : Organisational norms and practices	9	5	0	4	3	2	1	1	1	0	7	1	0	0	3	2	0	1
56 : Gender-Sexual diversity	23	10	7	6	2	2	0	14	5	9	20	6	6	2	3	3	0	0

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57 : Ethnic and religious diversity	3	2	0	1	1	1	0	0	0	0	3	1	0	0	1	1	0	0
58 : Country-based representation	2	0	0	2	1	1	0	0	0	0	3	0	0	1	1	1	0	0
59 : Disability	2	0	1	1	2	1	1	0	0	0	6	0	1	1	2	1	0	1
60 : Academic diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 : Age diversity	0	0	0	0	1	1	0	0	0	0	2	0	0	2	0	0	0	0
62 : Socio-economic diversity and inclusion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63 : Motives-Benefits of diversity and inclusion	1	1	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0
64 : Risks-Disadvantages associated with diversity and inclusion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65 : Discrimination and lack of diversity	6	2	2	2	1	0	1	0	0	0	13	2	0	1	5	3	1	1

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66 : Lack or uncertainty of policy	15	11	1	3	3	2	1	2	1	1	8	3	1	0	2	1	0	1
67 : Discrimination- a non-issue	12	6	3	3	2	2	0	10	2	8	11	2	5	0	2	2	0	0
68 : Ethics	56	28	9	19	16	15	1	19	10	9	39	11	4	4	10	9	0	1
69 : Positioning ethics- where does the responsibility lie	11	8	0	3	2	2	0	1	0	1	7	2	0	1	2	2	0	0
70 : Disidentification with ethical responsibility	7	7	0	0	0	0	0	1	0	1	4	2	0	0	1	1	0	0
71 : Personal responsibility and morality	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72 : Organisational norms and practices	6	6	0	0	1	1	0	3	2	1	4	2	0	0	1	1	0	0
73 : Safety and security	15	1	1	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0
74 : Justice and fair dealing	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0
75 : Quality assurance and testing	7	2	3	2	1	1	0	1	0	1	2	0	0	0	1	1	0	0

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76 : Transparency	6	3	1	2	2	2	0	9	6	3	11	3	4	0	2	2	0	0
77 : Accountability	1	0	0	1	2	1	1	2	0	2	2	0	0	0	1	0	0	1
78 : Lack or uncertainty of ethical standards and policies	8	6	1	1	3	3	0	3	2	1	4	2	0	0	1	1	0	0
79 : Protection of rights	23	9	4	10	7	6	1	2	2	0	14	4	1	3	3	2	0	1
80 : Meeting societal needs	102	33	20	49	12	6	6	20	8	12	49	9	4	10	13	6	1	6
81 : Demand-driven research and innovation	88	26	19	43	10	5	5	16	7	9	38	7	3	10	9	4	0	5
82 : Targeting critical societal challenges	47	13	11	23	2	0	2	11	4	7	14	3	3	4	2	0	0	2
83 : Benefiting specific groups	10	4	2	4	1	0	1	3	2	1	6	2	0	0	2	1	0	1
84 : Furthering research-developing policy or standards	16	7	6	3	4	2	2	1	0	1	10	1	0	1	4	2	0	2
85 : Organisational norms and practices	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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86 : Lack of consideration of societal benefits	2	0	0	2	1	0	1	0	0	0	2	0	0	0	1	0	0	1
87 : Lack or uncertainty of policy for meeting societal needs	9	6	1	2	0	0	0	4	1	3	5	2	1	0	1	0	1	0
88 : Anticipation	47	15	17	15	5	2	3	10	7	3	27	6	3	2	8	4	1	3
89 : Future societal needs and challenges	5	1	1	3	0	0	0	2	1	1	3	1	0	0	1	1	0	0
90 : Environmental sustainability	20	3	11	6	0	0	0	2	2	0	3	2	0	1	0	0	0	0
91 : Responsive approach	12	6	1	5	3	0	3	6	4	2	12	4	1	1	3	0	0	3
92 : Organisational norms and practices	4	3	0	1	1	1	0	0	0	0	2	0	0	0	1	1	0	0
93 : Lack or uncertainty of anticipation policy and framework	7	3	4	0	1	1	0	1	1	0	8	0	2	0	3	2	1	0
94 : Enablers	35	7	2	26	8	8	0	12	6	6	31	5	1	3	11	9	2	0

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95 : Accounting for local contexts	8	2	0	6	3	3	0	6	2	4	15	2	0	1	6	4	2	0
96 : Importance of customisation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97 : Contextualising technology and innovation	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0
98 : Importance of politics	0	0	0	0	0	0	0	3	0	3	2	0	0	0	1	1	0	0
99 : Accounting for geographic scale	3	1	0	2	3	3	0	1	1	0	12	1	0	1	5	3	2	0
100 : Evaluation	18	3	2	13	4	4	0	4	3	1	7	2	1	0	2	2	0	0
101 : Importance of feedback	4	1	2	1	0	0	0	3	1	2	2	0	0	0	1	0	1	0
102 : R&I Capacity Building	3	0	0	3	0	0	0	0	0	0	4	0	0	0	2	2	0	0
103 : Participation in upstream R&I	6	2	0	4	1	1	0	2	1	1	5	1	0	2	1	1	0	0
104 : Constraints	14	4	1	9	4	2	2	2	2	0	9	2	0	1	3	1	0	2
105 : Time frames and time constraints	1	1	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0

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106 : Financial constraints and considerations	9	2	1	6	3	1	2	2	2	0	8	1	0	1	3	1	0	2
107 : Lack of (perceived) interest of general public	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108 : Lack of (perceived) applicability of RRI	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109 : Conflicts between theory and practice	17	4	1	12	4	4	0	1	1	0	10	2	0	6	1	1	0	0
110 : Conflicts and tensions in R&I expectations	17	4	1	12	4	4	0	1	1	0	10	2	0	6	1	1	0	0
111 : Collaboration	64	25	10	19	2	2	0	19	10	9	23	15	4	2	1	1	0	0
112 : Building support networks and strategic alliances	26	11	5	10	1	1	0	4	3	1	9	5	1	1	1	1	0	0
113 : Actor mapping	2	2	0	0	0	0	0	3	1	2	3	1	2	0	0	0	0	0
114 : Integration of different	9	2	2	5	0	0	0	7	1	6	2	1	1	0	0	0	0	0

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domains and stakeholders																				
115 : RRI frameworks for new cross disciplinary research	1	1	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0		
116 : Difficulties in collaboration and engagement	19	9	3	7	0	0	0	5	5	0	8	7	0	1	0	0	0	0		

### 5.7.3 ASIAN AND PACIFIC STATES: CODE FREQUENCIES BY DOMAINS

DOMAIN COUNTS	ASIAN AND PACIFIC STATES															
Codes	Energy				Waste				ICT				Bioeconomy			
	Total	India	Singapore	Japan	Total	India	Singapore	Japan	Total	India	Singapore	Japan	Total	India	Singapore	Japan
1 : Public engagement	20	16	3	1	6	5		1	14	8	0	6	6	4		2
2 : Organisational norms and practices	5	3	2	0	1	1		0	2	1	0	1	4	4		0
3 : Lack or uncertainty of public engagement policy	7	7	0	0	1	1		0	4	4	0	0	0	0		0
4 : Motives-Benefits of public engagement and collaboration	6	5	1	0	3	3		0	5	2	0	3	2	1		1
5 : Risks-Disadvantages associated with public engagement and collaboration	2	1	0	1	1	0		1	3	1	0	2	1	0		1
6 : Types of stakeholders for engagement	54	40	5	9	27	18		9	88	35	16	37	15	5		10
7 : Government bodies, municipalities and regulatory authorities	11	8	1	2	9	7		2	19	5	8	6	2	0		2
8 : Professional bodies	1	1	0	0	1	1		0	0	0	0	0	0	0		0
9 : Research Funding organisations	7	4	0	3	3	0		3	8	1	0	7	4	1		3
10 : Scientific community	9	8	0	1	3	2		1	20	9	3	8	4	2		2
11 : Specialists-Experts	3	3	0	0	1	1		0	6	3	1	2	0	0		0
12 : Civil society organisations	2	2	0	0	1	1		0	1	1	0	0	0	0		0
13 : Industry and Business	9	4	4	1	2	1		1	12	3	3	6	2	0		2

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14 : Marketing and communication agencies- Public Relations Industry	4	3	0	1	2	1	1	12	6	3	3	1	0	1
15 : Celebrities	0	0	0	0	0	0	0	1	0	0	1	0	0	0
16 : Citizens or the general public	8	8	0	0	4	4	0	5	3	0	2	1	1	0
17 : Others	1	0	0	1	1	0	1	6	4	0	2	2	1	1
18 : Tools for engagement	5	5	0	0	2	2	0	23	13	3	7	5	3	2
19 : Information-based tools	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 : Training and workshops	2	2	0	0	1	1	0	7	3	2	2	0	0	0
21 : Conferences, symposiums, talks and exhibitions	8	7	1	0	0	0	0	18	8	4	6	2	0	2
22 : Research publications and policy reports	1	1	0	0	1	1	0	7	1	2	4	5	3	2
23 : Information centres	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 : University open days	1	1	0	0	0	0	0	2	1	0	1	1	1	0
25 : Media	4	4	0	0	6	6	0	10	7	1	2	4	2	2
26 : Consultation tools	0	0	0	0	1	1	0	5	0	0	5	1	0	1
27 : Surveys	0	0	0	0	0	0	0	1	0	0	1	0	0	0
28 : Public-citizen consultations	0	0	0	0	1	1	0	2	0	0	2	1	0	1
29 : Feasibility studies- working groups	0	0	0	0	0	0	0	2	0	0	2	0	0	0
30 : Involvement tools	2	2	0	0	1	1	0	5	4	0	1	1	0	1
31 : Open public calls and funding initiatives, etc.	1	1	0	0	0	0	0	1	0	0	1	0	0	0

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32 : Focus groups and discussions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33 : Competitions and awards	0	0	0	0	1	1	0	2	2	0	0	0	0	0
34 : Tie-ups with local schools	1	1	0	0	0	0	0	2	2	0	0	1	0	1
35 : Collaboration tools	3	3	0	0	0	0	0	12	6	3	3	3	3	0
36 : Social networks	0	0	0	0	0	0	0	1	0	0	1	1	1	0
37 : University-based start-ups	0	0	0	0	0	0	0	2	0	0	2	0	0	0
38 : Applied research laboratories	1	1	0	0	0	0	0	1	1	0	0	2	2	0
39 : R&I matchmaking	2	2	0	0	0	0	0	8	5	3	0	0	0	0
40 : Empowerment tools	0	0	0	0	0	0	0	3	3	0	0	0	0	0
41 : Participatory management-approaches	0	0	0	0	0	0	0	1	1	0	0	0	0	0
42 : Campaigning-Lobbying	0	0	0	0	0	0	0	2	2	0	0	0	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	22	20	0	2	12	10	2	37	20	8	9	19	7	12
46 : Level and limits of open access	5	5	0	0	2	2	0	5	2	3	0	1	0	1
47 : Data protection	1	1	0	0	0	0	0	1	0	0	1	0	0	0
48 : Data accessibility	1	1	0	0	1	1	0	12	5	5	2	2	1	1
49 : Organisational norms and practices	3	3	0	0	4	4	0	7	2	4	1	2	0	2

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50 : Lack or uncertainty of policy	2	2	0	0	1	1	0	6	2	2	2	6	1	5
51 : Risks-Disadvantages associated with open data-access	10	8	0	2	5	3	2	10	7	0	3	9	5	4
52 : Motives-Benefits of open access and data	4	4	0	0	1	1	0	9	6	1	2	1	1	0
53 : Diversity and inclusion	27	20	4	3	13	10	3	52	11	7	34	20	4	16
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	4	4	0	0	0	0	0	6	1	1	4	0	0	0
55 : Organisational norms and practices	7	4	1	2	3	1	2	9	3	1	5	4	0	4
56 : Gender-Sexual diversity	11	6	3	2	8	6	2	24	5	5	14	7	2	5
57 : Ethnic and religious diversity	1	1	0	0	0	0	0	4	2	0	2	1	0	1
58 : Country-based representation	1	0	0	1	1	0	1	7	0	2	5	1	0	1
59 : Disability	1	0	1	0	0	0	0	2	0	0	2	1	0	1
60 : Academic diversity	1	0	1	0	0	0	0	3	0	0	3	0	0	0
61 : Age diversity	0	0	0	0	0	0	0	2	0	0	2	0	0	0
62 : Socio-economic diversity and inclusion	0	0	0	0	2	2	0	1	1	0	0	0	0	0
63 : Motives-Benefits of diversity and inclusion	1	1	0	0	0	0	0	2	1	1	0	0	0	0
64 : Risks-Disadvantages associated with diversity and inclusion	0	0	0	0	0	0	0	1	0	0	1	0	0	0
65 : Discrimination and lack of diversity	3	3	0	0	0	0	0	8	1	4	3	4	0	4
66 : Lack or uncertainty of policy	7	7	0	0	2	2	0	5	2	1	2	4	1	3

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67 : Discrimination- a non-issue	0	0	0	0	0	0	0	0	0	0	0	2	2	0
68 : Ethics	24	16	1	7	20	13	7	31	10	9	12	22	5	17
69 : Positioning ethics- where does the responsibility lie	0	0	0	0	0	0	0	4	1	0	3	4	3	1
70 : Disidentification with ethical responsibility	0	0	0	0	0	0	0	0	0	0	0	4	3	1
71 : Personal responsibility and morality	0	0	0	0	0	0	0	1	1	0	0	0	0	0
72 : Organisational norms and practices	6	5	0	1	4	3	1	7	4	1	2	5	2	3
73 : Safety and security	3	3	0	0	1	1	0	3	2	1	0	3	1	2
74 : Justice and fair dealing	1	0	0	1	1	0	1	2	0	1	1	1	0	1
75 : Quality assurance and testing	1	0	0	1	3	2	1	2	0	1	1	2	0	2
76 : Transparency	2	0	1	1	2	1	1	3	1	1	1	1	0	1
77 : Accountability	8	5	0	3	4	1	3	8	4	0	4	4	0	4
78 : Lack or uncertainty of ethical standards and policies	4	3	0	1	3	2	1	6	2	2	2	3	0	3
79 : Protection of rights	1	1	0	0	3	3	0	5	0	5	0	6	1	5
80 : Meeting societal needs	39	36	3	0	15	15	0	28	17	2	9	12	6	6
81 : Demand-driven research and innovation	33	30	3	0	13	13	0	23	13	2	8	9	6	3
82 : Targeting critical societal challenges	18	15	3	0	8	8	0	11	7	1	3	6	3	3
83 : Benefiting specific groups	4	4	0	0	1	1	0	1	0	1	0	1	1	0

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84 : Furthering research-developing policy or standards	8	8	0	0	4	4	0	5	2	0	3	0	0	0
85 : Organisational norms and practices	2	2	0	0	2	2	0	0	0	0	0	0	0	0
86 : Lack of consideration of societal benefits	0	0	0	0	0	0	0	0	0	0	0	3	0	3
87 : Lack or uncertainty of policy for meeting societal needs	1	1	0	0	0	0	0	1	1	0	0	0	0	0
88 : Anticipation	11	8	2	1	5	4	1	6	2	0	4	4	3	1
89 : Future societal needs and challenges	2	2	0	0	0	0	0	4	1	0	3	0	0	0
90 : Environmental sustainability	6	5	1	0	1	1	0	0	0	0	0	0	0	0
91 : Responsive approach	2	1	1	0	2	2	0	1	1	0	0	1	1	0
92 : Organisational norms and practices	2	1	0	1	2	1	1	1	0	0	1	2	1	1
93 : Lack or uncertainty of anticipation policy and framework	3	3	0	0	1	1	0	0	0	0	0	1	1	0
94 : Enablers	31	19	11	1	10	9	1	19	10	6	3	5	1	4
95 : Accounting for local contexts	20	9	11	0	2	2	0	16	9	6	1	2	0	2
96 : Importance of customisation	3	3	0	0	0	0	0	3	3	0	0	0	0	0
97 : Contextualising technology and innovation	3	1	2	0	0	0	0	1	0	1	0	0	0	0
98 : Importance of politics	7	2	5	0	2	2	0	6	2	3	1	0	0	0
99 : Accounting for geographic scale	7	3	4	0	0	0	0	4	4	0	0	1	0	1
100 : Evaluation	8	7	0	1	3	2	1	2	0	0	2	3	1	2

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101 : Importance of feedback	1	1	0	0	0	0	0	0	0	0	0	1	1	0
102 : R&I Capacity Building	2	2	0	0	3	3	0	0	0	0	0	0	0	0
103 : Participation in upstream R&I	1	1	0	0	2	2	0	1	1	0	0	0	0	0
104 : Constraints	12	6	3	3	5	2	3	14	10	0	4	9	4	5
105 : Time frames and time constraints	1	0	1	0	2	2	0	0	0	0	0	3	2	1
106 : Financial constraints and considerations	8	3	2	3	3	0	3	10	6	0	4	5	2	3
107 : Lack of (perceived) interest of general public	1	1	0		0	0	0	3	3	0	0	1	0	1
108 : Lack of (perceived) applicability of RRI	2	2	0	0	0	0	0	1	1	0	0	0	0	0
109 : Conflicts between theory and practice	11	5	2	4	6	2	4	16	8	2	6	6	1	5
110 : Conflicts and tensions in R&I expectations	5	5	0		6	2	4	16	8	2	6	6	1	5
111 : Collaboration	18	10	5	3	8	5	3	30	11	2	17	8	3	5
112 : Building support networks and strategic alliances	10	4	5	1	4	3	1	9	4	0	5	2	1	1
113 : Actor mapping	0	0	0		1	1	0	2	2	0	0	0	0	0
114 : Integration of different domains and stakeholders	6	5	0	1	2	1	1	16	5	1	10	3	1	2
115 : RRI frameworks for new cross disciplinary research	0	0	0	0	0	0	0	3	0	0	3	2	2	0
116 : Difficulties in collaboration and engagement	2	2	0		3	1	2	8	3	1	4	3	0	3

### 5.7.4 ASIAN AND PACIFIC STATES: CODE FREQUENCIES BY STAKEHOLDER TYPES

STAKEHOLD ER COUNTS	Asian and Pacific States																			
Codes	Research Organisation				Research Funding Organisation				Industry & Business				Civil Society Organisation				Policy bodies			
	Total	India	Singapore	Japan	Total	India	Singapore	Japan	Total	India	Singapore	Japan	Total	India	Singapore	Japan	Total	India	Singapore	Japan
1 : Public engagement	19	9	3	7	9	8		1	3	3			13	13			19	9	3	7
2 : Organisational norms and practices	8	5	2	1	3	2		1	1	1			3	3			8	5	2	1
3 : Lack or uncertainty of public engagement policy	0	0	0	0	2	2		0	1	1			2	2			0	0	0	0
4 : Motives-Benefits of public engagement and collaboration	10	5	1	4	4	4		0	1	1			8	8			10	5	1	4
5 : Risks-Disadvantages associated with public engagement and collaboration	2	0	0	2	0	0		0	0	0			0	0			2	0	0	2

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6 : Types of stakeholders for engagement	96	37	21	38	28	19	9	9	9	51	51	96	37	21	38
7 : Government bodies, municipalities and regulatory authorities	22	7	9	6	5	3	2	5	5	10	10	22	7	9	6
8 : Professional bodies	1	1	0	0	1	1	0	0	0	2	2	1	1	0	0
9 : Research Funding organisations	8	1	0	7	3	3	0	0	0	3	3	8	1	0	7
10 : Scientific community	20	8	3	9	4	3	1	1	1	9	9	20	8	3	9
11 : Specialists-Experts	7	4	1	2	5	3	2	0	0	7	7	7	4	1	2
12 : Civil society organisations	1	1	0	0	1	1	0	0	0	2	2	1	1	0	0
13 : Industry and Business	16	2	7	7	4	2	2	0	0	4	4	16	2	7	7
14 : Marketing and communication agencies- Public Relations Industry	10	4	3	3	0	0	0	1	1	4	4	10	4	3	3
15 : Celebrities	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1

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16 : Citizens or the general public	6	4	0	2	6	4	2	2	2	7	7	6	4	0	2
17 : Others	7	5	0	2	0	0	0	0	0	4	4	7	5	0	2
18 : Tools for engagement	26	14	3	9	4	1	3	0	0	12	12	26	14	3	9
19 : Information-based tools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 : Training and workshops	7	3	2	2	3	1	2	0	0	4	4	7	3	2	2
21 : Conferences, symposiums, talks and exhibitions	17	4	5	8	5	3	2	0	0	7	7	17	4	5	8
22 : Research publications and policy reports	12	4	2	6	2	0	2	0	0	1	1	12	4	2	6
23 : Information centres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 : University open days	2	1	0	1	0	0	0	0	0	0	0	2	1	0	1
25 : Media	16	11	1	4	2	0	2	0	0	9	9	16	11	1	4
26 : Consultation tools	7	1	0	6	2	0	2	0	0	1	1	7	1	0	6
27 : Surveys	1	0	0	1	1	0	1	0	0	0	0	1	0	0	1

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28 : Public-citizen consultations	4	1	0	3	0	0	0	0	0	1	1	4	1	0	3
29 : Feasibility studies- working groups	2	0	0	2	1	0	1	0	0	0	0	2	0	0	2
30 : Involvement tools	6	4	0	2	2	1	1	0	0	5	5	6	4	0	2
31 : Open public calls and funding initiatives, etc.	1	0	0	1	2	1	1	0	0	1	1	1	0	0	1
32 : Focus groups and discussions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33 : Competitions and awards	3	3	0	0	0	0	0	0	0	3	3	3	3	0	0
34 : Tie-ups with local schools	2	1	0	1	0	0	0	0	0	1	1	2	1	0	1
35 : Collaboration tools	12	6	3	3	1	0	1	0	0	3	3	12	6	3	3
36 : Social networks	2	1	0	1	1	0	1	0	0	0	0	2	1	0	1
37 : University-based start-ups	2	0	0	2	0	0	0	0	0	0	0	2	0	0	2

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38 : Applied research laboratories	2	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0
39 : R&I matchmaking	6	3	3	0	0	0	0	0	0	0	3	3	6	3	3	0
40 : Empowerment tools	3	3	0	0	0	0	0	0	0	0	3	3	3	3	0	0
41 : Participatory management-approaches	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0
42 : Campaigning-Lobbying	2	2	0	0	0	0	0	0	0	0	2	2	2	2	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	49	22	8	19	7	5	2	5	5	20	20	49	22	8	19	
46 : Level and limits of open access	7	3	3	1	4	4	0	0	0	7	7	7	3	3	1	
47 : Data protection	1	0	0	1	2	1	1	0	0	1	1	1	0	0	1	

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

48 : Data accessibility	14	6	5	3	0	0	0	1	1	5	5	14	6	5	3
49 : Organisational norms and practices	10	3	4	3	0	0	0	3	3	3	3	10	3	4	3
50 : Lack or uncertainty of policy	13	4	2	7	4	2	2	0	0	5	5	13	4	2	7
51 : Risks-Disadvantages associated with open data-access	12	7	0	5	0	0	0	1	1	2	2	12	7	0	5
52 : Motives-Benefits of open access and data	7	4	1	2	0	0	0	1	1	3	3	7	4	1	2
53 : Diversity and inclusion	75	17	11	47	28	12	16	2	2	25	25	75	17	11	47
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	6	1	1	4	5	4	1	0	0	5	5	6	1	1	4
55 : Organisational norms and practices	11	2	2	7	4	2	2	1	1	4	4	11	2	2	7
56 : Gender-Sexual diversity	34	9	8	17	8	2	6	1	1	9	9	34	9	8	17

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57 : Ethnic and religious diversity	4	1	0	3	1	0	1	0	0	1	1	4	1	0	3
58 : Country-based representation	7	0	2	5	2	0	2	0	0	0	0	7	0	2	5
59 : Disability	4	0	1	3	1	0	1	0	0	0	0	4	0	1	3
60 : Academic diversity	4	0	1	3	0	0	0	0	0	0	0	4	0	1	3
61 : Age diversity	2	0	0	2	1	0	1	0	0	0	0	2	0	0	2
62 : Socio-economic diversity and inclusion	3	3	0	0	0	0	0	0	0	3	3	3	3	0	0
63 : Motives-Benefits of diversity and inclusion	2	1	1	0	1	1	0	0	0	2	2	2	1	1	0
64 : Risks-Disadvantages associated with diversity and inclusion	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1
65 : Discrimination and lack of diversity	11	0	4	7	5	2	3	0	0	2	2	11	0	4	7

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66 : Lack or uncertainty of policy	9	3	1	5	6	5	1	1	1	7	7	9	3	1	5
67 : Discrimination- a non-issue	2	2	0	0	0	0	0	0	0	0	0	2	2	0	0
68 : Ethics	53	21	10	22	11	9	2	4	4	25	25	53	21	10	22
69 : Positioning ethics- where does the responsibility lie	8	4	0	4	2	0	2	0	0	1	1	8	4	0	4
70 : Disidentification with ethical responsibility	4	3	0	1	0	0	0	0	0	0	0	4	3	0	1
71 : Personal responsibility and morality	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0
72 : Organisational norms and practices	11	6	1	4	2	2	0	2	2	6	6	11	6	1	4
73 : Safety and security	6	3	1	2	2	2	0	1	1	4	4	6	3	1	2
74 : Justice and fair dealing	2	0	1	1	0	0	0	0	0	0	0	2	0	1	1
75 : Quality assurance and testing	5	2	1	2	0	0	0	0	0	2	2	5	2	1	2

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76 : Transparency	5	2	2	1	0	0	0	0	0	2	2	5	2	2	1
77 : Accountability	8	3	0	5	3	3	0	0	0	6	6	8	3	0	5
78 : Lack or uncertainty of ethical standards and policies	8	2	2	4	2	1	1	1	1	3	3	8	2	2	4
79 : Protection of rights	14	4	5	5	1	1	0	0	0	4	4	14	4	5	5
80 : Meeting societal needs	45	25	5	15	28	23	5	8	8	42	42	45	25	5	15
81 : Demand- driven research and innovation	40	24	5	11	26	22	4	6	6	40	40	40	24	5	11
82 : Targeting critical societal challenges	25	15	4	6	14	12	2	3	3	24	24	25	15	4	6
83 : Benefiting specific groups	3	2	1	0	4	4	0	0	0	5	5	3	2	1	0
84 : Furthering research- developing policy or standards	6	3	0	3	5	5	0	3	3	8	8	6	3	0	3
85 : Organisational norms and practices	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0

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86 : Lack of consideration of societal benefits	3	0	0	3	0	0	0	0	0	0	0	3	0	0	3
87 : Lack or uncertainty of policy for meeting societal needs	1	1	0	0	1	1	0	0	0	2	2	1	1	0	0
88 : Anticipation	13	7	2	4	6	6	0	2	2	10	10	13	7	2	4
89 : Future societal needs and challenges	4	1	0	3	2	2	0	0	0	3	3	4	1	0	3
90 : Environmental sustainability	1	0	1	0	4	4	0	1	1	4	4	1	0	1	0
91 : Responsive approach	4	3	1	0	0	0	0	1	1	2	2	4	3	1	0
92 : Organisational norms and practices	2	1	0	1	0	0	0	1	1	0	0	2	1	0	1
93 : Lack or uncertainty of anticipation policy and framework	2	2	0	0	3	3	0	0	0	4	4	2	2	0	0
94 : Enablers	38	15	17	6	15	14	1	2	2	28	28	38	15	17	6

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95 : Accounting for local contexts	26	6	17	3	4	4	0	2	2	10	10	26	6	17	3
96 : Importance of customisation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97 : Contextualising technology and innovation	3	0	3	0	1	1	0	0	0	1	1	3	0	3	0
98 : Importance of politics	11	2	8	1	0	0	0	2	2	2	2	11	2	8	1
99 : Accounting for geographic scale	9	4	4	1	3	3	0	0	0	7	7	9	4	4	1
100 : Evaluation	6	3	0	3	8	7	1	0	0	9	9	6	3	0	3
101 : Importance of feedback	1	1	0	0	1	1	0	0	0	1	1	1	1	0	0
102 : R&I Capacity Building	3	3	0	0	2	2	0	0	0	5	5	3	3	0	0
103 : Participation in upstream R&I	3	3	0	0	1	1	0	0	0	4	4	3	3	0	0
104 : Constraints	21	12	3	6	2	2	0	0	0	10	10	21	12	3	6
105 : Time frames and time constraints	6	4	1	1	0	0	0	0	0	2	2	6	4	1	1

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106 : Financial constraints and considerations	12	6	2	4	1	1	0	0	0	5	5	12	6	2	4
107 : Lack of (perceived) interest of general public	3	2	0	1	0	0	0	0	0	2	2	3	2	0	1
108 : Lack of (perceived) applicability of RRI	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0
109 : Conflicts between theory and practice	17	6	4	7	0	0	0	2	2	5	5	17	6	4	7
110 : Conflicts and tensions in R&I expectations	15	6	2	7	0	0	0	2	2	5	5	15	6	2	7
111 : Collaboration	42	16	7	19	12	7	5	2	2	20	20	42	16	7	19
112 : Building support networks and strategic alliances	17	7	5	5	6	3	3	1	1	9	9	17	7	5	5
113 : Actor mapping	3	3	0	0	0	0	0	0	0	3	3	3	3	0	0
114 : Integration of different	18	6	1	11	8	4	4	1	1	9	9	18	6	1	11

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domains and stakeholders																		
115 : RRI frameworks for new cross disciplinary research	5	2	0	3	2	0	2	0	0	0	0	5	2	0	3			
116 : Difficulties in collaboration and engagement	8	2	1	5	0	0	0	1	1	2	2	8	2	1	5			

## 5.7.5 AFRICAN STATES: CODE FREQUENCIES BY DOMAINS

DOMAIN COUNTS	SUB-SAHARAN AFRICA															
Codes	Energy				Waste				ICT				Bioeconomy			
	Total	Botswana	Malawi	South Africa	Total	Botswana	Malawi	South Africa	Total	Botswana	Malawi	South Africa	Total	Botswana	Malawi	South Africa
1 : Public engagement	31	4	7	20	15	4	4	7	29	7	21	1	16	2	7	7
2 : Organisational norms and practices	12	1	3	8	4	1	2	1	13	3	10	0	4	1	2	1
3 : Lack or uncertainty of public engagement policy	7	1	2	4	5	1	1	3	6	2	3	1	5	1	1	3
4 : Motives-Benefits of public engagement and collaboration	12	1	3	8	5	1	2	2	9	1	8	0	6	0	4	2
5 : Risks-Disadvantages associated with public engagement and collaboration	2	1	0	1	2	1	0	1	2	1	1	0	1	0	0	1
6 : Types of stakeholders for engagement	79	12	7	60	33	12	1	20	55	23	27	5	21	4	4	13
7 : Government bodies, municipalities and regulatory authorities	26	4	4	18	13	4	1	8	12	6	5	1	6	1	2	3
8 : Professional bodies	5	0	1	4	3	0	0	3	3	0	3	0	3	0	0	3
9 : Research Funding organisations	8	1	0	7	2	1	0	1	3	2	0	1	2	1	0	1
10 : Scientific community	10	1	0	9	6	1	0	5	8	2	5	1	4	1	0	3
11 : Specialists-Experts	4	0	1	3	0	0	0	0	2	1	1	0	1	0	1	0

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12 : Civil society organisations	6	1	1	4	2	1	0	1	6	4	2	0	0	0	0	0
13 : Industry and Business	8	2	0	6	9	2	0	7	7	4	2	1	8	1	0	7
14 : Marketing and communication agencies- Public Relations Industry	3	1	0	2	1	1	0	0	1	1	0	0	0	0	0	0
15 : Celebrities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 : Citizens or the general public	13	2	1	10	4	2	0	2	12	3	8	1	2	0	0	2
17 : Others	2	0	0	2	1	0	0	1	3	0	3	0	2	0	1	1
18 : Tools for engagement	11	4	2	5	9	4	1	4	12	6	6	0	8	3	1	4
19 : Information-based tools	1	0	0	1	0	0	0	0	1	0	1	0	2	0	1	1
20 : Training and workshops	4	0	1	3	2	0	1	1	5	1	2	2	2	0	0	2
21 : Conferences, symposiums, talks and exhibitions	9	1	0	8	3	1	0	2	6	3	2	1	2	0	0	2
22 : Research publications and policy reports	1	0	1	0	1	0	1	0	4	1	3	0	0	0	0	0
23 : Information centres	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
24 : University open days	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
25 : Media	0	0	0	0	1	0	0	1	5	0	5	0	1	0	1	0
26 : Consultation tools	10	4	2	4	5	4	1	0	8	4	4	0	3	3	0	0
27 : Surveys	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
28 : Public-citizen consultations	7	4	1	2	4	4	0	0	5	4	1	0	3	3	0	0

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29 : Feasibility studies- working groups	3	0	1	2	1	0	1	0	2	0	2	0	0	0	0	0
30 : Involvement tools	1	0	1	0	3	0	0	3	3	2	1	0	2	0	0	2
31 : Open public calls and funding initiatives, etc.	0	0	0	0	3	0	0	3	0	0	0	0	1	0	0	1
32 : Focus groups and discussions	1	0	1	0	0	0	0	0	1	0	1	0	1	0	0	1
33 : Competitions and awards	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34 : Tie-ups with local schools	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0
35 : Collaboration tools	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
36 : Social networks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 : University-based start-ups	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38 : Applied research laboratories	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39 : R&I matchmaking	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
40 : Empowerment tools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 : Participatory management-approaches	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42 : Campaigning-Lobbying	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	40	7	4	29	20	7	1	12	44	10	32	2	28	4	12	12

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46 : Level and limits of open access	14	3	3	8	7	3	1	3	11	3	8	0	6	1	3	2
47 : Data protection	4	0	0	4	2	0	0	2	2	0	1	1	4	0	1	3
48 : Data accessibility	4	0	0	4	2	0	0	2	3	0	2	1	2	0	2	0
49 : Organisational norms and practices	6	1	1	4	2	1	1	0	8	2	6	0	6	1	4	1
50 : Lack or uncertainty of policy	4	2	1	1	5	2	0	3	8	3	5	0	4	1	0	3
51 : Risks-Disadvantages associated with open data-access	8	2	2	4	5	2	0	3	11	2	9	0	4	1	2	1
52 : Motives-Benefits of open access and data	8	0	1	7	0	0	0	0	7	1	6	0	5	0	3	2
53 : Diversity and inclusion	51	14	8	29	39	14	5	20	46	23	22	1	32	7	6	19
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	2	1	0	1	1	1	0	0	3	3	0	0	1	1	0	0
55 : Organisational norms and practices	9	5	1	3	11	5	1	5	10	6	4	0	11	4	2	5
56 : Gender-Sexual diversity	25	8	3	14	15	8	2	5	18	11	7	0	9	4	1	4
57 : Ethnic and religious diversity	7	0	0	7	3	0	0	3	4	3	1	0	4	0	0	4
58 : Country-based representation	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
59 : Disability	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0
60 : Academic diversity	2	2	0	0	4	2	0	2	3	2	1	0	2	0	0	2
61 : Age diversity	6	2	2	2	5	2	2	1	6	3	3	0	1	0	0	1
62 : Socio-economic diversity and inclusion	3	1	0	2	1	1	0	0	1	1	0	0	1	0	1	0

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63 : Motives-Benefits of diversity and inclusion	1	0	0	1	3	0	0	3	2	1	1	0	3	0	1	2
64 : Risks-Disadvantages associated with diversity and inclusion	2	0	1	1	0	0	0	0	2	0	2	0	0	0	0	0
65 : Discrimination and lack of diversity	4	2	1	1	4	2	0	2	4	4	0	0	1	1	0	0
66 : Lack or uncertainty of policy	6	1	1	4	3	1	0	2	8	2	5	1	7	1	2	4
67 : Discrimination- a non-issue	8	2	1	5	2	2	0	0	5	3	2	0	4	2	1	1
68 : Ethics	51	10	2	39	22	10	1	11	40	18	20	2	29	7	6	16
69 : Positioning ethics- where does the responsibility lie	4	1	0	3	2	1	0	1	6	3	3	0	1	0	0	1
70 : Disidentification with ethical responsibility	1	0	0	1	1	0	0	1	2	1	1	0	0	0	0	0
71 : Personal responsibility and morality	3	1	0	2	1	1	0	0	3	1	2	0	1	0	0	1
72 : Organisational norms and practices	10	5	0	5	11	5	0	6	12	10	1	1	13	2	0	11
73 : Safety and security	7	1	0	6	1	1	0	0	6	2	4	0	0	0	0	0
74 : Justice and fair dealing	3	0	0	3	0	0	0	0	1	0	1	0	1	0	0	1
75 : Quality assurance and testing	2	1	0	1	2	1	0	1	4	1	3	0	3	1	1	1
76 : Transparency	13	2	0	11	3	2	0	1	2	2	0	0	4	2	1	1
77 : Accountability	5	3	0	2	4	3	0	1	4	3	1	0	6	3	0	3
78 : Lack or uncertainty of ethical standards and policies	3	0	1	2	1	0	1	0	7	3	4	0	1	0	1	0

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79 : Protection of rights	11	0	1	10	1	0	0	1	6	1	4	1	4	0	3	1
80 : Meeting societal needs	48	5	7	36	14	5	3	6	30	12	17	1	14	2	7	5
81 : Demand-driven research and innovation	41	5	6	30	14	5	3	6	27	11	15	1	11	2	5	4
82 : Targeting critical societal challenges	34	3	6	25	9	3	3	3	19	7	11	1	8	2	3	3
83 : Benefiting specific groups	6	1	0	5	1	1	0	0	4	2	2	0	1	0	1	0
84 : Furthering research-developing policy or standards	2	0	0	2	3	0	0	3	4	1	3	0	3	0	2	1
85 : Organisational norms and practices	1	0	0	1	0	0	0	0	1	0	1	0	1	0	1	0
86 : Lack of consideration of societal benefits	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87 : Lack or uncertainty of policy for meeting societal needs	3	0	2	1	1	0	1	0	3	1	2	0	2	0	1	1
88 : Anticipation	25	4	5	16	15	4	3	8	20	7	13	0	12	1	4	7
89 : Future societal needs and challenges	2	0	1	1	3	0	1	2	1	0	1	0	3	0	2	1
90 : Environmental sustainability	14	0	4	10	2	0	2	0	4	0	4	0	0	0	0	0
91 : Responsive approach	6	4	1	1	9	4	1	4	9	5	4	0	4	1	1	2
92 : Organisational norms and practices	3	0	0	3	1	0	0	1	4	1	3	0	4	0	1	3
93 : Lack or uncertainty of anticipation policy and framework	1	0	0	1	1	0	0	1	4	2	2	0	1	0	0	1
94 : Enablers	38	4	4	30	17	4	3	10	15	4	7	4	9	1	0	8

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

95 : Accounting for local contexts	16	2	1	13	5	2	1	2	6	2	4	0	3	0	0	3
96 : Importance of customisation	1	0	0	1	0	0	0	0	2	0	2	0	0	0	0	0
97 : Contextualising technology and innovation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98 : Importance of politics	2	1	0	1	1	1	0	0	2	1	1	0	1	0	0	1
99 : Accounting for geographic scale	12	1	0	11	2	1	0	1	1	1	0	0	1	0	0	1
100 : Evaluation	11	2	1	8	6	2	0	4	4	2	0	2	3	1	0	2
101 : Importance of feedback	6	5	0	1	5	5	0	0	5	5	0	0	1	1	0	0
102 : R&I Capacity Building	2	0	2	0	4	0	2	2	3	0	2	1	0	0	0	0
103 : Participation in upstream R&I	9	0	0	9	2	0	0	2	2	0	1	1	3	0	0	3
104 : Constraints	27	4	6	17	10	4	2	4	7	4	3	0	5	1	0	4
105 : Time frames and time constraints	8	0	2	6	1	0	0	1	0	0	0	0	1	0	0	1
106 : Financial constraints and considerations	15	4	3	8	7	4	0	3	5	4	1	0	3	1	0	2
107 : Lack of (perceived) interest of general public	5	0	2	3	2	0	2	0	2	0	2	0	1	0	0	1
108 : Lack of (perceived) applicability of RRI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109 : Conflicts between theory and practice	7	1	1	5	5	1	0	4	4	2	2	0	3	0	0	3
110 : Conflicts and tensions in R&I expectations	6	1	1	4	4	1	0	3	4	2	2	0	2	0	0	2

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

111 : Collaboration	21	4	1	16	14	4	1	9	8	5	3	0	4	0	0	4
112 : Building support networks and strategic alliances	6	2	1	3	7	2	1	4	4	2	2	0	1	0	0	1
113 : Actor mapping	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1
114 : Integration of different domains and stakeholders	7	0	0	7	3	0	0	3	1	1	0	0	0	0	0	0
115 : RRI frameworks for new cross disciplinary research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
116 : Difficulties in collaboration and engagement	5	2	0	3	4	2	0	2	3	2	1	0	2	0	0	2

## 5.7.6 AFRICAN STATES: CODE FREQUENCIES BY STAKEHOLDER TYPES

STAKEHOLD ER COUNTS	SUB-SAHARAN AFRICA																				
Codes	Research Organisation				Research Funding Organisation				Industry & Business				Civil Society Organisation				Policy bodies				
	Total	Botswana	Malawi	South Africa	Total	Botswana	Malawi	South Africa	Total	Botswana	Malawi	South Africa	Total	Botswana	Malawi	South Africa	Total	Botswana	Malawi	South Africa	
1 : Public engagement	50	7	16	27	9	2	3	4	14	14			15	4			11	4	4		
2 : Organisational norms and practices	17	3	4	10	1	1	0	0	8	8			4	2			2	2	0		
3 : Lack or uncertainty of public engagement policy	13	2	4	7	4	1	1	2	2	2			2	1			1	3	2		
4 : Motives-Benefits of public engagement and collaboration	18	1	7	10	3	0	2	1	5	5			10	2			8	2	1		
5 : Risks-Disadvantages associated with public engagement and collaboration	3	1	1	1	1	0	0	1	0	0			1	0			1	11	1		

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

6 : Types of stakeholders for engagement	125	23	24	78	14	4	0	10	15	15	13	1	12	13	10
7 : Government bodies, municipalities and regulatory authorities	36	6	6	24	4	1	0	3	5	5	7	1	6	6	3
8 : Professional bodies	5	0	1	4	3	0	0	3	4	4	2	0	2	4	3
9 : Research Funding organisations	10	2	0	8	2	1	0	1	0	0	0	0	0	4	1
10 : Scientific community	18	2	4	12	4	1	0	3	1	1	1	0	1	3	3
11 : Specialists-Experts	6	1	2	3	0	0	0	0	1	1	2	0	2	0	0
12 : Civil society organisations	11	4	2	5	0	0	0	0	2	2	1	0	1	4	0
13 : Industry and Business	19	4	2	13	5	1	0	4	0	0	0	0	0	4	4
14 : Marketing and communication agencies- Public Relations Industry	3	1	0	2	0	0	0	0	0	0	1	0	1	0	0
15 : Celebrities	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

16 : Citizens or the general public	22	3	8	11	2	0	0	2	2	2	2	0	2	3	2
17 : Others	4	0	2	2	1	0	0	1	1	1	0	0	0	2	1
18 : Tools for engagement	22	6	5	11	4	3	0	1	3	3	1	1	0	1	1
19 : Information-based tools	3	0	1	2	0	0	0	0	0	0	0	0	0	1	0
20 : Training and workshops	7	1	0	6	1	0	0	1	2	2	1	1	0	3	1
21 : Conferences, symposiums, talks and exhibitions	14	3	2	9	2	0	0	2	0	0	3	0	3	2	2
22 : Research publications and policy reports	2	1	1	0	0	0	0	0	2	2	1	1	0	0	0
23 : Information centres	2	0	0	2	0	0	0	0	0	0	2	0	2	0	0
24 : University open days	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
25 : Media	6	0	5	1	0	0	0	0	0	0	0	0	0	0	0
26 : Consultation tools	11	4	3	4	3	3	0	0	3	3	1	1	0	0	0
27 : Surveys	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

28 : Public-citizen consultations	7	4	1	2	3	3	0	0	2	2	0	0	0	0
29 : Feasibility studies- working groups	3	0	1	2	0	0	0	0	1	1	1	1	0	1
30 : Involvement tools	7	2	2	3	1	0	0	1	1	1	0	0	0	2
31 : Open public calls and funding initiatives, etc.	2	0	0	2	1	0	0	1	0	0	0	0	0	1
32 : Focus groups and discussions	3	0	2	1	0	0	0	0	1	1	0	0	0	0
33 : Competitions and awards	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34 : Tie-ups with local schools	2	2	0	0	0	0	0	0	0	0	0	0	0	0
35 : Collaboration tools	1	0	0	1	0	0	0	0	0	0	0	0	0	0
36 : Social networks	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 : University-based start-ups	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

38 : Applied research laboratories	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39 : R&I matchmaking	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
40 : Empowerment tools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 : Participatory management-approaches	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42 : Campaigning-Lobbying	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
45 : Open access	82	10	31	41	14	4	3	7	10	10	7	1	6	9	7
46 : Level and limits of open access	19	3	7	9	3	1	0	2	5	5	2	1	1	4	2
47 : Data protection	7	0	1	6	2	0	0	2	0	0	1	0	1	2	2

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

48 : Data accessibility	9	0	2	7	1	0	1	0	1	1	0	0	0	0
49 : Organisational norms and practices	11	2	4	5	1	1	0	0	2	2	1	1	0	2
50 : Lack or uncertainty of policy	11	3	5	3	3	1	0	2	2	2	0	0	0	3
51 : Risks-Disadvantages associated with open data-access	17	2	9	6	3	1	1	1	5	5	2	0	2	1
52 : Motives-Benefits of open access and data	19	1	9	9	2	0	2	0	1	1	2	0	2	16
53 : Diversity and inclusion	77	23	17	37	25	7	2	16	13	13	16	5	11	16
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	4	3	0	1	1	1	0	0	0	0	0	0	0	5
55 : Organisational norms and practices	12	6	3	3	9	4	0	5	1	1	4	1	3	9
56 : Gender-Sexual diversity	31	11	5	15	9	4	1	4	5	5	9	2	7	7

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

57 : Ethnic and religious diversity	12	3	1	8	3	0	0	3	0	0	5	0	5	3	3
58 : Country-based representation	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
59 : Disability	0	0	0	0	0	0	0	0	1	1	1	1	0	2	0
60 : Academic diversity	2	2	0	0	2	0	0	2	1	1	0	0	0	3	2
61 : Age diversity	6	3	1	2	1	0	0	1	2	2	3	2	1	1	1
62 : Socio-economic diversity and inclusion	4	1	1	2	1	0	1	0	0	0	2	0	2	2	0
63 : Motives-Benefits of diversity and inclusion	4	1	1	2	3	0	1	2	1	1	0	0	0	2	2
64 : Risks-Disadvantages associated with diversity and inclusion	2	0	1	1	0	0	0	0	3	3	0	0	0	0	0
65 : Discrimination and lack of diversity	8	4	1	3	1	1	0	0	1	1	0	0	0	2	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

66 : Lack or uncertainty of policy	14	2	5	7	3	1	0	2	2	2	0	0	0	2	2
67 : Discrimination- a non-issue	12	3	3	6	2	2	0	0	1	1	5	0	5	9	0
68 : Ethics	87	18	19	50	20	7	4	9	7	7	9	1	8	9	9
69 : Positioning ethics- where does the responsibility lie	11	3	3	5	0	0	0	0	0	0	0	0	0	0	0
70 : Disidentification with ethical responsibility	4	1	1	2	0	0	0	0	0	0	0	0	0	0	0
71 : Personal responsibility and morality	6	1	2	3	0	0	0	0	0	0	0	0	0	6	0
72 : Organisational norms and practices	21	10	0	11	8	2	0	6	1	1	0	0	0	6	6
73 : Safety and security	10	2	2	6	0	0	0	0	2	2	3	0	3	0	0
74 : Justice and fair dealing	5	0	1	4	0	0	0	0	0	0	0	0	0	1	0
75 : Quality assurance and testing	6	1	4	1	3	1	1	1	0	0	0	0	0	1	1

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

76 : Transparency	16	2	1	13	3	2	1	0	0	0	2	0	2	1	0
77 : Accountability	8	3	1	4	4	3	0	1	0	0	1	0	1	1	1
78 : Lack or uncertainty of ethical standards and policies	7	3	2	2	0	0	0	0	2	2	2	1	1	1	0
79 : Protection of rights	18	1	6	11	4	0	3	1	3	3	2	0	2	2	1
80 : Meeting societal needs	74	12	16	46	4	2	1	1	10	10	14	3	11	2	1
81 : Demand-driven research and innovation	63	11	13	39	4	2	1	1	9	9	10	3	7	1	1
82 : Targeting critical societal challenges	48	7	9	32	2	2	0	0	8	8	9	3	6	0	0
83 : Benefiting specific groups	9	2	2	5	0	0	0	0	0	0	1	0	1	1	0
84 : Furthering research-developing policy or standards	9	1	4	4	2	0	1	1	0	0	0	0	0	1	1
85 : Organisational norms and practices	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

86 : Lack of consideration of societal benefits	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87 : Lack or uncertainty of policy for meeting societal needs	5	1	2	2	0	0	0	0	2	2	1	1	0	4	0
88 : Anticipation	39	7	9	23	7	1	2	4	10	10	9	3	6	5	4
89 : Future societal needs and challenges	4	0	2	2	3	0	2	1	1	1	2	1	1	1	1
90 : Environmental sustainability	12	0	2	10	0	0	0	0	6	6	6	2	4	1	0
91 : Responsive approach	13	5	3	5	2	1	0	1	1	1	2	1	1	2	1
92 : Organisational norms and practices	7	1	1	5	1	0	0	1	2	2	0	0	0	2	1
93 : Lack or uncertainty of anticipation policy and framework	4	2	1	1	1	0	0	1	1	1	0	0	0	7	1
94 : Enablers	48	4	4	40	7	1	0	6	5	5	8	3	5	8	6

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95 : Accounting for local contexts	18	2	2	14	2	0	0	2	2	2	2	1	1	2	2
96 : Importance of customisation	3	0	2	1	0	0	0	0	0	0	0	0	0	0	0
97 : Contextualising technology and innovation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98 : Importance of politics	3	1	0	2	0	0	0	0	1	1	0	0	0	1	0
99 : Accounting for geographic scale	12	1	0	11	1	0	0	1	0	0	1	0	1	3	1
100 : Evaluation	15	2	1	12	3	1	0	2	1	1	2	0	2	2	2
101 : Importance of feedback	6	5	0	1	1	1	0	0	0	0	0	0	0	0	0
102 : R&I Capacity Building	3	0	0	3	0	0	0	0	2	2	2	2	0	2	0
103 : Participation in upstream R&I	12	0	1	11	2	0	0	2	0	0	2	0	2	5	2
104 : Constraints	28	4	5	19	4	1	0	3	6	6	4	2	2	4	3
105 : Time frames and time constraints	8	0	2	6	1	0	0	1	2	2	1	0	1	3	1

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106 : Financial constraints and considerations	17	4	4	9	3	1	0	2	3	3	0	0	0	2	2
107 : Lack of (perceived) interest of general public	4	0	0	4	0	0	0	0	2	2	3	2	1	0	0
108 : Lack of (perceived) applicability of RRI	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
109 : Conflicts between theory and practice	9	2	1	6	3	0	0	3	3	3	0	0	0	5	3
110 : Conflicts and tensions in R&I expectations	8	2	1	5	2	0	0	2	3	3	0	0	0	4	2
111 : Collaboration	32	5	2	25	2	0	0	2	1	1	2	1	1	3	2
112 : Building support networks and strategic alliances	9	2	1	6	1	0	0	1	1	1	1	1	0	1	1
113 : Actor mapping	4	0	0	4	0	0	0	0	0	0	1	0	1	0	0
114 : Integration of different	11	1	0	10	0	0	0	0	0	0	0	0	0	0	0

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domains and stakeholders															
115 : RRI frameworks for new cross disciplinary research	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
116 : Difficulties in collaboration and engagement	8	2	1	5	1	0	0	1	0	0	0	0	0	1	1

## 5.7.7 EUROPEAN AND NORTH AMERICAN STATES: CODE FREQUENCIES BY DOMAINS

DOMAIN COUNTS	Europe & North America																							
Codes	Energy						Waste						ICT						Bioeconomy					
	Total	Israel	United Kingdom	Italy	USA	Serbia	Total	Israel	United Kingdom	Italy	USA	Serbia	Total	Israel	United Kingdom	Italy	USA	Serbia	Total	Israel	United Kingdom	Italy	USA	Serbia
1 : Public engagement	29	3	8	7	11	0	10	3	2	3		2	29	4	4	14		7	67	0	32	5	19	11
2 : Organisational norms and practices	13	1	4	1	7	0	3	1	1	0		1	8	1	0	4		3	26	0	11	2	10	3
3 : Lack or uncertainty of public engagement policy	5	1	2	0	2	0	3	1	0	1		1	3	0	0	1		2	9	0	3	1	3	2
4 : Motives-Benefits of public engagement and collaboration	12	1	2	7	2	0	3	0	1	2		0	18	4	3	9		2	35	0	21	1	7	6
5 : Risks-Disadvantages associated with public	0	0	0	0	0	0	1	1	0	0		0	2	0	1	1		0	8	0	1	1	6	0

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engagement and collaboration																						
6 : Types of stakeholders for engagement	95	19	33	21	17	5	28	7	10	8	3	79	18	5	35	21	92	6	43	5	21	17
7 : Government bodies, municipalities and regulatory authorities	20	3	8	2	5	2	8	1	2	3	2	13	3	1	6	3	14	1	6	1	2	4
8 : Professional bodies	5	2	0	3	0	0	1	0	0	1	0	7	2	0	4	1	6	0	2	0	2	2
9 : Research Funding organisations	7	1	2	3	1	0	1	0	1	0	0	8	2	1	4	1	8	0	5	1	2	0
10 : Scientific community	19	4	6	5	3	1	4	2	2	0	0	15	3	1	8	3	17	2	8	1	1	5
11 : Specialists-Experts	4	0	3	1	0	0	0	0	0	0	0	4	1	0	1	2	6	0	0	0	4	2
12 : Civil society organisations	8	0	4	1	2	1	2	0	1	1	0	6	1	0	4	1	10	0	6	1	2	1
13 : Industry and Business	24	9	7	7	1	0	9	4	4	1	0	21	6	2	10	3	17	4	9	1	2	1

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14 : Marketing and communication agencies- Public Relations Industry	1	0	0	0	0	1	1	0	0	1	0	1	0	0	0	1	3	0	2	0	0	1
15 : Celebrities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 : Citizens or the general public	8	0	4	0	4	0	1	0	0	1	0	3	0	0	0	3	9	0	6	0	3	0
17 : Others	5	1	0	1	3	0	2	1	0	0	1	4	0	0	1	3	7	0	1	0	4	2
18 : Tools for engagement	21	4	6	5	5	1	6	1	3	2	0	18	5	1	10	2	17	0	7	1	9	0
19 : Information-based tools	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
20 : Training and workshops	4	3	0	0	0	1	1	1	0	0	0	3	2	1	0	0	5	0	0	0	5	0
21 : Conferences, symposiums, talks and exhibitions	8	1	2	2	1	2	2	0	2	0	0	10	2	1	3	4	8	0	4	1	2	1
22 : Research publications and policy reports	12	4	4	3	0	1	4	0	3	0	1	13	5	4	4	0	6	0	2	1	1	2

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23 : Information centres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
24 : University open days	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
25 : Media	7	1	2	3	1	0	2	1	1	0	0	7	0	1	4	2	11	1	3	1	6	0
26 : Consultation tools	8	0	4	3	1	0	2	0	2	0	0	5	2	0	3	0	1	0	1	0	0	0
27 : Surveys	3	0	2	1	0	0	2	0	2	0	0	3	2	0	1	0	1	0	0	0	1	0
28 : Public-citizen consultations	4	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	4	0	2	0	2	0
29 : Feasibility studies-working groups	2	0	0	2	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0
30 : Involvement tools	5	0	2	2	0	1	2	0	1	1	0	6	1	0	4	1	9	0	2	0	7	0
31 : Open public calls and funding initiatives, etc	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
32 : Focus groups and discussions	5	0	2	2	0	1	2	0	1	1	0	5	1	0	4	0	8	0	1	0	7	0

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33 : Competitions and awards	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34 : Tie-ups with local schools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
35 : Collaboration tools	5	4	0	0	1	0	2	1	0	1	0	5	3	1	0	1	0	0	0	0	0
36 : Social networks	1	1	0	0	0	0	1	0	0	1	0	2	1	0	0	1	0	0	0	0	0
37 : University-based start-ups	2	2	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
38 : Applied research laboratories	2	1	0	0	1	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0
39 : R&I matchmaking	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 : Empowerment tools	3	0	0	1	2	0	1	0	0	1	0	4	0	0	4	0	6	0	4	1	1
41 : Participatory management-approaches	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1

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42 : Campaigning-Lobbying	1	0	0	1	0	0	1	0	0	1	0	1	0	0	1	0	3	0	3	0	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	1	0	0	1	0	0
44 : Other	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	80	15	23	16	16	10	32	14	11	2	5	60	11	12	30	7	76	5	26	10	22	13
46 : Level and limits of open access	17	2	4	6	4	1	1	0	1	0	0	15	3	0	11	1	19	0	10	4	3	2
47 : Data protection	8	0	3	2	3	0	1	0	1	0	0	12	2	2	7	1	5	0	1	3	1	0
48 : Data accessibility	12	1	4	2	1	4	3	1	2	0	0	8	2	0	5	1	13	1	3	3	5	1
49 : Organisational norms and practices	11	1	5	1	3	1	4	0	3	0	1	6	1	1	1	3	13	0	5	0	5	3
50 : Lack or uncertainty of policy	10	2	3	1	3	1	7	3	1	1	2	2	0	0	1	1	6	1	3	0	0	2
51 : Risks-Disadvantages associated	10	5	1	1	1	2	9	8	1	0	0	13	1	7	5	0	18	1	6	2	5	4

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with open data-access																						
52 : Motives-Benefits of open access and data	24	4	6	7	3	4	8	2	3	1	2	16	4	2	9	1	18	2	3	2	8	3
53 : Diversity and inclusion	47	10	9	10	15	3	24	16	4	1	3	36	7	6	21	2	58	4	25	8	15	6
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	4	0	0	1	3	0	3	3	0	0	0	5	0	0	3	2	3	0	1	2	0	0
55 : Organisational norms and practices	7	0	2	2	2	1	1	0	1	0	0	4	0	1	3	0	7	0	3	1	3	0
56 : Gender-Sexual diversity	17	4	6	3	3	1	10	5	4	1	0	11	2	2	6	1	18	2	7	3	5	1
57 : Ethnic and religious diversity	4	2	2	0	0	0	3	1	2	0	0	3	1	1	0	1	4	1	0	0	2	1
58 : Country-based representation	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0
59 : Disability	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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60 : Academic diversity	3	1	1	0	1	0	2	1	1	0	0	2	0	1	0	1	2	1	1	0	0	0
61 : Age diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62 : Socio-economic diversity and inclusion	4	1	0	0	3	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0
63 : Motives-Benefits of diversity and inclusion	2	1	0	1	0	0	1	1	0	0	0	5	1	1	2	1	14	0	3	1	9	1
64 : Risks-Disadvantages associated with diversity and inclusion	2	0	2	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0
65 : Discrimination and lack of diversity	5	0	2	1	2	0	4	2	2	0	0	2	0	0	2	0	14	0	9	1	4	0
66 : Lack or uncertainty of policy	6	2	0	1	2	1	1	0	0	0	1	3	2	0	1	0	4	0	2	0	1	1
67 : Discrimination- a non-issue	4	0	2	1	0	1	2	0	0	0	2	5	1	0	4	0	7	0	1	0	2	4
68 : Ethics	51	7	18	8	15	3	17	6	6	4	1	48	11	12	17	8	95	1	45	8	30	11
69 : Positioning	16	4	6	2	3	1	9	6	1	1	1	10	1	5	4	0	20	1	7	2	7	3

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ethics- where does the responsibility lie																						
70 : Disidentificati on with ethical responsibility	8	4	2	1	1	0	6	5	0	0	1	5	1	3	1	0	4	1	2	0	0	1
71 : Personal responsibility and morality	6	0	3	0	2	1	2	0	1	1	0	2	0	1	1	0	10	0	1	1	6	2
72 : Organisationa l norms and practices	7	0	3	2	1	1	1	0	1	0	0	7	0	4	2	1	16	0	7	0	7	2
73 : Safety and security	8	2	0	3	3	0	2	2	0	0	0	11	5	0	5	1	22	0	13	2	5	2
74 : Justice and fair dealing	2	0	0	2	0	0	0	0	0	0	0	4	1	1	2	0	5	0	0	0	4	1
75 : Quality assurance and testing	4	1	2	1	0	0	1	0	0	1	0	3	2	0	1	0	2	0	1	0	1	0
76 : Transparency	6	0	0	1	4	1	1	0	0	1	0	5	0	0	1	4	8	0	6	0	2	0
77 : Accountabilit y	4	1	1	0	2	0	1	0	1	0	0	1	1	0	0	0	2	0	2	0	0	0
78 : Lack or uncertainty of	8	1	3	0	2	2	1	0	0	1	0	3	1	0	0	2	10	0	7	0	2	1

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ethical standards and policies																						
79 : Protection of rights	6	1	3	0	2	0	3	0	3	0	0	8	1	2	5	0	20	0	7	4	7	2
80 : Meeting societal needs	59	9	26	6	15	3	19	7	4	3	5	36	10	5	12	9	58	1	12	0	21	24
81 : Demand-driven research and innovation	55	9	26	5	13	2	14	7	4	2	1	30	9	2	11	8	46	1	10	0	17	18
82 : Targeting critical societal challenges	33	8	15	2	6	2	8	6	1	0	1	12	4	2	3	3	31	1	8	0	10	12
83 : Benefiting specific groups	8	0	6	1	1	0	0	0	0	0	0	5	0	0	1	4	2	0	2	0	0	0
84 : Furthering research-developing policy or standards	13	1	6	4	1	1	4	0	3	1	0	11	5	0	5	1	11	0	2	0	5	4
85 : Organisational norms and practices	1	0	0	1	0	0	1	0	0	0	1	4	1	2	1	0	6	0	0	0	4	2
86 : Lack of consideration	0	0	0	0	0	0	3	0	0	0	3	2	0	2	0	0	5	0	2	0	0	3

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of societal benefits																						
87 : Lack or uncertainty of policy for meeting societal needs	3	0	0	0	2	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1
88 : Anticipation	31	5	11	5	8	2	17	4	7	3	3	21	8	1	9	3	37	3	14	3	7	10
89 : Future societal needs and challenges	9	2	3	1	2	1	4	2	2	0	0	4	0	0	2	2	13	2	4	1	4	2
90 : Environmental sustainability	5	1	2	1	1	0	6	1	2	3	0	2	1	0	1	0	5	1	3	0	0	1
91 : Responsive approach	12	1	4	3	4	0	1	0	1	0	0	13	7	1	5	0	11	0	7	2	1	1
92 : Organisational norms and practices	4	0	3	0	1	0	2	0	2	0	0	1	0	0	1	0	4	0	1	0	1	2
93 : Lack or uncertainty of anticipation policy and framework	3	1	0	0	1	1	4	1	0	0	3	1	0	0	0	1	6	0	0	0	2	4
94 : Enablers	38	1	9	16	6	6	11	5	2	4	0	35	5	5	23	2	45	0	29	3	8	5

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95 : Accounting for local contexts	20	1	3	8	4	4	9	5	1	3	0	15	2	2	10	1	24	0	19	1	2	2
96 : Importance of customisation	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0
97 : Contextualising technology and innovation	2	0	0	1	0	1	0	0	0	0	0	3	1	0	2	0	2	0	1	0	1	0
98 : Importance of politics	5	1	1	1	2	0	9	5	1	3	0	3	1	0	1	1	4	0	2	0	0	2
99 : Accounting for geographic scale	9	0	0	5	1	3	0	0	0	0	0	6	0	1	5	0	14	0	13	0	1	0
100 : Evaluation	14	0	5	7	2	0	1	0	1	0	0	18	3	3	11	1	17	0	11	0	4	2
101 : Importance of feedback	3	0	2	0	1	0	2	0	2	0	0	2	0	0	1	1	1	0	1	0	0	0
102 : R&I Capacity Building	1	0	0	1	0	0	0	0	0	0	0	2	0	0	2	0	2	0	0	1	0	1
103 : Participation	3	0	1	0	0	2	1	0	0	1	0	1	0	0	1	0	5	0	0	1	4	0

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in upstream R&I																						
104 : Constraints	23	8	4	3	6	2	8	6	0	0	2	15	4	1	5	5	38	5	18	2	11	2
105 : Time frames and time constraints	8	1	3	2	1	1	1	1	0	0	0	4	0	1	3	0	9	1	7	1	0	0
106 : Financial constraints and considerations	14	7	1	1	5	0	6	5	0	0	1	9	4	0	1	4	23	4	8	0	10	1
107 : Lack of (perceived) interest of general public	2	1	0	0	0	1	2	1	0	0	1	1	0	0	1	0	4	1	0	1	1	1
108 : Lack of (perceived) applicability of RRI	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	2	0	0	0
109 : Conflicts between theory and practice	7	1	3	2	1	0	13	10	0	3	0	10	0	2	7	1	45	1	25	5	12	2
110 : Conflicts and tensions in R&I expectations	7	1	3	2	1	0	13	10	0	3	0	10	0	2	7	1	45	1	25	5	12	2
111 : Collaboration	34	11	7	14	2	0	13	8	2	2	1	43	11	3	23	6	55	5	22	6	14	8

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112 : Building support networks and strategic alliances	15	4	2	7	2	0	3	2	0	0	1	25	5	3	12	5	25	2	11	3	5	4
113 : Actor mapping	2	0	2	0	0	0	3	0	2	1	0	0	0	0	0	0	3	0	2	0	1	0
114 : Integration of different domains and stakeholders	9	2	0	7	0	0	2	2	0	0	0	16	5	0	10	1	9	1	2	2	3	1
115 : RRI frameworks for new cross disciplinary research	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
116 : Difficulties in collaboration and engagement	7	5	2	0	0	0	6	4	0	2	0	2	1	0	1	0	15	2	5	1	4	3

### 5.7.8 EUROPEAN AND NORTH AMERICAN STATES: CODE FREQUENCIES BY STAKEHOLDER TYPES

STAKEHOLDER COUNTS	Europe & North America																											
Codes	Research Organisation						Research Funding Organisation					Industry & Business					Civil Society Organisation					Policy bodies						
	Total	Israel	United Kingdom	Italy	USA	Serbia	Total	Israel	United Kingdom	Italy	USA	Serbia	Total	Israel	United Kingdom	Italy	USA	Serbia	Total	Israel	United Kingdom	Italy	USA	Serbia				
1 : Public engagement	62	7	18	3	27	7	6		3		3		36		20	12		4	10		3			7	8		3	5
2 : Organisational norms and practices	28	2	9	0	15	2	4		2		2		7		3	3		1	4		1			3	3		2	1
3 : Lack or uncertainty of public engagement policy	10	1	2	1	4	2	2		1		1		2		1	1		0	3		1			2	2		1	1
4 : Motives-Benefits of public engagement and collaboration	26	4	8	2	9	3	0		0		0		28		17	8		3	3		1			2	3		0	3
5 : Risks-Disadvantages associated with public engagement and collaboration	8	1	1	0	6	0	0		0		0		2		1	1		0	0		0			0	0		0	0
6 : Types of stakeholders for engagement	127	25	44	8	37	13	11		10		1		49		14	26		9	34		13			21	27		10	17
7 : Government bodies, municipalities and regulatory authorities	25	4	7	3	7	4	1		1		0		7		2	3		2	8		5			3	7		1	6

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8 : Professional bodies	7	2	2	1	2	0	0	0	0	5	0	3	2	1	0	1	2	0	2
9 : Research Funding organisations	11	2	6	0	3	0	0	0	0	5	1	4	0	2	1	1	0	0	0
10 : Scientific community	21	5	9	0	4	3	2	2	0	11	2	6	3	5	2	3	4	2	2
11 : Specialists-Experts	6	1	0	0	4	1	3	3	0	2	0	1	1	2	0	2	3	3	0
12 : Civil society organisations	10	1	3	1	4	1	2	2	0	7	4	2	1	2	1	1	5	2	3
13 : Industry and Business	28	10	13	1	3	1	1	1	0	10	2	8	0	5	2	3	4	1	3
14 : Marketing and communication agencies-Public Relations Industry	3	0	1	1	0	1	0	0	0	2	1	0	1	1	0	1	1	0	1
15 : Celebrities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 : Citizens or the general public	11	0	4	1	6	0	2	1	1	2	2	0	0	6	3	3	2	1	1
17 : Others	11	1	1	0	7	2	0	0	0	1	0	1	0	3	0	3	0	0	0
18 : Tools for engagement	32	6	10	2	13	1	4	3	1	7	1	6	0	2	0	2	9	3	6
19 : Information-based tools	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 : Training and workshops	9	3	0	0	5	1	0	0	0	1	1	0	0	0	0	0	0	0	0
21 : Conferences, symposiums, talks and exhibitions	10	2	4	0	2	2	1	0	1	7	3	3	1	4	0	4	0	0	0

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22 : Research publications and policy reports	13	5	4	0	1	3	1	1	0	9	5	4	0	0	0	0	1	1	0
23 : Information centres	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 : University open days	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 : Media	12	1	4	0	7	0	0	0	0	5	1	4	0	3	1	2	0	0	0
26 : Consultation tools	6	2	3	0	1	0	2	2	0	3	0	3	0	0	0	0	2	2	0
27 : Surveys	5	2	2	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0
28 : Public-citizen consultations	6	0	2	0	3	1	2	2	0	0	0	0	0	0	0	0	2	2	0
29 : Feasibility studies-working groups	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0
30 : Involvement tools	12	1	3	1	6	1	2	1	1	2	0	2	0	1	0	1	4	1	3
31 : Open public calls and funding initiatives, etc	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
32 : Focus groups and discussions	11	1	2	1	6	1	2	1	1	2	0	2	0	0	0	0	4	1	3
33 : Competitions and awards	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34 : Tie-ups with local schools	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 : Collaboration tools	6	4	0	1	1	0	0	0	0	1	1	0	0	1	0	1	1	0	1
36 : Social networks	2	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1

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37 : University-based start-ups	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38 : Applied research laboratories	2	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
39 : R&I matchmaking	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 : Empowerment tools	8	0	4	1	3	0	0	0	0	2	0	2	0	0	0	0	3	0
41 : Participatory management-approaches	4	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
42 : Campaigning-Lobbying	4	0	3	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2	0
44 : Other	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	113	25	33	2	33	20	11	6	5	45	16	26	3	13	6	7	12	6
46 : Level and limits of open access	20	3	9	0	7	1	0	0	0	14	2	10	2	4	3	1	1	0
47 : Data protection	8	2	2	0	4	0	0	0	0	7	2	5	0	3	2	1	2	0
48 : Data accessibility	18	3	5	0	5	5	2	1	1	5	0	5	0	2	1	1	1	1
49 : Organisational norms and practices	18	1	8	0	6	3	4	2	2	3	1	1	1	3	0	3	2	2
50 : Lack or uncertainty of policy	14	3	4	1	3	3	1	1	0	1	0	1	0	2	1	1	2	1

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51 : Risks-Disadvantages associated with open data-access	24	9	4	0	6	5	0	0	0	14	10	3	1	0	0	0	2	0	2
52 : Motives-Benefits of open access and data	29	6	6	1	9	7	5	3	2	11	2	9	0	1	0	1	4	3	1
53 : Diversity and inclusion	87	23	26	1	28	9	6	4	2	27	9	18	0	3	1	2	8	4	4
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	7	3	1	0	3	0	0	0	0	3	0	3	0	2	0	2	0	0	0
55 : Organisational norms and practices	10	0	4	0	5	1	1	1	0	4	1	3	0	0	0	0	1	1	0
56 : Gender-Sexual diversity	29	7	11	1	8	2	1	1	0	8	2	6	0	2	1	1	2	1	1
57 : Ethnic and religious diversity	7	2	2	0	2	1	0	0	0	1	1	0	0	1	0	1	0	0	0
58 : Country-based representation	3	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59 : Disability	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60 : Academic diversity	4	1	2	0	1	0	0	0	0	1	1	0	0	1	0	1	0	0	0
61 : Age diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62 : Socio-economic diversity and inclusion	5	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63 : Motives-Benefits of diversity and inclusion	14	2	2	0	9	1	0	0	0	4	2	2	0	1	0	1	0	0	0

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64 : Risks-Disadvantages associated with diversity and inclusion	1	0	1	0	0	0	1	1	0	1	1	0	0	0	0	1	1	0
65 : Discrimination and lack of diversity	19	2	11	0	6	0	0	0	0	2	0	2	0	0	0	0	0	0
66 : Lack or uncertainty of policy	8	2	1	0	3	2	0	0	0	2	1	1	0	0	0	0	0	0
67 : Discrimination- a non-issue	7	1	1	0	0	5	4	2	2	1	0	1	0	0	0	5	2	3
68 : Ethics	119	17	47	4	40	11	10	5	5	35	16	16	3	15	7	8	10	5
69 : Positioning ethics- where does the responsibility lie	27	7	6	1	10	3	3	3	0	12	7	4	1	2	2	0	4	3
70 : Disidentification with ethical responsibility	10	6	2	0	1	1	1	1	0	4	3	1	0	1	1	0	1	1
71 : Personal responsibility and morality	13	0	2	1	8	2	2	2	0	3	1	1	1	0	0	0	3	2
72 : Organisational norms and practices	15	0	7	0	5	3	5	2	3	7	5	2	0	1	0	1	2	2
73 : Safety and security	30	7	13	0	8	2	0	0	0	5	0	5	0	1	0	1	0	0
74 : Justice and fair dealing	4	1	0	0	3	0	1	0	1	4	1	2	1	0	0	0	0	0
75 : Quality assurance and testing	5	2	1	1	1	0	0	0	0	1	0	1	0	2	2	0	1	0
76 : Transparency	13	0	6	1	5	1	1	0	1	1	0	1	0	4	0	4	1	0
77 : Accountability	5	1	2	0	2	0	0	0	0	1	1	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

78 : Lack or uncertainty of ethical standards and policies	16	1	7	1	4	3	0	0	0	0	0	0	0	5	3	2	1	0	1
79 : Protection of rights	21	1	10	0	9	1	0	0	0	7	2	4	1	0	0	0	1	0	1
80 : Meeting societal needs	81	17	13	3	33	15	13	10	3	26	8	6	12	21	12	9	19	10	9
81 : Demand-driven research and innovation	66	16	11	2	27	10	13	10	3	20	5	5	10	20	12	8	18	10	8
82 : Targeting critical societal challenges	36	10	7	0	13	6	10	7	3	14	4	2	8	10	7	3	8	7	1
83 : Benefiting specific groups	3	0	2	0	1	0	0	0	0	1	0	1	0	10	6	4	0	0	0
84 : Furthering research-developing policy or standards	22	5	5	1	6	5	2	2	0	4	0	4	0	2	1	1	4	2	2
85 : Organisational norms and practices	6	1	0	0	4	1	0	0	0	4	2	1	1	0	0	0	0	0	0
86 : Lack of consideration of societal benefits	5	0	2	0	0	3	0	0	0	2	2	0	0	0	0	0	0	0	0
87 : Lack or uncertainty of policy for meeting societal needs	4	0	0	1	2	1	0	0	0	1	0	0	1	1	0	1	1	0	1
88 : Anticipation	56	12	19	3	14	8	4	3	1	15	3	8	4	4	1	3	7	3	4
89 : Future societal needs and challenges	16	2	6	0	5	3	2	1	1	2	0	2	0	2	0	2	1	1	0
90 : Environmental sustainability	10	2	4	3	1	0	0	0	0	3	1	1	1	0	0	0	3	0	3

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

91 : Responsive approach	19	7	7	0	5	0	2	2	0	8	2	5	1	1	1	0	2	2	0
92 : Organisational norms and practices	4	0	3	0	1	0	2	1	1	2	0	0	2	0	0	0	2	1	1
93 : Lack or uncertainty of anticipation policy and framework	9	1	0	0	3	5	0	0	0	0	0	0	0	1	0	1	0	0	0
94 : Enablers	57	10	22	4	14	7	0	0	0	37	14	19	4	9	7	2	8	0	8
95 : Accounting for local contexts	36	7	15	3	6	5	0	0	0	17	7	9	1	3	2	1	4	0	4
96 : Importance of customisation	3	0	2	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0
97 : Contextualising technology and innovation	4	1	1	0	1	1	0	0	0	1	0	1	0	0	0	0	1	0	1
98 : Importance of politics	13	6	1	3	2	1	0	0	0	4	2	1	1	1	0	1	3	0	3
99 : Accounting for geographic scale	16	0	11	0	2	3	0	0	0	8	3	5	0	0	0	0	0	0	0
100 : Evaluation	17	3	8	0	6	0	0	0	0	16	7	7	2	5	4	1	4	0	4
101 : Importance of feedback	4	0	3	0	1	0	0	0	0	0	0	0	0	1	0	1	1	0	1
102 : R&I Capacity Building	0	0	0	0	0	0	0	0	0	3	0	2	1	0	0	0	0	0	0
103 : Participation in upstream R&I	7	0	0	1	4	2	0	0	0	1	0	1	0	1	1	0	1	0	1
104 : Constraints	43	10	13	0	16	4	5	4	1	11	6	5	0	5	0	5	4	4	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

105 : Time frames and time constraints	6	1	3	0	1	1	3	3	0	8	5	3	0	0	0	0	3	3	0
106 : Financial constraints and considerations	32	9	8	0	14	1	2	1	1	1	0	1	0	4	0	4	1	1	0
107 : Lack of (perceived) interest of general public	4	1	0	0	1	2	0	0	0	1	0	1	0	0	0	0	0	0	0
108 : Lack of (perceived) applicability of RRI	2	0	2	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
109 : Conflicts between theory and practice	42	10	18	3	11	0	4	2	2	18	9	7	2	2	1	1	5	2	3
110 : Conflicts and tensions in R&I expectations	42	10	18	3	11	0	4	2	2	18	9	7	2	2	1	1	5	2	3
111 : Collaboration	54	19	14	2	16	3	2	2	0	38	13	20	5	9	3	6	7	2	5
112 : Building support networks and strategic alliances	24	7	8	0	7	2	2	2	0	18	6	10	2	5	0	5	4	2	2
113 : Actor mapping	6	0	4	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
114 : Integration of different domains and stakeholders	13	7	2	0	3	1	0	0	0	9	0	9	0	1	0	1	1	0	1
115 : RRI frameworks for new cross disciplinary research	2	0	0	0	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0
116 : Difficulties in collaboration and engagement	11	5	0	2	4	0	0	0	0	9	5	1	3	2	2	0	2	0	2



### 5.7.9 LATIN AMERICAN AND CARIBBEAN STATES: CODE FREQUENCIES BY DOMAINS

DOMAIN COUNTS	LATIN AMERICA & THE CARIBBEAN															
Codes	Energy				Waste				ICT				Bio-economy			
	Total	Bolivia	Brazil	Uruguay	Total	Bolivia	Brazil	Uruguay	Total	Bolivia	Brazil	Uruguay	Total	Bolivia	Brazil	Uruguay
1 : Public engagement	17	0	8	9	18	7	2	9	19	6	8	5	34	6	15	13
2 : Organisational norms and practices	6	0	5	1	5	3	1	1	7	0	5	2	10	1	8	1
3 : Lack or uncertainty of public engagement policy	1	0	0	1	3	2	0	1	4	2	1	1	7	1	4	2
4 : Motives-Benefits of public engagement and collaboration	11	0	3	8	11	2	1	8	8	4	2	2	16	4	3	9

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

5 : Risks-Disadvantages associated with public engagement and collaboration	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
6 : Types of stakeholders for engagement	87	21	28	38	71	17	16	38	91	35	29	27	103	15	43	45
7 : Government bodies, municipalities and regulatory authorities	21	4	8	9	22	9	4	9	27	12	5	10	21	5	6	10
8 : Professional bodies	6	0	0	6	6	0	0	6	7	3	1	3	11	1	1	9
9 : Research Funding organisations	4	1	2	1	2	0	1	1	5	1	2	2	3	0	2	1
10 : Scientific community	24	7	6	11	18	4	3	11	31	14	10	7	27	4	11	12
11 : Specialists-Experts	3	1	1	1	2	0	1	1	3	2	0	1	4	0	3	1

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

12 : Civil society organisations	13	2	4	7	12	1	4	7	6	1	3	2	17	1	7	9
13 : Industry and Business	16	6	4	6	9	2	1	6	8	0	5	3	16	3	6	7
14 : Marketing and communication agencies- Public Relations Industry	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
15 : Celebrities	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0
16 : Citizens or the general public	4	1	3	0	4	1	3	0	6	2	2	2	10	2	8	0
17 : Others	3	2	1	0	1	1	0	0	4	0	1	3	1	0	1	0
18 : Tools for engagement	21	1	11	9	20	3	8	9	16	6	6	4	26	2	15	9
19 : Information-based tools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

20 : Training and workshops	8	2	3	3	8	2	3	3	5	0	0	5	11	5	3	3
21 : Conferences, symposiums, talks and exhibitions	1	0	0	1	1	0	0	1	6	1	0	5	2	0	1	1
22 : Research publications and policy reports	5	1	0	4	6	2	0	4	3	2	0	1	4	0	0	4
23 : Information centres	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0
24 : University open days	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 : Media	2	1	0	1	1	0	0	1	0	0	0	0	2	1	0	1
26 : Consultation tools	2	0	1	1	3	1	1	1	1	0	1	0	4	0	3	1
27 : Surveys	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0	0
28 : Public-citizen consultations	2	0	1	1	2	0	1	1	0	0	0	0	3	0	2	1

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

29 : Feasibility studies- working groups	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0
30 : Involvement tools	4	0	1	3	6	2	1	3	5	1	1	3	6	0	3	3
31 : Open public calls and funding initiatives, etc	4	0	1	3	5	1	1	3	2	0	1	1	5	0	2	3
32 : Focus groups and discussions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33 : Competitions and awards	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34 : Tie-ups with local schools	0	0	0	0	1	1	0	0	3	1	0	2	1	0	1	0
35 : Collaboration tools	11	1	6	4	7	0	3	4	9	5	4	0	9	1	4	4

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

36 : Social networks	1	0	0	1	1	0	0	1	2	2	0	0	1	0	0	1
37 : University-based start-ups	1	0	1	0	0	0	0	0	3	2	1	0	0	0	0	0
38 : Applied research laboratories	1	0	1	0	1	0	1	0	1	0	1	0	2	0	2	0
39 : R&I matchmaking	8	1	4	3	5	0	2	3	4	2	2	0	6	1	2	3
40 : Empowerment tools	4	0	3	1	4	0	3	1	1	0	0	1	7	1	5	1
41 : Participatory management-approaches	4	0	3	1	4	0	3	1	1	0	0	1	5	1	3	1
42 : Campaigning-Lobbying	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
43 : Open innovation approach- the quadruple-helix	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

stakeholder model														
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45 : Open access	41	10	18	13	32	9	10	13	48	25	15	8	51	11 23 17
46 : Level and limits of open access	9	1	4	4	7	1	2	4	13	6	5	2	14	3 6 5
47 : Data protection	5	0	1	4	5	0	1	4	5	2	0	3	6	0 1 5
48 : Data accessibility	5	2	0	3	5	2	0	3	8	5	2	1	7	2 2 3
49 : Organisational norms and practices	5	1	3	1	1	0	0	1	6	2	4	0	4	1 2 1
50 : Lack or uncertainty of policy	5	1	3	1	5	2	2	1	9	7	1	1	6	1 3 2
51 : Risks-Disadvantages associated with	9	1	5	3	7	0	4	3	9	6	3	0	11	3 4 4

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

open data-access														
52 : Motives-Benefits of open access and data	11	6	2	3	8	4	1	3	8	5	2	1	13	3 6 4
53 : Diversity and inclusion	40	10	20	10	32	8	14	10	43	17	14	12	58	13 31 14
54 : Contextual understanding of diversity and inclusion-societal and cultural norms	3	0	1	2	2	0	0	2	6	2	2	2	5	2 0 3
55 : Organisational norms and practices	5	1	3	1	3	1	1	1	5	1	4	0	9	2 6 1
56 : Gender-Sexual diversity	15	3	8	4	15	4	7	4	21	11	4	6	19	1 12 6
57 : Ethnic and religious diversity	2	0	2	0	2	0	2	0	5	2	3	0	11	3 7 1

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

58 : Country-based representation	1	0	1	0	0	0	0	0	2	0	2	0	1	0	1	0
59 : Disability	1	0	0	1	2	1	0	1	3	1	0	2	4	1	1	2
60 : Academic diversity	1	0	1	0	0	0	0	0	4	0	3	1	2	0	2	0
61 : Age diversity	2	0	1	1	2	0	1	1	2	1	0	1	5	2	2	1
62 : Socio-economic diversity and inclusion	2	1	1	0	0	0	0	0	5	1	4	0	3	0	3	0
63 : Motives-Benefits of diversity and inclusion	0	0	0	0	0	0	0	0	2	1	0	1	3	1	2	0
64 : Risks-Disadvantages associated with diversity and inclusion	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65 : Discrimination	4	0	3	1	3	0	2	1	4	2	1	1	5	0	3	2

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

and lack of diversity																
66 : Lack or uncertainty of policy	8	3	3	2	7	2	3	2	2	1	0	1	10	2	6	2
67 : Discrimination-a non-issue	2	1	0	1	1	0	0	1	2	0	2	0	5	2	2	1
68 : Ethics	46	14	15	17	33	7	9	17	60	21	13	26	53	9	21	23
69 : Positioning ethics- where does the responsibility lie	9	6	0	3	5	2	0	3	6	5	0	1	6	1	0	5
70 : Disidentification with ethical responsibility	4	3	0	1	1	0	0	1	0	0	0	0	1	0	0	1
71 : Personal responsibility and morality	3	2	0	1	2	1	0	1	5	5	0	0	4	1	0	3
72 : Organisational	11	7	4	0	2	1	1	0	13	7	5	1	7	3	4	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

norms and practices																	
73 : Safety and security	2	0	2	0	2	1	1	0	4	1	3	0	1	0	1	0	
74 : Justice and fair dealing	2	0	1	1	2	0	1	1	0	0	0	0	3	1	1	1	
75 : Quality assurance and testing	0	0	0	0	1	1	0	0	7	3	1	3	5	4	1	0	
76 : Transparency	7	0	2	5	6	0	1	5	10	1	1	8	11	1	5	5	
77 : Accountability	1	0	0	1	1	0	0	1	3	0	0	3	3	0	1	2	
78 : Lack or uncertainty of ethical standards and policies	6	3	3	0	5	3	2	0	2	0	2	0	9	0	5	4	
79 : Protection of rights	12	1	4	7	11	0	4	7	21	7	2	12	16	0	6	10	
80 : Meeting societal needs	57	20	22	15	42	14	13	15	46	11	26	9	62	17	26	19	

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

81 : Demand-driven research and innovation	45	14	19	12	36	13	11	12	36	8	21	7	51	15	21	15
82 : Targeting critical societal challenges	25	6	12	7	23	6	10	7	20	5	13	2	34	8	17	9
83 : Benefiting specific groups	11	4	3	4	6	2	0	4	5	0	3	2	12	7	1	4
84 : Furthering research-developing policy or standards	4	4	0	0	7	7	0	0	7	3	3	1	4	2	0	2
85 : Organisational norms and practices	4	0	4	0	0	0	0	0	8	1	7	0	1	0	1	0
86 : Lack of consideration of societal benefits	3	3	0	0	0	0	0	0	1	1	0	0	0	0	0	0
87 : Lack or uncertainty of policy for	6	4	0	2	3	1	0	2	3	1	0	2	6	2	1	3

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

meeting societal needs																
88 : Anticipation	21	9	6	6	16	8	2	6	23	10	5	8	25	9	8	8
89 : Future societal needs and challenges	6	4	1	1	2	1	0	1	3	1	1	1	5	2	1	2
90 : Environmental sustainability	5	3	1	1	6	5	0	1	6	4	1	1	6	2	3	1
91 : Responsive approach	7	2	3	2	4	0	2	2	10	3	2	5	11	5	4	2
92 : Organisational norms and practices	3	0	3	0	0	0	0	0	5	2	3	0	1	1	0	0
93 : Lack or uncertainty of anticipation policy and framework	1	0	0	1	3	2	0	1	1	0	0	1	2	0	0	2
94 : Enablers	34	2	12	20	33	4	9	20	35	15	9	11	42	5	16	21

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

95 : Accounting for local contexts	14	2	6	6	15	4	5	6	20	13	4	3	16	3	6	7
96 : Importance of customisation	3	0	1	2	3	0	1	2	1	0	0	1	4	1	1	2
97 : Contextualising technology and innovation	0	0	0	0	1	1	0	0	3	2	0	1	1	0	0	1
98 : Importance of politics	3	0	1	2	6	3	1	2	3	1	1	1	5	1	2	2
99 : Accounting for geographic scale	4	1	2	1	2	0	1	1	7	4	3	0	2	0	1	1
100 : Evaluation	11	0	3	8	11	0	3	8	6	0	3	3	13	0	5	8
101 : Importance of feedback	1	0	0	1	1	0	0	1	2	0	0	2	4	1	2	1
102 : R&I Capacity Building	7	0	2	5	5	0	0	5	6	0	2	4	5	0	0	5

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

103 : Participation in upstream R&I	2	0	1	1	2	0	1	1	6	5	0	1	8	2	5	1
104 : Constraints	15	1	9	5	17	3	9	5	15	14	0	1	23	6	12	5
105 : Time frames and time constraints	3	0	2	1	3	0	2	1	1	0	0	1	7	2	4	1
106 : Financial constraints and considerations	14	1	9	4	15	2	9	4	13	13	0	0	18	4	10	4
107 : Lack of (perceived) interest of general public	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
108 : Lack of (perceived) applicability of RRI	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
109 : Conflicts between theory and practice	31	6	16	9	27	5	13	9	12	4	7	1	26	1	14	11

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

110 : Conflicts and tensions in R&I expectations	27	6	12	9	23	5	9	9	12	4	7	1	22	1	10	11
111 : Collaboration	33	5	17	11	30	8	11	11	40	14	14	12	43	4	26	13
112 : Building support networks and strategic alliances	14	2	8	4	11	1	6	4	18	4	4	10	21	2	14	5
113 : Actor mapping	1	0	0	1	2	1	0	1	2	0	2	0	3	0	2	1
114 : Integration of different domains and stakeholders	13	2	6	5	11	1	5	5	8	3	4	1	15	2	7	6
115 : RRI frameworks for new cross disciplinary research	3	1	2	0	0	0	0	0	4	1	2	1	1	0	1	0
116 : Difficulties in	4	2	2	0	7	5	2	0	7	6	1	0	7	2	5	0

RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

collaboration and engagement								
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### 5.7.10 LATIN AMERICAN AND CARIBBEAN STATES: CODE FREQUENCIES BY STAKEHOLDER TYPES

STAKEHOLDER COUNTS	LATIN AMERICA & THE CARIBBEAN																			
Codes	Research Organisation				Research Organisation Funding				Industry & Business				Civil Organisation Society				Policy bodies			
	Total	Bolivia	Brazil	Uruguay	Total	Bolivia	Brazil	Uruguay	Total	Bolivia	Brazil	Uruguay	Total	Bolivia	Brazil	Uruguay	Total	Bolivia	Brazil	Uruguay
1 : Public engagement	30	15	13	2	0	0			8	4	4		23	5	4	14	0	0 0		
2 : Organisational norms and practices	13	4	9	0	0	0			1	0	1		6	1	2	3	0	0 0		
3 : Lack or uncertainty of public engagement policy	6	3	2	1	0	0			3	2	1		4	2	1	1	0	0 0		
4 : Motives-Benefits of public	11	8	2	1	0	0			4	2	2		12	2	1	9	0	0 0		

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

engagement and collaboration																
5 : Risks-Disadvantages associated with public engagement and collaboration	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	
6 : Types of stakeholders for engagement	100	61	29	10	9	9	27	16	11	96	20	24	52	20	11	9
7 : Government bodies, municipalities and regulatory authorities	28	21	6	1	1	1	7	6	1	28	6	4	18	4	3	1
8 : Professional bodies	4	2	1	1	1	1	3	2	1	12	2	0	10	1	0	1

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

9 : Research Funding organisations	4	2	1	1	0	0	0	0	0	3	0	2	1	0	0	0
10 : Scientific community	35	19	11	5	5	5	9	6	3	22	8	5	9	9	4	5
11 : Specialists-Experts	2	1	1	0	0	0	2	1	1	4	1	1	2	1	1	0
12 : Civil society organisations	7	4	3	0	2	2	1	0	1	17	1	5	11	3	1	2
13 : Industry and Business	14	6	5	3	1	1	4	1	3	7	1	2	4	5	4	1
14 : Marketing and communication agencies-Public Relations Industry	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0
15 : Celebrities	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

16 : Citizens or the general public	6	5	1	0	0	0	3	1	2	8	1	5	2	0	0	0
17 : Others	4	3	1	0	0	0	1	0	1	3	0	0	3	0	0	0
18 : Tools for engagement	11	5	5	1	0	0	8	6	2	25	3	11	11	1	1	0
19 : Information-based tools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 : Training and workshops	10	8	0	2	0	0	1	1	0	11	4	3	4	0	0	0
21 : Conferences, symposiums, talks and exhibitions	2	1	1	0	0	0	0	0	0	6	0	0	6	0	0	0
22 : Research publications and policy reports	6	5	0	1	0	0	0	0	0	3	0	0	3	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

23 : Information centres	0	0	0	0	0	0	0	0	1	0	1	0	0	0
24 : University open days	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 : Media	1	1	0	0	0	0	0	0	2	1	0	1	1	0
26 : Consultation tools	0	0	0	0	0	0	2	1	3	0	2	1	0	0
27 : Surveys	0	0	0	0	0	0	1	1	1	0	0	1	0	0
28 : Public-citizen consultations	0	0	0	0	0	0	1	0	2	0	1	1	0	0
29 : Feasibility studies-working groups	0	0	0	0	0	0	0	0	1	0	1	0	0	0
30 : Involvement tools	3	1	1	1	0	0	2	2	6	0	2	4	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

31 : Open public calls and funding initiatives, etc	1	0	0	1	0	0	1	1	0	4	0	2	2	0	0	0
32 : Focus groups and discussions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33 : Competitions and awards	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34 : Tie-ups with local schools	2	1	1	0	0	0	1	1	0	2	0	0	2	0	0	0
35 : Collaboration tools	6	3	3	0	0	0	3	3	0	11	3	4	4	1	1	0
36 : Social networks	0	0	0	0	0	0	2	2	0	3	2	0	1	0	0	0
37 : University-based start-ups	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

38 : Applied research laboratories	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0
39 : R&I matchmaking	3	1	2	0	0	0	2	2	0	7	2	2	3	1	1	0
40 : Empowerment tools	2	1	1	0	0	0	1	0	1	5	0	3	2	0	0	0
41 : Participatory management-approaches	1	1	0	0	0	0	0	0	0	5	0	3	2	0	0	0
42 : Campaigning -Lobbying	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
43 : Open innovation approach- the quadruple-helix stakeholder model	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44 : Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

45 : Open access	55	34	18	3	6	6	25	17	8	49	19	11	19	10	4	6
46 : Level and limits of open access	13	5	7	1	3	3	8	6	2	15	8	2	5	3	0	3
47 : Data protection	3	2	0	1	0	0	0	0	0	7	0	1	6	0	0	0
48 : Data accessibility	8	6	2	0	1	1	4	4	0	9	4	1	4	2	1	1
49 : Organisational norms and practices	4	1	3	0	0	0	3	2	1	4	2	1	1	1	1	0
50 : Lack or uncertainty of policy	7	4	2	1	0	0	6	6	0	8	5	2	1	1	1	0
51 : Risks-Disadvantages associated with open data-access	11	8	3	0	2	2	1	1	0	11	3	4	4	3	1	2
52 : Motives-Benefits of	13	11	2	0	1	1	10	5	5	11	5	1	5	3	2	1

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

open access and data																
53 : Diversity and inclusion	51	29	18	4	6	6	23	14	9	50	16	16	18	11	5	6
54 : Contextual understandin g of diversity and inclusion- societal and cultural norms	6	3	2	1	1	1	1	1	0	4	1	0	3	1	0	1
55 : Organisationa l norms and practices	7	5	2	0	0	0	3	0	3	5	1	3	1	0	0	0
56 : Gender- Sexual diversity	13	7	5	1	2	2	12	10	2	26	8	8	10	4	2	2
57 : Ethnic and religious diversity	4	4	0	0	0	0	3	1	2	10	4	5	1	0	0	0
58 : Country- based	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

representatio n																
59 : Disability	1	1	0	0	0	0	3	2	1	6	2	0	4	0	0	0
60 : Academic diversity	3	0	3	0	2	2	2	0	2	1	0	0	1	2	0	2
61 : Age diversity	2	2	0	0	0	0	2	1	1	4	1	1	2	0	0	0
62 : Socio-economic diversity and inclusion	4	2	2	0	1	1	1	0	1	2	0	2	0	1	0	1
63 : Motives-Benefits of diversity and inclusion	2	1	1	0	0	0	2	1	1	3	2	0	1	0	0	0
64 : Risks-Disadvantages associated with diversity and inclusion	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65 : Discriminatio	4	1	2	1	0	0	1	1	0	4	1	2	1	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

n and lack of diversity																
66 : Lack or uncertainty of policy	8	5	2	1	0	0	2	1	1	5	1	3	1	2	2	0
67 : Discrimination- a non-issue	2	2	0	0	0	0	0	0	0	4	1	2	1	1	1	0
68 : Ethics	61	37	17	7	5	5	13	9	4	57	11	11	35	10	5	5
69 : Positioning ethics- where does the responsibility lie	11	10	0	1	0	0	0	0	0	4	0	0	4	4	4	0
70 : Disidentification with ethical responsibility	0	0	0	0	0	0	0	0	0	1	0	0	1	3	3	0
71 : Personal responsibility and morality	9	9	0	0	0	0	0	0	0	3	0	0	3	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

72 : Organisationa l norms and practices	17	12	5	0	1	1	6	5	1	9	6	2	1	2	1	1
73 : Safety and security	4	1	3	0	2	2	1	1	0	1	0	1	0	2	0	2
74 : Justice and fair dealing	1	1	0	0	0	0	0	0	0	3	1	1	1	0	0	0
75 : Quality assurance and testing	8	8	0	0	0	0	0	0	0	8	4	1	3	0	0	0
76 : Transparency	4	1	3	0	0	0	3	1	2	15	1	1	13	0	0	0
77 : Accountabilit y	0	0	0	0	0	0	1	0	1	5	0	0	5	0	0	0
78 : Lack or uncertainty of ethical standards and policies	4	2	2	0	0	0	3	2	1	7	0	3	4	2	2	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

79 : Protection of rights	15	5	4	6	2	2	3	3	0	17	3	4	10	2	0	2
80 : Meeting societal needs	76	46	25	5	15	15	17	7	10	41	8	15	18	24	9	15
81 : Demand- driven research and innovation	63	39	21	3	12	12	13	5	8	33	5	12	16	18	6	12
82 : Targeting critical societal challenges	34	20	13	1	10	10	8	3	5	24	4	11	9	12	2	10
83 : Benefiting specific groups	16	11	3	2	0	0	2	1	1	4	2	0	2	1	1	0
84 : Furthering research- developing policy or standards	14	11	3	0	3	3	2	2	0	3	0	0	3	6	3	3

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

85 : Organisationa l norms and practices	8	1	7	0	3	3	1	0	1	0	0	0	0	3	0	3
86 : Lack of consideration of societal benefits	1	1	0	0	0	0	1	1	0	1	1	0	0	2	2	0
87 : Lack or uncertainty of policy for meeting societal needs	7	5	0	2	0	0	2	1	1	3	2	0	1	2	2	0
88 : Anticipation	36	28	6	2	1	1	9	4	5	18	4	2	12	5	4	1
89 : Future societal needs and challenges	7	4	2	1	0	0	1	1	0	1	0	0	1	3	3	0
90 : Environment al sustainability	13	12	1	0	0	0	5	2	3	3	1	0	2	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

91 : Responsive approach	11	9	2	0	1	1	2	0	2	12	3	2	7	2	1	1
92 : Organisational norms and practices	6	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
93 : Lack or uncertainty of anticipation policy and framework	2	1	0	1	0	0	1	1	0	1	0	0	1	0	0	0
94 : Enablers	24	8	9	7	5	5	21	16	5	44	16	10	18	7	2	5
95 : Accounting for local contexts	11	6	3	2	2	2	14	14	0	25	13	6	6	4	2	2
96 : Importance of customisation	2	1	0	1	0	0	0	0	0	3	1	1	1	0	0	0
97 : Contextualising technology	1	1	0	0	0	0	2	2	0	3	1	0	2	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

and innovation																
98 : Importance of politics	4	3	0	1	0	0	2	2	0	3	0	2	1	0	0	0
99 : Accounting for geographic scale	3	0	3	0	2	2	4	4	0	6	4	1	1	3	1	2
100 : Evaluation	5	0	3	2	3	3	2	0	2	10	0	3	7	3	0	3
101 : Importance of feedback	1	1	0	0	0	0	2	0	2	4	1	0	3	0	0	0
102 : R&I Capacity Building	5	0	2	3	0	0	0	0	0	3	0	0	3	0	0	0
103 : Participation in upstream R&I	3	2	1	0	0	0	8	5	3	9	6	1	2	0	0	0

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

104 : Constraints	17	15	2	0	0	0	10	9	1	27	12	9	6	0	0	0
105 : Time frames and time constraints	3	2	1	0	0	0	1	0	1	5	1	2	2	0	0	0
106 : Financial constraints and considerations	13	12	1	0	0	0	8	8	0	23	10	9	4	0	0	0
107 : Lack of (perceived) interest of general public	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0
108 : Lack of (perceived) applicability of RRI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109 : Conflicts between	15	8	6	1	3	3	4	4	0	28	4	14	10	7	4	3

## RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

theory and practice																
110 : Conflicts and tensions in R&I expectations	15	8	6	1	3	3	4	4	0	24	4	10	10	7	4	3
111 : Collaboration	32	17	13	2	5	5	20	10	10	47	12	14	21	9	4	5
112 : Building support networks and strategic alliances	11	5	5	1	2	2	10	3	7	22	3	6	13	3	1	2
113 : Actor mapping	1	1	0	0	0	0	0	0	0	3	0	2	1	0	0	0
114 : Integration of different domains and stakeholders	9	4	5	0	3	3	3	2	1	14	2	5	7	5	2	3
115 : RRI frameworks for new cross	2	0	2	0	0	0	2	1	1	2	1	0	1	1	1	0

RRING Deliverable 3.1-5 – State of the Art of RRI in the Five UNESCO World Regions

disciplinary research															
116 : Difficulties in collaboration and engagement	9	9	0	0	0	6	4	2	9	6	3	0	2	2	0

## 5.8 APPENDIX VIII: GLOBAL SURVEY RESEARCH DATA TABLES

### 5.8.1 DATA TABLES FOR AFRICAN STATES

#### 5.8.1.1 CLOSED-ENDED SURVEY QUESTION DATA TABLES

##### 5.8.1.1.1 Socio-Demographics

Table 29: African States - Distribution of age.

In what year were you born?	Count
18-28	26
29-38	80
39-48	34
49-58	36
59-68	23
69+	6

Table 30: African States - Distribution of gender.

Please indicate if you are...	Count
Female	88
Male	133
Prefer not to say	5

Table 31: African States - Currently studying at school, college or university.

Are you currently a student at school, college or university?	Count
No	176
Prefer not to say	7
Unsure	1

<b>Yes</b>	<b>41</b>
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Table 32: African States - Highest level of formal education completed.

<b>What is the highest level of formal education you have completed?</b>	<b>Count</b>
<b>Bachelor's (or equivalent)</b>	79
<b>Doctoral (or equivalent)</b>	51
<b>Master's (or equivalent)</b>	78
<b>Other (please specify)</b>	9
<b>Prefer not to say</b>	7

Table 33: African States - Distribution of degrees by subject area (multiple choice).

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Education</b>	29	9.5%
<b>Arts and humanities</b>	29	9.5%
<b>Social sciences, journalism and information</b>	35	11.4%
<b>Business, administration and law</b>	37	12.1%
<b>Natural sciences, mathematics and statistics</b>	60	19.6%
<b>Information and Communication Technologies (ICTs)</b>	31	10.1%
<b>Engineering, manufacturing and construction</b>	13	4.2%
<b>Agriculture, forestry, fisheries and veterinary</b>	24	7.8%
<b>Health and welfare</b>	29	9.5%
<b>Services</b>	3	1%
<b>Other</b>	16	5.2%

Table 34: African States - Years of experience as professional / since completing PhD (log scale).

Question	1-10	11-20	21-30	31-40	41-50
Professional	78	39	25	22	3
Since completing PhD	18	9	13	2	

Table 35: African States - Fields or professions in which respondents work.

In which field do you work?	Count
Agricultural sciences	21
Engineering and technology	18
Humanities	17
Medical and health sciences	33
Natural sciences, mathematics and statistics	37
Other (please specify)	54
Prefer not to say	9
Social sciences	31

Table 36: African States - Sub-fields of natural sciences.

Which sub-field of natural sciences best encompasses the type of research and innovation activities you are involved in?	Count
Biological sciences	14
Chemical sciences	1
Computer and information sciences	6
Earth and related environmental sciences	10
Other	4

<b>Physical sciences</b>	<b>3</b>
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Table 37: African States - Sub-fields of medical and health sciences.

<b>Which sub-field of medical and health sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Clinical medicine</b>	6
<b>Health sciences</b>	15
<b>Medical biotechnology</b>	4
<b>Other (please specify)</b>	6
<b>Prefer not to say</b>	2

Table 38: African States - Sub-fields of engineering and technology.

<b>Which sub-field of engineering and technology best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Chemical Engineering</b>	1
<b>Civil engineering</b>	1
<b>Electrical/electronic/information engineering</b>	6
<b>Environmental engineering</b>	4
<b>Mechanical engineering</b>	2
<b>Other</b>	5
<b>Prefer not to say</b>	1

Table 39: African States - Sub-fields of agricultural sciences.

<b>Which sub-field of agricultural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
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<b>Agricultural biotechnology</b>	2
<b>Agriculture, forestry, and fisheries</b>	14
<b>Animal and dairy science</b>	3
<b>Other</b>	2

Table 40: African States - Sub fields of social sciences.

<b>Which sub-field of social sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Economics and business</b>	9
<b>Educational sciences</b>	10
<b>Law</b>	1
<b>Media and communication</b>	2
<b>Other</b>	2
<b>Prefer not to say</b>	2
<b>Social and economic geography</b>	4

Table 41: African States - Sub-fields of humanities.

<b>Which sub-field of humanities best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Arts (history/performing arts, music)</b>	3
<b>History and archaeology</b>	1
<b>Languages and literature</b>	3
<b>Other</b>	5
<b>Philosophy, ethics and religion</b>	2
<b>Prefer not to say</b>	2

Table 42: African States - Sectors in which participants work[ed] in.

<b>In what type of organisation do you work (or have you most recently worked)?</b>	<b>Count</b>
<b>Civil society/non-governmental organisation</b>	20
<b>Industry (large)</b>	23
<b>International governmental organisation</b>	8
<b>National governmental organisation</b>	49
<b>Other (please specify)</b>	15
<b>Policy</b>	3
<b>Prefer not to say</b>	12
<b>Small and medium-size enterprise [&lt; 250 employees]</b>	24
<b>University or similar research performing organisation</b>	66

Table 43: African States - Participants' employment status.

<b>What is your current employment status?</b>	<b>Count</b>
<b>Employed full-time</b>	173
<b>Employed part-time</b>	18
<b>Other (please specify)</b>	3
<b>Prefer not to say</b>	4
<b>Retired</b>	3
<b>Self-employed</b>	9
<b>Student only</b>	4
<b>Unemployed (looking for work)</b>	4
<b>Unemployed (not looking for work)</b>	1

Table 44: African States - Hours spent on activities in the last 7 days (log scale).

Question	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71+
Administration unrelated to research/innovation	93	28	9	12	3	3		3
Management or supervision of staff/students	90	21	15	9	6	2		1
Public engagement (all types)	107	14	9	6	4	1		
Research or innovation work	96	29	10	19	4	6	1	4
Seeking or managing research/innovation funding	93	10	7	6	1			3
Teaching or capacity building (including training)	98	23	11	3	4			1

Table 45: African States - Years that respondents worked in their current role / as researcher or innovator (log scale).

Question	1-10	11-20	21-30	31-40	41-50
...as researcher or innovator	109	29	20	7	1
...in their current role	128	21	13	6	

Table 46: African States - Domains relating to participants' recent work.

Label	Count	Percent
Digital (ICT)	70	30.3%
Energy	18	7.8%
Bio-economy	33	14.3%
Waste Management	22	9.5%

<b>None of these</b>	88	38.1%
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#### 5.8.1.1.2 RRI Dimension – Diverse and Inclusive

*Table 47: African States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work.'*

	<b>Count</b>
<b>Agree</b>	82
<b>Disagree</b>	1
<b>Neutral</b>	10
<b>Somewhat Agree</b>	15
<b>Somewhat Disagree</b>	0
<b>Strongly Agree</b>	81
<b>Strongly Disagree</b>	8

*Table 48: African States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.*

<b>In the last 12 months, have you involved individuals/organisations with a diverse range of perspectives and expertise when planning your research and innovation work?</b>	<b>Count</b>
<b>No</b>	49
<b>Not applicable / No opinion</b>	28
<b>Prefer not to say</b>	4
<b>Unsure</b>	17
<b>Yes</b>	109

*Table 49: African States - Sectors participants involved in research and innovation practice.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	67	18.3%
<b>Primary / Secondary school education</b>	13	3.6%
<b>Government agency</b>	60	16.4%
<b>Industry / Commercial</b>	31	8.5%
<b>Non-profit organisation</b>	37	10.1%
<b>Research organisation</b>	51	13.9%
<b>Research funding organisation</b>	39	10.7%
<b>Journalism / Media</b>	23	6.3%
<b>General public</b>	40	10.9%
<b>Other</b>	5	1.4%

*Table 50: African States - Sectors participants involved in research and innovation dissemination.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	66	17.9%
<b>Primary / Secondary school education</b>	16	4.3%
<b>Government agency</b>	56	15.2%
<b>Industry / Commercial</b>	27	7.3%
<b>Non-profit organisation</b>	36	9.8%
<b>Research organisation</b>	48	13%
<b>Research funding organisation</b>	38	10.3%
<b>Journalism / Media</b>	27	7.3%
<b>General public</b>	51	13.9%
<b>Other</b>	3	0.8%

Table 51: African States - 'It is important to promote gender equality in my research and innovation work.'

	Count
<b>Agree</b>	70
<b>Disagree</b>	2
<b>Neutral</b>	13
<b>Somewhat Agree</b>	9
<b>Somewhat Disagree</b>	0
<b>Strongly Agree</b>	94
<b>Strongly Disagree</b>	6

Table 52: African States - Promoted gender equality in research and innovation work in the past 12 months.

In the last 12 months, have you taken steps to promote gender equality in your research and innovation work?	Count
<b>No</b>	35
<b>Not applicable / No opinion</b>	32
<b>Prefer not to say</b>	6
<b>Unsure</b>	25
<b>Yes</b>	104

Table 53: African States - 'It is important to include ethnic minorities in my research and innovation work.'

	Count
<b>Agree</b>	70

<b>Disagree</b>	6
<b>Neutral</b>	24
<b>Somewhat Agree</b>	11
<b>Somewhat Disagree</b>	3
<b>Strongly Agree</b>	68
<b>Strongly Disagree</b>	8

*Table 54: African States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken any steps to include ethnic minorities in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	57
<b>Not applicable / No opinion</b>	38
<b>Prefer not to say</b>	9
<b>Unsure</b>	34
<b>Yes</b>	64

*Table 55: African States - 'Ethical principles guide my research and innovation work'.*

	<b>Count</b>
<b>Agree</b>	62
<b>Disagree</b>	0
<b>Neutral</b>	12
<b>Somewhat Agree</b>	14
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	91

<b>Strongly Disagree</b>	<b>6</b>
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*Table 56: African States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure that ethical principles guide your research and innovation work?</b>	<b>Count</b>
<b>No</b>	28
<b>Not applicable / No opinion</b>	23
<b>Prefer not to say</b>	11
<b>Unsure</b>	22
<b>Yes</b>	110

*Table 57: African States - Statements related to working in research and innovation.*

<b>Question</b>	<b>Agree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Somewhat Agree</b>	<b>Somewhat Disagree</b>	<b>Strongly Agree</b>	<b>Strongly Disagree</b>
<b>'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals.'</b>	31	31	16	19	23	26	11
<b>'Ethnic differences are irrelevant in my work.'</b>	13	58	12	8	13	14	37

<b>'Gender is irrelevant in my work.'</b>	13	56	16	7	6	17	42
<b>'I feel a professional responsibility to communicate findings from my research or innovation work to public audiences.'</b>	58	4	13	22	1	58	0
<b>'It is important to maintain an equal number of men and women in research and innovation teams.'</b>	56	11	26	26	7	30	2
<b>'It is important to take ethnic diversity into account when developing my research and innovation work.'</b>	53	3	12	19	3	62	3
<b>'It is important to take gender into account when developing my research and</b>	64	7	16	12	2	53	2

<b>innovation work.'</b>							
<b>'My organisation encourages me to communicate findings from my research or innovation work to public audiences.'</b>	57	8	23	18	3	41	2
<b>'My primary organisation where I work discourages me from communicating the results of my research or innovation work to public audiences.'</b>	9	51	9	4	11	5	46
<b>'The best time to talk to public audiences about my research and innovation work is at the very end of the process after all the work has been completed.'</b>	27	37	13	26	20	14	21

### 5.8.1.1.3 RRI Dimension – Anticipative and Reflective

Table 58: African States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society.'.

	Count
<b>Agree</b>	79
<b>Disagree</b>	4
<b>Neutral</b>	10
<b>Somewhat Agree</b>	6
<b>Somewhat Disagree</b>	4
<b>Strongly Agree</b>	84
<b>Strongly Disagree</b>	11

Table 59: African States - Ensured work does not cause concerns for society in the past 12 months.

<b>In the last 12 months, have you taken steps to ensure the way you do your work does not cause concerns for society?</b>	Count
<b>No</b>	23
<b>Not applicable / No opinion</b>	28
<b>Prefer not to say</b>	4
<b>Unsure</b>	27
<b>Yes</b>	120

### 5.8.1.1.4 RRI Dimension – Open and Transparent

Table 60: African States - 'It is important to make my research and innovation methods/processes open and transparent.'.

	Count
<b>Agree</b>	77

<b>Disagree</b>	2
<b>Neutral</b>	5
<b>Somewhat Agree</b>	8
<b>Somewhat Disagree</b>	4
<b>Strongly Agree</b>	89
<b>Strongly Disagree</b>	9

*Table 61: African States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure your research and innovation methods/processes are open and transparent?</b>	<b>Count</b>
<b>No</b>	29
<b>Not applicable / No opinion</b>	26
<b>Prefer not to say</b>	6
<b>Unsure</b>	31
<b>Yes</b>	110

*Table 62: African States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.*

	<b>Count</b>
<b>Agree</b>	63
<b>Disagree</b>	9
<b>Neutral</b>	7
<b>Somewhat Agree</b>	5
<b>Somewhat Disagree</b>	3

<b>Strongly Agree</b>	98
<b>Strongly Disagree</b>	9

*Table 63: African States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.*

<b>In the last 12 months, have you taken steps to make the results of your research and innovation work accessible to as wide a public as possible?</b>	<b>Count</b>
<b>No</b>	41
<b>Not applicable / No opinion</b>	19
<b>Prefer not to say</b>	8
<b>Unsure</b>	19
<b>Yes</b>	112

*Table 64: African States - 'It is important to make data from my research and innovation activities freely available to the public'.*

	<b>Count</b>
<b>Agree</b>	56
<b>Disagree</b>	24
<b>Neutral</b>	9
<b>Somewhat Agree</b>	16
<b>Somewhat Disagree</b>	5
<b>Strongly Agree</b>	67
<b>Strongly Disagree</b>	12

*Table 65: African States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.*

<b>In the last 12 months, have you taken steps to make data from your research and innovation activities freely available to the public?</b>	<b>Count</b>
<b>No</b>	75
<b>Not applicable / No opinion</b>	22
<b>Prefer not to say</b>	9
<b>Unsure</b>	20
<b>Yes</b>	72

Table 66: African States - 'Research and innovation should address societal needs.'

	<b>Count</b>
<b>Agree</b>	64
<b>Disagree</b>	0
<b>Neutral</b>	5
<b>Somewhat Agree</b>	12
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	104
<b>Strongly Disagree</b>	9

#### 5.8.1.1.5 RRI Dimension – Responsive and Adaptive to Change

Table 67: African States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.

<b>In the last 12 months, have you taken steps to ensure your research and innovation work addresses societal needs?</b>	<b>Count</b>
<b>No</b>	28
<b>Not applicable / No opinion</b>	18

<b>Prefer not to say</b>	3
<b>Unsure</b>	25
<b>Yes</b>	129

*Table 68: African States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.*

<b>To what extent is your research/innovation work guided by a regulatory framework that covers all relevant aspects of social responsibility?</b>	<b>Count</b>
<b>Always</b>	23
<b>Frequently</b>	21
<b>Never</b>	9
<b>Not applicable / No Opinion</b>	13
<b>Occasionally</b>	15
<b>Rarely</b>	38
<b>Sometimes</b>	22
<b>Usually</b>	25

#### 5.8.1.1.6 Stakeholder Categories

*Table 69: African States - Hours interacting with research performing organisations / academics / researchers in the last 7 days.*

<b>Research Performing Organisations / Academics / Researchers</b>	<b>Count</b>
<b>1-10</b>	98
<b>11-20</b>	18
<b>21-30</b>	14
<b>31-40</b>	12

<b>41-50</b>	<b>2</b>
<b>51-60</b>	<b>4</b>
<b>71+</b>	<b>1</b>

*Table 70: African States - Hours interacting with research funding organisations in the last 7 days.*

<b>Research Funding Organisations</b>	<b>Count</b>
<b>1-10</b>	<b>62</b>
<b>11-20</b>	<b>11</b>
<b>21-30</b>	<b>3</b>
<b>31-40</b>	<b>2</b>
<b>41-50</b>	<b>1</b>
<b>51-60</b>	<b>2</b>
<b>71+</b>	<b>3</b>

*Table 71: African States - Hours interacting with industry / small and medium sized enterprise in the last 7 days.*

<b>Industry / small and medium sized enterprise</b>	<b>Count</b>
<b>1-10</b>	<b>79</b>
<b>11-20</b>	<b>12</b>
<b>21-30</b>	<b>6</b>
<b>31-40</b>	<b>2</b>
<b>71+</b>	<b>1</b>

*Table 72: African States - Hours interacting with civil society / citizens in the last 7 days.*

<b>Civil society / citizens</b>	<b>Count</b>
<b>1-10</b>	78
<b>11-20</b>	15
<b>21-30</b>	10
<b>31-40</b>	4
<b>41-50</b>	3
<b>51-60</b>	1
<b>71+</b>	1

*Table 73: African States - Hours interacting with policy makers in the last 7 days.*

<b>Policy makers</b>	<b>Count</b>
<b>1-10</b>	81
<b>11-20</b>	9
<b>21-30</b>	4
<b>31-40</b>	3
<b>41-50</b>	1

*Table 74: African States - Hours interacting with NGOs / international organisations in the last 7 days.*

<b>NGOs / international organisations</b>	<b>Count</b>
<b>1-10</b>	82
<b>11-20</b>	12
<b>21-30</b>	6
<b>31-40</b>	2
<b>41-50</b>	1

<b>51-60</b>	<b>1</b>
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### 5.8.1.1.7 UN Sustainable Development Goals

Table 75: African States - Participants' familiarity with the UN SDGs.

	<b>Count</b>
<b>Extremely Familiar</b>	32
<b>Moderately Familiar</b>	59
<b>Not at all Familiar</b>	26
<b>Slightly Familiar</b>	49
<b>Somewhat Familiar</b>	23

Table 76: African States - Heard or read about the UN Sustainable Development Goals in the last 30 days.

<b>In the last 30 days, how much have you heard or read about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	40
<b>2-3 times a week</b>	16
<b>4-6 times per week</b>	3
<b>Daily</b>	17
<b>Not at all</b>	25
<b>Once</b>	33
<b>Once per week</b>	23
<b>Unsure</b>	6

Table 77: African States - Thought about the UN Sustainable Development Goals in the last 30 days.

<b>In the last 30 days, how frequently have you thought about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	27
<b>2-3 times a week</b>	19
<b>4-6 times per week</b>	6
<b>Daily</b>	26
<b>Not at all</b>	28
<b>Once</b>	37
<b>Once per week</b>	15
<b>Unsure</b>	5

Table 78: African States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

<b>Question</b>	<b>-1</b>	<b>-2</b>	<b>-3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>[Harmful - Beneficial]</b>	1	1	3	5	13	31	107
<b>[Irrelevant - Relevant]</b>	1	3	5	5	13	32	103
<b>[Unimportant - Important]</b>	1	6	4	4	7	22	119
<b>[Unnecessary - Essential]</b>	3	4	4	6	11	18	115
<b>[Useless - Useful]</b>	3	3	7	9	8	26	105
<b>[Worthless - Valuable]</b>	0	3	4	4	12	28	110

Table 79: African States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

<b>Question</b>	<b>-1</b>	<b>-2</b>	<b>-3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>[Harmful - Beneficial]</b>	1	2	1	6	22	27	102

<b>[Irrelevant - Relevant]</b>	2	4	7	8	13	25	103
<b>[Unimportant - Important]</b>	2	0	2	5	14	27	112
<b>[Unnecessary - Essential]</b>	3	1	2	6	23	25	102
<b>[Useless - Useful]</b>	1	1	4	8	12	28	108
<b>[Worthless - Valuable]</b>	5	0	3	7	11	33	103

Table 80: African States - Detailed perspective on UN SDGs.

<b>Question</b>	<b>Agree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Somewhat Agree</b>	<b>Somewhat Disagree</b>	<b>Strongly Agree</b>	<b>Strongly Disagree</b>
<b>'I follow stories in the news about the UN SDGs.'</b>	56	13	34	22	8	23	2
<b>'The UN SDGs are a priority for me.'</b>	48	15	22	34	2	35	3
<b>'The UN SDGs are focused only on long-term financial development.'</b>	36	33	30	19	16	17	9
<b>'The UN SDGs represent legally binding international</b>	54	17	28	16	5	31	8

treaties to protect the environment.							
'The UN SDGs should be a priority for my professional field.'	51	8	22	19	1	55	6

### 5.8.1.2 CONTENT ANALYSIS DATA TABLES

*Table 81: African States - Steps taken to involve individuals / organisations with a diverse range of perspectives and expertise in planning research and innovation work.*

Label	Count	Percent
Non-specific, vague, platitude or virtue signalling response	18	23.1%
Engagement with non-academic stakeholders	27	34.6%
Engagement with non-academic stakeholders (general)	20	25.6%
Engagement with non-academic stakeholders (specific steps)	8	10.3%
Stakeholder type – industry / business	8	10.3%
Stakeholder type – civil society organisation (CSO)	3	3.8%
Stakeholder type – policy bodies / policymakers	10	12.8%
Stakeholder type – other non-academic stakeholder type	6	7.7%
Stakeholder type – no stakeholder types indicated (beyond non-academic)	8	10.3%
General dissemination/broadcasting of information about the research/innovation work	3	3.8%

<b>‘In-reach’ to other disciplines, researchers, academics, experts or students</b>	20	25.6%
<b>Steps for building collaboration/teams/consortia with no connection to diversity per se</b>	8	10.3%
<b>Meetings, workshops, focus groups and ‘consultations’</b>	28	35.9%
<b>Unclear / Uncertain</b>	1	1.3%

Table 82: African States - Steps taken to promote gender equality in research and innovation work.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	22	25%
<b>Gender equality in R&amp;I, within the R&amp;I environment</b>	66	75%
<b>Gender equality in R&amp;I, academic (general)</b>	27	30.7%
<b>Gender equality in R&amp;I, academic (specific steps)</b>	39	44.3%
<b>Supporting female researchers’ publications, co-authorship, academic citations</b>	2	2.3%
<b>Integrating gender equality in research participant selection</b>	9	10.2%
<b>Fostering gender equality in research/innovation teams / workforce</b>	12	13.6%
<b>Integrating gender as a substantive dimension/focus of R&amp;I content/practice</b>	4	4.5%
<b>Promotion/ mentorship of female researchers</b>	10	11.4%
<b>Promoting women in R&amp;I decision-making roles and senior positions</b>	8	9.1%
<b>Ensuring gender equality in process of recruitment and selection of R&amp;I staff</b>	11	12.5%
<b>Promoting gender equality through delivering or attending training</b>	2	2.3%
<b>Participation in or engagement with equality committees</b>	1	1.1%

<b>Compliance with rules, regulations and legal obligations</b>	5	5.7%
<b>Other gender equality promotion step taken</b>	21	23.9%

Table 83: African States - Steps taken to include ethnic minorities in research and innovation work.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	8	16.3%
<b>Racial/ethnic equality within the R&amp;I environment</b>	40	81.6%
<b>Racial/ethnic equality within the R&amp;I environment (general)</b>	24	49%
<b>Racial/ethnic equality within the R&amp;I environment (specific steps)</b>	16	32.7%
<b>Supporting racial/ethnic minority researchers' publications, co-authorship, academic citations</b>	1	2%
<b>Integrating racial/ethnic equality in research participant selection</b>	7	14.3%
<b>Fostering racial/ethnic equality in research/innovation teams / workforce</b>	6	12.2%
<b>Integrating race/ethnicity as a substantive dimension/focus of R&amp;I content/practice</b>	5	10.2%
<b>Promotion/ mentorship of ethnic minority researchers/innovators</b>	9	18.4%
<b>Ensuring racial/ethnic equality in process of recruitment and selection of R&amp;I staff</b>	2	4.1%
<b>Promoting racial/ethnic equality through delivering or attending training</b>	2	4.1%
<b>Compliance with rules, regulations and legal obligations</b>	3	6.1%
<b>Other racial/ethnic equality promotion step taken</b>	12	24.5%
<b>Downplaying, minimising and excusing ethnic diversity issues in R&amp;I</b>	1	2%

*Table 84: African States - Steps taken to ensure that ethical principles guide research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	27	29.3%
<b>Integrating Ethics in R&amp;I work</b>	65	70.7%
<b>Ethics in R&amp;I work (general)</b>	42	45.7%
<b>Ethics in R&amp;I work (specific steps)</b>	23	25%
<b>Integrating ethics through participatory methods</b>	2	2.2%
<b>Ensuring informed consent with participants</b>	13	14.1%
<b>Ensuring participant anonymisation or confidentiality</b>	11	12%
<b>Ensuring open access to research methods and outputs</b>	1	1.1%
<b>Ensuring that R&amp;I outputs are used to deliver positive societal impact</b>	1	1.1%
<b>Integrating research ethics as a substantive focus of respondent's R&amp;I content/practice</b>	2	2.2%
<b>Promoting research ethics through delivering or attending training</b>	9	9.8%
<b>Participation in or engagement with ethics committees</b>	15	16.3%
<b>Compliance with rules, regulations, and legal obligations</b>	15	16.3%
<b>Integrating ethics through respecting intellectual property rights and academic referencing</b>	3	3.3%
<b>Reporting of unethical ethical conduct</b>	1	1.1%
<b>Other research ethics step taken</b>	8	8.7%
<b>Unclear / Uncertain</b>	2	2.2%

*Table 85: African States - Steps taken to ensure research and innovation methods/processes are open and transparent.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	10	11.2%
<b>Pathways to open/transparent R&amp;I methods and processes</b>	46	51.7%
<b>Pathways to open/transparent R&amp;I methods and processes (general)</b>	22	24.7%
<b>Pathways to open/transparent R&amp;I methods and processes (specific steps)</b>	24	27%
<b>Documenting/reporting research and decision-making processes</b>	17	19.1%
<b>Disclosing research data, raw data, codes, and statistics</b>	6	6.7%
<b>Seeking upstream academic/researcher feedback on research ideas or plans</b>	4	4.5%
<b>Seeking upstream feedback on research ideas/plans from non-academics/nonresearchers</b>	13	14.6%
<b>Seeking approval for methods/processes in research applications</b>	8	9%
<b>Participation in or engagement with relevant committees</b>	2	2.2%
<b>Other step taken to ensure R&amp;I openness and transparency</b>	5	5.6%
<b>One-way dissemination with no reference to research methods/processes or transparency/openness per se</b>	38	42.7%
<b>Open access publication</b>	9	10.1%
<b>Unclear / Uncertain</b>	1	1.1%

*Table 86: African States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	9	9%
<b>Public accessibility of R&amp;I results</b>	59	59%
<b>Public accessibility of R&amp;I results (general)</b>	5	5%

<b>Public accessibility of R&amp;I results (specific steps)</b>	54	54%
<b>Institutional- or project-based/supported publishing of research findings (outside of scholarly publishing)</b>	7	7%
<b>Publishing/disseminating R&amp;I outputs using institutional open access repositories or external open access databases</b>	5	5%
<b>Personally publishing/disseminating R&amp;I outputs to the public outside of scholarly publishing</b>	13	13%
<b>Engaging with non-academic/public stakeholders through outreach activities after research is completed</b>	17	17%
<b>Promoting R&amp;I results in the media</b>	20	20%
<b>Open access scholarly publishing</b>	10	10%
<b>Efforts to facilitate public understanding of R&amp;I results</b>	2	2%
<b>Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research</b>	2	2%
<b>Other step taken to make R&amp;I results available to the public</b>	4	4%
<b>Sharing R&amp;I work within professional R&amp;I stakeholder environments</b>	52	52%
<b>Unclear / Uncertain</b>	3	3%

Table 87: African States - Steps taken to make the data from research and innovation activities freely available to the public.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	16	26.7%
<b>Confusing open access to research findings and open data</b>	31	51.7%
<b>Public availability of R&amp;I data</b>	11	18.3%
<b>Public availability of R&amp;I data (general)</b>	7	11.7%
<b>Public availability of R&amp;I data (specific steps)</b>	4	6.7%

<b>Publishing research data to institutional/project websites</b>	3	5%
<b>Personally publishing/distributing R&amp;I data</b>	1	1.7%
<b>Publishing data in public repositories</b>	3	5%
<b>Establishment or compliance with regulations on open data</b>	2	3.3%
<b>Other step taken to make research data available to the public</b>	4	6.7%
<b>Resisting/delimiting open data or supporting closed data</b>	3	5%

Table 88: African States - Steps taken to ensure research and innovation work addresses societal needs.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	7	7.4%
<b>Addressing societal needs in R&amp;I work</b>	89	94.7%
<b>Addressing societal needs in R&amp;I work (general)</b>	51	54.3%
<b>Addressing societal needs in R&amp;I work (specific steps)</b>	36	38.3%
<b>Participatory process: research topic/problem defined by societal needs</b>	16	17%
<b>Selection of research topic/problem defined by researchers' perceptions of societal needs</b>	35	37.2%
<b>Participatory process: research design/approach defined by societal needs</b>	2	2.1%
<b>Societal issues as a substantive dimension in R&amp;I content/focus</b>	13	13.8%
<b>Reflecting on/evaluating R&amp;I impact on societal needs</b>	3	3.2%
<b>Compliance with institutional/funding requirements</b>	1	1.1%
<b>Communicating R&amp;I work/activities to public/non-academic stakeholders</b>	7	7.4%
<b>Other step taken to address societal needs in R&amp;I work</b>	16	17%

<b>Unclear / Uncertain</b>	<b>1</b>	<b>1.1%</b>
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*Table 89: African States - Steps taken to ensure that the way work is done does not cause concerns for society.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	12	12.4%
<b>Addressing societal concerns about implementation of R&amp;I work</b>	80	82.5%
<b>Addressing societal concerns in R&amp;I work (general)</b>	43	44.3%
<b>Addressing societal concerns in R&amp;I work (specific steps)</b>	37	38.1%
<b>Seeking upstream feedback from non-R&amp;I stakeholders on R&amp;I ideas/plans</b>	15	15.5%
<b>Making the research directly responsive to societal needs or concerns</b>	2	2.1%
<b>Seeking upstream feedback from other R&amp;I stakeholders on R&amp;I ideas/plans</b>	11	11.3%
<b>Addressing societal concerns as substantive dimension of the R&amp;I work</b>	8	8.2%
<b>Compliance with rules, regulations, or legal obligations</b>	20	20.6%
<b>Mitigating or preventing societal concerns through delivering or attending training</b>	6	6.2%
<b>Participation in or engagement with relevant committees</b>	8	8.2%
<b>Ensuring integrity in R&amp;I processes involving human participants</b>	10	10.3%
<b>Preventing societal concerns resulting from R&amp;I work by following responsible safety and waste practices to avoid damage</b>	5	5.2%
<b>Other step taken to consider societal concerns in R&amp;I work</b>	11	11.3%
<b>Unclear / Uncertain</b>	<b>6</b>	<b>6.2%</b>

Table 90: African States - What comes to mind when you think of 'responsible research and innovation'?

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	37	31.6%
<b>Ideas, practices or policies associated with RRI</b>	79	67.5%
<b>Aligning research and innovation with societal benefits</b>	31	26.5%
<b>Integrating / anticipating public perspectives in research and innovation</b>	8	6.8%
<b>Ensuring societal acceptance of research and innovation</b>	1	0.9%
<b>Do no harm to people/society/participants with R&amp;I</b>	13	11.1%
<b>Protecting the environment, preventing negative impacts of research and innovation on the environment</b>	13	11.1%
<b>Empowering non-academic stakeholders to shape the direction of R&amp;I</b>	2	1.7%
<b>Open and honest science</b>	4	3.4%
<b>Enhancing research quality through appropriate methods</b>	3	2.6%
<b>Engaging / communicating with non-academic stakeholders or publics about research and innovation activities</b>	6	5.1%
<b>Ensuring ethical procedures and approvals are completed in R&amp;I work</b>	9	7.7%
<b>Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty</b>	9	7.7%
<b>Ensuring ethnic/racial diversity in research and innovation activities</b>	4	3.4%
<b>Ensuring research independence</b>	1	0.9%
<b>Ensuring norms/practices evincing research integrity and high professional standards</b>	6	5.1%
<b>Following formal/official research guidelines and regulations</b>	3	2.6%
<b>Ensuring gender equality within academic community</b>	1	0.9%

<b>Other association with RRI</b>	9	7.7%
<b>Unclear / Uncertain</b>	1	0.9%

Table 91: African States - What comes to mind when you think of the UN Sustainable Development Goals?.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	43	30.7%
<b>Defining sustainable development</b>	82	58.6%
<b>Integrating/balancing different aspects of sustainable development</b>	4	2.9%
<b>Educational aspects of sustainable development</b>	25	17.9%
<b>Economic aspects of sustainable development</b>	53	37.9%
<b>Integrating economic and environmental aspects of sustainable development</b>	5	3.6%
<b>Preserving natural resources</b>	14	10%
<b>Health-related aspects of sustainable development</b>	14	10%
<b>Diversity/inclusion aspects of sustainable development</b>	25	17.9%
<b>Addressing climate change</b>	14	10%
<b>Other aspects of sustainable development</b>	4	2.9%
<b>Governance dimensions of SDGs</b>	18	12.9%
<b>Achieving the SDGs</b>	2	1.4%
<b>Other implementation actions to achieve SDGs</b>	2	1.4%
<b>General Criticism of the UN SDGs</b>	4	2.9%
<b>Unclear / Uncertain</b>	1	0.7%

Table 92: African States - Number of valid responses by code.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Diverse Perspectives</b>	78	43.3%
<b>Gender Equality</b>	88	48.9%
<b>Ethics of Research</b>	48	26.7%
<b>Ethnic Minorities</b>	92	51.1%
<b>Research Transparency</b>	89	49.4%
<b>Public Accessibility of Research Findings</b>	100	55.6%
<b>Open Data</b>	60	33.3%
<b>Societal Needs Addressed in Research</b>	94	52.2%
<b>Societal Concerns</b>	97	53.9%
<b>Associations with RRI</b>	117	65%
<b>Associations with UN SDGs</b>	140	77.8%

## 5.8.2 DATA TABLES FOR EUROPEAN AND NORTH AMERICAN STATES

### 5.8.2.1 CLOSED-ENDED SURVEY QUESTION DATA TABLES

#### 5.8.2.1.1 Socio-Demographics

Table 93: European and North American States - Distribution of age.

In what year were you born?	Count
18-28	91
29-38	402
39-48	470
49-58	328
59-68	179
69+	67

Table 94: European and North American States - Distribution of gender.

Please indicate if you are...	Count
Female	893
Male	766
Other	3
Prefer not to say	40

Table 95: European and North American States - Currently studying at school, college or university.

Are you currently a student at school, college or university?	Count
No	1429
Prefer not to say	18
Unsure	10

<b>Yes</b>	<b>219</b>
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Table 96: European and North American States - Highest level of formal education completed.

<b>What is the highest level of formal education you have completed?</b>	<b>Count</b>
<b>Bachelor's (or equivalent)</b>	87
<b>Doctoral (or equivalent)</b>	1028
<b>Master's (or equivalent)</b>	494
<b>Other (please specify)</b>	49
<b>Prefer not to say</b>	14

Table 97: European and North American States - Distribution of degrees by subject area (multiple choice).

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Education</b>	127	5.7%
<b>Arts and humanities</b>	222	10%
<b>Social sciences, journalism and information</b>	408	18.4%
<b>Business, administration and law</b>	226	10.2%
<b>Natural sciences, mathematics and statistics</b>	552	24.8%
<b>Information and Communication Technologies (ICTs)</b>	104	4.7%
<b>Engineering, manufacturing and construction</b>	238	10.7%
<b>Agriculture, forestry, fisheries and veterinary</b>	66	3%
<b>Health and welfare</b>	161	7.2%
<b>Services</b>	7	0.3%
<b>Other</b>	111	5%

Table 98: European and North American States - Years of experience as professional / since completing PhD (log scale).

Question	1-10	11-20	21-30	31-40	41-50	51-60	61-70
<b>Professional</b>	317	483	326	172	48	10	
<b>Since completing PhD</b>	409	281	143	55	14	5	1

Table 99: European and North American States - Fields or professions in which respondents work.

In which field do you work?	Count
<b>Agricultural sciences</b>	50
<b>Engineering and technology</b>	221
<b>Humanities</b>	94
<b>Medical and health sciences</b>	187
<b>Natural sciences, mathematics and statistics</b>	372
<b>Other (please specify)</b>	274
<b>Prefer not to say</b>	18
<b>Social sciences</b>	416

Table 100: European and North American States - Sub-fields of natural sciences.

Which sub-field of natural sciences best encompasses the type of research and innovation activities you are involved in?	Count
<b>Biological sciences</b>	128
<b>Chemical sciences</b>	50
<b>Computer and information sciences</b>	32
<b>Earth and related environmental sciences</b>	66
<b>Mathematics</b>	12

<b>Other</b>	17
<b>Physical sciences</b>	73
<b>Prefer not to say</b>	1

Table 101: European and North American States - Sub-fields of medical and health sciences.

<b>Which sub-field of medical and health sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Basic medicine</b>	17
<b>Clinical medicine</b>	40
<b>Health sciences</b>	69
<b>Medical biotechnology</b>	15
<b>Other (please specify)</b>	43
<b>Prefer not to say</b>	2

Table 102: European and North American States - Sub-fields of engineering and technology.

<b>Which sub-field of engineering and technology best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Chemical Engineering</b>	17
<b>Civil engineering</b>	15
<b>Electrical/electronic/information engineering</b>	75
<b>Environmental biotechnology</b>	3
<b>Environmental engineering</b>	22
<b>Industrial biotechnology</b>	3
<b>Materials engineering</b>	16
<b>Mechanical engineering</b>	26

<b>Medical engineering</b>	4
<b>Nano-technology</b>	3
<b>Other</b>	37
<b>Prefer not to say</b>	5

Table 103: European and North American States - Sub-fields of agricultural sciences.

<b>Which sub-field of agricultural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Agricultural biotechnology</b>	5
<b>Agriculture, forestry, and fisheries</b>	23
<b>Animal and dairy science</b>	5
<b>Other</b>	14
<b>Veterinary science</b>	4

Table 104: European and North American States - Sub fields of social sciences.

<b>Which sub-field of social sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Economics and business</b>	121
<b>Educational sciences</b>	35
<b>Law</b>	20
<b>Media and communication</b>	22
<b>Other</b>	65
<b>Political science</b>	41
<b>Prefer not to say</b>	3
<b>Psychology</b>	29

<b>Social and economic geography</b>	25
<b>Sociology</b>	60

Table 105: European and North American States - Sub-fields of humanities.

<b>Which sub-field of humanities best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Arts (history/performing arts, music)</b>	18
<b>History and archaeology</b>	15
<b>Languages and literature</b>	18
<b>Other</b>	20
<b>Philosophy, ethics and religion</b>	26
<b>Prefer not to say</b>	1

Table 106: European and North American States - Sectors in which participants work[ed] in.

<b>In what type of organisation do you work (or have you most recently worked)?</b>	<b>Count</b>
<b>Civil society/non-governmental organisation</b>	59
<b>Industry (large)</b>	33
<b>International governmental organisation</b>	21
<b>National governmental organisation</b>	168
<b>Other (please specify)</b>	86
<b>Policy</b>	21
<b>Prefer not to say</b>	15
<b>Small and medium-size enterprise [&lt; 250 employees]</b>	72
<b>University or similar research performing organisation</b>	1146

Table 107: European and North American States - Participants' employment status.

<b>What is your current employment status?</b>	<b>Count</b>
<b>Employed full-time</b>	1283
<b>Employed part-time</b>	198
<b>Other (please specify)</b>	34
<b>Prefer not to say</b>	11
<b>Retired</b>	22
<b>Self-employed</b>	37
<b>Student only</b>	27
<b>Unemployed (looking for work)</b>	6
<b>Unemployed (not looking for work)</b>	3

Table 108: European and North American States - Hours spent on activities in the last 7 days (log scale).

<b>Question</b>	<b>1-10</b>	<b>11-20</b>	<b>21-30</b>	<b>31-40</b>	<b>41-50</b>	<b>51-60</b>	<b>61-70</b>	<b>71+</b>
<b>Administration unrelated to research/innovation</b>	819	144	45	29	6	2	2	4
<b>Management or supervision of staff/students</b>	799	131	34	17	8	3		2
<b>Public engagement (all types)</b>	688	69	24	16	2			4
<b>Research or innovation work</b>	524	317	210	181	32	18	2	12
<b>Seeking or managing research/innovation funding</b>	715	142	54	44	7	4	1	9
<b>Teaching or capacity building (including training)</b>	717	154	41	10	4	1	1	3

Table 109: European and North American States - Years that respondents worked in their current role / as researcher or innovator (log scale).

Question	1-10	11-20	21-30	31-40	41-50	51-60	61-70
...as researcher or innovator	620	378	209	87	27	7	1
...in their current role	946	240	84	31	9	4	

Table 110: European and North American States - Domains relating to participants' recent work.

Label	Count	Percent
Digital (ICT)	431	23.8%
Energy	219	12.1%
Bio-economy	203	11.2%
Waste Management	130	7.2%
None of these	825	45.6%

#### 5.8.2.1.2 RRI Dimension – Diverse and Inclusive

Table 111: European and North American States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work.'

	Count
Agree	467
Disagree	23
Neutral	94
Somewhat Agree	180
Somewhat Disagree	24
Strongly Agree	562
Strongly Disagree	19

*Table 112: European and North American States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.*

<b>In the last 12 months, have you involved individuals/organisations with a diverse range of perspectives and expertise when planning your research and innovation work?</b>	<b>Count</b>
<b>No</b>	192
<b>Not applicable / No opinion</b>	170
<b>Prefer not to say</b>	36
<b>Unsure</b>	133
<b>Yes</b>	895

*Table 113: European and North American States - Sectors participants involved in research and innovation practice.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	764	22.1%
<b>Primary / Secondary school education</b>	123	3.6%
<b>Government agency</b>	442	12.8%
<b>Industry / Commercial</b>	394	11.4%
<b>Non-profit organisation</b>	396	11.5%
<b>Research organisation</b>	476	13.8%
<b>Research funding organisation</b>	381	11%
<b>Journalism / Media</b>	145	4.2%
<b>General public</b>	278	8.1%
<b>Other</b>	53	1.5%

*Table 114: European and North American States - Sectors participants involved in research and innovation dissemination.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	694	20.8%
<b>Primary / Secondary school education</b>	151	4.5%
<b>Government agency</b>	382	11.5%
<b>Industry / Commercial</b>	302	9.1%
<b>Non-profit organisation</b>	351	10.5%
<b>Research organisation</b>	373	11.2%
<b>Research funding organisation</b>	292	8.8%
<b>Journalism / Media</b>	373	11.2%
<b>General public</b>	383	11.5%
<b>Other</b>	32	1%

*Table 115: European and North American States - 'It is important to promote gender equality in my research and innovation work.'*

	<b>Count</b>
<b>Agree</b>	331
<b>Disagree</b>	29
<b>Neutral</b>	199
<b>Somewhat Agree</b>	93
<b>Somewhat Disagree</b>	19
<b>Strongly Agree</b>	624
<b>Strongly Disagree</b>	29

*Table 116: European and North American States - Promoted gender equality in research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken steps to promote gender equality in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	323
<b>Not applicable / No opinion</b>	277
<b>Prefer not to say</b>	48
<b>Unsure</b>	165
<b>Yes</b>	591

*Table 117: European and North American States - 'It is important to include ethnic minorities in my research and innovation work.'*

	<b>Count</b>
<b>Agree</b>	326
<b>Disagree</b>	40
<b>Neutral</b>	283
<b>Somewhat Agree</b>	137
<b>Somewhat Disagree</b>	23
<b>Strongly Agree</b>	442
<b>Strongly Disagree</b>	22

*Table 118: European and North American States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken any steps to include ethnic minorities in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	485

<b>Not applicable / No opinion</b>	367
<b>Prefer not to say</b>	37
<b>Unsure</b>	167
<b>Yes</b>	337

*Table 119: European and North American States - 'Ethical principles guide my research and innovation work'.*

	<b>Count</b>
<b>Agree</b>	371
<b>Disagree</b>	17
<b>Neutral</b>	67
<b>Somewhat Agree</b>	72
<b>Somewhat Disagree</b>	6
<b>Strongly Agree</b>	726
<b>Strongly Disagree</b>	7

*Table 120: European and North American States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure that ethical principles guide your research and innovation work?</b>	<b>Count</b>
<b>No</b>	142
<b>Not applicable / No opinion</b>	243
<b>Prefer not to say</b>	43
<b>Unsure</b>	142
<b>Yes</b>	772

Table 121: European and North American States - Statements related to working in research and innovation.

Question	Agree	Disagree	Neutral	Somewhat Agree	Somewhat Disagree	Strongly Agree	Strongly Disagree
'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals.'	130	208	103	180	184	90	123
'Ethnic differences are irrelevant in my work.'	192	140	125	79	94	193	170
'Gender is irrelevant in my work.'	155	167	116	72	97	188	217
'I feel a professional responsibility to communicate findings from my research or innovation work to public audiences.'	375	10	62	137	15	403	8
'It is important to maintain an	235	70	197	200	85	187	58

<b>equal number of men and women in research and innovation teams.'</b>							
<b>'It is important to take ethnic diversity into account when developing my research and innovation work.'</b>	233	49	221	155	41	229	42
<b>'It is important to take gender into account when developing my research and innovation work.'</b>	227	73	167	152	51	250	67
<b>'My organisation encourages me to communicate findings from my research or innovation work to public audiences.'</b>	332	26	84	153	51	336	20
<b>'My primary organisation where I work discourages me from</b>	41	306	67	36	65	34	373

<b>communicating the results of my research or innovation work to public audiences.'</b>							
<b>'The best time to talk to public audiences about my research and innovation work is at the very end of the process after all the work has been completed.'</b>	119	260	81	146	210	52	143

#### 5.8.2.1.3 RRI Dimension – Anticipative and Reflective

Table 122: European and North American States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society.'

	<b>Count</b>
<b>Agree</b>	387
<b>Disagree</b>	40
<b>Neutral</b>	114
<b>Somewhat Agree</b>	132
<b>Somewhat Disagree</b>	51
<b>Strongly Agree</b>	555
<b>Strongly Disagree</b>	28

*Table 123: European and North American States - Ensured work does not cause concerns for society in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure the way you do your work does not cause concerns for society?</b>	<b>Count</b>
<b>No</b>	255
<b>Not applicable / No opinion</b>	357
<b>Prefer not to say</b>	44
<b>Unsure</b>	231
<b>Yes</b>	520

#### 5.8.2.1.4 RRI Dimension – Open and Transparent

*Table 124: European and North American States - 'It is important to make my research and innovation methods/processes open and transparent.'*

	<b>Count</b>
<b>Agree</b>	429
<b>Disagree</b>	7
<b>Neutral</b>	48
<b>Somewhat Agree</b>	103
<b>Somewhat Disagree</b>	23
<b>Strongly Agree</b>	747
<b>Strongly Disagree</b>	7

*Table 125: European and North American States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure your research and innovation methods/processes are open and transparent?</b>	<b>Count</b>
<b>No</b>	96

<b>Not applicable / No opinion</b>	193
<b>Prefer not to say</b>	32
<b>Unsure</b>	175
<b>Yes</b>	921

*Table 126: European and North American States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.*

	<b>Count</b>
<b>Agree</b>	401
<b>Disagree</b>	15
<b>Neutral</b>	42
<b>Somewhat Agree</b>	141
<b>Somewhat Disagree</b>	20
<b>Strongly Agree</b>	721
<b>Strongly Disagree</b>	10

*Table 127: European and North American States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.*

<b>In the last 12 months, have you taken steps to make the results of your research and innovation work accessible to as wide a public as possible?</b>	<b>Count</b>
<b>No</b>	143
<b>Not applicable / No opinion</b>	157
<b>Prefer not to say</b>	31
<b>Unsure</b>	118
<b>Yes</b>	948

*Table 128: European and North American States - 'It is important to make data from my research and innovation activities freely available to the public'.*

	<b>Count</b>
<b>Agree</b>	361
<b>Disagree</b>	32
<b>Neutral</b>	110
<b>Somewhat Agree</b>	233
<b>Somewhat Disagree</b>	58
<b>Strongly Agree</b>	488
<b>Strongly Disagree</b>	28

*Table 129: European and North American States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.*

<b>In the last 12 months, have you taken steps to make data from your research and innovation activities freely available to the public?</b>	<b>Count</b>
<b>No</b>	337
<b>Not applicable / No opinion</b>	229
<b>Prefer not to say</b>	39
<b>Unsure</b>	161
<b>Yes</b>	615

*Table 130: European and North American States - 'Research and innovation should address societal needs.'.*

	<b>Count</b>
<b>Agree</b>	404
<b>Disagree</b>	27

<b>Neutral</b>	68
<b>Somewhat Agree</b>	225
<b>Somewhat Disagree</b>	34
<b>Strongly Agree</b>	611
<b>Strongly Disagree</b>	22

### 5.8.2.1.5 RRI Dimension – Responsive and Adaptive to Change

*Table 131: European and North American States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure your research and innovation work addresses societal needs?</b>	<b>Count</b>
<b>No</b>	134
<b>Not applicable / No opinion</b>	158
<b>Prefer not to say</b>	33
<b>Unsure</b>	212
<b>Yes</b>	875

*Table 132: European and North American States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.*

<b>To what extent is your research/innovation work guided by a regulatory framework that covers all relevant aspects of social responsibility?</b>	<b>Count</b>
<b>Always</b>	131
<b>Frequently</b>	120
<b>Never</b>	65
<b>Not applicable / No Opinion</b>	205
<b>Occasionally</b>	87

<b>Rarely</b>	162
<b>Sometimes</b>	166
<b>Usually</b>	158

#### 5.8.2.1.6 Stakeholder Categories

*Table 133: European and North American States - Hours interacting with research performing organisations / academics / researchers in the last 7 days.*

<b>Research Performing Organisations / Academics / Researchers</b>	<b>Count</b>
<b>1-10</b>	588
<b>11-20</b>	252
<b>21-30</b>	125
<b>31-40</b>	182
<b>41-50</b>	24
<b>51-60</b>	6
<b>71+</b>	10

*Table 134: European and North American States - Hours interacting with research funding organisations in the last 7 days.*

<b>Research Funding Organisations</b>	<b>Count</b>
<b>1-10</b>	582
<b>11-20</b>	33
<b>21-30</b>	8
<b>31-40</b>	5
<b>41-50</b>	1
<b>51-60</b>	1

*Table 135: European and North American States - Hours interacting with industry / small and medium sized enterprise in the last 7 days.*

<b>Industry / small and medium sized enterprise</b>	<b>Count</b>
<b>1-10</b>	482
<b>11-20</b>	56
<b>21-30</b>	19
<b>31-40</b>	10
<b>41-50</b>	2
<b>61-70</b>	1

*Table 136: European and North American States - Hours interacting with civil society / citizens in the last 7 days.*

<b>Civil society / citizens</b>	<b>Count</b>
<b>1-10</b>	519
<b>11-20</b>	42
<b>21-30</b>	12
<b>31-40</b>	9
<b>41-50</b>	5

*Table 137: European and North American States - Hours interacting with policy makers in the last 7 days.*

<b>Policy makers</b>	<b>Count</b>
<b>1-10</b>	443
<b>11-20</b>	19
<b>21-30</b>	8

<b>31-40</b>	4
<b>51-60</b>	1
<b>71+</b>	1

*Table 138: European and North American States - Hours interacting with NGOs / international organisations in the last 7 days.*

<b>NGOs / international organisations</b>	<b>Count</b>
<b>1-10</b>	459
<b>11-20</b>	15
<b>21-30</b>	7
<b>31-40</b>	2
<b>41-50</b>	1
<b>51-60</b>	2

### 5.8.2.1.7 UN Sustainable Development Goals

*Table 139: European and North American States - Participants' familiarity with the UN SDGs.*

	<b>Count</b>
<b>Extremely Familiar</b>	215
<b>Moderately Familiar</b>	368
<b>Not at all Familiar</b>	337
<b>Slightly Familiar</b>	158
<b>Somewhat Familiar</b>	229

*Table 140: European and North American States - Heard or read about the UN Sustainable Development Goals in the last 30 days.*

<b>In the last 30 days, how much have you heard or read about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	216
<b>2-3 times a week</b>	81
<b>4-6 times per week</b>	52
<b>Daily</b>	61
<b>Not at all</b>	233
<b>Once</b>	161
<b>Once per week</b>	121
<b>Unsure</b>	42

*Table 141: European and North American States - Thought about the UN Sustainable Development Goals in the last 30 days.*

<b>In the last 30 days, how frequently have you thought about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	215
<b>2-3 times a week</b>	95
<b>4-6 times per week</b>	53
<b>Daily</b>	84
<b>Not at all</b>	226
<b>Once</b>	137
<b>Once per week</b>	107
<b>Unsure</b>	51

*Table 142: European and North American States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.*

Question	-1	-2	-3	0	1	2	3
[Harmful - Beneficial]	22	15	8	73	111	257	476
[Irrelevant - Relevant]	22	19	15	60	98	243	500
[Unimportant - Important]	16	16	15	48	84	220	564
[Unnecessary - Essential]	18	11	7	86	145	282	410
[Useless - Useful]	22	11	12	63	147	292	414
[Worthless - Valuable]	15	15	13	71	112	260	476

Table 143: European and North American States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

Question	-1	-2	-3	0	1	2	3
[Harmful - Beneficial]	15	12	4	225	183	224	293
[Irrelevant - Relevant]	26	33	29	141	164	235	330
[Unimportant - Important]	22	26	25	161	171	238	313
[Unnecessary - Essential]	33	31	26	230	218	196	221
[Useless - Useful]	26	26	18	188	173	230	293
[Worthless - Valuable]	33	25	18	183	179	231	287

Table 144: European and North American States - Detailed perspective on UN SDGs.

Question	Agree	Disagree	Neutral	Somewhat Agree	Somewhat Disagree	Strongly Agree	Strongly Disagree
'I follow stories in the news about	177	113	159	234	72	87	72

the UN SDGs.'							
'The UN SDGs are a priority for me.'	210	50	220	227	42	134	28
'The UN SDGs are focused only on long-term financial development. '	77	218	145	99	142	29	145
'The UN SDGs represent legally binding international treaties to protect the environment. '	162	106	145	161	93	77	101
'The UN SDGs should be a priority for my professional field.'	258	22	151	223	40	197	21

### 5.8.2.2 CONTENT ANALYSIS DATA TABLES

Table 145: European and North American States - Steps taken to involve individuals / organisations with a diverse range of perspectives and expertise in planning research and innovation work.

Label	Count	Percent
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<b>Non-specific, vague, platitude or virtue signalling response</b>	144	21.6%
<b>Engagement with non-academic stakeholders</b>	145	21.7%
<b>Engagement with non-academic stakeholders (general)</b>	120	18%
<b>Engagement with non-academic stakeholders (specific steps)</b>	24	3.6%
<b>Stakeholder type – industry / business</b>	45	6.7%
<b>Stakeholder type – civil society organisation (CSO)</b>	31	4.6%
<b>Stakeholder type – policy bodies / policymakers</b>	31	4.6%
<b>Stakeholder type – other non-academic stakeholder type</b>	38	5.7%
<b>Stakeholder type – no stakeholder types indicated (beyond non-academic)</b>	45	6.7%
<b>General dissemination/broadcasting of information about the research/innovation work</b>	45	6.7%
<b>‘In-reach’ to other disciplines, researchers, academics, experts or students</b>	245	36.7%
<b>Steps for building collaboration/teams/consortia with no connection to diversity per se</b>	77	11.5%
<b>Meetings, workshops, focus groups and ‘consultations’</b>	168	25.2%
<b>Unclear / Uncertain</b>	15	2.2%

*Table 146: European and North American States - Steps taken to promote gender equality in research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	73	15.8%
<b>Gender equality in R&amp;I, within the R&amp;I environment</b>	383	82.9%
<b>Gender equality in R&amp;I, academic (general)</b>	127	27.5%
<b>Gender equality in R&amp;I, academic (specific steps)</b>	255	55.2%

<b>Supporting female researchers' publications, co-authorship, academic citations</b>	11	2.4%
<b>Integrating gender equality in research participant selection</b>	20	4.3%
<b>Fostering gender equality in research/innovation teams / workforce</b>	110	23.8%
<b>Integrating gender as a substantive dimension/focus of R&amp;I content/practice</b>	70	15.2%
<b>Promotion/ mentorship of female researchers</b>	42	9.1%
<b>Promoting women in R&amp;I decision-making roles and senior positions</b>	20	4.3%
<b>Ensuring gender equality in process of recruitment and selection of R&amp;I staff</b>	49	10.6%
<b>Promoting gender equality through delivering or attending training</b>	34	7.4%
<b>Participation in or engagement with equality committees</b>	14	3%
<b>Compliance with rules, regulations and legal obligations</b>	12	2.6%
<b>Other gender equality promotion step taken</b>	137	29.7%
<b>Unclear / Uncertain</b>	8	1.7%

*Table 147: European and North American States - Steps taken to include ethnic minorities in research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	51	19%
<b>Racial/ethnic equality within the R&amp;I environment</b>	206	76.9%
<b>Racial/ethnic equality within the R&amp;I environment (general)</b>	116	43.3%
<b>Racial/ethnic equality within the R&amp;I environment (specific steps)</b>	92	34.3%
<b>Supporting racial/ethnic minority researchers' publications, co-authorship, academic citations</b>	7	2.6%

<b>Integrating racial/ethnic equality in research participant selection</b>	36	13.4%
<b>Fostering racial/ethnic equality in research/innovation teams / workforce</b>	46	17.2%
<b>Integrating race/ethnicity as a substantive dimension/focus of R&amp;I content/practice</b>	41	15.3%
<b>Promotion/ mentorship of ethnic minority researchers/innovators</b>	28	10.4%
<b>Promoting ethnic minorities in R&amp;I decision-making roles and senior positions</b>	6	2.2%
<b>Ensuring racial/ethnic equality in process of recruitment and selection of R&amp;I staff</b>	36	13.4%
<b>Promoting racial/ethnic equality through delivering or attending training</b>	7	2.6%
<b>Participation in or engagement with relevant equality committees</b>	4	1.5%
<b>Compliance with rules, regulations and legal obligations</b>	2	0.7%
<b>Other racial/ethnic equality promotion step taken</b>	35	13.1%
<b>Downplaying, minimising and excusing ethnic diversity issues in R&amp;I</b>	18	6.7%
<b>Unclear / Uncertain</b>	2	0.7%

*Table 148: European and North American States - Steps taken to ensure that ethical principles guide research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	124	22.3%
<b>Integrating Ethics in R&amp;I work</b>	426	76.8%
<b>Ethics in R&amp;I work (general)</b>	298	53.7%
<b>Ethics in R&amp;I work (specific steps)</b>	130	23.4%
<b>Integrating ethics through participatory methods</b>	8	1.4%

<b>Integrating ethics through shared ownership of the research/research outputs</b>	4	0.7%
<b>Ensuring informed consent with participants</b>	23	4.1%
<b>Ensuring participant anonymisation or confidentiality</b>	26	4.7%
<b>Ensuring open access to research methods and outputs</b>	15	2.7%
<b>Ensuring that R&amp;I outputs are used to deliver positive societal impact</b>	7	1.3%
<b>Integrating research ethics as a substantive focus of respondent's R&amp;I content/practice</b>	25	4.5%
<b>Promoting research ethics through delivering or attending training</b>	53	9.5%
<b>Participation in or engagement with ethics committees</b>	156	28.1%
<b>Compliance with rules, regulations, and legal obligations</b>	128	23.1%
<b>Integrating ethics through respecting intellectual property rights and academic referencing</b>	25	4.5%
<b>Reporting of unethical ethical conduct</b>	5	0.9%
<b>Other research ethics step taken</b>	66	11.9%
<b>Unclear / Uncertain</b>	4	0.7%

*Table 149: European and North American States - Steps taken to ensure research and innovation methods/processes are open and transparent.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	72	10%
<b>Pathways to open/transparent R&amp;I methods and processes</b>	389	53.9%
<b>Pathways to open/transparent R&amp;I methods and processes (general)</b>	145	20.1%
<b>Pathways to open/transparent R&amp;I methods and processes (specific steps)</b>	252	34.9%

<b>Documenting/reporting research and decision-making processes</b>	197	27.3%
<b>Disclosing research data, raw data, codes, and statistics</b>	109	15.1%
<b>Seeking upstream academic/researcher feedback on research ideas or plans</b>	58	8%
<b>Seeking upstream feedback on research ideas/plans from non-academics/nonresearchers</b>	29	4%
<b>Seeking approval for methods/processes in research applications</b>	27	3.7%
<b>Participation in or engagement with relevant committees</b>	13	1.8%
<b>Other step taken to ensure R&amp;I openness and transparency</b>	54	7.5%
<b>One-way dissemination with no reference to research methods/processes or transparency/openness per se</b>	375	51.9%
<b>Open access publication</b>	154	21.3%
<b>Unclear / Uncertain</b>	5	0.7%

*Table 150: European and North American States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	56	6.9%
<b>Public accessibility of R&amp;I results</b>	583	72.1%
<b>Public accessibility of R&amp;I results (general)</b>	34	4.2%
<b>Public accessibility of R&amp;I results (specific steps)</b>	558	69%
<b>Institutional- or project-based/supported publishing of research findings (outside of scholarly publishing)</b>	50	6.2%
<b>Publishing/disseminating R&amp;I outputs using institutional open access repositories or external open access databases</b>	62	7.7%
<b>Personally publishing/disseminating R&amp;I outputs to the public outside of scholarly publishing</b>	151	18.7%

<b>Engaging with non-academic/public stakeholders through outreach activities after research is completed</b>	163	20.1%
<b>Promoting R&amp;I results in the media</b>	125	15.5%
<b>Open access scholarly publishing</b>	177	21.9%
<b>Efforts to facilitate public understanding of R&amp;I results</b>	49	6.1%
<b>Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research</b>	15	1.9%
<b>Other step taken to make R&amp;I results available to the public</b>	29	3.6%
<b>Sharing R&amp;I work within professional R&amp;I stakeholder environments</b>	307	37.9%
<b>Unclear / Uncertain</b>	17	2.1%

*Table 151: European and North American States - Steps taken to make the data from research and innovation activities freely available to the public.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	85	18%
<b>Confusing open access to research findings and open data</b>	274	58.1%
<b>Public availability of R&amp;I data</b>	100	21.2%
<b>Public availability of R&amp;I data (general)</b>	52	11%
<b>Public availability of R&amp;I data (specific steps)</b>	47	10%
<b>Appending research data to scientific publications</b>	5	1.1%
<b>Publishing research data to institutional/project websites</b>	9	1.9%
<b>Personally publishing/distributing R&amp;I data</b>	7	1.5%
<b>Publishing data in public repositories</b>	44	9.3%
<b>Promoting open data internally through delivering or attending training</b>	1	0.2%

<b>Establishment or compliance with regulations on open data</b>	10	2.1%
<b>Other step taken to make research data available to the public</b>	33	7%
<b>Resisting/delimiting open data or supporting closed data</b>	33	7%

*Table 152: European and North American States - Steps taken to ensure research and innovation work addresses societal needs.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	67	10.1%
<b>Addressing societal needs in R&amp;I work</b>	595	89.7%
<b>Addressing societal needs in R&amp;I work (general)</b>	333	50.2%
<b>Addressing societal needs in R&amp;I work (specific steps)</b>	266	40.1%
<b>Participatory process: research topic/problem defined by societal needs</b>	52	7.8%
<b>Selection of research topic/problem defined by researchers' perceptions of societal needs</b>	287	43.3%
<b>Participatory process: research design/approach defined by societal needs</b>	35	5.3%
<b>Societal issues as a substantive dimension in R&amp;I content/focus</b>	112	16.9%
<b>Reflecting on/evaluating R&amp;I impact on societal needs</b>	24	3.6%
<b>Compliance with institutional/funding requirements</b>	16	2.4%
<b>Communicating R&amp;I work/activities to public/non-academic stakeholders</b>	61	9.2%
<b>Other step taken to address societal needs in R&amp;I work</b>	97	14.6%
<b>Unclear / Uncertain</b>	4	0.6%

*Table 153: European and North American States - Steps taken to ensure that the way work is done does not cause concerns for society.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	38	9%
<b>Addressing societal concerns about implementation of R&amp;I work</b>	351	83.6%
<b>Addressing societal concerns in R&amp;I work (general)</b>	180	42.9%
<b>Addressing societal concerns in R&amp;I work (specific steps)</b>	171	40.7%
<b>Seeking upstream feedback from non-R&amp;I stakeholders on R&amp;I ideas/plans</b>	39	9.3%
<b>Making the research directly responsive to societal needs or concerns</b>	18	4.3%
<b>Seeking upstream feedback from other R&amp;I stakeholders on R&amp;I ideas/plans</b>	31	7.4%
<b>Addressing societal concerns as substantive dimension of the R&amp;I work</b>	36	8.6%
<b>Compliance with rules, regulations, or legal obligations</b>	89	21.2%
<b>Mitigating or preventing societal concerns through delivering or attending training</b>	15	3.6%
<b>Participation in or engagement with relevant committees</b>	57	13.6%
<b>Ensuring integrity in R&amp;I processes involving human participants</b>	44	10.5%
<b>Preventing societal concerns resulting from R&amp;I work by following responsible safety and waste practices to avoid damage</b>	36	8.6%
<b>Ensuring positive outcomes for society, without explicitly mentioning the prevention of societal concerns</b>	8	1.9%
<b>Other step taken to consider societal concerns in R&amp;I work</b>	83	19.8%
<b>Unclear / Uncertain</b>	31	7.4%

*Table 154: European and North American States - What comes to mind when you think of 'responsible research and innovation'?*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	248	32.8%
<b>Ideas, practices or policies associated with RRI</b>	460	60.9%
<b>Aligning research and innovation with societal benefits</b>	178	23.6%
<b>Integrating / anticipating public perspectives in research and innovation</b>	40	5.3%
<b>Ensuring societal acceptance of research and innovation</b>	3	0.4%
<b>Do no harm to people/society/participants with R&amp;I</b>	109	14.4%
<b>Protecting the environment, preventing negative impacts of research and innovation on the environment</b>	69	9.1%
<b>Orientating research and innovation towards generating improved technologies/outputs</b>	6	0.8%
<b>Empowering non-academic stakeholders to shape the direction of R&amp;I</b>	22	2.9%
<b>Open and honest science</b>	42	5.6%
<b>Enhancing research quality through appropriate methods</b>	12	1.6%
<b>Engaging / communicating with non-academic stakeholders or publics about research and innovation activities</b>	29	3.8%
<b>Ensuring ethical procedures and approvals are completed in R&amp;I work</b>	66	8.7%
<b>Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty</b>	53	7%
<b>Ensuring ethnic/racial diversity in research and innovation activities</b>	16	2.1%
<b>Ensuring gender equality in research and innovation activities</b>	16	2.1%
<b>Ensuring research independence</b>	11	1.5%
<b>Ensuring norms/practices evincing research integrity and high professional standards</b>	54	7.2%

<b>Following formal/official research guidelines and regulations</b>	21	2.8%
<b>Sharing research and innovation results and data within the academic community</b>	25	3.3%
<b>Ensuring ethnic diversity within the academic community or research teams</b>	5	0.7%
<b>Ensuring gender equality within academic community</b>	5	0.7%
<b>Associating RRI with certain research and innovation areas/fields</b>	9	1.2%
<b>Other association with RRI</b>	76	10.1%
<b>Associating RRI with the EU and Horizon 2020</b>	20	2.6%
<b>Criticism related to RRI</b>	30	4%
<b>Unclear / Uncertain</b>	3	0.4%

*Table 155: European and North American States - What comes to mind when you think of the UN Sustainable Development Goals?.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	221	30.7%
<b>Defining sustainable development</b>	343	47.6%
<b>Integrating/balancing different aspects of sustainable development</b>	24	3.3%
<b>Educational aspects of sustainable development</b>	62	8.6%
<b>Economic aspects of sustainable development</b>	152	21.1%
<b>Integrating economic and environmental aspects of sustainable development</b>	67	9.3%
<b>Preserving natural resources</b>	102	14.2%
<b>Health-related aspects of sustainable development</b>	57	7.9%
<b>Diversity/inclusion aspects of sustainable development</b>	128	17.8%

<b>Addressing climate change</b>	88	12.2%
<b>Other aspects of sustainable development</b>	34	4.7%
<b>Governance dimensions of SDGs</b>	98	13.6%
<b>Achieving the SDGs</b>	18	2.5%
<b>Contribution of technological innovation to sustainable development</b>	3	0.4%
<b>Other implementation actions to achieve SDGs</b>	15	2.1%
<b>Integrating SDGs within formal education</b>	5	0.7%
<b>General Criticism of the UN SDGs</b>	89	12.4%
<b>Unclear / Uncertain</b>	7	1%

Table 156: European and North American States - Number of valid responses by code.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Diverse Perspectives</b>	667	54.6%
<b>Gender Equality</b>	454	37.2%
<b>Ethics of Research</b>	267	21.9%
<b>Ethnic Minorities</b>	554	45.4%
<b>Research Transparency</b>	723	59.2%
<b>Public Accessibility of Research Findings</b>	811	66.4%
<b>Open Data</b>	469	38.4%
<b>Societal Needs Addressed in Research</b>	655	53.6%
<b>Societal Concerns</b>	413	33.8%
<b>Associations with RRI</b>	757	62%
<b>Associations with UN SDGs</b>	727	59.5%



## 5.8.3 DATA TABLES FOR ARAB STATES

### 5.8.3.1 CLOSED-ENDED SURVEY QUESTION DATA TABLES

#### 5.8.3.1.1 Socio-Demographics

Table 157: Arab States - Distribution of age.

In what year were you born?	Count
18-28	6
29-38	39
39-48	84
49-58	39
59-68	14
69+	4

Table 158: Arab States - Distribution of gender.

Please indicate if you are...	Count
Female	88
Male	116

Table 159: Arab States - Currently studying at school, college or university.

Are you currently a student at school, college or university?	Count
No	169
Prefer not to say	2
Unsure	1
Yes	25

Table 160: Arab States - Highest level of formal education completed.

<b>What is the highest level of formal education you have completed?</b>	<b>Count</b>
<b>Bachelor's (or equivalent)</b>	29
<b>Doctoral (or equivalent)</b>	119
<b>Master's (or equivalent)</b>	48
<b>Other (please specify)</b>	4

*Table 161: Arab States - Distribution of degrees by subject area (multiple choice).*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Education</b>	7	2.9%
<b>Arts and humanities</b>	3	1.2%
<b>Social sciences, journalism and information</b>	3	1.2%
<b>Business, administration and law</b>	19	7.9%
<b>Natural sciences, mathematics and statistics</b>	34	14%
<b>Information and Communication Technologies (ICTs)</b>	12	5%
<b>Engineering, manufacturing and construction</b>	41	16.9%
<b>Agriculture, forestry, fisheries and veterinary</b>	63	26%
<b>Health and welfare</b>	33	13.6%
<b>Services</b>	1	0.4%
<b>Other</b>	26	10.7%

*Table 162: Arab States - Years of experience as professional / since completing PhD (log scale).*

<b>Question</b>	<b>1-10</b>	<b>11-20</b>	<b>21-30</b>	<b>31-40</b>	<b>41-50</b>
<b>Professional</b>	34	69	32	18	6
<b>Since completing PhD</b>	63	26	11	4	1

Table 163: Arab States - Fields or professions in which respondents work.

<b>In which field do you work?</b>	<b>Count</b>
<b>Agricultural sciences</b>	54
<b>Engineering and technology</b>	38
<b>Humanities</b>	2
<b>Medical and health sciences</b>	33
<b>Natural sciences, mathematics and statistics</b>	20
<b>Other (please specify)</b>	37
<b>Prefer not to say</b>	3
<b>Social sciences</b>	9

Table 164: Arab States - Sub-fields of natural sciences.

<b>Which sub-field of natural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Biological sciences</b>	12
<b>Chemical sciences</b>	4
<b>Computer and information sciences</b>	1
<b>Earth and related environmental sciences</b>	1
<b>Other</b>	1

Table 165: Arab States - Sub-fields of medical and health sciences.

<b>Which sub-field of medical and health sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Basic medicine</b>	2

<b>Clinical medicine</b>	9
<b>Health sciences</b>	9
<b>Medical biotechnology</b>	5
<b>Other (please specify)</b>	8

Table 166: Arab States - Sub-fields of engineering and technology.

<b>Which sub-field of engineering and technology best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Chemical Engineering</b>	2
<b>Electrical/electronic/information engineering</b>	12
<b>Environmental biotechnology</b>	3
<b>Environmental engineering</b>	10
<b>Materials engineering</b>	1
<b>Mechanical engineering</b>	6
<b>Nano-technology</b>	1
<b>Other</b>	2

Table 167: Arab States - Sub-fields of agricultural sciences.

<b>Which sub-field of agricultural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Agricultural biotechnology</b>	8
<b>Agriculture, forestry, and fisheries</b>	19
<b>Animal and dairy science</b>	4
<b>Other</b>	13
<b>Prefer not to say</b>	1

<b>Veterinary science</b>	<b>8</b>
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Table 168: Arab States - Sub-fields of social sciences.

<b>Which sub-field of social sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Economics and business</b>	<b>6</b>
<b>Educational sciences</b>	<b>1</b>
<b>Sociology</b>	<b>2</b>

Table 169: Arab States - Sub-fields of humanities.

<b>Which sub-field of humanities best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>History and archaeology</b>	<b>1</b>
<b>Other</b>	<b>1</b>

Table 170: Arab States - Sectors in which participants work[ed] in.

<b>In what type of organisation do you work (or have you most recently worked)?</b>	<b>Count</b>
<b>Civil society/non-governmental organisation</b>	<b>11</b>
<b>Industry (large)</b>	<b>5</b>
<b>International governmental organisation</b>	<b>7</b>
<b>National governmental organisation</b>	<b>59</b>
<b>Other (please specify)</b>	<b>14</b>
<b>Prefer not to say</b>	<b>5</b>
<b>Small and medium-size enterprise [&lt; 250 employees]</b>	<b>6</b>
<b>University or similar research performing organisation</b>	<b>86</b>

Table 171: Arab States - Participants' employment status.

<b>What is your current employment status?</b>	<b>Count</b>
<b>Employed full-time</b>	172
<b>Employed part-time</b>	9
<b>Other (please specify)</b>	4
<b>Prefer not to say</b>	3
<b>Retired</b>	1
<b>Self-employed</b>	1
<b>Student only</b>	3
<b>Unemployed (looking for work)</b>	2

Table 172: Arab States - Hours spent on activities in the last 7 days (log scale).

<b>Question</b>	<b>1-10</b>	<b>11-20</b>	<b>21-30</b>	<b>31-40</b>	<b>41-50</b>	<b>51-60</b>	<b>61-70</b>	<b>71+</b>
<b>Administration unrelated to research/innovation</b>	107	14	5	5		2		1
<b>Management or supervision of staff/students</b>	99	22	11	6		1		1
<b>Public engagement (all types)</b>	106	17	8	1		2		
<b>Research or innovation work</b>	69	38	25	15	9	3	1	4
<b>Seeking or managing research/innovation funding</b>	91	28	10	4	2	1		1
<b>Teaching or capacity building (including training)</b>	100	26	12	2	3	1	1	1

Table 173: Arab States - Years that respondents worked in their current role / as researcher or innovator (log scale).

Question	1-10	11-20	21-30	31-40	41-50
...as researcher or innovator	73	57	19	11	3
...in their current role	82	50	9	6	3

Table 174: Arab States - Domains relating to participants' recent work.

Label	Count	Percent
Digital (ICT)	36	16.3%
Energy	29	13.1%
Bio-economy	31	14%
Waste Management	36	16.3%
None of these	89	40.3%

### 5.8.3.1.2 RRI Dimension – Diverse and Inclusive

Table 175: Arab States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work.'

	Count
Agree	58
Disagree	0
Neutral	9
Somewhat Agree	10
Somewhat Disagree	0
Strongly Agree	80
Strongly Disagree	6

*Table 176: Arab States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.*

<b>In the last 12 months, have you involved individuals/organisations with a diverse range of perspectives and expertise when planning your research and innovation work?</b>	<b>Count</b>
<b>No</b>	25
<b>Not applicable / No opinion</b>	14
<b>Prefer not to say</b>	8
<b>Unsure</b>	11
<b>Yes</b>	112

*Table 177: Arab States - Sectors participants involved in research and innovation practice.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	77	22.1%
<b>Primary / Secondary school education</b>	11	3.2%
<b>Government agency</b>	44	12.6%
<b>Industry / Commercial</b>	34	9.8%
<b>Non-profit organisation</b>	41	11.8%
<b>Research organisation</b>	64	18.4%
<b>Research funding organisation</b>	49	14.1%
<b>Journalism / Media</b>	7	2%
<b>General public</b>	20	5.7%
<b>Other</b>	1	0.3%

*Table 178: Arab States - Sectors participants involved in research and innovation dissemination.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	76	22.9%
<b>Primary / Secondary school education</b>	9	2.7%
<b>Government agency</b>	41	12.3%
<b>Industry / Commercial</b>	22	6.6%
<b>Non-profit organisation</b>	32	9.6%
<b>Research organisation</b>	57	17.2%
<b>Research funding organisation</b>	41	12.3%
<b>Journalism / Media</b>	22	6.6%
<b>General public</b>	30	9%
<b>Other</b>	2	0.6%

Table 179: Arab States - 'It is important to promote gender equality in my research and innovation work.'

	<b>Count</b>
<b>Agree</b>	49
<b>Disagree</b>	4
<b>Neutral</b>	13
<b>Somewhat Agree</b>	9
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	76
<b>Strongly Disagree</b>	6

Table 180: Arab States - Promoted gender equality in research and innovation work in the past 12 months.

<b>In the last 12 months, have you taken steps to promote gender equality in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	35
<b>Not applicable / No opinion</b>	23
<b>Prefer not to say</b>	7
<b>Unsure</b>	17
<b>Yes</b>	86

Table 181: Arab States - 'It is important to include ethnic minorities in my research and innovation work.'.

	<b>Count</b>
<b>Agree</b>	46
<b>Disagree</b>	4
<b>Neutral</b>	30
<b>Somewhat Agree</b>	13
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	45
<b>Strongly Disagree</b>	2

Table 182: Arab States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.

<b>In the last 12 months, have you taken any steps to include ethnic minorities in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	50
<b>Not applicable / No opinion</b>	52
<b>Prefer not to say</b>	9

<b>Unsure</b>	<b>18</b>
<b>Yes</b>	<b>36</b>

Table 183: Arab States - 'Ethical principles guide my research and innovation work'.

	<b>Count</b>
<b>Agree</b>	39
<b>Disagree</b>	1
<b>Neutral</b>	8
<b>Somewhat Agree</b>	4
<b>Somewhat Disagree</b>	0
<b>Strongly Agree</b>	103
<b>Strongly Disagree</b>	3

Table 184: Arab States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.

<b>In the last 12 months, have you taken steps to ensure that ethical principles guide your research and innovation work?</b>	<b>Count</b>
<b>No</b>	19
<b>Not applicable / No opinion</b>	23
<b>Prefer not to say</b>	7
<b>Unsure</b>	18
<b>Yes</b>	94

Table 185: Arab States - Statements related to working in research and innovation.

<b>Question</b>	<b>Agree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Somewhat Agree</b>	<b>Somewhat Disagree</b>	<b>Strongly Agree</b>	<b>Strongly Disagree</b>
'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals.'	40	10	12	20	8	28	6
'Ethnic differences are irrelevant in my work.'	38	10	16	6	2	29	15
'Gender is irrelevant in my work.'	28	16	19	8	7	19	21
'I feel a professional responsibility to communicate findings from my research or innovation work to public audiences.'	47	3	10	13	1	46	2
'It is important to maintain an equal number of men and	40	5	19	24	9	20	5

<b>women in research and innovation teams.'</b>							
<b>'It is important to take ethnic diversity into account when developing my research and innovation work.'</b>	31	6	25	14	6	21	8
<b>'It is important to take gender into account when developing my research and innovation work.'</b>	43	8	24	9	4	20	14
<b>'My organisation encourages me to communicate findings from my research or innovation work to public audiences.'</b>	49	1	18	14	6	27	7
<b>'My primary organisation where I work discourages me from communicating the results of</b>	9	35	18	6	6	4	34

my research or innovation work to public audiences.'							
'The best time to talk to public audiences about my research and innovation work is at the very end of the process after all the work has been completed.'	39	15	8	24	10	26	3

#### 5.8.3.1.3 RRI Dimension – Anticipative and Reflective

Table 186: Arab States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society.'

	Count
Agree	50
Disagree	4
Neutral	10
Somewhat Agree	13
Somewhat Disagree	1
Strongly Agree	69
Strongly Disagree	7

Table 187: Arab States - Ensured work does not cause concerns for society in the past 12 months.

<b>In the last 12 months, have you taken steps to ensure the way you do your work does not cause concerns for society?</b>	<b>Count</b>
<b>No</b>	36
<b>Not applicable / No opinion</b>	29
<b>Prefer not to say</b>	8
<b>Unsure</b>	30
<b>Yes</b>	62

#### 5.8.3.1.4 RRI Dimension – Open and Transparent

*Table 188: Arab States - 'It is important to make my research and innovation methods/processes open and transparent.'*

	<b>Count</b>
<b>Agree</b>	58
<b>Disagree</b>	1
<b>Neutral</b>	10
<b>Somewhat Agree</b>	15
<b>Somewhat Disagree</b>	3
<b>Strongly Agree</b>	75
<b>Strongly Disagree</b>	3

*Table 189: Arab States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure your research and innovation methods/processes are open and transparent?</b>	<b>Count</b>
<b>No</b>	24
<b>Not applicable / No opinion</b>	20

<b>Prefer not to say</b>	<b>6</b>
<b>Unsure</b>	<b>19</b>
<b>Yes</b>	<b>101</b>

*Table 190: Arab States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.*

	<b>Count</b>
<b>Agree</b>	49
<b>Disagree</b>	4
<b>Neutral</b>	7
<b>Somewhat Agree</b>	13
<b>Somewhat Disagree</b>	3
<b>Strongly Agree</b>	85
<b>Strongly Disagree</b>	2

*Table 191: Arab States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.*

<b>In the last 12 months, have you taken steps to make the results of your research and innovation work accessible to as wide a public as possible?</b>	<b>Count</b>
<b>No</b>	25
<b>Not applicable / No opinion</b>	8
<b>Prefer not to say</b>	7
<b>Unsure</b>	17
<b>Yes</b>	111

Table 192: Arab States - 'It is important to make data from my research and innovation activities freely available to the public'.

	Count
<b>Agree</b>	52
<b>Disagree</b>	7
<b>Neutral</b>	18
<b>Somewhat Agree</b>	19
<b>Somewhat Disagree</b>	6
<b>Strongly Agree</b>	56
<b>Strongly Disagree</b>	4

Table 193: Arab States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.

<b>In the last 12 months, have you taken steps to make data from your research and innovation activities freely available to the public?</b>	Count
<b>No</b>	41
<b>Not applicable / No opinion</b>	17
<b>Prefer not to say</b>	5
<b>Unsure</b>	22
<b>Yes</b>	81

Table 194: Arab States - 'Research and innovation should address societal needs.'

	Count
<b>Agree</b>	42
<b>Disagree</b>	1

<b>Neutral</b>	2
<b>Somewhat Agree</b>	12
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	102
<b>Strongly Disagree</b>	3

### 5.8.3.1.5 RRI Dimension – Responsive and Adaptive to Change

*Table 195: Arab States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure your research and innovation work addresses societal needs?</b>	<b>Count</b>
<b>No</b>	16
<b>Not applicable / No opinion</b>	14
<b>Prefer not to say</b>	7
<b>Unsure</b>	17
<b>Yes</b>	114

*Table 196: Arab States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.*

<b>To what extent is your research/innovation work guided by a regulatory framework that covers all relevant aspects of social responsibility?</b>	<b>Count</b>
<b>Always</b>	25
<b>Frequently</b>	24
<b>Never</b>	4
<b>Not applicable / No Opinion</b>	13
<b>Occasionally</b>	6

<b>Rarely</b>	10
<b>Sometimes</b>	24
<b>Usually</b>	25

### 5.8.3.1.6 Stakeholder Categories

*Table 197: Arab States - Hours interacting with research performing organisations / academics / researchers in the last 7 days.*

<b>Research Performing Organisations / Academics / Researchers</b>	<b>Count</b>
<b>1-10</b>	69
<b>11-20</b>	31
<b>21-30</b>	14
<b>31-40</b>	15
<b>41-50</b>	7
<b>51-60</b>	2
<b>61-70</b>	1
<b>71+</b>	2

*Table 198: Arab States - Hours interacting with research funding organisations in the last 7 days.*

<b>Research Funding Organisations</b>	<b>Count</b>
<b>1-10</b>	68
<b>11-20</b>	10
<b>21-30</b>	1
<b>51-60</b>	1

*Table 199: Arab States - Hours interacting with industry / small and medium sized enterprise in the last 7 days.*

<b>Industry / small and medium sized enterprise</b>	<b>Count</b>
<b>1-10</b>	67
<b>11-20</b>	4
<b>21-30</b>	3
<b>51-60</b>	1

*Table 200: Arab States - Hours interacting with civil society / citizens in the last 7 days.*

<b>Civil society / citizens</b>	<b>Count</b>
<b>1-10</b>	79
<b>11-20</b>	8
<b>21-30</b>	1
<b>31-40</b>	1
<b>41-50</b>	2
<b>61-70</b>	1

*Table 201: Arab States - Hours interacting with policy makers in the last 7 days.*

<b>Policy makers</b>	<b>Count</b>
<b>1-10</b>	63
<b>11-20</b>	1
<b>21-30</b>	3
<b>41-50</b>	1

*Table 202: Arab States - Hours interacting with NGOs / international organisations in the last 7 days.*

<b>NGOs / international organisations</b>	<b>Count</b>
-------------------------------------------	--------------

<b>1-10</b>	<b>73</b>
<b>11-20</b>	<b>11</b>
<b>21-30</b>	<b>1</b>
<b>31-40</b>	<b>1</b>
<b>51-60</b>	<b>1</b>

### 5.8.3.1.7 UN Sustainable Development Goals

*Table 203: Arab States - Participants' familiarity with the UN SDGs.*

	<b>Count</b>
<b>Extremely Familiar</b>	<b>36</b>
<b>Moderately Familiar</b>	<b>45</b>
<b>Not at all Familiar</b>	<b>30</b>
<b>Slightly Familiar</b>	<b>21</b>
<b>Somewhat Familiar</b>	<b>22</b>

*Table 204: Arab States - Heard or read about the UN Sustainable Development Goals in the last 30 days.*

<b>In the last 30 days, how much have you heard or read about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	<b>22</b>
<b>2-3 times a week</b>	<b>22</b>
<b>4-6 times per week</b>	<b>7</b>
<b>Daily</b>	<b>15</b>
<b>Not at all</b>	<b>18</b>
<b>Once</b>	<b>24</b>

<b>Once per week</b>	<b>5</b>
<b>Unsure</b>	<b>11</b>

Table 205: Arab States - Thought about the UN Sustainable Development Goals in the last 30 days.

<b>In the last 30 days, how frequently have you thought about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	<b>28</b>
<b>2-3 times a week</b>	<b>14</b>
<b>4-6 times per week</b>	<b>15</b>
<b>Daily</b>	<b>15</b>
<b>Not at all</b>	<b>21</b>
<b>Once</b>	<b>15</b>
<b>Once per week</b>	<b>11</b>
<b>Unsure</b>	<b>5</b>

Table 206: Arab States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

<b>Question</b>	<b>-1</b>	<b>-2</b>	<b>-3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>[Harmful - Beneficial]</b>	0	3	2	5	7	31	75
<b>[Irrelevant - Relevant]</b>	1	4	1	5	5	35	70
<b>[Unimportant - Important]</b>	1	1	1	10	2	16	91
<b>[Unnecessary - Essential]</b>	0	2	0	8	5	31	75
<b>[Useless - Useful]</b>	1	1	2	7	5	28	78
<b>[Worthless - Valuable]</b>	1	2	2	5	4	28	80

Table 207: Arab States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

Question	-1	-2	-3	0	1	2	3
[Harmful - Beneficial]	0	0	1	11	7	35	68
[Irrelevant - Relevant]	0	2	2	9	9	27	73
[Unimportant - Important]	0	1	0	11	8	28	75
[Unnecessary - Essential]	0	1	0	13	8	33	67
[Useless - Useful]	0	0	2	9	7	32	73
[Worthless - Valuable]	0	1	1	11	6	31	73

Table 208: Arab States - Detailed perspective on UN SDGs.

Question	Agree	Disagree	Neutral	Somewhat Agree	Somewhat Disagree	Strongly Agree	Strongly Disagree
'I follow stories in the news about the UN SDGs.'	46	5	24	22	3	17	1
'The UN SDGs are a priority for me.'	48	0	17	24	1	31	0
'The UN SDGs are focused only on long-term financial development.'	27	25	18	19	12	11	7

'The UN SDGs represent legally binding international treaties to protect the environment.'	42	9	13	18	3	33	2
'The UN SDGs should be a priority for my professional field.'	48	1	11	19	1	41	0

### 5.8.3.2 CONTENT ANALYSIS DATA TABLES

Table 209: Arab States - Steps taken to involve individuals / organisations with a diverse range of perspectives and expertise in planning research and innovation work.

Label	Count	Percent
Non-specific, vague, platitude or virtue signalling response	15	19.7%
Engagement with non-academic stakeholders	14	18.4%
Engagement with non-academic stakeholders (general)	11	14.5%
Engagement with non-academic stakeholders (specific steps)	3	3.9%
Stakeholder type – industry / business	5	6.6%
Stakeholder type – civil society organisation (CSO)	2	2.6%
Stakeholder type – policy bodies / policymakers	2	2.6%
Stakeholder type – other non-academic stakeholder type	4	5.3%

<b>Stakeholder type – no stakeholder types indicated (beyond non-academic)</b>	3	3.9%
<b>General dissemination/broadcasting of information about the research/innovation work</b>	5	6.6%
<b>‘In-reach’ to other disciplines, researchers, academics, experts or students</b>	24	31.6%
<b>Steps for building collaboration/teams/consortia with no connection to diversity per se</b>	10	13.2%
<b>Meetings, workshops, focus groups and ‘consultations’</b>	20	26.3%
<b>Unclear / Uncertain</b>	1	1.3%

*Table 210: Arab States - Steps taken to promote gender equality in research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	18	29%
<b>Gender equality in R&amp;I, within the R&amp;I environment</b>	41	66.1%
<b>Gender equality in R&amp;I, academic (general)</b>	16	25.8%
<b>Gender equality in R&amp;I, academic (specific steps)</b>	25	40.3%
<b>Supporting female researchers’ publications, co-authorship, academic citations</b>	1	1.6%
<b>Integrating gender equality in research participant selection</b>	3	4.8%
<b>Fostering gender equality in research/innovation teams / workforce</b>	18	29%
<b>Integrating gender as a substantive dimension/focus of R&amp;I content/practice</b>	2	3.2%
<b>Promotion/ mentorship of female researchers</b>	7	11.3%
<b>Promoting women in R&amp;I decision-making roles and senior positions</b>	1	1.6%

<b>Ensuring gender equality in process of recruitment and selection of R&amp;I staff</b>	1	1.6%
<b>Promoting gender equality through delivering or attending training</b>	3	4.8%
<b>Participation in or engagement with equality committees</b>	1	1.6%
<b>Other gender equality promotion step taken</b>	12	19.4%
<b>Unclear / Uncertain</b>	3	4.8%

Table 211: Arab States - Steps taken to include ethnic minorities in research and innovation work.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	8	40%
<b>Racial/ethnic equality within the R&amp;I environment</b>	12	60%
<b>Racial/ethnic equality within the R&amp;I environment (general)</b>	7	35%
<b>Racial/ethnic equality within the R&amp;I environment (specific steps)</b>	5	25%
<b>Supporting racial/ethnic minority researchers' publications, co-authorship, academic citations</b>	2	10%
<b>Integrating racial/ethnic equality in research participant selection</b>	3	15%
<b>Fostering racial/ethnic equality in research/innovation teams / workforce</b>	1	5%
<b>Integrating race/ethnicity as a substantive dimension/focus of R&amp;I content/practice</b>	2	10%
<b>Promotion/ mentorship of ethnic minority researchers/innovators</b>	1	5%
<b>Other racial/ethnic equality promotion step taken</b>	4	20%
<b>Downplaying, minimising and excusing ethnic diversity issues in R&amp;I</b>	2	10%

Table 212: Arab States - Steps taken to ensure that ethical principles guide research and innovation work.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	13	21%
<b>Integrating Ethics in R&amp;I work</b>	49	79%
<b>Ethics in R&amp;I work (general)</b>	36	58.1%
<b>Ethics in R&amp;I work (specific steps)</b>	13	21%
<b>Ensuring informed consent with participants</b>	2	3.2%
<b>Ensuring participant anonymisation or confidentiality</b>	2	3.2%
<b>Ensuring that R&amp;I outputs are used to deliver positive societal impact</b>	1	1.6%
<b>Integrating research ethics as a substantive focus of respondent's R&amp;I content/practice</b>	1	1.6%
<b>Promoting research ethics through delivering or attending training</b>	4	6.5%
<b>Participation in or engagement with ethics committees</b>	20	32.3%
<b>Compliance with rules, regulations, and legal obligations</b>	10	16.1%
<b>Integrating ethics through respecting intellectual property rights and academic referencing</b>	9	14.5%
<b>Other research ethics step taken</b>	7	11.3%

*Table 213: Arab States - Steps taken to ensure research and innovation methods/processes are open and transparent.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	12	16.7%
<b>Pathways to open/transparent R&amp;I methods and processes</b>	36	50%
<b>Pathways to open/transparent R&amp;I methods and processes (general)</b>	15	20.8%
<b>Pathways to open/transparent R&amp;I methods and processes (specific steps)</b>	19	26.4%

<b>Documenting/reporting research and decision-making processes</b>	18	25%
<b>Disclosing research data, raw data, codes, and statistics</b>	3	4.2%
<b>Seeking upstream academic/researcher feedback on research ideas or plans</b>	7	9.7%
<b>Seeking upstream feedback on research ideas/plans from non-academics/nonresearchers</b>	1	1.4%
<b>Seeking approval for methods/processes in research applications</b>	4	5.6%
<b>Participation in or engagement with relevant committees</b>	4	5.6%
<b>Other step taken to ensure R&amp;I openness and transparency</b>	3	4.2%
<b>One-way dissemination with no reference to research methods/processes or transparency/openness per se</b>	32	44.4%
<b>Open access publication</b>	5	6.9%

*Table 214: Arab States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	1	1.1%
<b>Public accessibility of R&amp;I results</b>	45	47.9%
<b>Public accessibility of R&amp;I results (general)</b>	4	4.3%
<b>Public accessibility of R&amp;I results (specific steps)</b>	43	45.7%
<b>Institutional- or project-based/supported publishing of research findings (outside of scholarly publishing)</b>	1	1.1%
<b>Publishing/disseminating R&amp;I outputs using institutional open access repositories or external open access databases</b>	4	4.3%
<b>Personally publishing/disseminating R&amp;I outputs to the public outside of scholarly publishing</b>	17	18.1%

<b>Engaging with non-academic/public stakeholders through outreach activities after research is completed</b>	7	7.4%
<b>Promoting R&amp;I results in the media</b>	8	8.5%
<b>Open access scholarly publishing</b>	11	11.7%
<b>Other step taken to make R&amp;I results available to the public</b>	2	2.1%
<b>Sharing R&amp;I work within professional R&amp;I stakeholder environments</b>	56	59.6%
<b>Unclear / Uncertain</b>	6	6.4%

*Table 215: Arab States - Steps taken to make the data from research and innovation activities freely available to the public.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	12	19.4%
<b>Confusing open access to research findings and open data</b>	43	69.4%
<b>Public availability of R&amp;I data</b>	5	8.1%
<b>Public availability of R&amp;I data (general)</b>	3	4.8%
<b>Public availability of R&amp;I data (specific steps)</b>	2	3.2%
<b>Personally publishing/distributing R&amp;I data</b>	3	4.8%
<b>Other step taken to make research data available to the public</b>	3	4.8%
<b>Resisting/delimiting open data or supporting closed data</b>	2	3.2%

*Table 216: Arab States - Steps taken to ensure research and innovation work addresses societal needs.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	5	5.7%
<b>Addressing societal needs in R&amp;I work</b>	82	94.3%

<b>Addressing societal needs in R&amp;I work (general)</b>	36	41.4%
<b>Addressing societal needs in R&amp;I work (specific steps)</b>	46	52.9%
<b>Participatory process: research topic/problem defined by societal needs</b>	6	6.9%
<b>Selection of research topic/problem defined by researchers' perceptions of societal needs</b>	38	43.7%
<b>Participatory process: research design/approach defined by societal needs</b>	2	2.3%
<b>Societal issues as a substantive dimension in R&amp;I content/focus</b>	20	23%
<b>Reflecting on/evaluating R&amp;I impact on societal needs</b>	1	1.1%
<b>Compliance with institutional/funding requirements</b>	1	1.1%
<b>Communicating R&amp;I work/activities to public/non-academic stakeholders</b>	4	4.6%
<b>Other step taken to address societal needs in R&amp;I work</b>	12	13.8%

*Table 217: Arab States - Steps taken to ensure that the way work is done does not cause concerns for society.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	5	11.4%
<b>Addressing societal concerns about implementation of R&amp;I work</b>	36	81.8%
<b>Addressing societal concerns in R&amp;I work (general)</b>	17	38.6%
<b>Addressing societal concerns in R&amp;I work (specific steps)</b>	19	43.2%
<b>Seeking upstream feedback from non-R&amp;I stakeholders on R&amp;I ideas/plans</b>	4	9.1%
<b>Making the research directly responsive to societal needs or concerns</b>	5	11.4%

<b>Seeking upstream feedback from other R&amp;I stakeholders on R&amp;I ideas/plans</b>	5	11.4%
<b>Addressing societal concerns as substantive dimension of the R&amp;I work</b>	3	6.8%
<b>Compliance with rules, regulations, or legal obligations</b>	7	15.9%
<b>Mitigating or preventing societal concerns through delivering or attending training</b>	1	2.3%
<b>Participation in or engagement with relevant committees</b>	5	11.4%
<b>Ensuring integrity in R&amp;I processes involving human participants</b>	2	4.5%
<b>Preventing societal concerns resulting from R&amp;I work by following responsible safety and waste practices to avoid damage</b>	5	11.4%
<b>Ensuring positive outcomes for society, without explicitly mentioning the prevention of societal concerns</b>	1	2.3%
<b>Other step taken to consider societal concerns in R&amp;I work</b>	3	6.8%
<b>Unclear / Uncertain</b>	3	6.8%

Table 218: Arab States - What comes to mind when you think of 'responsible research and innovation'?

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	46	46%
<b>Ideas, practices or policies associated with RRI</b>	53	53%
<b>Aligning research and innovation with societal benefits</b>	35	35%
<b>Integrating / anticipating public perspectives in research and innovation</b>	7	7%
<b>Ensuring societal acceptance of research and innovation</b>	1	1%
<b>Do no harm to people/society/participants with R&amp;I</b>	5	5%
<b>Protecting the environment, preventing negative impacts of research and innovation on the environment</b>	8	8%

<b>Orientating research and innovation towards generating improved technologies/outputs</b>	1	1%
<b>Open and honest science</b>	1	1%
<b>Engaging / communicating with non-academic stakeholders or publics about research and innovation activities</b>	3	3%
<b>Ensuring ethical procedures and approvals are completed in R&amp;I work</b>	6	6%
<b>Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty</b>	4	4%
<b>Ensuring norms/practices evincing research integrity and high professional standards</b>	3	3%
<b>Following formal/official research guidelines and regulations</b>	1	1%
<b>Other association with RRI</b>	9	9%
<b>Criticism related to RRI</b>	1	1%

Table 219: Arab States - What comes to mind when you think of the UN Sustainable Development Goals?.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	17	17.2%
<b>Defining sustainable development</b>	65	65.7%
<b>Integrating/balancing different aspects of sustainable development</b>	3	3%
<b>Educational aspects of sustainable development</b>	12	12.1%
<b>Economic aspects of sustainable development</b>	43	43.4%
<b>Integrating economic and environmental aspects of sustainable development</b>	9	9.1%
<b>Preserving natural resources</b>	20	20.2%
<b>Health-related aspects of sustainable development</b>	19	19.2%

<b>Diversity/inclusion aspects of sustainable development</b>	21	21.2%
<b>Addressing climate change</b>	9	9.1%
<b>Other aspects of sustainable development</b>	9	9.1%
<b>Governance dimensions of SDGs</b>	12	12.1%
<b>Achieving the SDGs</b>	3	3%
<b>Contribution of technological innovation to sustainable development</b>	1	1%
<b>Other implementation actions to achieve SDGs</b>	2	2%
<b>General Criticism of the UN SDGs</b>	3	3%
<b>Unclear / Uncertain</b>	4	4%

Table 220: Arab States - Number of valid responses by code.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Diverse Perspectives</b>	75	47.8%
<b>Gender Equality</b>	60	38.2%
<b>Ethics of Research</b>	20	12.7%
<b>Ethnic Minorities</b>	62	39.5%
<b>Research Transparency</b>	70	44.6%
<b>Public Accessibility of Research Findings</b>	95	60.5%
<b>Open Data</b>	63	40.1%
<b>Societal Needs Addressed in Research</b>	86	54.8%
<b>Societal Concerns</b>	44	28%
<b>Associations with RRI</b>	100	63.7%
<b>Associations with UN SDGs</b>	98	62.4%



## 5.8.4 DATA TABLES FOR ASIAN AND PACIFIC STATES

### 5.8.4.1 CLOSED-ENDED SURVEY QUESTION DATA TABLES

#### 5.8.4.1.1 Socio-Demographics

Table 221: Asian and Pacific States - Distribution of age.

In what year were you born?	Count
18-28	19
29-38	68
39-48	79
49-58	61
59-68	35
69+	8

Table 222: Asian and Pacific States - Distribution of gender.

Please indicate if you are...	Count
Female	132
Male	175
Prefer not to say	8

Table 223: Asian and Pacific States - Currently studying at school, college or university.

Are you currently a student at school, college or university?	Count
No	267
Prefer not to say	6
Yes	36

Table 224: Asian and Pacific States - Highest level of formal education completed.

<b>What is the highest level of formal education you have completed?</b>	<b>Count</b>
<b>Bachelor's (or equivalent)</b>	27
<b>Doctoral (or equivalent)</b>	202
<b>Master's (or equivalent)</b>	72
<b>Other (please specify)</b>	4
<b>Prefer not to say</b>	3

Table 225: Asian and Pacific States - Distribution of degrees by subject area (multiple choice).

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Education</b>	29	6.7%
<b>Arts and humanities</b>	50	11.6%
<b>Social sciences, journalism and information</b>	68	15.8%
<b>Business, administration and law</b>	58	13.5%
<b>Natural sciences, mathematics and statistics</b>	63	14.7%
<b>Information and Communication Technologies (ICTs)</b>	29	6.7%
<b>Engineering, manufacturing and construction</b>	48	11.2%
<b>Agriculture, forestry, fisheries and veterinary</b>	18	4.2%
<b>Health and welfare</b>	37	8.6%
<b>Services</b>	1	0.2%
<b>Other</b>	29	6.7%

Table 226: Asian and Pacific States - Years of experience as professional / since completing PhD (log scale).

<b>Question</b>	<b>1-10</b>	<b>11-20</b>	<b>21-30</b>	<b>31-40</b>	<b>41-50</b>	<b>51-60</b>
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<b>Professional</b>	73	83	51	39	4	1
<b>Since completing PhD</b>	79	57	21	8	1	

Table 227: Asian and Pacific States - Fields or professions in which respondents work.

<b>In which field do you work?</b>	<b>Count</b>
<b>Agricultural sciences</b>	12
<b>Engineering and technology</b>	48
<b>Humanities</b>	9
<b>Medical and health sciences</b>	42
<b>Natural sciences, mathematics and statistics</b>	37
<b>Other (please specify)</b>	63
<b>Prefer not to say</b>	4
<b>Social sciences</b>	88

Table 228: Asian and Pacific States - Sub-fields of natural sciences.

<b>Which sub-field of natural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Biological sciences</b>	10
<b>Chemical sciences</b>	12
<b>Computer and information sciences</b>	5
<b>Earth and related environmental sciences</b>	7
<b>Mathematics</b>	1
<b>Other</b>	2
<b>Physical sciences</b>	2

Table 229: Asian and Pacific States - Sub-fields of medical and health sciences.

<b>Which sub-field of medical and health sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Basic medicine</b>	7
<b>Clinical medicine</b>	5
<b>Health sciences</b>	18
<b>Medical biotechnology</b>	4
<b>Other (please specify)</b>	8
<b>Prefer not to say</b>	1

Table 230: Asian and Pacific States - Sub-fields of engineering and technology.

<b>Which sub-field of engineering and technology best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Chemical Engineering</b>	8
<b>Civil engineering</b>	5
<b>Electrical/electronic/information engineering</b>	17
<b>Environmental engineering</b>	1
<b>Materials engineering</b>	4
<b>Mechanical engineering</b>	2
<b>Medical engineering</b>	1
<b>Nano-technology</b>	4
<b>Other</b>	4

Table 231: Asian and Pacific States - Sub-fields of agricultural sciences.

<b>Which sub-field of agricultural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Agricultural biotechnology</b>	3
<b>Agriculture, forestry, and fisheries</b>	4
<b>Other</b>	4
<b>Veterinary science</b>	1

Table 232: Asian and Pacific States - Sub fields of social sciences.

<b>Which sub-field of social sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Economics and business</b>	21
<b>Educational sciences</b>	11
<b>Law</b>	5
<b>Media and communication</b>	8
<b>Other</b>	22
<b>Political science</b>	4
<b>Prefer not to say</b>	1
<b>Psychology</b>	2
<b>Social and economic geography</b>	9
<b>Sociology</b>	7

Table 233: Asian and Pacific States - Sub-fields of humanities.

<b>Which sub-field of humanities best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>History and archaeology</b>	1

<b>Other</b>	<b>5</b>
<b>Philosophy, ethics and religion</b>	<b>3</b>

Table 234: Asian and Pacific States - Sectors in which participants work[ed] in.

<b>In what type of organisation do you work (or have you most recently worked)?</b>	<b>Count</b>
<b>Civil society/non-governmental organisation</b>	<b>21</b>
<b>Industry (large)</b>	<b>13</b>
<b>International governmental organisation</b>	<b>2</b>
<b>National governmental organisation</b>	<b>55</b>
<b>Other (please specify)</b>	<b>9</b>
<b>Policy</b>	<b>7</b>
<b>Prefer not to say</b>	<b>6</b>
<b>Small and medium-size enterprise [&lt; 250 employees]</b>	<b>6</b>
<b>University or similar research performing organisation</b>	<b>180</b>

Table 235: Asian and Pacific States - Participants' employment status.

<b>What is your current employment status?</b>	<b>Count</b>
<b>Employed full-time</b>	<b>252</b>
<b>Employed part-time</b>	<b>16</b>
<b>Other (please specify)</b>	<b>7</b>
<b>Prefer not to say</b>	<b>3</b>
<b>Retired</b>	<b>3</b>
<b>Self-employed</b>	<b>7</b>
<b>Student only</b>	<b>11</b>

Table 236: Asian and Pacific States - Hours spent on activities in the last 7 days (log scale).

Question	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71+
Administration unrelated to research/innovation	174	24	10	4	4			2
Management or supervision of staff/students	172	22	11	4	2			2
Public engagement (all types)	176	15	6	3		1		2
Research or innovation work	122	57	28	33	10	5	3	4
Seeking or managing research/innovation funding	168	17	6	3	3	1		1
Teaching or capacity building (including training)	163	37	7	4	2	1	1	1

Table 237: Asian and Pacific States - Years that respondents worked in their current role / as researcher or innovator (log scale).

Question	1-10	11-20	21-30	31-40	41-50	51-60
...as researcher or innovator	122	81	35	17	2	
...in their current role	168	60	23	7		1

Table 238: Asian and Pacific States - Domains relating to participants' recent work.

Label	Count	Percent
Digital (ICT)	86	26.8%
Energy	34	10.6%
Bio-economy	25	7.8%
Waste Management	30	9.3%

<b>None of these</b>	146	45.5%
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#### 5.8.4.1.2 RRI Dimension – Diverse and Inclusive

*Table 239: Asian and Pacific States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work.'*

	<b>Count</b>
<b>Agree</b>	84
<b>Disagree</b>	5
<b>Neutral</b>	11
<b>Somewhat Agree</b>	32
<b>Somewhat Disagree</b>	2
<b>Strongly Agree</b>	115
<b>Strongly Disagree</b>	10

*Table 240: Asian and Pacific States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.*

<b>In the last 12 months, have you involved individuals/organisations with a diverse range of perspectives and expertise when planning your research and innovation work?</b>	<b>Count</b>
<b>No</b>	30
<b>Not applicable / No opinion</b>	21
<b>Prefer not to say</b>	9
<b>Unsure</b>	32
<b>Yes</b>	174

*Table 241: Asian and Pacific States - Sectors participants involved in research and innovation practice.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	135	23.6%
<b>Primary / Secondary school education</b>	26	4.6%
<b>Government agency</b>	83	14.5%
<b>Industry / Commercial</b>	53	9.3%
<b>Non-profit organisation</b>	71	12.4%
<b>Research organisation</b>	83	14.5%
<b>Research funding organisation</b>	55	9.6%
<b>Journalism / Media</b>	21	3.7%
<b>General public</b>	42	7.4%
<b>Other</b>	2	0.4%

*Table 242: Asian and Pacific States - Sectors participants involved in research and innovation dissemination.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	125	21.4%
<b>Primary / Secondary school education</b>	24	4.1%
<b>Government agency</b>	81	13.8%
<b>Industry / Commercial</b>	49	8.4%
<b>Non-profit organisation</b>	62	10.6%
<b>Research organisation</b>	76	13%
<b>Research funding organisation</b>	58	9.9%
<b>Journalism / Media</b>	50	8.5%
<b>General public</b>	55	9.4%

<b>Other</b>	<b>5</b>	<b>0.9%</b>
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Table 243: Asian and Pacific States - 'It is important to promote gender equality in my research and innovation work.'

	<b>Count</b>
<b>Agree</b>	70
<b>Disagree</b>	4
<b>Neutral</b>	20
<b>Somewhat Agree</b>	17
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	128
<b>Strongly Disagree</b>	10

Table 244: Asian and Pacific States - Promoted gender equality in research and innovation work in the past 12 months.

<b>In the last 12 months, have you taken steps to promote gender equality in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	46
<b>Not applicable / No opinion</b>	50
<b>Prefer not to say</b>	9
<b>Unsure</b>	35
<b>Yes</b>	124

Table 245: Asian and Pacific States - 'It is important to include ethnic minorities in my research and innovation work.'

	<b>Count</b>
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<b>Agree</b>	67
<b>Disagree</b>	2
<b>Neutral</b>	42
<b>Somewhat Agree</b>	28
<b>Somewhat Disagree</b>	5
<b>Strongly Agree</b>	85
<b>Strongly Disagree</b>	9

*Table 246: Asian and Pacific States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken any steps to include ethnic minorities in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	82
<b>Not applicable / No opinion</b>	61
<b>Prefer not to say</b>	6
<b>Unsure</b>	33
<b>Yes</b>	79

*Table 247: Asian and Pacific States - 'Ethical principles guide my research and innovation work'.*

	<b>Count</b>
<b>Agree</b>	63
<b>Disagree</b>	5
<b>Neutral</b>	13
<b>Somewhat Agree</b>	19
<b>Somewhat Disagree</b>	1

<b>Strongly Agree</b>	133
<b>Strongly Disagree</b>	5

*Table 248: Asian and Pacific States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure that ethical principles guide your research and innovation work?</b>	<b>Count</b>
<b>No</b>	27
<b>Not applicable / No opinion</b>	30
<b>Prefer not to say</b>	4
<b>Unsure</b>	35
<b>Yes</b>	157

*Table 249: Asian and Pacific States - Statements related to working in research and innovation.*

<b>Question</b>	<b>Agree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Somewhat Agree</b>	<b>Somewhat Disagree</b>	<b>Strongly Agree</b>	<b>Strongly Disagree</b>
<b>'Access to research and innovation work should be allowed only after all findings have been published in peer reviewed journals.'</b>	32	30	19	32	36	27	21
<b>'Ethnic differences</b>	22	41	27	20	20	30	31

<b>are irrelevant in my work.'</b>							
<b>'Gender is irrelevant in my work.'</b>	25	33	25	15	17	38	43
<b>'I feel a professional responsibility to communicate findings from my research or innovation work to public audiences.'</b>	84	1	8	22	3	79	0
<b>'It is important to maintain an equal number of men and women in research and innovation teams.'</b>	35	9	52	29	12	51	6
<b>'It is important to take ethnic diversity into account when developing my research and innovation work.'</b>	63	7	29	28	6	55	2
<b>'It is important to take gender into account when</b>	57	15	35	19	5	52	11

<b>developing my research and innovation work.'</b>							
<b>'My organisation encourages me to communicate findings from my research or innovation work to public audiences.'</b>	76	4	19	15	6	72	3
<b>'My primary organisation where I work discourages me from communicating the results of my research or innovation work to public audiences.'</b>	10	48	18	9	7	7	74
<b>'The best time to talk to public audiences about my research and innovation work is at the very end of the process after all the work has been completed.'</b>	25	36	30	24	36	21	25

### 5.8.4.1.3 RRI Dimension – Anticipative and Reflective

Table 250: Asian and Pacific States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society.'

	Count
<b>Agree</b>	62
<b>Disagree</b>	13
<b>Neutral</b>	21
<b>Somewhat Agree</b>	26
<b>Somewhat Disagree</b>	9
<b>Strongly Agree</b>	106
<b>Strongly Disagree</b>	13

Table 251: Asian and Pacific States - Ensured work does not cause concerns for society in the past 12 months.

<b>In the last 12 months, have you taken steps to ensure the way you do your work does not cause concerns for society?</b>	Count
<b>No</b>	52
<b>Not applicable / No opinion</b>	47
<b>Prefer not to say</b>	9
<b>Unsure</b>	46
<b>Yes</b>	112

### 5.8.4.1.4 RRI Dimension – Open and Transparent

Table 252: Asian and Pacific States - 'It is important to make my research and innovation methods/processes open and transparent.'

	Count
--	-------

<b>Agree</b>	79
<b>Disagree</b>	3
<b>Neutral</b>	12
<b>Somewhat Agree</b>	25
<b>Somewhat Disagree</b>	2
<b>Strongly Agree</b>	133
<b>Strongly Disagree</b>	8

*Table 253: Asian and Pacific States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure your research and innovation methods/processes are open and transparent?</b>	<b>Count</b>
<b>No</b>	29
<b>Not applicable / No opinion</b>	36
<b>Prefer not to say</b>	7
<b>Unsure</b>	42
<b>Yes</b>	159

*Table 254: Asian and Pacific States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.*

	<b>Count</b>
<b>Agree</b>	68
<b>Disagree</b>	4
<b>Neutral</b>	13
<b>Somewhat Agree</b>	21

<b>Somewhat Disagree</b>	3
<b>Strongly Agree</b>	142
<b>Strongly Disagree</b>	8

*Table 255: Asian and Pacific States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.*

<b>In the last 12 months, have you taken steps to make the results of your research and innovation work accessible to as wide a public as possible?</b>	<b>Count</b>
<b>No</b>	42
<b>Not applicable / No opinion</b>	20
<b>Prefer not to say</b>	6
<b>Unsure</b>	27
<b>Yes</b>	171

*Table 256: Asian and Pacific States - 'It is important to make data from my research and innovation activities freely available to the public'.*

	<b>Count</b>
<b>Agree</b>	75
<b>Disagree</b>	11
<b>Neutral</b>	28
<b>Somewhat Agree</b>	37
<b>Somewhat Disagree</b>	7
<b>Strongly Agree</b>	84
<b>Strongly Disagree</b>	7

Table 257: Asian and Pacific States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.

<b>In the last 12 months, have you taken steps to make data from your research and innovation activities freely available to the public?</b>	<b>Count</b>
<b>No</b>	79
<b>Not applicable / No opinion</b>	35
<b>Prefer not to say</b>	9
<b>Unsure</b>	33
<b>Yes</b>	105

Table 258: Asian and Pacific States - 'Research and innovation should address societal needs.'

	<b>Count</b>
<b>Agree</b>	72
<b>Disagree</b>	1
<b>Neutral</b>	14
<b>Somewhat Agree</b>	35
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	137
<b>Strongly Disagree</b>	5

#### 5.8.4.1.5 RRI Dimension – Responsive and Adaptive to Change

Table 259: Asian and Pacific States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.

<b>In the last 12 months, have you taken steps to ensure your research and innovation work addresses societal needs?</b>	<b>Count</b>
<b>No</b>	22

<b>Not applicable / No opinion</b>	22
<b>Prefer not to say</b>	6
<b>Unsure</b>	33
<b>Yes</b>	187

*Table 260: Asian and Pacific States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.*

<b>To what extent is your research/innovation work guided by a regulatory framework that covers all relevant aspects of social responsibility?</b>	<b>Count</b>
<b>Always</b>	36
<b>Frequently</b>	25
<b>Never</b>	8
<b>Not applicable / No Opinion</b>	31
<b>Occasionally</b>	17
<b>Rarely</b>	26
<b>Sometimes</b>	32
<b>Usually</b>	33

#### 5.8.4.1.6 Stakeholder Categories

*Table 261: Asian and Pacific States - Hours interacting with research performing organisations / academics / researchers in the last 7 days.*

<b>Research Performing Organisations / Academics / Researchers</b>	<b>Count</b>
<b>1-10</b>	133
<b>11-20</b>	32
<b>21-30</b>	23

<b>31-40</b>	19
<b>41-50</b>	6
<b>51-60</b>	1
<b>61-70</b>	1
<b>71+</b>	2

*Table 262: Asian and Pacific States - Hours interacting with research funding organisations in the last 7 days.*

<b>Research Funding Organisations</b>	<b>Count</b>
<b>1-10</b>	103
<b>11-20</b>	6
<b>21-30</b>	1
<b>31-40</b>	1
<b>41-50</b>	1
<b>71+</b>	1

*Table 263: Asian and Pacific States - Hours interacting with industry / small and medium sized enterprise in the last 7 days.*

<b>Industry / small and medium sized enterprise</b>	<b>Count</b>
<b>1-10</b>	91
<b>11-20</b>	9
<b>21-30</b>	3
<b>51-60</b>	1

*Table 264: Asian and Pacific States - Hours interacting with civil society / citizens in the last 7 days.*

Civil society / citizens	Count
1-10	122
11-20	9
31-40	2
41-50	1

Table 265: Asian and Pacific States - Hours interacting with policy makers in the last 7 days.

Policy makers	Count
1-10	112
11-20	5

Table 266: Asian and Pacific States - Hours interacting with NGOs / international organisations in the last 7 days.

NGOs / international organisations	Count
1-10	94
11-20	10
21-30	1
31-40	2
41-50	2

#### 5.8.4.1.7 UN Sustainable Development Goals

Table 267: Asian and Pacific States - Participants' familiarity with the UN SDGs.

	Count
Extremely Familiar	44
Moderately Familiar	75

<b>Not at all Familiar</b>	36
<b>Slightly Familiar</b>	37
<b>Somewhat Familiar</b>	48

*Table 268: Asian and Pacific States - Heard or read about the UN Sustainable Development Goals in the last 30 days.*

<b>In the last 30 days, how much have you heard or read about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	59
<b>2-3 times a week</b>	19
<b>4-6 times per week</b>	12
<b>Daily</b>	14
<b>Not at all</b>	33
<b>Once</b>	29
<b>Once per week</b>	29
<b>Unsure</b>	7

*Table 269: Asian and Pacific States - Thought about the UN Sustainable Development Goals in the last 30 days.*

<b>In the last 30 days, how frequently have you thought about the UN Sustainable Development Goals?</b>	<b>Count</b>
<b>2-3 times</b>	49
<b>2-3 times a week</b>	24
<b>4-6 times per week</b>	13
<b>Daily</b>	17
<b>Not at all</b>	35

<b>Once</b>	29
<b>Once per week</b>	29
<b>Unsure</b>	6

Table 270: Asian and Pacific States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

<b>Question</b>	<b>-1</b>	<b>-2</b>	<b>-3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>[Harmful - Beneficial]</b>	3	1	2	10	17	46	120
<b>[Irrelevant - Relevant]</b>	3	2	3	11	24	46	110
<b>[Unimportant - Important]</b>	1	1	5	6	24	33	131
<b>[Unnecessary - Essential]</b>	4	3	3	9	23	37	121
<b>[Useless - Useful]</b>	1	4	3	14	19	53	106
<b>[Worthless - Valuable]</b>	3	2	4	12	20	39	119

Table 271: Asian and Pacific States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

<b>Question</b>	<b>-1</b>	<b>-2</b>	<b>-3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>[Harmful - Beneficial]</b>	2	2	0	29	18	46	102
<b>[Irrelevant - Relevant]</b>	5	6	5	17	23	44	99
<b>[Unimportant - Important]</b>	2	3	4	21	23	43	103
<b>[Unnecessary - Essential]</b>	3	4	4	28	29	51	80
<b>[Useless - Useful]</b>	4	8	3	22	20	43	99
<b>[Worthless - Valuable]</b>	5	3	2	22	25	41	101

Table 272: Asian and Pacific States - Detailed perspective on UN SDGs.

<b>Question</b>	<b>Agree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Somewhat Agree</b>	<b>Somewhat Disagree</b>	<b>Strongly Agree</b>	<b>Strongly Disagree</b>
<b>'I follow stories in the news about the UN SDGs.'</b>	55	15	37	51	7	20	7
<b>'The UN SDGs are a priority for me.'</b>	53	11	32	49	4	37	4
<b>'The UN SDGs are focused only on long-term financial development.'</b>	30	36	35	18	29	16	21
<b>'The UN SDGs represent legally binding international treaties to protect the environment.'</b>	34	13	34	28	21	43	8
<b>'The UN SDGs should be a priority for my professional field.'</b>	56	9	23	55	1	45	1

### 5.8.4.2 CONTENT ANALYSIS DATA TABLES

*Table 273: Asian and Pacific States - Steps taken to involve individuals / organisations with a diverse range of perspectives and expertise in planning research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	33	24.6%
<b>Engagement with non-academic stakeholders</b>	37	27.6%
<b>Engagement with non-academic stakeholders (general)</b>	33	24.6%
<b>Engagement with non-academic stakeholders (specific steps)</b>	4	3%
<b>Stakeholder type – industry / business</b>	15	11.2%
<b>Stakeholder type – civil society organisation (CSO)</b>	8	6%
<b>Stakeholder type – policy bodies / policymakers</b>	12	9%
<b>Stakeholder type – other non-academic stakeholder type</b>	7	5.2%
<b>Stakeholder type – no stakeholder types indicated (beyond non-academic)</b>	10	7.5%
<b>General dissemination/broadcasting of information about the research/innovation work</b>	10	7.5%
<b>‘In-reach’ to other disciplines, researchers, academics, experts or students</b>	41	30.6%
<b>Steps for building collaboration/teams/consortia with no connection to diversity per se</b>	9	6.7%
<b>Meetings, workshops, focus groups and ‘consultations’</b>	37	27.6%
<b>Unclear / Uncertain</b>	2	1.5%

*Table 274: Asian and Pacific States - Steps taken to promote gender equality in research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
--------------	--------------	----------------

<b>Non-specific, vague, platitude or virtue signalling response</b>	15	15.3%
<b>Gender equality in R&amp;I, within the R&amp;I environment</b>	79	80.6%
<b>Gender equality in R&amp;I, academic (general)</b>	29	29.6%
<b>Gender equality in R&amp;I, academic (specific steps)</b>	51	52%
<b>Supporting female researchers' publications, co-authorship, academic citations</b>	5	5.1%
<b>Integrating gender equality in research participant selection</b>	8	8.2%
<b>Fostering gender equality in research/innovation teams / workforce</b>	19	19.4%
<b>Integrating gender as a substantive dimension/focus of R&amp;I content/practice</b>	15	15.3%
<b>Promotion/ mentorship of female researchers</b>	16	16.3%
<b>Promoting women in R&amp;I decision-making roles and senior positions</b>	5	5.1%
<b>Ensuring gender equality in process of recruitment and selection of R&amp;I staff</b>	2	2%
<b>Promoting gender equality through delivering or attending training</b>	7	7.1%
<b>Participation in or engagement with equality committees</b>	1	1%
<b>Compliance with rules, regulations and legal obligations</b>	5	5.1%
<b>Other gender equality promotion step taken</b>	22	22.4%
<b>Unclear / Uncertain</b>	4	4.1%

Table 275: Asian and Pacific States - Steps taken to include ethnic minorities in research and innovation work.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	12	19%
<b>Racial/ethnic equality within the R&amp;I environment</b>	48	76.2%

<b>Racial/ethnic equality within the R&amp;I environment (general)</b>	25	39.7%
<b>Racial/ethnic equality within the R&amp;I environment (specific steps)</b>	23	36.5%
<b>Supporting racial/ethnic minority researchers' publications, co-authorship, academic citations</b>	1	1.6%
<b>Integrating racial/ethnic equality in research participant selection</b>	13	20.6%
<b>Fostering racial/ethnic equality in research/innovation teams / workforce</b>	11	17.5%
<b>Integrating race/ethnicity as a substantive dimension/focus of R&amp;I content/practice</b>	17	27%
<b>Promotion/ mentorship of ethnic minority researchers/innovators</b>	6	9.5%
<b>Promoting ethnic minorities in R&amp;I decision-making roles and senior positions</b>	1	1.6%
<b>Ensuring racial/ethnic equality in process of recruitment and selection of R&amp;I staff</b>	5	7.9%
<b>Promoting racial/ethnic equality through delivering or attending training</b>	1	1.6%
<b>Participation in or engagement with relevant equality committees</b>	1	1.6%
<b>Compliance with rules, regulations and legal obligations</b>	3	4.8%
<b>Other racial/ethnic equality promotion step taken</b>	7	11.1%
<b>Downplaying, minimising and excusing ethnic diversity issues in R&amp;I</b>	2	3.2%
<b>Unclear / Uncertain</b>	2	3.2%

Table 276: Asian and Pacific States - Steps taken to ensure that ethical principles guide research and innovation work.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	28	24.8%

<b>Integrating Ethics in R&amp;I work</b>	85	75.2%
<b>Ethics in R&amp;I work (general)</b>	64	56.6%
<b>Ethics in R&amp;I work (specific steps)</b>	20	17.7%
<b>Integrating ethics through participatory methods</b>	4	3.5%
<b>Integrating ethics through shared ownership of the research/research outputs</b>	1	0.9%
<b>Ensuring informed consent with participants</b>	8	7.1%
<b>Ensuring participant anonymisation or confidentiality</b>	2	1.8%
<b>Ensuring open access to research methods and outputs</b>	2	1.8%
<b>Ensuring that R&amp;I outputs are used to deliver positive societal impact</b>	2	1.8%
<b>Integrating research ethics as a substantive focus of respondent's R&amp;I content/practice</b>	4	3.5%
<b>Promoting research ethics through delivering or attending training</b>	5	4.4%
<b>Participation in or engagement with ethics committees</b>	45	39.8%
<b>Compliance with rules, regulations, and legal obligations</b>	13	11.5%
<b>Integrating ethics through respecting intellectual property rights and academic referencing</b>	7	6.2%
<b>Reporting of unethical ethical conduct</b>	1	0.9%
<b>Other research ethics step taken</b>	13	11.5%

Table 277: Asian and Pacific States - Steps taken to ensure research and innovation methods/processes are open and transparent.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	15	11.2%
<b>Pathways to open/transparent R&amp;I methods and processes</b>	67	50%

<b>Pathways to open/transparent R&amp;I methods and processes (general)</b>	25	18.7%
<b>Pathways to open/transparent R&amp;I methods and processes (specific steps)</b>	43	32.1%
<b>Documenting/reporting research and decision-making processes</b>	33	24.6%
<b>Disclosing research data, raw data, codes, and statistics</b>	10	7.5%
<b>Seeking upstream academic/researcher feedback on research ideas or plans</b>	11	8.2%
<b>Seeking upstream feedback on research ideas/plans from non-academics/nonresearchers</b>	7	5.2%
<b>Seeking approval for methods/processes in research applications</b>	4	3%
<b>Participation in or engagement with relevant committees</b>	4	3%
<b>Other step taken to ensure R&amp;I openness and transparency</b>	8	6%
<b>One-way dissemination with no reference to research methods/processes or transparency/openness per se</b>	67	50%
<b>Open access publication</b>	14	10.4%

Table 278: Asian and Pacific States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	6	4.1%
<b>Public accessibility of R&amp;I results</b>	94	63.5%
<b>Public accessibility of R&amp;I results (general)</b>	12	8.1%
<b>Public accessibility of R&amp;I results (specific steps)</b>	85	57.4%
<b>Institutional- or project-based/supported publishing of research findings (outside of scholarly publishing)</b>	6	4.1%
<b>Publishing/disseminating R&amp;I outputs using institutional open access repositories or external open access databases</b>	10	6.8%

<b>Personally publishing/disseminating R&amp;I outputs to the public outside of scholarly publishing</b>	27	18.2%
<b>Engaging with non-academic/public stakeholders through outreach activities after research is completed</b>	21	14.2%
<b>Promoting R&amp;I results in the media</b>	14	9.5%
<b>Open access scholarly publishing</b>	26	17.6%
<b>Efforts to facilitate public understanding of R&amp;I results</b>	2	1.4%
<b>Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research</b>	3	2%
<b>Other step taken to make R&amp;I results available to the public</b>	6	4.1%
<b>Sharing R&amp;I work within professional R&amp;I stakeholder environments</b>	64	43.2%
<b>Unclear / Uncertain</b>	4	2.7%

*Table 279: Asian and Pacific States - Steps taken to make the data from research and innovation activities freely available to the public.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	22	25.9%
<b>Confusing open access to research findings and open data</b>	44	51.8%
<b>Public availability of R&amp;I data</b>	18	21.2%
<b>Public availability of R&amp;I data (general)</b>	10	11.8%
<b>Public availability of R&amp;I data (specific steps)</b>	8	9.4%
<b>Publishing research data to institutional/project websites</b>	1	1.2%
<b>Personally publishing/distributing R&amp;I data</b>	2	2.4%
<b>Publishing data in public repositories</b>	5	5.9%
<b>Establishment or compliance with regulations on open data</b>	1	1.2%

<b>Other step taken to make research data available to the public</b>	12	14.1%
<b>Resisting/delimiting open data or supporting closed data</b>	2	2.4%

*Table 280: Asian and Pacific States - Steps taken to ensure research and innovation work addresses societal needs.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	14	9.7%
<b>Addressing societal needs in R&amp;I work</b>	129	89%
<b>Addressing societal needs in R&amp;I work (general)</b>	83	57.2%
<b>Addressing societal needs in R&amp;I work (specific steps)</b>	49	33.8%
<b>Participatory process: research topic/problem defined by societal needs</b>	10	6.9%
<b>Selection of research topic/problem defined by researchers' perceptions of societal needs</b>	74	51%
<b>Participatory process: research design/approach defined by societal needs</b>	4	2.8%
<b>Societal issues as a substantive dimension in R&amp;I content/focus</b>	18	12.4%
<b>Reflecting on/evaluating R&amp;I impact on societal needs</b>	2	1.4%
<b>Compliance with institutional/funding requirements</b>	1	0.7%
<b>Communicating R&amp;I work/activities to public/non-academic stakeholders</b>	14	9.7%
<b>Other step taken to address societal needs in R&amp;I work</b>	22	15.2%
<b>Unclear / Uncertain</b>	3	2.1%

*Table 281: Asian and Pacific States - Steps taken to ensure that the way work is done does not cause concerns for society.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
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<b>Non-specific, vague, platitude or virtue signalling response</b>	15	15.8%
<b>Addressing societal concerns about implementation of R&amp;I work</b>	79	83.2%
<b>Addressing societal concerns in R&amp;I work (general)</b>	45	47.4%
<b>Addressing societal concerns in R&amp;I work (specific steps)</b>	34	35.8%
<b>Seeking upstream feedback from non-R&amp;I stakeholders on R&amp;I ideas/plans</b>	12	12.6%
<b>Making the research directly responsive to societal needs or concerns</b>	3	3.2%
<b>Seeking upstream feedback from other R&amp;I stakeholders on R&amp;I ideas/plans</b>	9	9.5%
<b>Addressing societal concerns as substantive dimension of the R&amp;I work</b>	9	9.5%
<b>Compliance with rules, regulations, or legal obligations</b>	14	14.7%
<b>Mitigating or preventing societal concerns through delivering or attending training</b>	7	7.4%
<b>Participation in or engagement with relevant committees</b>	17	17.9%
<b>Ensuring integrity in R&amp;I processes involving human participants</b>	11	11.6%
<b>Preventing societal concerns resulting from R&amp;I work by following responsible safety and waste practices to avoid damage</b>	7	7.4%
<b>Ensuring positive outcomes for society, without explicitly mentioning the prevention of societal concerns</b>	3	3.2%
<b>Other step taken to consider societal concerns in R&amp;I work</b>	13	13.7%
<b>Unclear / Uncertain</b>	3	3.2%

Table 282: Asian and Pacific States - What comes to mind when you think of 'responsible research and innovation'?

<b>Label</b>	<b>Count</b>	<b>Percent</b>
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<b>Non-specific, vague, platitude or virtue signalling response</b>	50	35%
<b>Ideas, practices or policies associated with RRI</b>	87	60.8%
<b>Aligning research and innovation with societal benefits</b>	47	32.9%
<b>Integrating / anticipating public perspectives in research and innovation</b>	9	6.3%
<b>Do no harm to people/society/participants with R&amp;I</b>	14	9.8%
<b>Protecting the environment, preventing negative impacts of research and innovation on the environment</b>	8	5.6%
<b>Orientating research and innovation towards generating improved technologies/outputs</b>	1	0.7%
<b>Empowering non-academic stakeholders to shape the direction of R&amp;I</b>	2	1.4%
<b>Open and honest science</b>	6	4.2%
<b>Engaging / communicating with non-academic stakeholders or publics about research and innovation activities</b>	3	2.1%
<b>Ensuring ethical procedures and approvals are completed in R&amp;I work</b>	8	5.6%
<b>Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty</b>	8	5.6%
<b>Ensuring ethnic/racial diversity in research and innovation activities</b>	1	0.7%
<b>Ensuring gender equality in research and innovation activities</b>	1	0.7%
<b>Ensuring norms/practices evincing research integrity and high professional standards</b>	10	7%
<b>Following formal/official research guidelines and regulations</b>	5	3.5%
<b>Sharing research and innovation results and data within the academic community</b>	2	1.4%
<b>Associating RRI with certain research and innovation areas/fields</b>	1	0.7%

<b>Other association with RRI</b>	9	6.3%
<b>Associating RRI with the EU and Horizon 2020</b>	4	2.8%
<b>Unclear / Uncertain</b>	2	1.4%

*Table 283: Asian and Pacific States - What comes to mind when you think of the UN Sustainable Development Goals?.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	56	35%
<b>Defining sustainable development</b>	81	50.6%
<b>Integrating/balancing different aspects of sustainable development</b>	2	1.2%
<b>Educational aspects of sustainable development</b>	10	6.2%
<b>Economic aspects of sustainable development</b>	42	26.2%
<b>Integrating economic and environmental aspects of sustainable development</b>	14	8.8%
<b>Preserving natural resources</b>	23	14.4%
<b>Health-related aspects of sustainable development</b>	8	5%
<b>Diversity/inclusion aspects of sustainable development</b>	29	18.1%
<b>Addressing climate change</b>	16	10%
<b>Other aspects of sustainable development</b>	7	4.4%
<b>Governance dimensions of SDGs</b>	13	8.1%
<b>Achieving the SDGs</b>	7	4.4%
<b>Contribution of technological innovation to sustainable development</b>	1	0.6%
<b>Other implementation actions to achieve SDGs</b>	6	3.8%
<b>Integrating SDGs within formal education</b>	1	0.6%
<b>General Criticism of the UN SDGs</b>	9	5.6%

<b>Unclear / Uncertain</b>	<b>2</b>	<b>1.2%</b>
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Table 284: Asian and Pacific States - Number of valid responses by code.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Diverse Perspectives</b>	135	57%
<b>Gender Equality</b>	95	40.1%
<b>Ethics of Research</b>	64	27%
<b>Ethnic Minorities</b>	114	48.1%
<b>Research Transparency</b>	133	56.1%
<b>Public Accessibility of Research Findings</b>	148	62.4%
<b>Open Data</b>	85	35.9%
<b>Societal Needs Addressed in Research</b>	143	60.3%
<b>Societal Concerns</b>	94	39.7%
<b>Associations with RRI</b>	143	60.3%
<b>Associations with UN SDGs</b>	161	67.9%

## 5.8.5 DATA TABLES FOR LATIN-AMERICAN AND CARIBBEAN STATES

### 5.8.5.1 CLOSED-ENDED SURVEY QUESTION DATA TABLES

#### 5.8.5.1.1 Socio-Demographics

Table 285: Latin-American and Caribbean States - Distribution of age.

In what year were you born?	Count
18-28	97
29-38	43
39-48	34
49-58	36
59-68	20
69+	2

Table 286: Latin-American and Caribbean States - Distribution of gender.

Please indicate if you are...	Count
Female	106
Male	126
Other	2
Prefer not to say	3

Table 287: Latin-American and Caribbean States - Currently studying at school, college or university.

Are you currently a student at school, college or university?	Count
No	103
Unsure	1
Yes	129

Table 288: Latin-American and Caribbean States - Highest level of formal education completed.

<b>What is the highest level of formal education you have completed?</b>	<b>Count</b>
<b>Bachelor's (or equivalent)</b>	95
<b>Doctoral (or equivalent)</b>	54
<b>Master's (or equivalent)</b>	60
<b>Other (please specify)</b>	20
<b>Prefer not to say</b>	4

Table 289: Latin-American and Caribbean States - Distribution of degrees by subject area (multiple choice).

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Education</b>	27	8.8%
<b>Arts and humanities</b>	13	4.2%
<b>Social sciences, journalism and information</b>	24	7.8%
<b>Business, administration and law</b>	24	7.8%
<b>Natural sciences, mathematics and statistics</b>	71	23.2%
<b>Information and Communication Technologies (ICTs)</b>	33	10.8%
<b>Engineering, manufacturing and construction</b>	59	19.3%
<b>Agriculture, forestry, fisheries and veterinary</b>	17	5.6%
<b>Health and welfare</b>	7	2.3%
<b>Services</b>	4	1.3%
<b>Other</b>	27	8.8%

Table 290: Latin-American and Caribbean States - Years of experience as professional / since completing PhD (log scale).

<b>Question</b>	<b>1-10</b>	<b>11-20</b>	<b>21-30</b>	<b>31-40</b>	<b>41-50</b>	<b>51-60</b>
<b>Professional</b>	28	27	34	10	2	1
<b>Since completing PhD</b>	26	13	1	1		

Table 291: Latin-American and Caribbean States - Fields or professions in which respondents work.

<b>In which field do you work?</b>	<b>Count</b>
<b>Agricultural sciences</b>	14
<b>Engineering and technology</b>	105
<b>Humanities</b>	12
<b>Medical and health sciences</b>	7
<b>Natural sciences, mathematics and statistics</b>	43
<b>Other (please specify)</b>	18
<b>Prefer not to say</b>	2
<b>Social sciences</b>	30

Table 292: Latin-American and Caribbean States - Sub-fields of natural sciences.

<b>Which sub-field of natural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Biological sciences</b>	9
<b>Chemical sciences</b>	4
<b>Computer and information sciences</b>	1
<b>Earth and related environmental sciences</b>	11
<b>Mathematics</b>	5
<b>Other</b>	5

<b>Physical sciences</b>	<b>9</b>
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Table 293: Latin-American and Caribbean States - Sub-fields of medical and health sciences.

<b>Which sub-field of medical and health sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Basic medicine</b>	<b>3</b>
<b>Health sciences</b>	<b>4</b>
<b>Other (please specify)</b>	<b>1</b>

Table 294: Latin-American and Caribbean States - Sub-fields of engineering and technology.

<b>Which sub-field of engineering and technology best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Chemical Engineering</b>	<b>3</b>
<b>Civil engineering</b>	<b>1</b>
<b>Electrical/electronic/information engineering</b>	<b>17</b>
<b>Environmental engineering</b>	<b>6</b>
<b>Industrial biotechnology</b>	<b>10</b>
<b>Materials engineering</b>	<b>6</b>
<b>Mechanical engineering</b>	<b>18</b>
<b>Nano-technology</b>	<b>1</b>
<b>Other</b>	<b>39</b>
<b>Prefer not to say</b>	<b>4</b>

Table 295: Latin-American and Caribbean States - Sub-fields of agricultural sciences.

<b>Which sub-field of agricultural sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Agriculture, forestry, and fisheries</b>	8
<b>Animal and dairy science</b>	1
<b>Other</b>	5
<b>Veterinary science</b>	1

Table 296: Latin-American and Caribbean States - Sub fields of social sciences.

<b>Which sub-field of social sciences best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>Economics and business</b>	7
<b>Educational sciences</b>	4
<b>Law</b>	2
<b>Media and communication</b>	5
<b>Other</b>	6
<b>Political science</b>	2
<b>Psychology</b>	2
<b>Social and economic geography</b>	1
<b>Sociology</b>	2

Table 297: Latin-American and Caribbean States - Sub-fields of humanities.

<b>Which sub-field of humanities best encompasses the type of research and innovation activities you are involved in?</b>	<b>Count</b>
<b>History and archaeology</b>	4
<b>Other</b>	7

<b>Philosophy, ethics and religion</b>	<b>1</b>
<b>Prefer not to say</b>	<b>1</b>

Table 298: Latin-American and Caribbean States - Sectors in which participants work[ed] in.

<b>In what type of organisation do you work (or have you most recently worked)?</b>	<b>Count</b>
<b>Civil society/non-governmental organisation</b>	<b>15</b>
<b>Industry (large)</b>	<b>15</b>
<b>National governmental organisation</b>	<b>18</b>
<b>Other (please specify)</b>	<b>16</b>
<b>Policy</b>	<b>6</b>
<b>Prefer not to say</b>	<b>43</b>
<b>Small and medium-size enterprise [&lt; 250 employees]</b>	<b>37</b>
<b>University or similar research performing organisation</b>	<b>82</b>

Table 299: Latin-American and Caribbean States - Participants' employment status.

<b>What is your current employment status?</b>	<b>Count</b>
<b>Employed full-time</b>	<b>92</b>
<b>Employed part-time</b>	<b>20</b>
<b>Other (please specify)</b>	<b>11</b>
<b>Prefer not to say</b>	<b>1</b>
<b>Retired</b>	<b>7</b>
<b>Self-employed</b>	<b>15</b>
<b>Student only</b>	<b>73</b>
<b>Unemployed (looking for work)</b>	<b>8</b>

<b>Unemployed (not looking for work)</b>	<b>5</b>
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Table 300: Latin-American and Caribbean States - Hours spent on activities in the last 7 days (log scale).

<b>Question</b>	<b>1-10</b>	<b>11-20</b>	<b>21-30</b>	<b>31-40</b>	<b>41-50</b>	<b>51-60</b>	<b>71+</b>
<b>Administration unrelated to research/innovation</b>	90	12	9				
<b>Management or supervision of staff/students</b>	93	14	3	3	1		2
<b>Public engagement (all types)</b>	112	8	3	3	1		
<b>Research or innovation work</b>	91	36	29	11	4	2	3
<b>Seeking or managing research/innovation funding</b>	88	13	3	1		1	
<b>Teaching or capacity building (including training)</b>	96	20	6	5	3	1	

Table 301: Latin-American and Caribbean States - Years that respondents worked in their current role / as researcher or innovator (log scale).

<b>Question</b>	<b>1-10</b>	<b>11-20</b>	<b>21-30</b>	<b>31-40</b>
<b>...as researcher or innovator</b>	71	41	18	2
<b>...in their current role</b>	93	32	7	

Table 302: Latin-American and Caribbean States - Domains relating to participants' recent work.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Digital (ICT)</b>	37	16%
<b>Energy</b>	20	8.7%
<b>Bio-economy</b>	16	6.9%

<b>Waste Management</b>	21	9.1%
<b>None of these</b>	137	59.3%

#### 5.8.5.1.2 RRI Dimension – Diverse and Inclusive

*Table 303: Latin-American and Caribbean States - 'It is important to involve individuals/organisations with a diverse range of perspectives and expertise when planning my research and innovation work.'*

	<b>Count</b>
<b>Agree</b>	70
<b>Disagree</b>	7
<b>Neutral</b>	20
<b>Somewhat Agree</b>	20
<b>Somewhat Disagree</b>	3
<b>Strongly Agree</b>	83
<b>Strongly Disagree</b>	7

*Table 304: Latin-American and Caribbean States - Involved individuals/organisations with a diverse range of perspectives and expertise when planning research and innovation work in the past 12 months.*

<b>In the last 12 months, have you involved individuals/organisations with a diverse range of perspectives and expertise when planning your research and innovation work?</b>	<b>Count</b>
<b>No</b>	56
<b>Not applicable / No opinion</b>	34
<b>Prefer not to say</b>	4
<b>Unsure</b>	28
<b>Yes</b>	99

*Table 305: Latin-American and Caribbean States - Sectors participants involved in research and innovation practice.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	78	22.4%
<b>Primary / Secondary school education</b>	24	6.9%
<b>Government agency</b>	49	14.1%
<b>Industry / Commercial</b>	24	6.9%
<b>Non-profit organisation</b>	40	11.5%
<b>Research organisation</b>	34	9.8%
<b>Research funding organisation</b>	33	9.5%
<b>Journalism / Media</b>	15	4.3%
<b>General public</b>	37	10.6%
<b>Other</b>	14	4%

*Table 306: Latin-American and Caribbean States - Sectors participants involved in research and innovation dissemination.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>University or college</b>	68	19.9%
<b>Primary / Secondary school education</b>	20	5.9%
<b>Government agency</b>	44	12.9%
<b>Industry / Commercial</b>	17	5%
<b>Non-profit organisation</b>	44	12.9%
<b>Research organisation</b>	33	9.7%
<b>Research funding organisation</b>	29	8.5%
<b>Journalism / Media</b>	31	9.1%

<b>General public</b>	45	13.2%
<b>Other</b>	10	2.9%

Table 307: Latin-American and Caribbean States - 'It is important to promote gender equality in my research and innovation work.'

	<b>Count</b>
<b>Agree</b>	38
<b>Disagree</b>	6
<b>Neutral</b>	11
<b>Somewhat Agree</b>	13
<b>Somewhat Disagree</b>	3
<b>Strongly Agree</b>	127
<b>Strongly Disagree</b>	8

Table 308: Latin-American and Caribbean States - Promoted gender equality in research and innovation work in the past 12 months.

<b>In the last 12 months, have you taken steps to promote gender equality in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	41
<b>Not applicable / No opinion</b>	43
<b>Prefer not to say</b>	7
<b>Unsure</b>	35
<b>Yes</b>	91

Table 309: Latin-American and Caribbean States - 'It is important to include ethnic minorities in my research and innovation work.'

	<b>Count</b>
<b>Agree</b>	50
<b>Disagree</b>	9
<b>Neutral</b>	29
<b>Somewhat Agree</b>	20
<b>Somewhat Disagree</b>	3
<b>Strongly Agree</b>	84
<b>Strongly Disagree</b>	5

*Table 310: Latin-American and Caribbean States - Took steps to include ethnic minorities in research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken any steps to include ethnic minorities in your research and innovation work?</b>	<b>Count</b>
<b>No</b>	61
<b>Not applicable / No opinion</b>	64
<b>Prefer not to say</b>	8
<b>Unsure</b>	29
<b>Yes</b>	55

*Table 311: Latin-American and Caribbean States - 'Ethical principles guide my research and innovation work'.*

	<b>Count</b>
<b>Agree</b>	49
<b>Disagree</b>	5
<b>Neutral</b>	19

<b>Somewhat Agree</b>	4
<b>Somewhat Disagree</b>	0
<b>Strongly Agree</b>	117
<b>Strongly Disagree</b>	5

*Table 312: Latin-American and Caribbean States - Took steps to ensure that ethical principles guide research and innovation work in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure that ethical principles guide your research and innovation work?</b>	<b>Count</b>
<b>No</b>	28
<b>Not applicable / No opinion</b>	47
<b>Prefer not to say</b>	9
<b>Unsure</b>	22
<b>Yes</b>	106

*Table 313: Latin-American and Caribbean States - Statements related to working in research and innovation.*

<b>Question</b>	<b>Agree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Somewhat Agree</b>	<b>Somewhat Disagree</b>	<b>Strongly Agree</b>	<b>Strongly Disagree</b>
<b>'Access to research and innovation work should be allowed only after all findings have been published in</b>	38	19	15	33	17	16	21

<b>peer reviewed journals.'</b>							
<b>'Ethnic differences are irrelevant in my work.'</b>	27	19	20	12	9	33	30
<b>'Gender is irrelevant in my work.'</b>	32	22	17	5	9	36	33
<b>'I feel a professional responsibility to communicate findings from my research or innovation work to public audiences.'</b>	50	3	12	16	2	72	1
<b>'It is important to maintain an equal number of men and women in research and innovation teams.'</b>	33	6	30	28	6	48	3
<b>'It is important to take ethnic diversity into account when developing my research and innovation work.'</b>	41	5	25	19	4	53	1

<b>'It is important to take gender into account when developing my research and innovation work.'</b>	21	18	23	19	9	52	7
<b>'My organisation encourages me to communicate findings from my research or innovation work to public audiences.'</b>	27	4	25	17	12	49	7
<b>'My primary organisation where I work discourages me from communicating the results of my research or innovation work to public audiences.'</b>	6	18	12	2	7	2	31
<b>'The best time to talk to public audiences about my research and innovation work is at the very end of the</b>	28	23	15	37	21	12	22

<b>process after all the work has been completed.'</b>							
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#### 5.8.5.1.3 RRI Dimension – Anticipative and Reflective

*Table 314: Latin-American and Caribbean States - 'It is important to ensure that the way I do my research and innovation work does not cause concerns for society.'*

	<b>Count</b>
<b>Agree</b>	53
<b>Disagree</b>	9
<b>Neutral</b>	22
<b>Somewhat Agree</b>	23
<b>Somewhat Disagree</b>	6
<b>Strongly Agree</b>	86
<b>Strongly Disagree</b>	8

*Table 315: Latin-American and Caribbean States - Ensured work does not cause concerns for society in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure the way you do your work does not cause concerns for society?</b>	<b>Count</b>
<b>No</b>	40
<b>Not applicable / No opinion</b>	60
<b>Prefer not to say</b>	7
<b>Unsure</b>	48
<b>Yes</b>	62

#### 5.8.5.1.4 RRI Dimension – Open and Transparent

Table 316: Latin-American and Caribbean States - 'It is important to make my research and innovation methods/processes open and transparent.'

	Count
<b>Agree</b>	47
<b>Disagree</b>	4
<b>Neutral</b>	10
<b>Somewhat Agree</b>	15
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	126
<b>Strongly Disagree</b>	8

Table 317: Latin-American and Caribbean States - Ensured research and innovation methods/processes are open and transparent in the past 12 months.

In the last 12 months, have you taken steps to ensure your research and innovation methods/processes are open and transparent?	Count
<b>No</b>	29
<b>Not applicable / No opinion</b>	38
<b>Prefer not to say</b>	5
<b>Unsure</b>	48
<b>Yes</b>	99

Table 318: Latin-American and Caribbean States - 'It is important to make the results of my research and innovations work accessible to as wide a public as possible'.

	Count
<b>Agree</b>	45

<b>Disagree</b>	4
<b>Neutral</b>	12
<b>Somewhat Agree</b>	17
<b>Somewhat Disagree</b>	1
<b>Strongly Agree</b>	124
<b>Strongly Disagree</b>	8

*Table 319: Latin-American and Caribbean States - Took steps to make the results of research and innovation work accessible to as wide a public as possible in the past 12 months.*

<b>In the last 12 months, have you taken steps to make the results of your research and innovation work accessible to as wide a public as possible?</b>	<b>Count</b>
<b>No</b>	38
<b>Not applicable / No opinion</b>	39
<b>Prefer not to say</b>	6
<b>Unsure</b>	38
<b>Yes</b>	97

*Table 320: Latin-American and Caribbean States - 'It is important to make data from my research and innovation activities freely available to the public'.*

	<b>Count</b>
<b>Agree</b>	54
<b>Disagree</b>	5
<b>Neutral</b>	20
<b>Somewhat Agree</b>	32
<b>Somewhat Disagree</b>	10

<b>Strongly Agree</b>	81
<b>Strongly Disagree</b>	4

*Table 321: Latin-American and Caribbean States - Took steps to make data from research and innovation activities freely available to the public in the past 12 months.*

<b>In the last 12 months, have you taken steps to make data from your research and innovation activities freely available to the public?</b>	<b>Count</b>
<b>No</b>	53
<b>Not applicable / No opinion</b>	46
<b>Prefer not to say</b>	6
<b>Unsure</b>	36
<b>Yes</b>	76

*Table 322: Latin-American and Caribbean States - 'Research and innovation should address societal needs.'*

	<b>Count</b>
<b>Agree</b>	55
<b>Disagree</b>	8
<b>Neutral</b>	15
<b>Somewhat Agree</b>	15
<b>Somewhat Disagree</b>	5
<b>Strongly Agree</b>	109
<b>Strongly Disagree</b>	5

#### 5.8.5.1.5 RRI Dimension – Responsive and Adaptive to Change

*Table 323: Latin-American and Caribbean States - Took steps to ensure research and innovation work addresses societal needs in the past 12 months.*

<b>In the last 12 months, have you taken steps to ensure your research and innovation work addresses societal needs?</b>	<b>Count</b>
<b>No</b>	41
<b>Not applicable / No opinion</b>	37
<b>Prefer not to say</b>	7
<b>Unsure</b>	32
<b>Yes</b>	101

*Table 324: Latin-American and Caribbean States - Extent to which research/innovation work is guided by a regulatory framework that covers all relevant aspects of social responsibility.*

<b>To what extent is your research/innovation work guided by a regulatory framework that covers all relevant aspects of social responsibility?</b>	<b>Count</b>
<b>Always</b>	24
<b>Frequently</b>	24
<b>Never</b>	13
<b>Not applicable / No Opinion</b>	38
<b>Occasionally</b>	8
<b>Rarely</b>	24
<b>Sometimes</b>	17
<b>Usually</b>	17

#### 5.8.5.1.6 Stakeholder Categories

*Table 325: Latin-American and Caribbean States - Hours interacting with research performing organisations / academics / researchers in the last 7 days.*

<b>Research Performing Organisations / Academics / Researchers</b>	<b>Count</b>
<b>1-10</b>	84

<b>11-20</b>	31
<b>21-30</b>	16
<b>31-40</b>	14
<b>41-50</b>	1
<b>51-60</b>	1
<b>71+</b>	2

*Table 326: Latin-American and Caribbean States - Hours interacting with research funding organisations in the last 7 days.*

<b>Research Funding Organisations</b>	<b>Count</b>
<b>1-10</b>	57
<b>11-20</b>	4
<b>21-30</b>	3
<b>31-40</b>	1

*Table 327: Latin-American and Caribbean States - Hours interacting with industry / small and medium sized enterprise in the last 7 days.*

<b>Industry / small and medium sized enterprise</b>	<b>Count</b>
<b>1-10</b>	73
<b>11-20</b>	9
<b>21-30</b>	4
<b>31-40</b>	4
<b>41-50</b>	1

*Table 328: Latin-American and Caribbean States - Hours interacting with civil society / citizens in the last 7 days.*

<b>Civil society / citizens</b>	<b>Count</b>
<b>1-10</b>	84
<b>11-20</b>	22
<b>21-30</b>	5
<b>31-40</b>	2
<b>41-50</b>	3
<b>51-60</b>	1
<b>61-70</b>	1
<b>71+</b>	3

*Table 329: Latin-American and Caribbean States - Hours interacting with policy makers in the last 7 days.*

<b>Policy makers</b>	<b>Count</b>
<b>1-10</b>	42
<b>11-20</b>	4
<b>21-30</b>	2
<b>31-40</b>	1
<b>61-70</b>	1

*Table 330: Latin-American and Caribbean States - Hours interacting with NGOs / international organisations in the last 7 days.*

<b>NGOs / international organisations</b>	<b>Count</b>
<b>1-10</b>	52
<b>11-20</b>	4
<b>21-30</b>	1

### 5.8.5.1.7 UN Sustainable Development Goals

Table 331: Latin-American and Caribbean States - Participants' familiarity with the UN SDGs.

	Count
<b>Extremely Familiar</b>	32
<b>Moderately Familiar</b>	53
<b>Not at all Familiar</b>	82
<b>Slightly Familiar</b>	13
<b>Somewhat Familiar</b>	22

Table 332: Latin-American and Caribbean States - Heard or read about the UN Sustainable Development Goals in the last 30 days.

<b>In the last 30 days, how much have you heard or read about the UN Sustainable Development Goals?</b>	Count
<b>2-3 times</b>	29
<b>2-3 times a week</b>	4
<b>4-6 times per week</b>	5
<b>Daily</b>	11
<b>Not at all</b>	23
<b>Once</b>	26
<b>Once per week</b>	19
<b>Unsure</b>	4

Table 333: Latin-American and Caribbean States - Thought about the UN Sustainable Development Goals in the last 30 days.

<b>In the last 30 days, how frequently have you thought about the UN Sustainable Development Goals?</b>	Count
---------------------------------------------------------------------------------------------------------	-------

<b>2-3 times</b>	26
<b>2-3 times a week</b>	15
<b>4-6 times per week</b>	6
<b>Daily</b>	19
<b>Not at all</b>	20
<b>Once</b>	13
<b>Once per week</b>	12
<b>Unsure</b>	10

Table 334: Latin-American and Caribbean States - Semantic differentials on thoughts about the UN Sustainable Development Goals in general.

<b>Question</b>	<b>-1</b>	<b>-2</b>	<b>-3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>[Harmful - Beneficial]</b>	1	0	1	5	13	20	79
<b>[Irrelevant - Relevant]</b>	3	1	3	2	13	16	82
<b>[Unimportant - Important]</b>	0	1	3	3	5	19	88
<b>[Unnecessary - Essential]</b>	0	1	2	7	8	28	73
<b>[Useless - Useful]</b>	1	2	2	6	11	23	74
<b>[Worthless - Valuable]</b>	3	3	2	5	6	23	77

Table 335: Latin-American and Caribbean States - Semantic differentials on thoughts about the UN Sustainable Development Goals for research/innovation work.

<b>Question</b>	<b>-1</b>	<b>-2</b>	<b>-3</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>[Harmful - Beneficial]</b>	3	0	0	14	11	29	62
<b>[Irrelevant - Relevant]</b>	3	0	0	12	12	28	64
<b>[Unimportant - Important]</b>	1	3	0	12	10	30	63

<b>[Unnecessary - Essential]</b>	1	2	0	14	25	25	52
<b>[Useless - Useful]</b>	2	2	0	10	12	29	64
<b>[Worthless - Valuable]</b>	3	3	1	13	14	28	57

Table 336: Latin-American and Caribbean States - Detailed perspective on UN SDGs.

<b>Question</b>	<b>Agree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Somewhat Agree</b>	<b>Somewhat Disagree</b>	<b>Strongly Agree</b>	<b>Strongly Disagree</b>
'I follow stories in the news about the UN SDGs.'	27	10	32	20	4	12	4
'The UN SDGs are a priority for me.'	42	3	18	26	2	21	2
'The UN SDGs are focused only on long-term financial development.'	12	31	13	16	19	1	20
'The UN SDGs represent legally binding international treaties to protect the	46	6	11	24	2	19	2

<b>environment.</b>							
<b>'The UN SDGs should be a priority for my professional field.'</b>	41	1	11	22	3	35	2

### 5.8.5.2 CONTENT ANALYSIS DATA TABLES

*Table 337: Latin-American and Caribbean States - Steps taken to involve individuals / organisations with a diverse range of perspectives and expertise in planning research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	16	20%
<b>Engagement with non-academic stakeholders</b>	24	30%
<b>Engagement with non-academic stakeholders (general)</b>	16	20%
<b>Engagement with non-academic stakeholders (specific steps)</b>	8	10%
<b>Stakeholder type – industry / business</b>	7	8.8%
<b>Stakeholder type – civil society organisation (CSO)</b>	6	7.5%
<b>Stakeholder type – policy bodies / policymakers</b>	7	8.8%
<b>Stakeholder type – other non-academic stakeholder type</b>	8	10%
<b>Stakeholder type – no stakeholder types indicated (beyond non-academic)</b>	6	7.5%
<b>General dissemination/broadcasting of information about the research/innovation work</b>	11	13.8%
<b>'In-reach' to other disciplines, researchers, academics, experts or students</b>	22	27.5%

<b>Steps for building collaboration/teams/consortia with no connection to diversity per se</b>	8	10%
<b>Meetings, workshops, focus groups and ‘consultations’</b>	19	23.8%
<b>Unclear / Uncertain</b>	3	3.8%

*Table 338: Latin-American and Caribbean States - Steps taken to promote gender equality in research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	14	20%
<b>Gender equality in R&amp;I, within the R&amp;I environment</b>	54	77.1%
<b>Gender equality in R&amp;I, academic (general)</b>	21	30%
<b>Gender equality in R&amp;I, academic (specific steps)</b>	33	47.1%
<b>Integrating gender equality in research participant selection</b>	4	5.7%
<b>Fostering gender equality in research/innovation teams / workforce</b>	15	21.4%
<b>Integrating gender as a substantive dimension/focus of R&amp;I content/practice</b>	8	11.4%
<b>Promotion/ mentorship of female researchers</b>	2	2.9%
<b>Promoting women in R&amp;I decision-making roles and senior positions</b>	1	1.4%
<b>Promoting gender equality through delivering or attending training</b>	9	12.9%
<b>Participation in or engagement with equality committees</b>	3	4.3%
<b>Compliance with rules, regulations and legal obligations</b>	1	1.4%
<b>Other gender equality promotion step taken</b>	27	38.6%
<b>Unclear / Uncertain</b>	2	2.9%

*Table 339: Latin-American and Caribbean States - Steps taken to include ethnic minorities in research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	9	17.3%
<b>Racial/ethnic equality within the R&amp;I environment</b>	41	78.8%
<b>Racial/ethnic equality within the R&amp;I environment (general)</b>	26	50%
<b>Racial/ethnic equality within the R&amp;I environment (specific steps)</b>	15	28.8%
<b>Integrating racial/ethnic equality in research participant selection</b>	6	11.5%
<b>Fostering racial/ethnic equality in research/innovation teams / workforce</b>	6	11.5%
<b>Integrating race/ethnicity as a substantive dimension/focus of R&amp;I content/practice</b>	17	32.7%
<b>Promotion/ mentorship of ethnic minority researchers/innovators</b>	3	5.8%
<b>Ensuring racial/ethnic equality in process of recruitment and selection of R&amp;I staff</b>	1	1.9%
<b>Promoting racial/ethnic equality through delivering or attending training</b>	1	1.9%
<b>Compliance with rules, regulations and legal obligations</b>	1	1.9%
<b>Other racial/ethnic equality promotion step taken</b>	10	19.2%
<b>Downplaying, minimising and excusing ethnic diversity issues in R&amp;I</b>	1	1.9%

*Table 340: Latin-American and Caribbean States - Steps taken to ensure that ethical principles guide research and innovation work.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	22	29.7%
<b>Integrating Ethics in R&amp;I work</b>	53	71.6%
<b>Ethics in R&amp;I work (general)</b>	40	54.1%

<b>Ethics in R&amp;I work (specific steps)</b>	13	17.6%
<b>Integrating ethics through participatory methods</b>	4	5.4%
<b>Integrating ethics through shared ownership of the research/research outputs</b>	2	2.7%
<b>Ensuring informed consent with participants</b>	5	6.8%
<b>Ensuring participant anonymisation or confidentiality</b>	2	2.7%
<b>Ensuring open access to research methods and outputs</b>	3	4.1%
<b>Integrating research ethics as a substantive focus of respondent's R&amp;I content/practice</b>	3	4.1%
<b>Promoting research ethics through delivering or attending training</b>	4	5.4%
<b>Participation in or engagement with ethics committees</b>	15	20.3%
<b>Compliance with rules, regulations, and legal obligations</b>	11	14.9%
<b>Integrating ethics through respecting intellectual property rights and academic referencing</b>	6	8.1%
<b>Other research ethics step taken</b>	13	17.6%

*Table 341: Latin-American and Caribbean States - Steps taken to ensure research and innovation methods/processes are open and transparent.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	9	11.2%
<b>Pathways to open/transparent R&amp;I methods and processes</b>	40	50%
<b>Pathways to open/transparent R&amp;I methods and processes (general)</b>	15	18.8%
<b>Pathways to open/transparent R&amp;I methods and processes (specific steps)</b>	26	32.5%
<b>Documenting/reporting research and decision-making processes</b>	23	28.7%
<b>Disclosing research data, raw data, codes, and statistics</b>	9	11.2%

<b>Seeking upstream academic/researcher feedback on research ideas or plans</b>	7	8.8%
<b>Seeking upstream feedback on research ideas/plans from non-academics/nonresearchers</b>	4	5%
<b>Seeking approval for methods/processes in research applications</b>	3	3.8%
<b>Participation in or engagement with relevant committees</b>	1	1.2%
<b>Other step taken to ensure R&amp;I openness and transparency</b>	6	7.5%
<b>One-way dissemination with no reference to research methods/processes or transparency/openness per se</b>	38	47.5%
<b>Open access publication</b>	9	11.2%

*Table 342: Latin-American and Caribbean States - Steps taken to make the results of research and innovation work accessible to as wide a public as possible.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	10	11.4%
<b>Public accessibility of R&amp;I results</b>	46	52.3%
<b>Public accessibility of R&amp;I results (general)</b>	2	2.3%
<b>Public accessibility of R&amp;I results (specific steps)</b>	45	51.1%
<b>Institutional- or project-based/supported publishing of research findings (outside of scholarly publishing)</b>	2	2.3%
<b>Publishing/disseminating R&amp;I outputs using institutional open access repositories or external open access databases</b>	4	4.5%
<b>Personally publishing/disseminating R&amp;I outputs to the public outside of scholarly publishing</b>	12	13.6%
<b>Engaging with non-academic/public stakeholders through outreach activities after research is completed</b>	18	20.5%
<b>Promoting R&amp;I results in the media</b>	8	9.1%

<b>Open access scholarly publishing</b>	5	5.7%
<b>Efforts to facilitate public understanding of R&amp;I results</b>	7	8%
<b>Upstream engagement and participatory approaches with non-academic/public stakeholders shaping direction of the research</b>	2	2.3%
<b>Other step taken to make R&amp;I results available to the public</b>	4	4.5%
<b>Sharing R&amp;I work within professional R&amp;I stakeholder environments</b>	48	54.5%
<b>Unclear / Uncertain</b>	4	4.5%

*Table 343: Latin-American and Caribbean States - Steps taken to make the data from research and innovation activities freely available to the public.*

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	15	23.4%
<b>Confusing open access to research findings and open data</b>	37	57.8%
<b>Public availability of R&amp;I data</b>	11	17.2%
<b>Public availability of R&amp;I data (general)</b>	7	10.9%
<b>Public availability of R&amp;I data (specific steps)</b>	5	7.8%
<b>Appending research data to scientific publications</b>	1	1.6%
<b>Publishing research data to institutional/project websites</b>	1	1.6%
<b>Publishing data in public repositories</b>	1	1.6%
<b>Establishment or compliance with regulations on open data</b>	1	1.6%
<b>Other step taken to make research data available to the public</b>	8	12.5%
<b>Resisting/delimiting open data or supporting closed data</b>	1	1.6%
<b>Unclear/Uncertain</b>	1	1.6%

Table 344: Latin-American and Caribbean States - Steps taken to ensure research and innovation work addresses societal needs.

Label	Count	Percent
Non-specific, vague, platitude or virtue signalling response	9	10.3%
Addressing societal needs in R&I work	78	89.7%
Addressing societal needs in R&I work (general)	49	56.3%
Addressing societal needs in R&I work (specific steps)	32	36.8%
Participatory process: research topic/problem defined by societal needs	9	10.3%
Selection of research topic/problem defined by researchers' perceptions of societal needs	27	31%
Participatory process: research design/approach defined by societal needs	7	8%
Societal issues as a substantive dimension in R&I content/focus	12	13.8%
Reflecting on/evaluating R&I impact on societal needs	8	9.2%
Communicating R&I work/activities to public/non-academic stakeholders	14	16.1%
Other step taken to address societal needs in R&I work	14	16.1%

Table 345: Latin-American and Caribbean States - Steps taken to ensure that the way work is done does not cause concerns for society.

Label	Count	Percent
Non-specific, vague, platitude or virtue signalling response	10	19.6%
Addressing societal concerns about implementation of R&I work	38	74.5%
Addressing societal concerns in R&I work (general)	21	41.2%
Addressing societal concerns in R&I work (specific steps)	16	31.4%

<b>Seeking upstream feedback from non-R&amp;I stakeholders on R&amp;I ideas/plans</b>	8	15.7%
<b>Making the research directly responsive to societal needs or concerns</b>	7	13.7%
<b>Seeking upstream feedback from other R&amp;I stakeholders on R&amp;I ideas/plans</b>	2	3.9%
<b>Addressing societal concerns as substantive dimension of the R&amp;I work</b>	1	2%
<b>Compliance with rules, regulations, or legal obligations</b>	12	23.5%
<b>Mitigating or preventing societal concerns through delivering or attending training</b>	2	3.9%
<b>Participation in or engagement with relevant committees</b>	2	3.9%
<b>Ensuring integrity in R&amp;I processes involving human participants</b>	5	9.8%
<b>Preventing societal concerns resulting from R&amp;I work by following responsible safety and waste practices to avoid damage</b>	1	2%
<b>Ensuring positive outcomes for society, without explicitly mentioning the prevention of societal concerns</b>	1	2%
<b>Other step taken to consider societal concerns in R&amp;I work</b>	5	9.8%
<b>Unclear / Uncertain</b>	3	5.9%

Table 346: Latin-American and Caribbean States - What comes to mind when you think of 'responsible research and innovation'?

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	38	29%
<b>Ideas, practices or policies associated with RRI</b>	90	68.7%
<b>Aligning research and innovation with societal benefits</b>	36	27.5%
<b>Integrating / anticipating public perspectives in research and innovation</b>	9	6.9%

<b>Ensuring societal acceptance of research and innovation</b>	2	1.5%
<b>Do no harm to people/society/participants with R&amp;I</b>	13	9.9%
<b>Protecting the environment, preventing negative impacts of research and innovation on the environment</b>	30	22.9%
<b>Orientating research and innovation towards generating improved technologies/outputs</b>	7	5.3%
<b>Empowering non-academic stakeholders to shape the direction of R&amp;I</b>	5	3.8%
<b>Open and honest science</b>	7	5.3%
<b>Enhancing research quality through appropriate methods</b>	7	5.3%
<b>Engaging / communicating with non-academic stakeholders or publics about research and innovation activities</b>	10	7.6%
<b>Ensuring ethical procedures and approvals are completed in R&amp;I work</b>	11	8.4%
<b>Ethical self-assessment: Conducting informal analyses or reviews to fulfil ethical duty</b>	8	6.1%
<b>Ensuring ethnic/racial diversity in research and innovation activities</b>	3	2.3%
<b>Ensuring gender equality in research and innovation activities</b>	2	1.5%
<b>Ensuring research independence</b>	2	1.5%
<b>Ensuring norms/practices evincing research integrity and high professional standards</b>	5	3.8%
<b>Following formal/official research guidelines and regulations</b>	1	0.8%
<b>Sharing research and innovation results and data within the academic community</b>	2	1.5%
<b>Associating RRI with certain research and innovation areas/fields</b>	2	1.5%
<b>Other association with RRI</b>	16	12.2%
<b>Unclear / Uncertain</b>	1	0.8%

Table 347: Latin-American and Caribbean States - What comes to mind when you think of the UN Sustainable Development Goals?.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Non-specific, vague, platitude or virtue signalling response</b>	29	27.4%
<b>Defining sustainable development</b>	56	52.8%
<b>Integrating/balancing different aspects of sustainable development</b>	4	3.8%
<b>Educational aspects of sustainable development</b>	10	9.4%
<b>Economic aspects of sustainable development</b>	29	27.4%
<b>Integrating economic and environmental aspects of sustainable development</b>	12	11.3%
<b>Preserving natural resources</b>	25	23.6%
<b>Health-related aspects of sustainable development</b>	6	5.7%
<b>Diversity/inclusion aspects of sustainable development</b>	26	24.5%
<b>Addressing climate change</b>	7	6.6%
<b>Other aspects of sustainable development</b>	7	6.6%
<b>Governance dimensions of SDGs</b>	17	16%
<b>Achieving the SDGs</b>	5	4.7%
<b>Contribution of technological innovation to sustainable development</b>	1	0.9%
<b>Other implementation actions to achieve SDGs</b>	4	3.8%
<b>Integrating SDGs within formal education</b>	3	2.8%
<b>General Criticism of the UN SDGs</b>	8	7.5%
<b>Unclear / Uncertain</b>	2	1.9%

Table 348: Latin-American and Caribbean States - Number of valid responses by code.

<b>Label</b>	<b>Count</b>	<b>Percent</b>
<b>Diverse Perspectives</b>	78	44.3%
<b>Gender Equality</b>	69	39.2%
<b>Ethics of Research</b>	49	27.8%
<b>Ethnic Minorities</b>	74	42%
<b>Research Transparency</b>	78	44.3%
<b>Public Accessibility of Research Findings</b>	88	50%
<b>Open Data</b>	64	36.4%
<b>Societal Needs Addressed in Research</b>	86	48.9%
<b>Societal Concerns</b>	51	29%
<b>Associations with RRI</b>	131	74.4%
<b>Associations with UN SDGs</b>	105	59.7%

