FOSTERING IMPROVED TRAINING TOOLS FOR RESPONSIBLE RESEARCH AND INNOVATION

Grant Agreement n. 741477
Project Acronym: FIT4RRI

WP5 Summary Report

Deliverable 5.2

Due date of deliverable: October 31, 2020
Actual submission date: October 31, 2020

WP lead organisation: UNIROMA1
Deliverable responsible: Luciano d'Andrea (K&I)
Status: Public

Function	Staff	Delivery date
Prepared by	Luciano d'Andrea, Maresa Berliri and Federico Luigi Marta (K&I)	October 13, 2018
Internal review	Alfonso Alfonsi (K&I)	October 15, 2018
1st draft delivered by	Luciano d'Andrea and Maresa Berliri (K&I)	October 20, 2018
Reviewed by	Andrea Riccio (UNIROMA1)	October 22, 2018
Final version	Luciano d'Andrea (K&I)	October 24, 2018
Submitted to EU by	Andrea Riccio	October 31, 2018

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Project full title: Fostering Improved Training Tools for Responsible Research and Innovation
Start date of the project: May 1, 2017
Duration of the project: 42 months
Project funding scheme: Horizon 2020, SwafS-04-2016 - Opening Research Organisations in the European Research Area
Project Co-ordinator: Università degli Studi di Roma La Sapienza
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This project has received funding from the European Union's Horizon 2020 Programme for research and innovation under Grant Agreement no. 741477

Introduction

This report summarises the results of WP5 (Governance Setting) of the project "Fostering Improved Training Tools for Responsible Research and Innovation" (FIT4RRI), funded by the EU DG Research and Innovation under Horizon 2020. The project is implemented by a consortium of 12 partners, led by University Sapienza of Rome (UNIROMA1).

The overall aim of the project is to promote the diffusion and embedment of governance settings (cross-cutting organisational practices, tools, arrangements, and culture) conducive to Responsible Research and Innovation (RRI) and Open Science (OS) in European Research Funding and Performing Organisations (RFPOs). This involves enhancing RRI competences and skills through improvements in currently available RRI training (in terms of training tools, actions, and strategies), as well as promoting the diffusion of more advanced governance settings to foster the institutional embedment of RRI and OS in research organisations.

In this context, WP5, coordinated by the UNIROMA1, was aimed at capitalising the knowledge and experience generated through other WPs (in particular, WP1 "Mapping and Benchmarking"; WP2 "Sectoral diagnosis", and WP3 "Co-creation experiments") and organised them in a form able to reach the potential users, with special reference to RFPOs. This aim has been pursued mainly through the development of a set of guidelines, accessible in the Internet, titled "Guidelines on governance settings for RRI", mainly targeting researchers and research managers, and the organisation of a set of initiatives (overall referred to as "Governance Setting Support Action") in cooperation with WP3 (Training tools and actions) and WP6 (Communication, Exploitation and Dissemination of Results).

WP5 started on 1 December 2018 and was planned to be ended on 30 April 2020. Due to the outbreak of the Covid-19 pandemic, the project was extended for another 6 months, to be ended on 31 October 2020. Thus, WP5 lasted 23 months.

This Report (D5.2) includes three chapters.

Chapter One describes aims and structure of WP5 and the activities carried out. **Chapter Two** focuses on the Guidelines on governance settings, while **Chapter Three** deals with on the support initiatives.

Two documents are attached to this report, i.e., the Guidelines on governance setting in its downloadable version (Annex 1) and the Summary Report of the Guidelines (Annex 2). The attached versions are those prepared before the final layout was made and uploaded on the FIT4RRI website.

The text has been drafted by the Knowledge & Innovation (K&I) Team made up of Luciano d'Andrea, Maresa Berliri and Federico Luigi Marta.

Chapter One

Aims, structure and activities of WP5

1. Aims

WP5 “Governance settings” was aimed at the capitalisation and diffusion of knowledge and experience generated in the previous WPs, with special reference to WP1“Mapping and Benchmarking” (aimed at analysing the diffusion and embedment of RRI and OS in terms of governance setting), WP2 “Sectoral diagnosis” (aimed at exploring the variability of RRI and OS-related dynamics in different research and disciplinary contexts) and WP3 “Co-creation experiments” (aimed at testing some RRI/OS practices through four co-creation experiments).

The objective of the **capitalisation** of the acquired knowledge was mainly pursued through the development of the Guidelines of governance settings, conceived as an agile and comprehensive tool available online to help researchers and research managers define and develop specific RRI/OS-oriented strategies and actions in their own organisation.

The objective of the **diffusion** of such knowledge was pursued through the organisation of four online National Feedback Meetings in as many EC countries and the FIT4RRI Final Summit “RRI4real”. An online consultation (titled “FIT4RRI Awareness & Consensus Survey”) involving 50 people working in the R&I sector focusing on the level of awareness on RRI has been also organized, used both as an awareness-raising tool and as a simple tool for gathering basic information about the perception of RRI.

2. Structure

To attain these objectives, **four tasks** have been carried out.

- **Task 5.1 – Design of the Governance Settings Support Action**. This task was aimed at defining a set of initiatives favouring dissemination and promoting a debate on RRI/OS, especially using the Guidelines of governance settings as the main tool. This task was led by UNIROMA1.

- **Task 5.2 – Development of the Guidelines on governance settings for RRI and OS**. This task was aimed at developing the Guidelines on governance setting, intended as an easily-accessible web-based document providing practical orientations on how to promote RRI/OS-oriented institutional changes in RFPOs. The task was led by K&I.

- **Task 5.3 – Implementation of the Governance Settings Support Action**. This task was geared toward developing a set of initiatives focused on the Guidelines. The task was led by UNIROMA1.

- **Task 5.4 – WP5 Summary report**. This task was aimed at producing this report. The task was led by K&I.

3. Activities

In this paragraph, a brief description of the activities carried out under WP5 will be provided.

3.1. Task 5.1 – Design of the Governance Settings Support Action

With regard to Task 5.1 "Design of the Governance Settings Support Action", the following activities were carried out.

- Drafting of a Preliminary Design Note on the Governance Settings Support Action, i.e., an internal note aimed at identifying the contents and timeline of the Action (September 2019)
- Presentation of Note to the Consortium Members at the FIT4RRI General Assembly Meeting held in Thessaloniki (30th September – 1st October 2019)
- Drafting of the final version of the Design Note (October 2019)

3.2. Task 5.2 – Development of the Guidelines on governance settings for RRI and OS

With regard to Task 5.2 "Development of the Guidelines on governance settings for RRI and OS", the following activities were carried out.

- Designing of the Guidelines (January 2019)
- Approval of the design document by the Consortium Members (February 2019)
- Drafting of the Guidelines (March − May 2019)
- Presentation and approval of the Guidelines at the FIT4RRI General Assembly Meeting held in Maastricht (14th and 15th May 2019)
- Revision of the text on the part of Mikko Rask, Helsinki University (June 2019)
- Delivery to the Commission (August 2019)
- Uploading of the Guidelines on the Internet (January 2020)
- Drafting of a PDF version of the Guidelines downloadable online (January 2020)
- Drafting of the Executive Summary of the Guidelines downloadable online (February 2020)

3.3. Task 5.3 – Implementation of the Governance Settings Support Action

With regard to Task 5.3 "Implementation of the Governance Settings Support Action", the following activities were carried out.

- Implementation of dissemination activities of the Guidelines (March – September 2020)
- Organisation of 4 online National Feedback Meetings on the Guidelines (July – September 2020)
- Preparation, organisation, and implementation of the consultation online (September 2019 – September 2020)

3.4. Task 5.4 – WP5 Summary Report

With regard to Task 5.4 “Summary report”, the structure of the report was defined in July 2020 and the drafting process started in September to be completed in October 2020.

In addition to these tasks, a set of dissemination and information activities have been also conducted in cooperation with WP6 (Communication, Exploitation and Dissemination of Results) focused on the Guidelines.

This set of activities includes:

- Dissemination activities through social media on the Guidelines carried out both centrally and by the consortium members
- Sending information via email through a mailing list of targeted groups
- Information related to the Guidelines on the FIT4RRI newsletter
- Access to the Guidelines through the Project website and the websites of the consortium members
- Dissemination of the Guidelines among the participants in the FIT4RRI Final Summit (see below, Chapter 3, Section 4).

It was also planned to print the Summary Document of the Guidelines (see below, chapter 2, Section 4) to be included in the material to disseminate at the FIT4RRI Final Summit which was planned to be held in Rome in April 2020. Because of the Covid-19 crisis, the Summit was postponed and shifted online. Consequently, the printed version of the Summary Document has never been prepared.

Chapter Two

The Guidelines on governance settings

1. Introduction

This chapter is devoted to the Guidelines on governance settings, which has been the main product of WP5.

The chapter is divided into the following sections, in addition to this short introduction:

- Aims and main features of the Guidelines (Section 2)
- Theoretical framework and structure (Section 3)
- Versions of the Guidelines (Section 4).

2. Aims and main features of the Guidelines

2.1. Aims

The Guidelines are intended to help RFPOs to deal with the question: **how can RRI and OS be effectively embedded in research organisations?**

To pursue this aim, the Guidelines is primarily oriented to provide the readers with a critical view of the changes which are affecting science in the last decades and the role RRI and OS can play in managing them.

In such a framework, the Guidelines also propose a view of the **problems, risks, and uncertainties** connected to the application of RRI and OS in RFPOs. For example, RRI and OS are not univocally interpreted and many different methods, tools, and approaches have been proposed to put them into practice. Consequently, researchers, research managers, and stakeholders, while are perceiving how much the usual governance structures and ordinary practices related to scientific production are weakening, they are also uncertain about how RRI and OS can be practically applied. Finally, implementing RRI and OS creates tensions and conflicts within research organisations and only rarely these transformations occur smoothly, following a linear path without encountering obstacles and resistance.

For these reasons, the Guidelines do not purport to offer ready-made solutions. Rather, they seek to highlight a **pathway** in which the users of the guidelines will necessarily play a proactive and creative role for activating institutional change processes towards RRI and OS in their organisation in a way that is as feasible, sustainable, and useful as possible.

2.2. Main features

The main features of the Guidelines are summarised below.

Target audience. As we highlighted above, the Guidelines are mainly addressed to researchers and research managers since their focus are RFPOs of any kind (universities, research labs, funding agencies, governmental research agencies, etc.). However, they can be useful for all those interested in promoting RRI and OS at any level, including, e.g., policymakers, science centres, technology developers, or private firms.

Style. The Guidelines have been designed so as to be as user-friendly as possible. The texts are in plain English and easily readable. To facilitate access to the contents, different access levels to the text could be offered:

- The **main text**, in which all the essential concepts and arguments are presented in few pages (overall, 50 pages distributed among the introduction and 7 chapters)
- A set of additional resources
- A set of references, allowing to access relevant **external resources**.

Recurrent scheme. In order to facilitate the readers, it is advisable to organise the chapters adopting a recurrent scheme which is replicated in each chapter: including the following components:

- **Rationale** – a short and clear description of the contents of the chapter
- **What is at stake** – a short description of what is at stake with the issue dealt with, in consideration of possible risks and opportunities
- **Key issues** – a short description of the key issues related to the contents the chapter deals with (intended as possible risks, dilemmas, or situations to keep under control)
- **Recommendations** – a set of recommendations to deal with the key issues described above or, more in general, related to the contents of the chapter (overall, 21 recommendations, i.e., 3 for every chapter).

Internal navigation. The document has been developed with internal links allowing the readers to rapidly move from the different parts of the main text and to quickly access the additional resources.

3. Theoretical framework and contents

3.1. Theoretical framework

The theoretical framework on which the guidelines are grounded is prevalently based on the results of WP1 and WP2. The main components of such a framework can be summarised in the following points.

Defining RRI/OS. The first building block of the Guidelines is the interpretation of RRI and OS. Although different from each other, they can be both viewed as reactions that research organisations and research systems are taking in place in order to face the transformations occurring in science. These transformations, in turn, reflect wider changes affecting all the institutions of modernity. RRI/OS can be interpreted neither as a comprehensive response (for example, some critical issues in the production of scientific knowledge are overlooked or ignored) nor as a "superstructure" to be ideologically imposed as such upon RFPOs and researchers. Rather, they can be considered as wide stocks of theoretical and practical knowledge to take from in order to manage the transformations in science and innovation.

Activating RRI/OS. Being stocks of knowledge, RRI and OS do not exist in the real world in themselves. They start existing only when someone starts spending its contents for designing and implementing a set of actions in a given national and institutional context. This implies that, for activating RRI and OS, three elements are at least necessary.

- There must be an actor (transformational agent) who starts the process of contextualisation.
- There must be a process of contextualisation allowing to use RRI and OS for facing the problems of change of science as they specifically manifest themselves in the concerned RFPO.
- Each RFPO must develop and implement a specific RRI profile, based on the intersection between RRI/OS as a stock of knowledge and the context of application.

Defining Governance setting. The focus of the Guidelines is thus how to activate RRI and OS in RFPOs. Hence the relevance of the notion of RRI/OS-oriented governance setting. The concept of governance setting has been operationally defined as a process through which a given governance structure is modified in a way that permanently incorporates RRI and OS or part of them. This entails some modifications, not only in the internal structure and in the norms of the organisation (so to say, its "government"), but also to the networked forms of management of the organisation, built upon the involvement of – and the negotiation among – the many internal and external actors concerned. Therefore, the governance setting is understood here as a temporary process through which a set of knowledge is turned into a set of measures aimed at helping RFPOs to cope with the changes affecting science they are dealing with. A typology of governance settings has been also developed under WP1 and is proposed and described in the Guidelines.

3.2. Contents

The Guidelines are organised in an **introduction** and **three parts**:

Introduction. The introduction provides the necessary information about the institutional context in which the Guidelines have been developed, their objectives, how they have been developed and how to use them.

PART 1 – Guidelines for interpretation. This part is aimed at supporting the readers in interpreting the context of changes in which RRI is placed, allowing them to better understand what is really at stake with responsible research. This part includes two chapters, respectively devoted to the changes occurring in science, linked with broader societal transformations (Chapter 1) and how a responsible and open science could help steer these changes (Chapter 2).

PART 2 – Guidelines for decision. This part focuses on the decisions the concerned RFPOs should take in order to activate the process. Two chapters are included in this part, respectively focusing on the analysis of the organisation in the RRI/OS perspective so as to define an RRI/OS profile tailored on the needs of the research organisation (Chapter 3) and on the identification of the most appropriate governance setting model to adopt (Chapter 4).

PART 3 – Guidelines for action. This part concerns the application of a governance setting model to the organisation. This part includes three chapters, dealing with the activation (Chapter 5), the implementation (Chapter 6) and the completion (Chapter 7) of the governance setting process up to the embedment of RRI and OS in the RFPO.

4. Versions of the Guidelines

Three different versions of the Guidelines have been developed, to better match the needs of the readers and to favour their dissemination.

Online version on a website platform. The main version of the Guidelines is the online version accessible online on the FIT4RRI website (https://fit4rri.eu/guidelines/). This version includes more than 51,200 words, of which some 13,300 included in the main text and the remaining 37,900 pertaining to the additional resources and the references to external resources. A set of internal links allows the readers to rapidly moving across the parts and section of the text.

Online version in PDF format. This version of the Guidelines has been conceived for readers who prefer to download the guidelines and possibly to print them. This version includes some 17,700 words, i.e., the main text and a set of boxes internal to the main text summarising some additional resources.

Summary document. Finally, a Summary document of the Guidelines has been produced. It is to allow a quick view of the contents of the Guidelines. The text keeps the structure of the Guidelines and includes some 4,700 words. The printed version of the Summary document should have been distributed at the Final Summit of the Project, which was scheduled for May 2020 in Rome. The outbreak of the Covid-19 pandemic made it impossible to organise the conference in Rome (which was postponed and shifted online) and consequently to disseminate the document at the Summit.

Chapter three

Support initiatives

1. Introduction

This chapter is devoted to the support activities which have been developed to promote RRI/OS in general and, in particular, to disseminate the Guidelines on governance settings.

The Chapter is divided into the following sections, in addition to this short introduction, devoted to:

- The National Feedback Meetings (Section 2)
- The online consultation (Section 3)
- The Final Summit (Section 4)
- The dissemination activities of the Guidelines (Section 5).

2. National Feedback Meetings

2.1. Nature and aims

The National Feedback Meetings have been planned as a tool for getting feedback from stakeholders about the contents of the Guidelines and especially about the problems the Guidelines are intended to address.

The meetings were originally planned to be held in presence in the first part of 2020, but the Covid-19 pandemic made it necessary a postponement and their shifting online.

Four Feedback Meetings have been organised online, addressing different national audiences:

- The Portuguese research community (2 June)
- The Greek research community (4 June)
- The Italian research community (30 June)
- The German research community (4 September).

Overall, apart from FIT4RRI team members, 50 people participated (13 from Portugal, 18 from Greece, 10 from Italy, and 9 from Germany). The great majority of them were researchers or representatives of research organisations, even though some representatives from private companies and research funding organisations also participated.

The four meetings were convened respectively by the University of Minho (Portugal), SEERC (Greece), Sapienza University and K&I (Italy), and the University of Gottingen (Germany).

2.2. Structure

The meetings were structured following a unique scheme, including the following components:

- Welcome address from the FIT4RRI partners convening the meeting
- Self-presentation of participants
- Presentation of the Guidelines and a set of critical issues to propose for the discussion (Luciano d'Andrea, K&I)

- Discussion supported with an instant pool among the participants using the interactive presentation software Mentimeter
- Wrap-up of the meeting.

The meetings were organised in a way not to exceed 1 hour and half of duration.

2.3. Contents

Five issues were considered in the meetings:

- What does implementing institutional changes actually mean?
- How to mobilise the key actors on RRI and OS?
- Which are the key factors for triggering institutional changes?
- How RRI and OS can be started?
- When can RRI and OS be considered practically triggered?

The first two issues have been discussed in all meetings. A third issue has been selected among the remaining three ones by the participants using Mentimeter. In all the cases, the issue chosen by the participants was the third one (Which are the key factors for triggering institutional changes?).

Each of them has been introduced with a presentation of the view proposed in the Guidelines on governance settings.

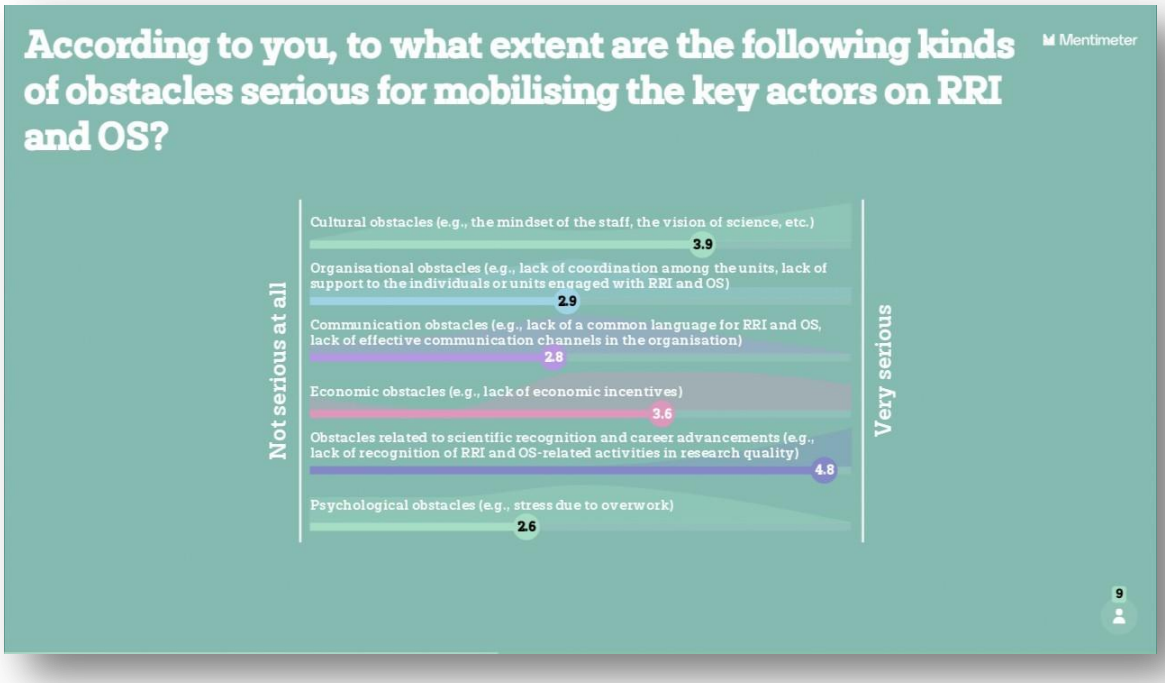
The specific questions discussed through Mentimeter, with regard to the first two issues, together with the possible options in the case of closed questions, are listed in the table below.

What does implementing institutional changes actually mean?
According to you, which is the most promising option for activating institutional changes towards RRI and OS in research institutions? (please, tick one item only)
– *Assigning new tasks and responsibilities to the existing units (e.g., HR departments, Communication Department, Research Departments) and officers, with appropriate training inputs* – *Asking for support from external experts in RRI and OS or single RRI keys* – *Assigning the responsibility for the RRI and OS to a Board member or establishing a new Board member in charge of them* – *Establishing a devoted team with an autonomous budget in charge of launching RRI and OS*
What institutional change means to you? (Please, express your thoughts in few sentences)

How to mobilise the key actors in RRI and OS?
Which are the key actors you have in your institutions/your field? (please, list them below; a tag cloud will be automatically developed; please, list maximum 3 actors)
According to you, to what extent are the following kinds of obstacles serious for mobilising the key actors on RRI and OS? (1 = not serious at all; 5 = very serious)
– *Cultural obstacles (e.g., the mindset of the staff, the vision of science, etc.)*

- *Organisational obstacles (e.g., lack of coordination among the units, lack of support to the individuals or units engaged with RRI and OS)*
- *Communication obstacles (e.g., lack of a common language for speaking of RRI and OS, lack of effective communication channels in the organisation)*
- *Economic obstacles (e.g., lack of economic incentives)*
- *Obstacles related to scientific recognition and career advancements (e.g., lack of recognition of RRI and OS-related activities in research quality evaluation systems and in hiring and promotion)*
- *Psychological obstacles (e.g., stress due to overwork)*

Some screenshots from the Mentimeter have been showed below.



The participants' opinions on the different questions proposed have been obviously quite diversified. However, some key points can be anyhow briefly mentioned.

- **CULTURAL AND NORMATIVE CHANGE**. RRI and OS, to be actually implemented, require the mobilisation of researchers and key stakeholders. A change in the culture of research actors is then considered necessary and not only the establishment of new measures or regulations, although necessary. A purely top-down approach is ineffective. RRI and OS should be supported by research actors and should be also considered as a choice for them and not simply a further obligation to fulfil. At the same time, strong normative changes are also needed, creating the actual institutional space for RRI and OS to be embedded in the organisation. Therefore, even a purely bottom-up approach is ineffective.

- **DEDICATED TEAMS**. The importance of creating a team dedicated to RRI and OS within research organisations has been often highlighted in the discussion. This does not mean that RRI and OS should be managed by such a team: to attain their institutional embedment, all the concerned units should be involved. Rather, it means that, especially in the first phases, a team is necessary to trigger the process, mobilising the concerned internal stakeholders, disseminating the necessary expertise, promoting the creation of an enabling environment for RRI and OS, negotiating with the management about the priorities and methods, and the like.

- **TRAINING**. Just because of their cultural relevance, RRI and OS should be part of the university curricula for students in STEM and should be the subject of training programmes addressing researchers and university leaders. Next generations of researchers should be more RRI/OS sensitive and skilled than the present ones.

- **ROLE OF TECHNICAL AND ADMINISTRATIVE UNITS**. Another important issue that emerged in the meetings is the key role that technical and administrative units may play in promoting RRI and OS. For example, it is impossible to introduce RRI/OS-oriented changes if the technical and administrative staff is not strongly involved. Another key role is played by university communication departments since they can strongly support a cultural change within the research organisation.

- **LIMITED AWARENESS OF RRI AND OS**. There is still a serious problem of awareness related to RRI and OS. As said by a participant in a Feedback Meeting, those who participated in EC-funded project on RRI and OS know how they are important, but all the other research actors who did not participate in them do not know at all. There are whole sectors of the European Research Area which are not still exposed to any form of communication about RRI and OS. Moreover, many participants highlighted the difficulties met by researchers to get involved in RRI/OS initiatives purely because of the lack of time, which seems to be a chronic and widespread problem they have to face daily. This is also due to the tendency to understand RRI and OS as something anyhow producing additional obligations for researchers. This fact, combined with little awareness, often lead researchers not to get involved with RRI and OS.

- **RRI/OS ECOSYSTEM**. Many participants stressed the need for developing an "RRI/OS ecosystem", i.e., an enabling environment for researchers and departments interested in getting engaged with RRI/OS and in modifying their organisational routines and research practices. The establishment of such an ecosystem is difficult to attain without a solid policy

framework and appropriate resources at national and European level. This entails the modification and revision of many building blocks of research systems, e.g., reward systems, incentives, criteria for career assessment and advancements, and research quality assessment parameters (for example, also including RRI/OS-related criteria). In the case of OS, also investments in research infrastructure (e.g., repositories) and specific resources for covering the costs of open access publications are needed. Strong involvement of research leaderships is obviously pivotal to establish such an ecosystem.

- **ROLE OF FUNDING ORGANISATIONS**. In this same perspective, many participants also highlighted the key role research funding organisations could play in promoting RRI and OS. They are undoubtedly in the best position for progressively lead research performing organisations to adopt RRI/OS oriented practices, establishing criteria, requirements and standards inspired to RRI and OS for accessing funds for what concerns both institutional aspects and research contents.

- **COOPERATION**. Developing RRI and OS, according to some participants, also requires increasing cooperation among researchers and research institutions, in order to find shared approaches and practices. However, as someone had noticed, such cooperation seems difficult to attain in a research context which is increasingly competitive, for what concerns, e.g., access to tenure track positions, research funds, or career development. These same problems can be found in the promotion of an open circulation of scientific publication and data, which can be (or be perceived) as conflicting with the present competitive research environment.

- **DISCIPLINARY COALITION**. Creating coalitions including researchers and research institutions working in the same disciplinary fields has been also recalled as an important step to take for facilitating the spreading of RRI/OS practices. Each discipline, in fact, may have specific needs and expectations related to RRI and OS and should develop their own interpretation of how they can be embedded in the research systems. This process may also favour the development of interdisciplinary works which are increasingly important to face societal challenges.

- **ETHICAL AND LEGAL QUESTIONS RELATED TO OS**. In one of the meeting, special attention has been devoted to the ethical and legal questions related to OS. It is important to clearly understand which kinds of data are concerned (for example, there are many differences among the data produced by STEM and those generated by social sciences) and which possible ethical implications they could have (for example, related to privacy, anonymity, harms and risks unintentionally generated). Moreover, OS necessarily introduces important changes in the market of scientific publications. Hence the need to define a robust legal framework able to establish strong mechanisms for copyright protection.

3. Online consultation

3.1. Nature and aims

The online consultation, titled “FIT4RRI Awareness & Consensus Survey”, was organised in order to pursue three main objectives:

- Increasing the awareness level on RRI/OS, using the consultation as a means for circulating the very idea of RRI especially among researchers and research managers
- Gathering some basic information about the perception of RRI/OS among these same target groups
- Indirectly, collecting information about if the FIT4RRI project had been perceived among the target groups.

To keep the consultation as simple as possible, only 14 questions were included.

3.2. Structure

The text of the online questionnaire includes two sections aimed at collecting respectively some information about the respondent and at gathering the respondent's opinion about RRI/OS.

The questionnaire is presented in the table below.

SECTION ONE
1. What is the name or the acronym of your organisation?
2. In which country is the organization based?
3. Could you specify which type of organization it is? – *A university* – *A research centre* – *A research funding organization* – *Other (specify)*
4. Could you specify its legal status? – *Public* – *Private for profit* – *Private non-profit* – *Other (specify)*
5. Could you indicate in which area of your organization you work? – *Direction* – *Administration* – *Human resources* – *Communication and public relations* – *Other central services* – *Research* – *Training and teaching* – *Other (specify)*
6. Could you specify in a few words what is your position or role in the organisation?

SECTION TWO

7. In recent years, a broad debate is taking place on Research and Responsible Innovation and on Open Science. In this regard, which of the following things have ever happened to you?

- *To read articles or essays on RRI and OS*
- *To participate in public events (seminars, workshops, conferences, etc.) in which aspects of RRI and OS were discussed*
- *To attend training courses which dealt with aspects of RRI and OS*
- *To get involved in projects and programmes pertaining to RRI and OS and involving the organisation you work in*
- *To get involved in projects and programmes pertaining to RRI and OS without involving the organization you work in*
- *Other (specify)*

8. In your opinion, how important is to be committed to a more responsible and open research?
(*Express a value between 5 = very important and 1 = not at all important*)

9. In your opinion, RRI and OS are most useful for addressing which of the following issues?
(*Multiple answers are allowed*)

- *Dealing with effectively the ethical questions related to research*
- *Encouraging the participation of people in research*
- *Educating people about science*
- *Promoting gender equality in research*
- *Supporting open and free access of everyone to scientific knowledge and data*
- *Anticipating the impacts of science in order to prevent risks and undesirable consequences*
- *The governance of all these keys*
- *Other (specify)*

10. Based on your experience, what are the main obstacles in achieving a more responsible and open research?
(*Multiple answers are allowed, with the exception of the item "I do not know")*

- *The little attention of policymakers toward these issues*
- *The poor and ambiguous definition of the question*
- *The difficulty to immediately identify which are the possible benefits of a more responsible and open research*
- *The disinterest of the actors involved, such as researchers and leaders of research organisations*
- *The disinterest of the public at large toward these issues*
- *Lack of resources and investments*
- *Lack of time and human resources*
- *Other (specify)*
- *I do not know*

11. Based on your experience, to what extent science policies and measures inspired by Responsible Research and Innovation approaches and by Open Science could have an impact on the governance of research organisations?
(*Express a value between 5 = a very good impact and -5= a very bad impact, whereas 0= no impact at all*)

12. Could you explain in a few words your opinion?

13. Can you tell if and how you came into contact with the FIT4RRI project - Improved Fostering Training Tools for Responsible Research and Innovation?
(*Multiple answers are allowed*)

- *I participated in public initiatives of the project (workshops, seminars, etc.)*
- *I participated in training initiatives of the project*
- *I was interviewed as part of the project activities*
- *I was involved in project testing activities*
- *I received the project newsletter*
- *I have seen other informative and public communication material*
- *I know some of the representatives of the partnership*
- *Only through this survey*
- *Other (specify)*

14. According to you, how much did your contact with the FIT4RRI project affect, in any case, your point of view regarding responsible research?
(*Express a value between 5 = very much and 1 = not at all*)?

3.3. Contents

In this section, some information about the results of the consultation are provided. To facilitate the reading, data will be presented in the percent format, even though they cannot be considered as representative of a specific universe.

The respondents

Overall 50 people participated in the consultation. The more represented countries are Greece, Italy, UK, Germany, and Portugal. More than half (56%) of respondents are representatives of university institutes and 26% of other types of research centres, including national research infrastructure, and research private companies. The remaining 18% includes organisations of different types such as academic publishers, libraries, local authorities and private consulting companies. Overall, 60% of the organisations are public, 20% no-profit organisations, 10% private for-profit organisations, and 8% hybrid organisations.

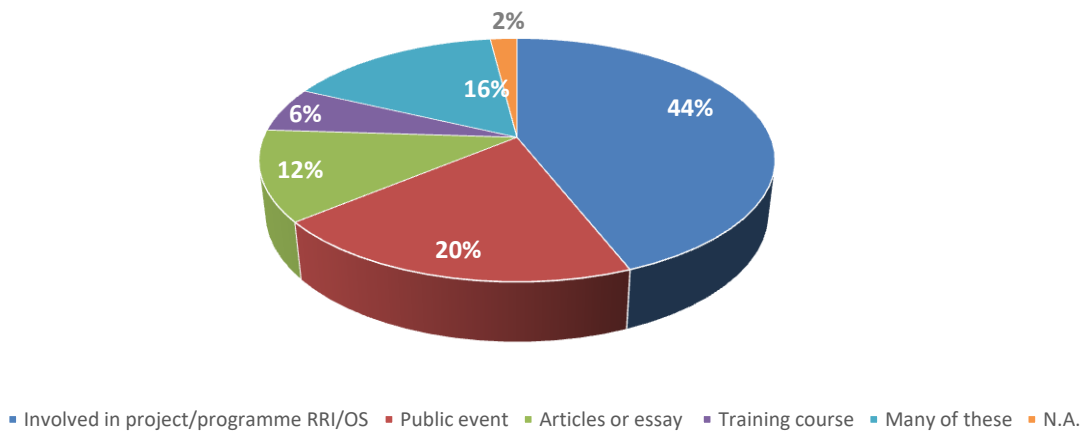
As for the respondents, 44% of them is directly involved in research work, 14% works in the organisation central services, 10% in communication and public relation departments, 8% is member of the direction of the organisation and another 8% works in administrative offices.

Opinions on RRI

The first issue considered was how the respondents got in contact with RRI and OS.

More than four respondents out of ten have been involved in RRI/OS-oriented programmes or projects, while one out of five participated in public events, 12% read articles or essays on RRI and 6% attended a training course (see Fig. 1 below). Being a group of people already engaged with RRI/OS, not surprisingly almost the totality of participants considers utmost or very important the commitment of researchers and institutions with RRI/OS (point 4 and 5 in a scale from 1 to 5).

Fig. 1 - Means of contact with RRI/OS



The opinions of respondents about the reasons why it should be useful to apply RRI and OS are given in the table below (multiple answers were allowed).

Issue	%
Supporting open and free access of everyone to scientific knowledge and data	80.0
Educating people about science	66.0
Dealing with effectively the ethical questions related to research	60.0
Encouraging the participation of people in research	60.0
Anticipating the impact of science in order to prevent risks and undesirable consequences	50.0
Promoting gender equality in research	34.0

It is worth noticing the importance attached by participants to the aspects related to the open access to publications and data, and, at the same time, the limited relevance attributed to gender equality in research. Another relevant aspect is the importance attached by participants to education, which is – among the RRI keys – likely the least considered.

Respondents were also asked to express their opinion about the main obstacles in achieving more responsible and open research. The answers are given below.

Issue	%
The disinterest of the actors involved, such as researchers and leaders of research organisations	54.0
Lack of resources and investments	50.0
The difficulty to immediately identify which are the possible benefits of a more responsible and open research	46.0
Lack of time and human resources	46.0
The little attention of policymakers toward these issues	40.0
The disinterest of the public at large toward these issues	40.0
The poor and ambiguous definition of the question	24.0
I don’t know	2.0

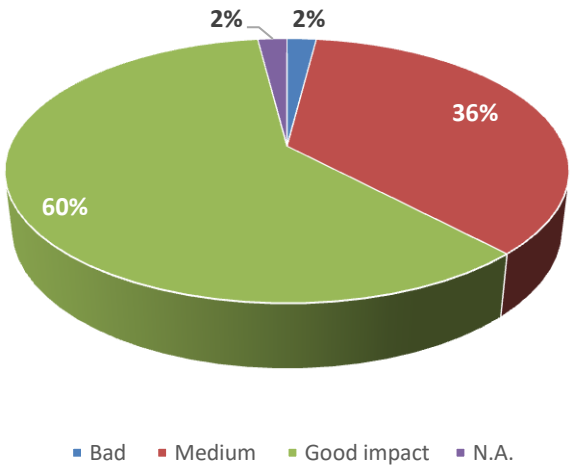
As it is simple to observe, the answers do not allow identifying a clear rank among the obstacles, since 6 obstacles out of 7 have been considered important by a great portion of respondents (from 40 to 54%). The only obstacles less considered serious is the poor and ambiguous definition of RRI and OS.

Other obstacles mentioned are, e.g., the presence of different epistemic cultures, lack of incentives, lack of a political will to promote RRI and OS or the current reward and recognition system which penalises who gets involved with RRI and OS.

The last question aimed at collecting the respondents' opinion on RR/OS concerns their potential policy impacts on the governance of research organisation.

Overall, according to 60% of the respondents, RRI and OS could have very good impacts on research organisations while 36% think of quite good impacts. Very few participants consider these impacts limited and none of them negative.

Fig. 2 - RRI/OS impact on research organisations



Asked to better explain their opinion, some participants focused on the preconditions for these potential impacts to be attained. Among them:

- Increased awareness and knowledge on the part of research leaders and researchers about RRI and OS through awareness-raising and training campaigns
- A better definition of RRI and OS contents and criteria (otherwise, RRI and OS risks to negatively affect the quality of research)
- Changes in the reward and reputation system (for example, open access publications are valued less favourably than those published in subscription-only journals)
- The adoption of a different metric system for research
- The promotion of a trans-disciplinary approach able to tackle the many RRI-related aspects
- The promotion of policies linking research funds with RRI/OS-related requirements and the allocation of RRI/OS-specific research funds (as occurred under the FP7 and the H2020 Framework Programmes)
- A closer connection between research and innovation.

Some respondents gave more comprehensive answers, in general focusing on the need to develop national and European research policies effectively able to support the adoption of RRI and OS by research organisations. Some of them are reported below.

> *Changes in policy are really probably the most effective way to change behaviour. So advocating policy changes which reflect OS an RRI and which then pass on to funders and other stakeholders are likely to be the most robust way to drove change.*
>
> *I think we need an overarching, politically/socially controlled framework for Open Science, which then naturally has an impact on everything else in practice.*
>
> *My opinion is that it would be great if policies would "constraints" researchers to work closely to society. At the moment policies in the forms of recommendations are not having an impact at all. The distance between the research on RRI and the reality is also an obstacle to the diffusion of this mindset. RRI is still not able to show relevance and impact as it is only concentrated on a closed debate between researchers.*
>
> *RRI and OS may have a positive impact on the governance of research organisations. However currently this influence may not be at a very big extent, as issues such as national and EU legislation, research fund priorities, administrative regulations govern the process.*
>
> *They would open new work and professional paths, requiring the identification of new professional positions; they would need the allocation of budget in a different way, to fund either professionals, or new engagement processes, or new IT management tools; they would impact on research funding, from the elaboration and choice of priorities to evaluation procedures.*
>
> *Imposing policy won't change governance if they're seen as contradictory, especially in places under pressure for resources. For example, you can't promote one thing and evaluate one another. You can't install a measure and not properly fund it. You can't have the ends disconnected from means. And you can't have policy disconnected from people.*

We can observe that, although with different accentuation, respondents tend to specify the main features RRI/OS policies should have to be successful: they should affect all the main components of the research system (quality assessment, funding schemes, administrative regulations, etc.); they cannot adopt a top-down approach; they should be effective in open research systems to external stakeholders; they should be clear in contents and objectives; they imply relevant changes in the way in which research systems are organised.

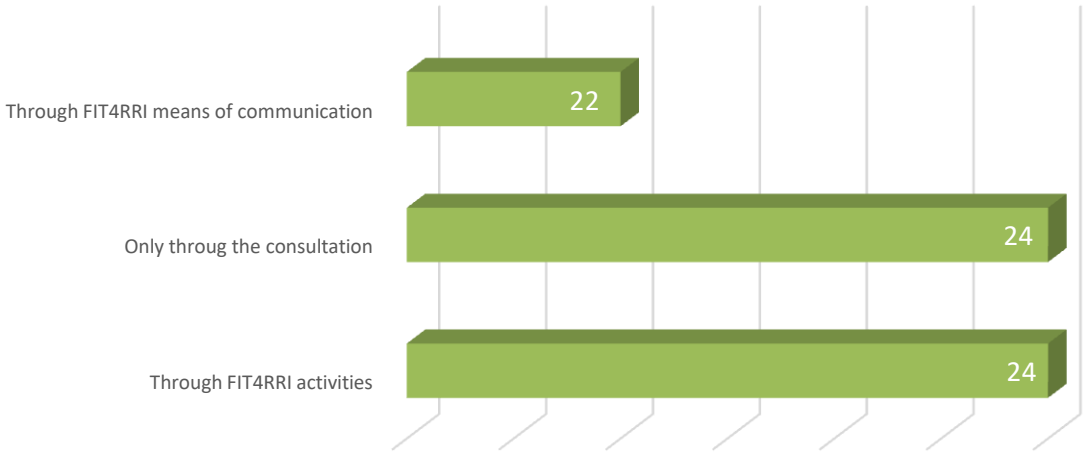
Contacts with FIT4RRI

The final section of the questionnaire was aimed at getting information on how respondents came into contact with the FIT4RRI Project and to see if such as contact was useful for them. Direct contacts with representatives of the FIT4RRI Project is the option mentioned the most (38%).

Overall, 24 interviewees came into contact with the project being involved in some of the activities conducted by FIT4RRI (e.g., training initiatives, public events, interviews, etc.) while an equal number of respondents (24) came into contact through the participation in the consultation. Finally, 22 respondents came into contact through the project newsletter and other in-

formation and communication materials. Obviously some of these came into contact with the project through more than one channel.

Fig. 3 - Means of contact with FIT4RRI project



Another question concerned the capacity of the contacts with FIT4RRI to affect the participants' point of view regarding RRI. The answers have been highly distributed: 46% of the respondents declare that their point of view has been very little or not at all affected, while 28% stated that it has been affected much or very much. The remaining 24% of respondents show an intermediated position.

4. Final Summit

4.1. Nature and aims

In the context of the FIT4RRI Project communication activities (WP6), the Final Summit "#RRI4Real" has been held online on September 30 and 31, and October 1.

The event was originally planned to be held in Rome in March 2020. The Covid-19 outbreak made it impossible to organise it as planned. Therefore, it was postponed and shifted online.

4.2. Structure

The Summit was organised in three strands (one day for each strand), respectively devoted to:

- STRAND 1 – RRI Culture and Skills
- STRAND 2 – RRI and Institutional Change
- STRAND 3 – RRI in Policies.

Each strand included four sessions:

- One session in plenary, focusing on a lecture made by one or more speakers
- Two parallel sessions devoted to more specific issues
- One interactive session specifically aimed at getting opinions and inputs from the participants of the core issues pertaining to the matter discussed in the Strand.

STRAND 3 was based on the results of WP5 and was organised as reported in the table below.

1 OCTOBER 2020	
9:30	**Welcome** **Panel session on the "The future of RRI"** (Linden Farrer and René von Schomberg, interviewed by Harro van Lente)
10:30	**Parallel Session 1: RRI as a cross cutting issue** (Robert Braun, Institute for Advanced Studies; contribution from New HoRRIzon project) **Parallel Session 2: Mainstreaming RRI in the ERA** (Alexander Gerber, Rhine-Waal University with contributions from 10 other SwafS projects)
11:45	**A governance perspective for responsible and open science** (Luciano d'Andrea, K&I)

In different moments of the Strand, the Guidelines on governance setting have been mentioned.

However, they have been the specific subject of the Third session of Strand 3 (October 1), titled "A governance perspective for responsible and open science", the aim of which precisely was that of spreading information about the Guidelines and attracting the interest of its potential users.

The session was organised in four different moments:

- The presentation of the Guidelines (Luciano d'Andrea, K&I)
- The presentation of some issues related to the guidelines proposed for the discussion (Andrea Riccio, Sapienza University of Rome)
- The discussion supported with the interactive presentation software Mentimeter
- Wrap-up of the session.

The session lasted 1 hour and 15 minutes and was attended by some 50 people.

4.3. Contents

The focus of the session has been on if, how and under which conditions it is possible to mainstream RRI and OS in the European Research Area, also taking into consideration the shift from the Horizon 2020 Framework Programme to the Horizon Europe Framework Programme.

Two kinds of mainstreaming process have been discussed, i.e.:
- The mainstreaming of RRI/OS-oriented institutional change processes
- The mainstreaming of RRI/OS in research contents.

The specific questions which have been discussed through Mentimeter, are listed in the table below.

MAINSTREAMING RRI-ORIENTED INSTITUTIONAL CHANGES
The establishment of which measures can be helpful in favouring RRI-oriented institutional changes in the context of mainstreaming? (Please, tick two items only)
– *Forms of professional recognition for researchers involved with RRI* – *Networks of trainers and communities of practice on RRI* – *RRI-related certification and award schemes addressed to research organizations* – *Coalitions among research organizations and universities on RRI* – *RRI resource centres to support research organizations* – *Basic RRI requirements to access public research funds*
Which are the main actors who may play a major role in RRI mainstreaming? (please, list them below; a tag cloud will be automatically developed)
MAINSTREAMING RRI IN RESEARCH CONTENTS
What means can be most effective for incorporating RRI into research contents and methods? (Please, tick two items only)
– *Embedding RRI considerations in the calls for proposals* – *Promoting the adoption of RRI-related criteria for accessing publication* – *Embedding RRI-related training in university curricula* – *Establishing RRI-related criteria in the research quality assessment schemes* – *Developing national research programmes embedding RRI in their contents and objectives* – *Favouring the embedment of RRI experts in STEM research projects*

Annex 1

Guidelines on governance setting (PDF version)

Starting the process

Guidelines on governance settings for responsible and open science

December 2019

Authors: Luciano d'Andrea, K&I (dandrea@knowledge-innovation.org) and Federico Marta, K&I

Project full title: Fostering Improved Training Tools for Responsible Research and Innovation
Project funding scheme: Horizon 2020, SwafS-04-2016 - Opening Research Organisations in the European Research Area
Project co-ordinator: Università degli Studi di Roma Sapienza
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This project has received funding from the European Union's Horizon 2020 Programme for research and innovation under Grant Agreement no. 741477

Contents

INTRODUCTION

Responsible Research and Innovation (RRI) and Open Science (OS) have been increasingly proposed to scientists and research organisations as the new framework for science, so as to make it **fully embedded in society**, involved in and responsible for the impacts it produces on economy and society at large, open to the external actors and sensitive towards expectations, needs, worries and problems of society.

However, this process is not free of problems, uncertainties, and risks. Research organisations are at the same time exposed to strong change processes, both internal and external, which are modifying their culture, procedures, decision-making processes and organi-sational structures. Moreover, RRI and OS are not univocally interpreted and many different methods, tools, and approaches have been proposed to put them into practice. Consequently, researchers and stakeholders perceive that usual governance structures and ordinary practices related to scientific production are weakening, but they are also uncertain about what will happen next. Finally, implementing RRI and OS creates tensions and conflicts within research organisations and only rarely these transformations occur smoothly, following a linear path without encountering obstacles and resistance.

These Guidelines are intended to deal with this complex set of issues, starting from a simple question: **how can RRI and OS be effectively embedded in research organisations?**

These guidelines do not purport to offer ready-made solutions to this problem, since ready-made solutions simply do not exist. Rather, their main aim is to propose a pathway – in which the users of the guidelines will necessarily play a proactive and creative role – for activating **institutional change processes towards RRI and OS** in their organisation in a way that is as feasible, sustainable and useful as possible.

In this perspective, a key concept which will be used in the Guidelines will be that of **governance setting**, i.e., a coordinated set of actions serving as a trigger to implement RRI and OS or parts of them in a given research organisation. Therefore, the focus is on the first steps to take for creating the minimal conditions to ensure that an evolutionary process towards RRI/OS can take place.

The Guidelines can be useful for all those interested in promoting RRI and OS at any level, including, e.g., policymakers, science centres, technology developers or private firms. However, as can be easily understood, the main targets of these Guidelines are European research funding and performing organisations of any kind (universities, research labs, funding agencies, governmental research agencies, etc.) since they are increasingly asked to introduce institutional changes towards RRI and OS and are exposed the most to the transformations affecting science.

The Guidelines are one the main products of the project "Fostering Improved Training Tools for Responsible Research and Innovation - FIT4RRI", co-funded by the EU DG Research and Innovation under Horizon 2020 and coordinated by Sapienza University of Rome. Some of the orientations reported in the Guidelines have been tested in **four experiments** carried out in the framework of FIT4RRI (see the box below).

THE FIT4RRI EXPERIMENTS

Four experiments have been carried out during the FIT4RRI project which were primarily aimed at observing RRI and OS in action, thus generating direct knowledge on RRI-related processes (barriers, drivers, resistances, interests and values, feasibility and transferability conditions, etc.).

The experiments have been conducted by the Instituto de Soldadura e Qualitade – ISQ (Portugal), the University of Liverpool (the United Kingdom), the Sapienza University of Rome (Italy) and the Open University (the United Kingdom). The experiments have been coordinated by the South-East European Research Centre (SEERC).

The experiment at **ISQ** was aimed at applying RRI and OS in ISQ R&D units, thus developing a self-tailored RRI model, through internal meetings and processes and the development of new rules and procedures.

The experiment at the **University of Liverpool** was intended to identify, through the involvement of internal and external stakeholders, the ethical and science educational implications of a monitoring system based on photonic sensors to detect unusual patterns of behaviour (for example, in the case of elderly people at home or protected environments).

The experiment at **Sapienza University of Rome** was aimed at setting up a multi-actor, co-created responsible governance in managing a new research centre (Saperi&Co.) serving several laboratories and supporting a fab lab, co-working activities, enterprise incubation services and four on-demand labs.

The experiment at the **Open University** was focused on developing a working group involving publishers, policymakers, text and data miners and industry for defining the conditions for extensively apply a specific platform – eduTDM – allowing text and data miners to machine access research literature their university subscribes to effectively and at scale.

The Guidelines on governance settings for a responsible science are organised in **three parts**.

Part One – **Guidelines for interpretation** – is aimed at providing orientations for interpreting the changes which are affecting science and innovation and the potential role RRI and OS should play in managing them.

Part Two – **Guidelines for decision** – is intended to help identify and take the basic decisions to activate the governance setting process.

Part Three – **Guidelines for action** – concerns the activation, implementation and finalisation of the governance setting process to produce long-term institutional changes towards RRI and OS in research organisations.

An **extended online version** of these guidelines is reachable through the FIT4RRI project website (https://fit4rri.eu/).

PART ONE
GUIDELINES FOR INTERPRETATION

CHAPTER ONE
CHANGES IN SCIENCE

RATIONALE

Responsible Research and Innovation and Open Science are part of a **broader context of changes** affecting science and innovation. Forming an opinion about features, contents, and trajectories of these changes is extremely important to approach RRI and OS properly (see box below).

CHANGES IN SCIENCE

Different interpretive models have been developed of the deep and broad changes which were and still are occurring in science and innovation.

Mode 1/Mode 2 Model. This model opposes the traditional mode of knowledge production (Mode 1) to a newly emerging one (Mode 2). In Mode 1, research is developed in the academic context and is generated under the internal impulse of specific disciplinary research dynamics. Topics, research design and end-users are autonomously identified in the academic realm. In Mode 2, knowledge is generated within the context of application, is used to solve problems, tends to be transdisciplinary in nature and is increasingly conducted with the involvement of different communities and types of stakeholders.

Post-academic science. This approach observes a set of trends transforming academic science into a post-academic one. In the context of post-academic science, research is increasingly produced outside the Academia, its results are subject to public scrutiny, it is pushed to produce knowledge which could have an economic and social value, is increasingly produced following industrial models and standards, and is subject to political steering.

Quadruple helix model. This approach highlights the prominent role acquired by universities in the innovation process, which is increasingly produced through a complex and continuously evolving system of relationships involving State, Academia, Industry and civil society (hence the image of the "quadruple helix").

Post-normal science. This model stresses how contemporary research increasingly deals with issues entailing higher decision stakes and a higher level of uncertainty. As a result, science increasingly requires the direct involvement of all those who, for different reasons, are affected by the issues under investigation, the development of new channels and ways to communicate science to facilitate political debate, a greater involvement of policy actors in all phases of the research process and the coexistence of competing interpretive solutions from which competing solutions may derive.

In general, although different from each other, these interpretive models agree that a **paradigm shift** is occurring in the way science is conceived and organised, contributes to innovation processes and interacts with the rest of society. Overall, because of this shift, the **consolidated social model of science** – often symbolically associated with the image of the "Ivory Tower" – is fading away and a new social model for science is emerging, although still unnamed.

The **consolidated social model of science** sees it as:

- Substantially autonomous from society
- Largely separated from the facts, worries and practicalities of society and, in general, of the real world
- Based on forms of self-direction (it mainly advances on the basis of scientists' interests)
- Internally organised in well-defined disciplinary fields
- Not involved in the actual implications and use of its outputs (in terms of knowledge, discoveries, technologies, but also impacts and risks).

The **emerging model** thinks science as:

- Fully embedded in society and strongly connected with political, economic, and societal dynamics (de facto limiting its autonomy)
- Open to the external lay actors and sensitive towards expectations, needs, worries and problems of society
- Increasingly adopting multidisciplinary approaches
- Based on forms of co-direction and co-production with stakeholders and the public at large
- Directly concerned with the actual implications and use of its outputs.

These are two abstract models, none of which exists in the real world. Moreover, the situation largely varies according to national contexts, disciplinary areas and even research institutions. However, identifying this general tendency is a necessary step for starting up a reflection on the role and benefits of responsible and open science.

This shift is to be understood as strongly linked to a broader **move from modernity to the so-called post-modernity**.

Modern society was characterised by strong social structures (social rules, social norms, behavioural patterns, social values, etc.) embodied by authoritative, powerful, hierarchically structured organisations (parties, state organisations, trade unions, etc.).

In the **post-modern age** – under the pressure of different factors like population growth, mass education, globalisation, pervasive diffusion of increasingly powerful technologies, and mass consumption – such structures and organisations started weakening, while the autonomy of individuals (e.g., to make their choices, to shape their own identity, to develop their worldview, etc.) and the groups they are part of is increasing.

The effect is that all the **social institutions of modernity**, including science, **are asked to adapt** to a horizontally structured and highly diversified society and to individuals much more inclined to distrust them, to challenge their authority, and to question their results and procedures, also asking for more transparency and accountability.

In this framework, the "Ivory Tower" model appears to be obsolete and highly dysfunctional, and the search started for more effective and adaptive models, like RRI and OS.

WHAT IS AT STAKE

This transition of science towards a new model is now rapidly accelerating its pace. However, it is not occurring smoothly, because it is strongly influenced by many other change trends occurring in contemporary societies, such as globalisation, increasing competition, social diversification and fragmentation, and increasing weight of economic and financial variables on the life of States, institutions, and individuals.

All of this is resulting in a wide range of **critical transformations** also affecting the most intimate mechanisms of scientific knowledge production.

The increasing competition among researchers and research organisations on a global scale is leading to an acceleration of the research processes, with impacts on the organisation of academic life, researchers' living conditions, research quality, and research integrity. Peer-reviewing procedures and research evaluation are more and more questioned in terms of both methods and outputs. A crisis in the capacity of scientists to reproduce and reuse research data is also emerging. The organisation of science as a community of peers is weakening while an "industrial" organisational approach is emerging, producing effects like overtraining and over-exploitation of young researchers, decrease in teaching quality, and increased attitude of self-promotion among scientists.

Thus, **what is at stake** is not only the relation of scientists and research institutions with society, but the very capacity of research actors and research systems to keep and develop those procedures, standards, and social processes which so far allowed them to produce the specific kind of knowledge we use to refer to as "scientific knowledge".

KEY ISSUES

In the perspective of activating a process of institutional change towards RRI and OS, three key issues should be taken into consideration with reference to the changes affecting science.

HOW CHANGES OCCURRING IN SCIENCE ARE AFFECTING ONE'S ORGANISATION

The first issue to deal with is how the changes are affecting one's own research organisation and with what effects. Both positive and negative impacts should be observed.

WHAT IS STAFF PERCEPTION ABOUT CHANGE

The second issue to deal with is how change is perceived by the staff (researchers, managers, leaders, students, etc.) of the organisation. Generally, people tend to only perceive a fraction of the ongoing changes, especially those which more directly affect them. In many cases, changes are overlooked or even denied, or they are experienced only in negative terms (uncertainty, decline, etc). Often, changes are only perceived for the direct impact they have on one's life: increase in adminis-

trative work, bureaucratisation of procedures, decrease in the time available for doing research, growing problems in retaining PhD students and post-docs because of the lack of resources, or the perception of increased competition in accessing funds or in publishing research works. Different generations of researchers or managers often see the transformations occurring in science in a different way.

WHICH MEASURES HAVE BEEN TAKEN SO FAR FOR MANAGING THE CHANGES

Another issue to be deepened is obviously how the organisational leadership or individual staff members react and attempt to manage the changes affecting the organisation. It is to consider that, in many cases, responses are provided at a very informal and personal level (changing personal time organisation, modifying personal career strategies, reducing one's career expectations, etc.). Moreover, formal measures are often taken by the organisation with low awareness levels about what is at stake with these change trends.

RECOMMENDATIONS

With respect to the changes involving science, three main recommendations can be identified

1 Mapping the main trends of change affecting one's research organisation

Regardless of RRI and OS, mapping the main trends of change affecting one's organisation could be an important step toward appropriately facing them. This mapping exercise can be conducted at different levels (personal level, the research group, department, or the organisation as a whole) and therefore with a variable size of investments and resources. The mapping exercise should concern trends and their impacts as well as the measures taken to cope with them. Relevant qualitative and quantitative data may be used (also selecting from the existing data already collected by the institution) concerning aspects like career development, staff professional and personal conditions (especially young researchers), impacts of the increasingly competitive research environment on the quality of research, peer reviews, or access to research funds. Other information can be collected through interviews, surveys, focus groups or other forms of consultation, including internal meetings and conferences.

2 Fostering an internal debate on the changes occurring in science and the measures to address them

Increasing the internal awareness and exchange on how the organisation is changing, which are the risks potentially endangering it and which opportunities the changes are opening for it and its staff could be an important step to better manage the transformation process. The forms may largely vary according to the type, size, internal structure, and leadership style. A strong commitment of the leaders is obviously a precondition for managing the possible impacts of the internal debate in terms of new measures to take or investments to make.

3 Establishing tools for monitoring and anticipating the trends of change affecting the organisation

Changes in science are extremely rapid and require equally rapid policy responses. Many European research organisations are not appropriately equipped to timely detect the problems met by researchers and staff and to connect them to broader trends involving many if not all research organisations. Hence the need to enhance, if necessary, the tools for monitoring and anticipating the internal change processes in the organisation. Different aspects can be considered, such as: the quality of research activities; the living and professional condition of researchers and staff, with special reference to the most vulnerable groups, such as women, youth, or staff members with temporary positions; the dynamics related to publishing; the research quality assessment procedures and their actual use; the problems connected to research funds. This can be done in different ways including, e.g., periodic internal surveys, systematic data collection procedures, the introduction of new criteria in the exploitation of existing administrative and statistical data, the creation of new structures or positions related to the monitoring and anticipation process.

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CHAPTER TWO
A RESPONSIBLE AND OPEN SCIENCE

RATIONALE

Responsible Research and Innovation and Open Science can be generally understood as **specific policy frameworks** aimed at **managing the deep transformations** affecting science and science-society relations. Rather than being univocal and well-defined approaches, they are "**umbrella concepts**" which include and try to coordinate different sets of practices, measures, and tools, more specialised in nature, through defining some general ordering principles.

RRI and OS have a different origin, but their trajectories are now increasingly converging and overlapping.

The concept of **Responsible Research and Innovation** (see the box below) is quite large in scope and relatively undefined in its boundaries. At its core, there is the idea that science actors should be responsible, in close interaction with other societal actors, of the (ethical) acceptability, sustainability and societal desirability of the scientific knowledge they produce, as well as of the innovation process and marketable products that such scientific knowledge makes it possible to develop. In the view of the European Commission, the notion of responsible research pragmatically includes five keys or pillars, each with its history and autonomous conceptualisation (i.e., gender equality, public engagement, research ethics and integrity, science education, and open access), and four dimensions (i.e., anticipation, reflexivity, inclusion, responsiveness).

SOME DEFINITIONS OF RRI

RRI is defined in different ways. Some examples are given below.

The process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (R. Von Schomberg, 2012).

A collective commitment of care for the future through responsive stewardship of science and innovation in the present (R. Owen et al., 2013).

An alignment of R&I process and its outcomes to values, needs and expectations of European society (M. Georhean-Quinn, 2012).

A way of proceeding in Research and Innovation that allow those who initiate and are involved in the processes of research and innovation at an early stage: (A) to obtain relevant knowledge on the consequences of the outcomes of their actions and on the range of options open to them; (B) to effectively evaluate both outcomes and options in terms of moral values (including, but not limited to wellbeing, justice, equality, privacy, autonomy, safety, security, sustainability, accountability, democracy and efficiency); (C) to use these considerations (under A and B) as functional requirements for design and development of new research, products and services (Expert Group on the State of Art in Europe on RRI, 2013).

Reflection, analysis and (public) debate concerning the moral acceptability of new technology and innovation (J. Van den Hoven, 2013).

A higher-level responsibility or meta-responsibility that aims to shape, maintain, develop, coordinate and align existing and novel research and innovation-related processes, actors and responsibilities with a view to ensuring desirable and acceptable research outcomes (B.C. Stahl, 2013).

The concept of **Open Science** (see the box below) emerges as a progressive enlargement of the principles of open access, i.e., making sure that publicly funded research outputs are accessible to all. Starting from the 1980s and 1990s, the idea of "openness", initially limited to publications, was applied to encompass many other products (data, software, peer-review) up to define highly-collaborative practices for doing science and for developing science policies. The concept of open science is more known than that of responsible research and innovation and it is probably more easily understood.

SOME DEFINITIONS OF OPEN SCIENCE

Open Science represents a new approach to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and new collaborative tools (European Commission, 2016).

Open science is the encounter between the age-old tradition of openness in science and the tools of information and communications technologies (ICTs) that have reshaped the scientific enterprise and require a critical look from policymakers seeking to promote long-term research as well as innovation (OECD, 2015).

Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods (FOSTER Project, on-line).

Open science is the concept of opening up all aspects of scientific research, to allow others to follow the process and collaborate. There is no formal definition of open science, but it usually incorporates aspects such as open access, open peer review, post-publication peer review, and open data. Additionally, it includes other ways to make science more transparent and accessible during the research process: open notebook science, citizen science, and aspects of open source software and crowdfunded research projects (Amsen, 2015).

Open science means the promotion of an open operating model in scientific research. The key objective is to publish research results, along with the data and methods used, so they can be examined and used by any interested party. Open science includes practices such as promoting open access publishing, open access publishing itself, harnessing open-source software and open standards, and the public documentation of research processes with 'memoing' (ATT – Open Science and Research Initiative, 2014).

Both concepts are intellectually rooted in the "**new model**" of science we discussed in Chapter One, variably referred to as "Mode2 of scientific knowledge production", "Post-academic science" or "Quadruple helix approach" to science and innovation. In this sense, they are both engaged in help science to implement and speed up the **paradigm shift** necessary to go beyond the "Ivory Tower".

WHAT IS AT STAKE

Although experiences and practices inspired by RRI and OS are multiplying, many **barriers** to RRI and Open Science are still there.

Most of them are related to the objective complexity of strongly modifying consolidated structures, practices, culture and procedures. Hence the importance to focus the attention on how to activate, implement and drive **the process of institutional change** within research organisations (see Part One, Chapter One).

However, these problems also arise because of the ways in which the **shift toward a responsible and open science is practically experienced**. Since they are both umbrella concepts, they are interpreted in different ways and, although they are both attractive and mobilising, it is often difficult to apply them.

Another big question is the **relation of RRI and OS with the transformations affecting science**. In the majority of cases, those who promote or study RRI and OS seem to overlook or even ignore many of the critical trends affecting science. The risk is that researchers and research managers feel RRI and OS as something producing other time-consuming obligations and tasks which add up to their ordinary (already highly absorbing) activities. The challenge is, therefore, that of making **RRI and OS something supporting researchers and research managers to solve their problems and save their time**.

What is at stake, therefore, is understanding, not if RRI and OS are right or not, but **how and under which conditions** they can be fruitfully used to drive, accelerate and make more effective the shift towards a different and more socially adaptive model of science.

KEY ISSUES

In the perspective of activating a process of institutional change towards RRI and OS in a given organisation, a set of key issues should be considered.

WHICH ARE THE ACTIONS AND STRATEGIES ALREADY IN PLACE OR PLANNED TO PROMOTE RRI AND OS AND HOW THEY WORK

Many research organisations have been developing practices and measures related to RRI and OS for some years now. In the majority of cases, these are not recognised as part of a unique policy framework (for example, they can be managed by different units of the organisation, they may not be labelled as related to RRI or OS, etc.). Policy areas such as public engagement, gender equality or research ethics have their story and communities of practices which are not connected with each other. A first key issue to consider is, therefore, reconstructing a unitary and consistent image of what the organisation is doing for implementing RRI and OS. Viewing and assessing them as a component of a common plan (even when they are not) can be extremely useful for capturing how and to what extent the research organisation is moving out of the traditional models of conceiving, producing, and managing scientific knowledge.

TO WHAT EXTENT STAFF AND LEADERS EXPRESS A CONSENT TOWARDS RRI AND OS

Changes cannot take place without someone proposing them and a group of people sustaining them over time. Especially in a post-modern context like the one we are living in, purely top-down change simply does not work any longer. Hence the importance of this second issue, i.e., the need to understand who are the actors, stakeholders, groups, or individual researchers, leaders, officers or managers who are bringing forward or supporting RRI and OS-related initiatives. More in general, it is important to understand how potentially large is the area of people supportive of RRI and OS policies and how large, on the contrary, is that of people who are not involved with, not interested in or even against RRI and OS.

WHICH ARE THE EXTERNAL ACTORS AND STAKEHOLDERS THE ORGANISATION IS ALREADY WORKING WITH TO CARRY OUT RRI AND OS

RRI and OS are part of cultural and policy trends which pass across organisations, governments and research systems. Whatever the terms and the concepts used, the tendency to move towards a more responsible and open science also manifests itself through networks, associations, common projects and cooperation relationships, as well as through conferences, meetings, and any other initiative connecting people and organisations. A third issue to consider is, therefore, understanding how far your research organisation is embedded in these networks and how the latter is effective and useful to help the organisation to enhance its action for implementing RRI and OS.

RECOMMENDATIONS

With respect to changes involving science, three main recommendations can be identified

4 Making an inventory of and assessing the actions and measures already in place or planned pertaining to RRI and OS

One of the preliminary steps to take is mapping the actions and measures pertaining to RRI and OS already in place or planned. This mapping exercise is extremely important especially in large organisations, since one might be unaware of the many initiatives already in place in this regard) and, on the other side, to start assessing them. Different means can be used, including documentary analysis, interviews with leaders and managers, or broader forms of consultation involving the staff. Much depends on the size and features of the research organisation and on who promotes the mapping and assessment exercise within the organisation.

5 Identifying people and resources already involved with or interested in RRI and OS

Equally important, in view of reasoning on RRI and OS, is identifying those who are already involved with RRI and OS and those who are interested in getting involved. We can refer here to, e.g., specific units, officers, or leaders in charge of implementing RRI/OS activities, researchers and staff members involved with initiatives connected to RRI/OS, or external networks, associations, partners, or communities of experts the organisation is already in contact with. At the same time, an analysis of available resources can also be done, including measures and regulations supporting RRI/OS, internal expertise and skills pertaining to RRI/OS, internal funds allocated for implement-

ing RRI/OS, equipped spaces, access to external research funds, access to public and private incentives to conduct RRI/OS activities, or external programmes supporting RRI/OS or RRI/OS-oriented research.

6 Raising awareness and disseminating knowledge on RRI and OS among leaders, managers and staff

Making an inventory and an assessment of RRI/OS actions in the organisation cannot be merely a desk research work, only based on the documentary analysis. On the contrary, it implies some forms of consultation and participatory mechanisms allowing to collect first-hand information about what leaders, managers and staff think and feel about RRI and OS. Hence the need for raising the awareness and disseminating knowledge about RRI and OS within the organisation, accompanying the analysis and assessment exercise with an *ad hoc* information campaign.

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PART TWO
Guidelines for Decision

CHAPTER THREE
DEFINING A TAILORED RRI/OS PROFILE

RATIONALE

Assessing the change trends affecting one's organisation (Chapter One) and the initiatives already in place or planned pertaining to RRI and OS (Chapter Two) are two preliminary steps for **deciding if, how and to what extent the research organisation should get engaged with RRI and OS**.

RRI and OS are not policy systems which can be applied as they are. Rather, they can be understood **as a stock of theoretical and practical knowledge** which can serve as cultural background and a source of inspiration for managing and orienting the transformations of science and innovation as they manifest themselves in the organisation. Therefore, it is up to the leaders, managers or staff to decide how and which part of this stock of knowledge can be usefully applied, thus developing an **RRI/OS** profile tailored on problems, needs, and objectives of the organisation.

There are no established procedures to suggest for building up a self-tailored RRI/OS profile. It can however be useful to clarify **some of the components** which come into play in this decision process.

First, deciding on RRI and OS necessarily means deciding whether to take a path aimed at introducing some **institutional changes**, i.e., changes in how the organisation manages research activities, organises its internal life, decides and defines its objectives or interacts with external actors. To a different extent, institutional changes require modifications affecting, e.g., rules, procedures, consolidated practices, routines, or structures of the organisation but also habits, feelings and attitudes of individual researchers, officers or technical staff members.

Secondly, for taking this kind of decisions, it could be also useful to "locate" the organisation within a **clear pathway towards institutional change**, thus defining, so to say, a starting point to move from. A scheme for locating the organisation is given in the box below.

THE RESPONSIBLE RESEARCH AND INNOVATION MATURITY MODEL

A group of experts, led by Bernd Carsten Stahl (2017) developed the **Responsible Research and Innovation Maturity Model**, aimed at identifying progressions towards RRI.

The model includes an operational definition of the components of RRI, structured around the three main elements of R&I, i.e.:

- Purpose (why R&I is undertaken)
- Process (the activities that are undertaken in the pursuit of R&I)
- Product (the outcomes of R&I).

Each element can be evaluated against an evolutionary scheme to assess the extent to which RRI is institutionally embedded in a given organisation. Five stages are identified.

- ***Level 1 – Unaware****. The organisation is not aware of RRI or its components and does not incorporate it in its processes.*
- ***Level 2 – Exploratory/reactive****. The organisation reacts to external pressure concerning aspects of RRI and experiments concerning appropriate processes.*
- ***Level 3 – Defined****. The organisation has a definition of RRI (or components of it) and has integrated these into its business processes.*
- ***Level 4 – Proactive****. The organisation realises the benefits of RRI and seeks to integrate these proactively and increasingly into its business process.*
- ***Level 5 – Strategic****. The organisation has adopted RRI as a component of its strategic framework and aims to ensure all R&I activities cover all (or most) RRI components.*

By combining these stages with RRI components and categories, a matrix can be developed to assess the maturity level reached by an organisation in embedding RRI into its procedures and objectives.

Moreover, in making the diagnosis, it can be useful to get some ideas about the **benefits** and **drivers** usually attached to RRI and OS.

Benefits can be, e.g., increasing the quality of research and innovation, preventing conflicts on controversial scientific issues or technologies, supporting a democratisation of the decision-making process and the research and innovation process, anticipating risks related to science and innovation, enhancing the capacity of science to target societal needs, values and interests, better exploiting research data and ideas, increasing and accelerating the social and economic impacts of research, or allowing the general public to more easily access research results and methods.

As for **drivers**, there would be political drivers (e.g., policy measures, incentives, or mechanisms supporting RRI and OS), economic drivers (e.g., the use of RRI and OS to access more resources or to accelerate innovation), social drivers (e.g., the public demand for better and more efficient, responsive and transparent science), technological drivers (e.g., digital technologies in research production and dissemination, technological platforms facilitating multi-actor innovation programmes), and values-related drivers (e.g., the attention towards ethical issues and responsibility, the relevance attached to risk prevention and mitigation).

In this perspective, it is also important to connect RRI and OS with the main changes the organisation is already facing. Often, it could be practical starting from specific problems requiring a responsible and open approach.

Finally, **i**t is to consider that rarely research organisations develop a **comprehensive action plan or programme** encompassing all the keys and dimensions of RRI. Quite often, they adopt policies or measures focused on each of them, such as gender equality or research ethics.

It is also important to take into consideration the **scale** and the **scope** of the RRI/OS profile.

The **scale** concerns the parts of the organisation which are involved in the governance setting process. One can decide, for example, either to start a programme directly involving the organisation as a whole, or to start a small pilot programme involving only some units of the organisation to then assess whether to scale up the process.

The **scope** concerns the components of RRI or OS concerned in the governance setting process. Once again, one can decide to develop a policy action embracing RRI or Open Science as a whole, developing specific actions for each component, or to start with some specific aspects of Open Science or one key of RRI (gender equality, public engagement, etc.) to then decide whether to enlarge the scope.

WHAT IS AT STAKE

In the great majority of cases, **research organisations are somehow already involved with RRI and OS**, even though their leaders and staff are not necessarily fully aware of it. This may concern the RRI keys (research ethics and integrity, gender equality, public engagement, science education, and open access), the RRI dimensions (inclusion, anticipation, responsiveness, reflexivity) or measures more related to Open Science (pertaining to publication, data, evaluation, protocols and workflows, and open infrastructure).

Therefore, the key decision to make is not whether to implement RRI and OS or not, but **whether it is worth developing stronger, wider, and, if necessary, unitary strategies inspired to RRI and OS**. In this same framework, other aspects should be also considered, such as the costs to be incurred, possible internal conflicts, and the distribution of the actions over time.

What is at stake with this decision to get the organisation more engaged with RRI and OS is, ultimately, the possibility to **increase control over the transformations** which are occurring in the organisation as well as in the environment the organisation is immersed in, also with the aim of identifying, preventing and managing the risks they could produce and the opportunities they offer. Hence the importance to **keep in mind the results of the analysis** carried out on the organisation (see Part One), considering them as part of the same diagnosis.

KEY ISSUES

Making decisions about the engagement of the organisation with RRI and OS likely requires to consider at least three major issues.

WHY THE ORGANISATION SHOULD START A PROCESS OF INSTITUTIONAL CHANGE BASED ON RRI AND OS

The first issue to consider is obviously why (i.e., to address which issues) the organisation should enhance its level of engagement in RRI and OS. The question may appear trivial, but it is not. As we already said, research organisations are facing many changes which need to be somehow managed. Understanding how RRI and OS could be helpful for addressing them can be a quite complicated exercise, especially when the organisation is large. It is also to consider that science is an increasingly globalised and competitive domain. Research organisations which do not succeed in updating their culture, motivations, practices, and structures risk being left behind. Therefore, the focus should be that of the usefulness of RRI and OS, avoiding to consider them as merely prescriptive or normative approaches.

WHICH ARE THE PRIORITY AREAS OF RRI AND OS, TO ACHIEVE WHICH GOALS AND TO MANAGE WHICH RISKS

Secondly, it is also important to establish which are the areas of RRI and OS which should be addressed first. This prioritisation exercise should lead to defining, for each of them, specific and hopefully realistic goals which can be achieved in a reasonable lapse of time, thus establishing the building blocks for designing an action plan or a long-term policy programme. All of this should take into due consideration the risks the research organisation is mainly exposed to because of the transformations affecting science systems.

WHICH CONSTRAINTS AND OBSTACLES SHOULD BE CONSIDERED BEFORE STARTING THE PROCESS

The third key issue proposed here is the need for timely assessing risks, constraints, and obstacles before the process of institutional embedment of RRI and OS actually starts. Constraints, and obstacles may pertain to different dimensions, like the organisational dimension (e.g., endangering existing RRI and OS experiences which work well, creating new organisational structures for managing RRI and OS when they are not necessary, bureaucratising RRI and OS procedures, etc.), the policy dimension (e.g., creating conflicts within the organisation, failing in embedding new measures and procedures in the existing policy frameworks, etc.), the economic dimension (e.g., unnecessarily increasing costs for doing research), the social and cultural dimension (e.g., arousing cultural resistance and explicit opposition, causing insecurity and discontent among the staff) or the legal dimension (e.g., ignoring or overlooking existing internal or national norms and regulations).

RECOMMENDATIONS

Three main recommendations connected to the definition of a self-tailored RRI/OS profile can be done.

7 Defining the RRI/OS profile for the organisation through an open decision-making process

A risk to be prevented from the beginning is that of launching programmes towards a more responsible and open science on the basis of decision-making processes which are "closed", i.e., restricted to a small number of people and not transparent in their steps and procedures. This should be avoided, not only for the paradox it produces (opening research organisations through closed decision-making procedures), but also for technical reasons. Top-down approaches to RRI and OS simply do not work, since the process of change, to be managed, inevitably involves, to a different extent or for different reasons, all the staff which is asked to largely cooperate for ensuring its implementation. Solutions to make the process participatory in nature can largely vary according to the research organisation. However, they are necessary to both get a reliable picture of what is going on in the organisation, and to develop realistic and feasible strategies towards RRI and OS.

8 Documenting the decision-making process and its results in order to make them accessible to everyone

For a similar reason, whatever the procedures adopted to make decisions about RRI and OS, they should be fully documented and their results accessible to everyone within the organisation. It is worth noting, in this regard, that RRI and OS are approaches aimed at making research and decision-making process as transparent and shareable as possible. It, therefore, could be quite paradoxical promoting them through procedures which are not equally transparent and shareable.

9 Keeping a process-like view of the RRI/OS profile and following an open and step-by-step approach

Institutional change in research organisations cannot be considered a result to achieve once and forever. It is not a project to execute, but a process to activate which usually does not follow a linear path. In this sense, it may take time to develop, take unexpected directions and have its own evolutionary dynamics. Therefore, even though plans and programmes are essential for driving institutional change, it is necessary to adopt an open and step-by-step approach while defining the RRI/OS profile. This means also including planning and monitoring mechanisms, check-points, consultation and negotiation moments throughout the process, as well as reflexive tools to prevent risks and timely seize the opportunities which open up. Actually, the only things to be feared are not unexpected changes, but lack of change.

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CHAPTER FOUR
CHOOSING THE GOVERNANCE SETTING

RATIONALE

As mentioned in the introduction, these guidelines are aimed at providing research organisations with some orientation on **how to start or to enhance the process of institutional embedment of RRI and OS** in the organisation.

To develop this aspect, the concept of "governance setting" has been introduced. This expression simply refers to a "favourable environment" for RRI and OS to be developed. More practically, it is used here to refer to a **short-term programme** or a **set of actions** serving as a trigger for longer-term **institutional changes towards RRI and OS** in the organisation. Different types of governance settings may be adopted. Thus, the focus of this chapter is on how to choose the governance setting that best fits features, needs, and objectives of the organisation and makes the most of RRI/OS experiences already in place.

In general terms, on the basis of an empirical analysis carried out under FIT4RRI on around 300 programmes and projects targeting RRI and OS, the **governance settings** can be operationally distinguished from each other on the basis of **two variables**.

The **first variable** can be referred to as the **triggering agent**, i.e., who starts and manages the process of change, i.e.:

- The **organisation** itself
- An **entity external to the organisation** (consultancy firm, funding organisation, etc.)
- A **network of actors** the organisation is or becomes part of.

The **second variable** is the **focus**, i.e., the aspects in the life of an organisation which the governance setting addresses first, i.e.:

- Directly changing the organisation firstly addressing **social patterns**
- Directly changing the organisation firstly addressing existing **norms**
- Indirectly changing the organisations firstly addressing the **ways in which scientific knowledge is produced**.

Crossing these two variables, a matrix can be developed (see below)

FOCUS / TRIGGERING AGENT	Social patterns first	Rules first	Knowledge first
Changes from inside	A Internally-initiated social model	B Internally-initiated normative model	C Internally-initiated knowledge-oriented model
Changes from outside	D Externally-initiated social model	E Externally-initiated normative model	F Internally-initiated knowledge-oriented model
Changes through networks	G Network-initiated social model	H Network-initiated normative model	I Network-initiated knowledge-oriented model

While the matrix shows ideal models, a real governance setting process is unlikely to exclusively fall within a specific type, and mixed situations are common. Nonetheless, the typology is helpful for taking appropriate decisions about the **best general strategy** to start the change process. Some examples for each type of governance settings are given below.

GOVERNANCE SETTING MODELS	EXAMPLES OF ACTIONS
Internally-initiated social model	Development of RRI/OS-oriented internal action plans based on the mobilisation of internal and external stakeholders; internal awareness-raising and training programme on RRI/OS
Internally-initiated normative model	Adoption of new internal regulations, procedures, guidelines developed by the organisations' leadership; establishment of internal RRI-oriented research funding criteria
Internally-initiated knowledge-oriented model	Establishment of a new research unit focused on RRI/OS-related issues; activation of RRI/OS-focused research programmes by the research organisation
Externally-initiated social model	Use of external RRI/OS experts; participation in national/international RRI/OS-oriented programmes
Externally-initiated normative model	RRI/OS-oriented certification processes
Externally-initiated knowledge-oriented model	RRI/OS-oriented national research funding schemes
Network-initiated social model	Participation of the organisation in RRI/OS-specialised networks; participation of the organisation in cross-institutional RRI-oriented programmes
Network-initiated normative model	The organisation signing up to a network-based charter (such as the UK Athena-SWAN Charted, aimed at supporting research organisations in developing a gender equality action plan)
Network-initiated knowledge-oriented model	Establishment within the organisation of RRI/OS-focused research units or research programmes supported by a pool, network, or association of research institutions

Within this general typology, governance settings can be also distinguished from each other on the basis of **many other elements**, mostly dependent on the features of the RRI/OS profile (such as the scale and the scope).

It is also to highlight that **not necessarily a unique governance** setting should be adopted. For example, one can decide to choose a governance setting for, e.g., promoting gender equality and another one for approaching ethical issues or Open Science.

WHAT IS AT STAKE

Focusing the attention on the governance setting should help **devise a realistic approach to RRI and OS**. Indeed, the process of defining an RRI/OS profile for the organisation – which usually involves different internal actors within the organisation – may lead to overambitious objectives and impractical plans, which do not take in due consideration constraints, limits, and the overall complexity of the process. This tendency can be also observed when actions focusing on specific RRI keys (for example, gender equality action plans) are concerned.

Deciding about how to start is the first step for **verifying and testing the feasibility conditions** for implementing an RRI/OS profile, primarily on the basis of what actually is already in place. This is the reason why the decisions about the development of an RRI/OS profile (see Chapter Three)and those pertaining to the choice of the governance setting should be ultimately understood **as part of the same decision-making process**, in which the RRI/OS profile defines the objectives to pursued and the governance setting helps define the pathway which can be followed to attain them.

What is at stake is the **actual contextualisation of RRI and OS** in a given organisation, and therefore the possibility of turning ideas and expectations pertaining to RRI and OS into real, feasible programmes.

KEY ISSUES

Three major issues should be considered about how to make decisions on the governance setting to develop for embedding RRI and OS in the organisation.

TO WHAT EXTENT THE ORGANISATION IS EQUIPPED FOR AUTONOMOUSLY ACTIVATING RRI AND OS PROCESSES

This issue concerns the first of the two variables which contribute to defining the typology of governance settings, i.e., the variable pertaining to the triggering agent. The core of the question is whether in the organisation there are the necessary skills and resources (of different kind, such as funds, physical spaces or equipment) for autonomously activating or accelerating the process of institutional embedment of RRI and OS. If not, external support (a consultancy firm, single experts, other research organisations, external funds, etc.) should be looked for. This does not mean for the organisation to lose control over the process, but to back the implementation of RRI and OS with external inputs so as to prevent risks of failure.

WHICH ASPECTS OF THE ORGANISATION'S LIFE CAN BE MORE EASILY MODIFIED

This second issue concerns the second variable characterising governance settings, i.e., the focus. As mentioned above (see Chapter Three), institutional change cannot be interpreted either as the modification of the norms of the organisation or a change of the mindset, attitudes, values, and behaviours of the staff. Both compo-

nents are concerned. Moreover, as mentioned, it is also possible to have different entry points to the change process, such as trying and directly changing the organisation or addressing how it fulfils its core business, i.e., the production of scientific knowledge. The key question here, therefore, is which of these aspects can be modified more easily and with fewer risks. The answer depends on many factors, such as quality and the authoritativeness of the leadership, leadership style, quality and intensity of the internal dialogue, cohesiveness of the staff, sensitiveness of research leaders, not to mention other features such as size of the organisation or previous experience on RRI and OS. The features of the RRI/OS profile, such as its scope and scale, strongly influence the decision.

WHICH (INTERNAL OR EXTERNAL) OPPORTUNITIES CAN BE EXPLOITED FOR DEVELOPING AN EFFECTIVE GOVERNANCE SETTING

We reasoned so far imaging a more or less planned process which, starting from a diagnosis of the changes affecting the organisation (Chapter One) and an analysis of already implemented RRI/OS actions (Chapter Two), allows defining a self-tailored RRI/OS profile (Chapter Three) and choosing the appropriate governance setting in order to make this profile real (subject of this chapter). However, it is infrequent that a process like this can be so linearly planned. In many cases, the decision to start developing RRI and OS is an unplanned effect of, e.g., the participation of individual researchers in conferences and networks or the application for accessing opportunities or research funds connected to responsible and open science. Hence the importance of not overlooking internal or external existing opportunities for facilitating the establishment of a governance setting, be they policies, incentives, committed people or funds.

RECOMMENDATIONS

Three main recommendations connected to the definition of a self-tailored RRI/OS profile can be made.

10 Choosing the governance setting model primarily on the basis of feasibility considerations

The choice of the strategy to adopt for starting institutional change processes towards RRI and OS depends on considerations of various nature. However, as we tried to show above (section “What is at stake”), the most important parameter to take into account is that of the feasibility of the governance setting. Indeed, the more feasible the governance setting, the more likely that the RRI/OS profile is implemented as planned. Feasibility considerations should address different dimensions, including economic feasibility (mainly relating to costs and economic resources), technical feasibility (concerning aspects like the access to necessary skills, the availability of technical and physical resources, or organisational aspects), institutional feasibility (which relates to support by the leadership, distribution of roles and tasks or the respect of internal rules and procedures), but also social feasibility (concerning the actual possibility of the governance setting to, e.g., involve the most active actors, match the expectations of the interested stakeholders, prevent or reduce the risk of tensions and conflicts, or

mobilise the target groups).

11 Scrutinising external resources to learn from

In the last two decades and more, a huge amount of theoretical and practical knowledge, as well as specialised know-how, has been accumulated on how to apply RRI and OS principles in research organisations. This knowledge is now available in many ways, including scientific literature, training tools, national and European networks, or European projects. A scrutiny of these resources is an important component of the choice of the governance setting process.

12 Testing the governance setting before starting the process

Even though the identification of a governance setting strategy can be considered a preliminary step before taking action, it should also be seen as already part of the action itself or, more precisely, of its testing phase. In particular, launching some testing actions or organising preliminary activities which are already of very practical nature could be useful for getting information about the real interests of the concerned actors and their willingness to get involved with the process, as well as about the attitudes of leaders and managers. It can also be useful to start identifying and testing the team in charge of the process (see Part Three, Chapter Five).

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Governance setting

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PART THREE
Guidelines for Action

CHAPTER FIVE
ACTIVATING THE GOVERNANCE SETTING PROCESS

RATIONALE

The main character of governance settings is **variability**. As Part Two shows, institutional changes aimed at implementing RRI and OS in research organisations can be activated in many ways, i.e., adopting strategies of governance setting which can be extremely different from each other, in terms of actors primarily involved, contents, scope and scale.

It is therefore difficult to exactly say what it takes to start the process. Nonetheless, some **recurrent critical issues** can be highlighted, whatever the strategy adopted or the features of the research organisation concerned with the process.

The first recurrent factor is the presence of a **guiding idea** around which the governance setting process can be structured. Defining a guiding idea is necessary to provide motivations to act and a line of action to follow to mobilise internal and external stakeholders on RRI and OS. **Examples of guiding ideas** about RRI and OS are provided in the box below.

EXAMPLES OF GUIDING IDEAS IN RRI AND OS-ORIENTED PROJECTS

Action: Framework for Responsible Innovation: introduction of RRI-related funding criteria
Organisation: Engineering and Physical Sciences Research Council
Guiding idea: Ensuring that our activities and the research we fund are aligned with the principles of Responsible Innovation, creating value for society in an ethical and responsible way

Action: Responsible Innovation Programme (MVI)
Organisation: Dutch Research Council (NWO)
Guiding idea: Identifying the ethical and societal aspects of technological innovations at an early stage, so that these can be taken into account in the design process

Action: Biotek 2021 RRI framework
Organisation: Norwegian Ministry of Education and Research
Guiding idea: Generating biotechnology that contributes to value creation and innovation to solve societal challenges in a responsible manner

Action: Promoting integrity as an integral dimension of excellence in research
Organisation: Radboud University
Guiding idea: Enhancing research integrity by promoting and fostering a research culture in which integrity is seen as an integral, substantial part of excellent research, not as an external and restrictive control system

Action: CAMBIA
Organisation: CAMBIA, an Australian independent non-profit institute promoting innovation
Guiding idea: Democratising innovation to create a more equitable and inclusive capability to solve problems using science and technology

Action: Reflexive System Biology – Towards an appreciation of biological, scientific and ethical complexity
Organisation: University of Bergen Centre for the study of sciences and humanities
Guiding idea: Promoting in systems biology and synthetic biology the ethical and social aspects involved in prediction, control, design and fabrication of organisms

Action: UNIAKTIV
Organisation: Centre for societal learning and social responsibility at the University of Duisburg-Essen
Guiding idea: Promoting social responsibility and community involvement of students and teachers and integrating these issues into university teaching

Another key factor is the **team** which will drive the governance setting process. The team serves multiple key functions, such as making an institutional learning process possible, motivating the actors to be mobilised, coping with resistances and constraints, keeping the direction of change or timely adapting it when necessary, and negotiating with all the actors involved.

Many **obstacles** are predictable but many others emerge unexpectedly. Hence the importance for the team to be prepared to timely identify and treat them, all along the governance setting process, but especially in its first phase, when it is still undefined and frail. Examples of barriers to RRI and OS have been already provided in Chapter Two.

The **support from leaders and managers** is another important factor to consider in terms of both benefits and barriers since almost always it plays a critical role in the activation of the institutional change process. Some reasons why involving leaders and managers is important are summarised in the box below.

SOME GOOD REASONS FOR INVOLVING LEADERS

Changing the organisational culture. Promoting RRI/OS could imply attacking profoundly rooted cultural resistances and promoting an overall change of the organisation's culture. This can be successfully achieved only with the strong commitment of senior management.

Producing a symbolic impact. Proactive involvement of leaders has a symbolic effect, which greatly facilitates the mobilisation of the other leaders and staff at all levels.

Making decisions. Only strong support by leaders makes it possible to develop successful initiatives aimed at embedding RRI/OS in the organisation, to mobilise appropriate resources and to prevent or settle possible conflicts.

Promoting internal dialogue. Leaders' involvement has an essential role in favouring an internal dialogue on RRI/OS. This is particularly true at an informal level, since transferring interest and passion towards a responsible and open science is more effective when it occurs through face-to-face informal relations between leaders and staff.

Favouring learning processes. It is up to the leaders to manage the outputs of the initiatives carried out,
so to turn them into decisions, measures, or new research inputs. Their involvement at the forefront of RRI and OS is necessary since they have to lead the institutional learning processes deriving from the implementation of RRI and OS.

Connecting RRI/OS with the mission of the organisation. Leaders' involvement is necessary from the beginning to prevent RRI and OS from becoming a marginal issue within the institutional agenda.

Playing as champions. Leaders may play the role of champions of RRI and OS to foster them throughout all researcher levels. The personal involvement of the leaders as testimonials for RRI and OS in public occasions turns out to be a good way to ensure a continuity in political backing.

WHAT IS AT STAKE

Starting a process of change requires an important initial **investment in human energy**, in terms of, e.g., ideas, motivations, time, creation of new relations and social ties, personal and institutional learning processes, and resources. Moreover, the starting phase may entail, in the short run, a lack of visible outputs and, therefore, of clear feedback to the actions carried out. This contributes to create uncertainties and doubts about initial choices and, in certain cases, risks to create distrust and weaken commitment about the future developments of the process in both the team and the other stakeholders.

It is also clear that the success of this initial phase is largely dependent upon the **quality of the previous phases** described in Parts One and Two of these guidelines. Analysing one's organisation, defining its RRI/OS profile and choosing the relevant governance setting(s) are all activities which help the team and the leadership to get prepared to launch the process, while also creating an enabling environment within the organisation.

What is at stake is avoiding to **take the wrong way to RRI and OS**. The governance setting activation phase should provide the promoters with first-hand information about the correctness of the choices made about the RRI/OS profile and the approach to governance settings. Moreover, it is in this phase that the capacity of the team to drive the process is tested for the first time. Hence the need for being prudent and self-reflexive, so to avoid false starts or timely correct the errors made.

KEY ISSUES

Those who start a governance setting process face a series of questions that need to be treated carefully. At least three of them deserve to be mentioned here.

TO WHAT EXTENT THE COMMITMENT OF LEADERS AND MANAGERS WITH THE DEVELOPMENT OF THE GOVERNANCE SETTING PROCESS IS STRONG AND VISIBLE

The political and institutional commitment of leaders and managers is structurally one of the key factors in the institutional change processes. Theoretically, the higher the support that leaders and managers give to the process, the higher the success rate of the latter. In practical terms, the situation can be much more complex to manage. There would be managers and leaders who express their commit-

ment but who have no time to be actually committed, those whose commitment is real but limited to certain choices or actions (we could speak of a "selective commitment"), those who are committed formally but not in practical terms, and those who are explicitly not committed and proactively against the introduction of institutional changes towards RRI and OS. Some of them are explicitly committed. These dynamics are present, to a different extent, everywhere. Thus, a specific capacity to manage them is necessary, defining a specific strategy for each leader and manager to be involved, to make their commitment as strong and visible as possible.

TO WHAT EXTENT THE GOVERNANCE SETTING PROCESS COULD BE BASED ON VOLUNTEERING

Addressing institutional change towards RRI and OS is often seen as a moral commitment which, for this reason, falls outside the normal academic portfolio, so that it is or should be taken up as volunteer service. Such a vision can be risky. Many actions aimed at RRI and OS indeed require some voluntary effort. However, all the activities necessary to activate, implement and make sustainable institutional changes have a cost, especially as concerns the costs of human resources (be they internal or external to the organisation). Therefore, volunteering can be surely welcomed as an indicator of a positive impact of the actions carried out, but only when it is not "imposed" because of a misleading view of institutional change or inappropriate allocation of resources. Moreover, volunteering on RRI and OS should be also recognised as an important aspect of the professional and scientific curriculum of researchers and duly taken into consideration in the recruitment and promotion processes.

HOW TO CREATE EFFECTIVE COMMUNICATION AND COOPERATION AMONG THE INVOLVED ACTORS

Institutional change is by definition a collective enterprise, especially when the governance setting model which has been adopted structurally implies the cooperation with external entities or networks. Bad communication and low cooperation levels reduce effectiveness and lead to wasting time, while also creating psychological distress. This concerns both the relations within the team and those involving other actors.

RECOMMENDATIONS

13 Establishing a team which is substantially and institutionally capable to activate the governance setting process

The team in charge of the governance setting should be put in the best possible conditions to activate and finalise the institutional change process. This means, for example, that the team should have access to the established resources, have the autonomy to make the current decisions, have access to the indispensable expertise and support, can easily interact with the concerned leaders and managers, and have the necessary legitimacy, authority and recognition within the organisation to develop the activities needed for activating the governance setting process.

14 Ensuring the transparency, inclusiveness and visibility of the governance setting process

Transparency, inclusiveness and visibility are part of the philosophy of RRI and OS and, at the same time, they are preconditions for developing effective measures aiming to RRI/OS. Therefore, all the information related to the activities to be carried out should be openly accessible and these activities should involve as many actors as it is useful and possible. Finally, the governance setting should be made visible within the organisation, including its more critical aspects, to favour a collective exchange about it. Some means can be used, including the establishment of referents for each involved entity and unit, the creation of an easily accessible online platform to share all the information and documents produced, or the development of reports about the activities carried out, so as to allow everyone to get informed about the development of the process.

15 Making RRI and OS part of the "core business" of the research organisation from the beginning

Even though the governance setting is a temporary and often small programme aimed at starting broader processes of institutional change, it should be intended from the beginning as a tool for making RRI and OS part of the "core business" of the research organisation, potentially influencing its mission and key functions (research, teaching, recruitment and promotion mechanisms, structures, leadership, etc.). This aspect should be clearly expressed, for example, in developing the guiding ideas, in involving leaders, in establishing the team, or in defining the plan of the actions to be carried out.

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CHAPTER SIX
IMPLEMENTING THE GOVERNANCE SETTING PROCESS

RATIONALE

Implementing a governance setting process means **turning ideas and plans** elaborated in the previous phases into new practices, approaches, and views.

Each organisation must find its way to do it.

However, **different models** have been elaborated about how the implementation process of RRI and OS is expected to occur, which can help understand how it could be successfully driven. Some examples are given below, drawn from different EC-funded projects.

MODELS OF CHANGE

✓ **FOTRRIS**

According to the experts of the FOTRRIS Project, institutional change towards RRI develops through the following steps:

- **The destabilisation** of the regime (i.e., the institutionalised organisations, interactions, rules, beliefs, routines, visions that stabilise the system and shape the activities of the system's actors)
- Experimentation of **RRI-based alternatives**, to be then implemented at the side of the regime or in replacement of the regime's ways of thinking, doing and organising
- **Phasing-out** the non-RRI-based elements of the system
- **Institutionalising** RRI-based alternatives.

✓ **National Academies of Sciences, Engineering, and Medicine**

The US National Academies of Sciences, Engineering, and Medicine defined a set of phases:

- **Provocation** - explore or mine open research resources and use open tools to network with colleagues
- **Ideation** - develop and revise research plans and prepare to share research results and tools under FAIR (Findable-Accessible-Interoperable-Reusable) principles
- **Knowledge generation** - collect data, conduct research using tools compatible with open sharing, and use automated workflow tools to ensure accessibility of research outputs.
- **Validation** - prepare data and tools for reproducibility and reuse and participate in replication studies
- **Dissemination** - use appropriate licenses for sharing research outputs and report all results and supporting information (data, code, articles, etc.)
- **Preservation** - deposit research outputs in FAIR archives and ensure long-term access to research results.

✓ **STAGES**

Under the STAGES project, focused on gender equality in science, a model of institutional change has been developed including the following components.

Creation of the transformational agent. This component refers to the establishment of the team as an actual new player within the organisation, able to enlarge and encompass increasingly wide circles of internal and external stakeholders, mobilising them on the project's objectives, also through the integration of the other groups' (compatible) objectives into the institutional change dynamics.

Activation of change-oriented agency dynamics. This component refers to the mobilisation of other "agencies" (groups, organisational units, beneficiaries, etc.) directly or indirectly concerned, so to gain their active and concrete support and contribution to the objectives and actions of the structural change programme. Ideally, the diffusion of transformational attitudes among different groups of players at the institutes should make it easier to pursue change objectives through ever-diminishing efforts on behalf of the teams.

Interaction between agency dynamics and structural circumstances. This component refers to the capacity of actually modifying the structural features of the organisation which may, according to the specific action concerned, facilitate or hinder the work of the transformational group/s by producing a "friction" on such structures, also in terms of resistance and negotiation processes.

Structural outcomes and impacts. This component refers to the different kinds of results emerging from the actions carried out, which can be both tangible (new rules, structures, norms, initiatives, etc.) and intangible (change in awareness levels, attitude, languages, cultural frames, etc.).

Moreover, some **analytical categories** can be proposed for better grasping the governance setting implementation phase. They concern **nature**, **contents**, and **management** of the process of change as well as the **actors** to be mobilised.

As for **nature**, activating an institutional change process primarily means activating a set of **negotiations** among the many actors involved about to what extent, why and how the research organisation should be changed to become more responsible and open. Negotiation is a sort of iterative process progressively moving the process of change ahead and weakening consolidated procedures, practices and rules. Different **dimensions of negotiation** are involved in the institutional change, including symbolic, interpretive, institutional, and operational negotiations (see the box below). It is important to recognise and use them properly, being aware of their potential, limits, and interconnections.

DIMENSIONS OF NEGOTIATION

Conventionally, **four dimensions** of negotiation can be identified.

Interpretive dimension. It concerns the nature of the problems to be dealt with and how RRI and OS would help cope with them. Interpretive negotiation aims at building a common understanding of the problems, including a raising-awareness process about, e.g., the risks to cope with, the appropriateness of the procedures, structures, values, and internal relations already in place, the opportunities to be seized for changing the situation, etc., thus creating the necessary preconditions for action. Interpretive negotiations are particularly involved with actions like, e.g., collection of data and reliable information on the changes affecting science, initiatives and best practices inspired to

RRI and OS, training activities aiming to modify how research works or public debates on RRI and OS.

Symbolic dimension. It concerns visibility and attractiveness of RRI and OS and their core message, i.e., making science a social institution more responsible and open to society than it was in the past. This dimension is involved with the symbolic aspects of actions like communication on RRI and OS-related issues, rewards and recognition of the actions, awareness-raising activities on RRI and OS, or exhibits dealing with the problems of science. The symbolic dimension is particularly concerned with sentiments, emotions, and passions.

Institutional negotiation. Institutional negotiation has the objective of modifying the "rules of the game", increasing the weight of RRI/OS tools and approaches in all relevant aspects of the organisation. This dimension is particularly involved with actions such as establishing new funds and scholarships, changing rules, regulations and procedures, creating new structures, departments, offices or networks, allocating resources for PE, creating training schemes, modifying curricula, or establishing partnerships agreement.

Operational negotiations. This dimension concerns the actual implementation of decisions already made and therefore the actual possibility to have things done effectively and in a reasonable time. This implies the power of translating goodwill and declarations into reality, activating monitoring and assessment mechanisms, providing for problem-solving, or speaking out when commitments are not respected.

These dimensions are often intertwined so that a single activity or a stream of action may serve more than one dimension. It is important to understand how to use and combine these different dimensions of negotiation in the context of a concrete governance setting process.

As for the **contents of the process of change**, all the components of the organisation, including both its intangible and tangible elements, should be touched, to different extents, such as, for example, the organisational culture, the motivational background of researchers and leaders, the procedures adopted, or the internal relations and structures. Understanding how to handle these components is a key issue for the governance setting process.

As for the **management** of the process of change, in the implementation phase, a key role is played by the establishment and use of **monitoring and evaluation mechanisms** about RRI and OS, which should be appropriate to the nature and contents of the governance setting process.

Finally, as for the **actors** to be involved, they should be selected based on technical considerations, i.e., through an analysis of the real interest of the different actors towards the specific RRI and OS-related action. They therefore largely vary according to a wide range of variables.

WHAT IS AT STAKE

Implementing the governance setting primarily means **being pro-active** in promoting the governance setting process and **reactive** or even **anticipatory** in preventing obstacles and seizing emerging opportunities. This may also entail quickly modifying plans and strategies when the original plans and strategies reveal to be ineffective. In this perspective, adopting an iterative approach to the implementation of the governance setting, also based on trial-and-error procedures, could be extremely helpful to prevent long-term failure.

In this sense, the most challenging issue concerns the **capacity of the team** to move the process further, to be resilient when critical situations emerge, and to keep the key actors of the organisation mobilised on RRI and OS over time. This allows the team constantly having a comprehensive view of the implementation process, including progress and backlashes as well as constantly learning from the experience.

What is at stake is **being able to successfully face the many expected and unexpected obstacles** which any institutional change process inevitably meet such as, e.g., lack of interest by the staff, lack of real engagement by the leaders, conflicts within the team, solutions inappropriate to the organisational and cultural context, or even unexpected events occurred in the organisation (a structural reform, a leadership turnover, a modification of the national policies, etc.).

KEY ISSUES

Some key issues concerning the implementation of the governance settings can be highlighted.

HOW TO CREATE SPACES FOR ENGAGEMENT AND MOBILISATION

Governance settings – whatever be the model applied – require the participation of researchers, staff, and leaders. To avoid the risk of people's and stakeholders' withdrawal from commitment over time, engagement spaces are to be created from the beginning such as networks, associations, research groups, or virtual platforms, allowing to turn passion, interest and willingness to participate into actual participation. It is equally important to take participation seriously, implementing what results of participation, even when it is not what was originally planned.

HOW TO PREVENT A "SATURATION EFFECT" OF RRI AND OS IN THE ORGANISATION

Just because RRI and OS are based on participation and engagement, implementing them requires an effort in term of communication and visibility and an investment of time and attention by the concerned actors. However, the great majority of researchers and managers feel they don't have enough time to get engaged, especially with activities which are not viewed as concerned with their "core business" (research, teaching, publications, etc.). Thus, there is the risk that a "saturation effect" may occur, i.e., the sensation of stakeholders and researchers that RRI and OS are "saturating" their time, thus generating negative reactions or even the refusal of getting involved with RRI and OS. This risk can be managed (but not fully prevented) through some expedients such as avoiding an over-exposition of RRI and OS in internal communication channels, extending the duration of the activities whenever possible, starting from a limited number of actions so as to allow a progressive involvement of the actors, or enlarging the target of the people to involve so as to reduce the level of engagement for each one.

HOW TO ENSURE CONTINUITY IN THE GOVERNANCE SETTING PROCESS

In the implementation phase, another – almost symmetrical – risk to prevent is the lack of continuity in the governance setting process. Implementation requires continuity of inputs, according to the most appropriate pace for the organisation. The risk is that people feel that nothing is occurring or "forget" RRI and OS. Hence the need for keeping the attention on RRI and OS alive, diffusing information to keep

people informed about "where we are" and "where we wish to go".

RECOMMENDATIONS

16 Activating negotiation processes within the organisation aimed at modifying current practices, rules, and views

Negotiation is, so to say, the main "substance" the governance setting process is made of. Negotiation is aimed at finding a common view of RRI and OS, preventing as far as possible conflicts and tensions and allowing the implementation of RRI and OS to progress over time. Negotiations develop at different levels (symbolic, interpretive, institutional, and operational level) since different are the components of the organisation which are touched by RRI and OS (culture, motivations, procedures, and structures). Therefore, activating effective negotiation processes represents the main focus of the governance setting implementation phase.

17 Looking for external backing and links to enhance the governance setting process

The success of the governance setting is dependent, at least partially, on the support given by leaders and managers of the organisation. However, especially in the implementation phase, support from entities and stakeholders external to the organisation could also play a critical role. This external backing may serve to pursue various objectives: learning from external experiences, gaining legitimacy and visibility for RRI and OS, introducing the organisation in national and international communication flows, getting external resources for implementing the governance setting and above all getting support and creating coalitions to facilitate the institutional change process inside the organisation.

18 Adopting an iterative approach in implementing the governance setting process

In choosing the governance setting, the possibility of errors in implementing the process must also be taken into account. This is the reason why it is advisable to adopt an iterative approach to governance setting, being aware of the possibility to radically change strategies and approaches even in an advanced stage of the process if they reveal not to be working. This also means assuming an open-minded and flexible attitude to timely explore new strategies or adopt a new governance setting models.

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CHAPTER SEVEN
COMPLETING THE GOVERNANCE SETTING PROCESS

RATIONALE

The governance setting is a "**device**" for triggering the implementation of RRI and OS. It can be viewed as a "special programme" destined to be ended in a reasonable lapse of time to pave the way to long-term RRI/OS-oriented mechanisms. In this sense, we could define the completion of the governance setting process as a **transition phase**, in which RRI and Open Science stop being the subject of such a special programme and start being managed through the ordinary structures and procedures of the research organisations.

Thus, the key question is: how to understand **when a governance setting process ends** and **a broader transition process towards RRI and OS starts**?

The answer largely depends on, e.g., the kind of governance setting strategy adopted, the RRI keys or the aspects of Open Science on which the governance setting is focused, or the history of RRI and OS in the research organisation.

However, whatever the context is, some **basic results** should be attained before closing the governance setting process.

First of all, a **sustainability plan for RRI and OS** (also including monitoring mechanisms) should be defined, consolidating the changes already produced during the governance setting process and establishing how RRI and OS are expected to evolve in the future in the research organisation. Some **basic questions** regarding the sustainability of RRI and OS can be identified.

Question	Description
Vision	Developing a vision of RRI and OS for the research organisation to allow identifying actions, services, functions, and benefits to be sustained. A vision is a clear picture of what the organisation would ideally like the future of RRI and OS to be
Governance	Defining a governance structure or a team responsible for RRI and OS in the research organisation
Action lines	Identifying the action lines which are more appropriate for RRI and OS to be sustainable and to evolve over time, focusing on pre-conditions, risks, and critical aspects
Policy support	Verifying if there is comprehensive and sufficient support by the leaders and managers for the development of RRI and OS in general and, more specifically, for the implementation of the action lines
Institutional and management capacity	Verifying if there are in the organisation the necessary expertise and skills, as well as the management capacity for implementing RRI and OS and, when lacking, identifying the measures to take for coping with the problem

Question	Description
Economic, technical and organisational viability	Assessing the human, organisational and technical resources needed and understanding to what extent they are secured on a multi-annual perspective
Ownership and mobilisation	Verifying whether the main actors and stakeholders within the research organisation support RRI and OS, agree with the action lines and sustainability hypotheses, express an interest in getting actively involved and express somehow a sense of ownership over RRI/OS-related programmes
Integration	Assessing if the RRI/OS activities are well integrated into the objectives and operations of the research organisation
Monitoring and evaluation mechanisms	Establishing monitoring and evaluation mechanisms for ensuring a quality assessment of the RRI/OS-related actions allowing to single out their strengths and weaknesses or ensuring that they are included in the monitoring and evaluation systems of the research organisation
Partnerships	Identifying partnerships and cooperation initiatives with external entities or actors necessary to support the development of RRI and OS in the organisation
Communication	Assessing the communication activities necessary for documenting and communicating RRI and OS both internally and externally the research organisation
Champions	Identifying champions who can promote and support RRI and OS inside and outside the organisation

The plan should also describe the **institutional arrangements** ensuring the long-term sustainability of the actions initiated during the governance setting process and those to be developed in the future. Examples of institutional arrangements are given below:

- Establishment of permanent agreements with external stakeholders
- Creation of awards and recognitions to support, e.g., women researchers, socially-engaged scientists or units engaged with RRI and OS
- Periodical collection of relevant data (for example, on gender dynamics, on the use of open access publications, on the diffusion of public engagement in the organisation)
- Allocation of funds on RRI and OS-related activities
- Creation of monitoring and evaluation systems on RRI and OS
- Establishment of new organisational structures or appointment of new officers (e.g., ethics committees, gender equality officer, open science department, public engagement office
- Establishment of new physical infrastructures (Open access repository, co-working spaces for favouring public engagement, kindergartens within the organisation, etc.)
- New regulations, standards, and procedures (e.g., new guidelines to develop gender-fair recruitment procedures, new procedures concerning publications, new criteria in research funds allocation allowing the involvement of external stakeholders)
- Organisation of annual events (conferences, galas, theatrical events, etc.)
- Training modules
- Web-based structures (web-pages, websites, blogs, web-based platforms and other forms of institutional communication).

These arrangements necessarily include an RRI/OS **governance structure** to keep on fostering RRI and Open Science over time, as well as a communication system to ensure that RRI and OS remain relevant subjects inside and, in case, also outside the organisation.

Finally, it is also important to ensure that RRI and OS remain relevant subjects in the **communication systems** inside and, in case, also outside the organisation.

WHAT IS AT STAKE

As highlighted above (see the previous chapter), the core of the institutional change process are **negotiations**. Four main kinds of negotiation have been proposed, i.e., interpretive, symbolic, institutional and operational negotiations, also relevant in the framework of sustainability arrangement.

Interpretive negotiations are mainly fostered by the RRI/OS sustainability plan, which provides the basis for an internal discussion on what RRI and OS are and how can be developed over time; **symbolic negotiations** are directly connected with the weight recognised to a responsible and open science in the internal and institutional communication of the research organisation; **institutional negotiations** are connected to both the plan and, above all, the governance structure; finally, **operational negotiations** play a pivotal role in the implementation of the institutional arrangements necessary to ensure long-term sustainability of the actions carried out.

What is at stake is the possibility, so to say, to transfer the responsibility on RRI and Open Science from a temporary programme to the ordinary structures of the research organisation, embedding them in all its relevant components, including culture, norms, structures, and procedures.

KEY ISSUES

Some key issues related to the completion of the governance setting process can be single out.

HOW TO PERMANENTLY INTEGRATE RRI/OS COMPONENTS

In the transition phase from governance settings to more stable forms of institutional embedment of RRI and Open Science in the research organisation, one of the key issues to consider is that of the mutual integration of the RRI keys (e.g., gender equality, public engagement, etc.), the RRI dimensions (e.g., anticipation, reflexivity, etc.), and the different aspects of Open Science (e.g., open access, open data, open science evaluation, etc.). A balance should be attained to prevent both over-integration and under-integration. Over-integration is risky since it can be expensive, it can produce conflicts, and it can be too complex to implement, unless the organisation is really small. Under-integration is risky as it leaves RRI and OS in a marginal position in the organisation. Probably an acceptable balance can only be found over time through a step-by-step process.

HOW TO FOSTER MOBILISATION ON RRI AND OS

RRI and OS, by their very nature, cannot be simply imposed. There is an unavoidable component of mobilisation and volunteering in RRI and OS which needs to be kept vital to prevent bureaucratisation. This aspect should be carefully considered in the RRI/OS development plan, even though it cannot be fully planned. Different arrangements can be identified, including, e.g., favouring the creation of and supporting specialised networks or groups (for example, on gender equality, on science communication, on ethical issues, etc.) functioning as “watchdogs” of RRI/OS poli-

cies in the organisation or introducing incentives, awards and recognition for those who are engaged with RRI and Open Science.

WHICH RISKS SHOULD BE CONSIDERED BEFORE CLOSING THE GOVERNANCE SETTING PROCESS

The transition phase of the governance setting process is a critical passage. For example, moving the responsibility from the governance setting team to other people (an officer, a unit, etc.) can be particularly difficult, since the former usually acquire know-how and practical experience which is difficult to transfer to the latter. Distributing tasks previously performed by the team to different units is risky also because this solution requires high coordination levels. Other risks are the bureaucratisation of the activities, the slowing down of the process, the diminishing visibility of the issue, or the lack of motivation of those who take on the institutional responsibility of RRI/OS-related programmes. To prevent these risks, it is advisable to plan a long transition phase allowing team members and the concerned units to work together as long as necessary.

RECOMMENDATIONS

19 Carefully planning and implementing the changeover of RRI/OS from the governance setting to the structures of the organisation

The changeover from the governance setting to the organisation's structures should be carefully planned and implemented. Before ending the governance setting process, it is important to ascertain that an RRI/OS sustainability plan is defined and operational, RRI/OS governance structures are established, organisational arrangements are defined to ensure the continuation of the actions initiated during the governance setting process, and measures are in place to ensure adequate visibility to RRI and Open Science.

20 Including RRI and Open Science in the organisational standards and practices following a mainstreaming approach

Making RRI and Open Science an ordinary component of the activities carried out by the research organisation entails that they are included in the organisational standards and practices. If this does not happen, RRI and Open science reduce their transformative capacity, becoming, so to say, only a tick-in-a-box procedure. Hence the importance to adopt a mainstreaming approach, i.e., an approach which considers RRI and Open science, although in a long-term perspective, something influencing all the aspects of the life of the research organisation (culture, motivations, procedures, norms, and structures), as well as all its functions (e.g., research, teaching, innovation-related activities, etc.).

21 Creating social and communication spaces and procedures to maintain a high degree of participation in RRI and Open Science

By their nature, RRI and Open Science are a multi-actor (i.e., they involve many people in mutual interaction) and multi-level process (i.e., they concern all the hierarchical levels of the organisation). Moreover, they can evolve only if they are sustained by the action of the many. Therefore, they can be "institutionalised" only creating appropri-

ate permanent social and communication spaces and procedures inside the organisation allowing all the concerned stakeholders (researchers, managers, internal and external actors, etc.) to participate, as appropriate and relevant.

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LIST OF RECOMMENDATIONS

1 **Mapping the main trends of change affecting one's research organisation**

2 **Fostering an internal debate on the changes occurring in science and the measures to address them**

3 **Establishing tools for monitoring and anticipating the trends of change affecting the organisation**

4 **Making an inventory of and assessing the actions and measures already in place or planned pertaining to RRI and OS**

5 **Identifying people and resources already involved with or interested in RRI and OS**

6 **Raising awareness and disseminating knowledge on RRI and OS among leaders, managers and staff**

7 **Defining the RRI/OS profile for the organisation through an open decision-making process**

8 **Documenting the decision-making process and its results to make them accessible to everyone**

9 **Keeping a process-like view of the RRI/OS profile and following an open and step-by-step approach**

10 **Choosing the governance setting model primarily on the basis of feasibility considerations**

11 **Scrutinising external resources to learn from**

12 **Testing the governance setting before starting the process**

13 **Establishing a team which is substantially and institutionally capable to activate the governance setting process**

14 **Ensuring the transparency, inclusiveness and visibility of the governance setting process**

15 **Making RRI and OS part of the "core business" of the research organisation from the beginning**

16 **Activating negotiation processes within the organisation aimed at modifying current practices, rules, and views**

17 **Looking for external backing and links to enhance the governance setting process**

18 **Adopting an iterative approach in implementing the governance setting process**

19 **Carefully planning and implementing the changeover of RRI/OS from the governance setting to the structures of the organisation**

20 **Including RRI and Open Science in the organisational standards and practices following a mainstreaming approach**

21 **Creating social and communication spaces and procedures to maintain a high degree of participation in RRI and Open Science**

ONLINE RESOURCES

Name	Web address	Focus
Ethicsweb	http://www.ethicsweb.eu/node/1	Ethical issues
EurecNet	http://www.eurecnet.org/index.html	Ethical issues
GEAR Toolkit	https://eige.europa.eu/gender-mainstreaming/toolkits/gear	Gender equality
GenPORT	https://www.genderportal.eu/	Gender equality
Gendered innovations	http://ec.europa.eu/research/swafs/gendered-innovations/index_en.cfm?pg=home	Gender equality
FOSTER	https://www.fosteropenscience.eu/	Open Science
OpenAIRE	http://actioncatalogue.eu/	Open Science
Tools for participatory science	http://s4s.wikidot.com/	Public engagement
Compass	https://innovation-compass.eu/compass-crash-course/	Public engagement
Engage2020 Action Catalogue	http://actioncatalogue.eu/	Public engagement
RRI-Tools	https://www.rri-tools.eu/about-rri	RRI
Heirri Training Programmes	https://www.rri-tools.eu/heirri-training-programmes	Science education
TA-Portal	https://technology-assessment.info/index.php/resources	Technology assessment
PE2020 Toolkit	https://toolkit.pe2020.eu/	Public engagement

Annex 2

Guidelines on governance setting (Summary Document)

Starting the process

Guidelines on governance settings for a responsible and open science

SUMMARY DOCUMENT

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Project full title: Fostering Improved Training Tools for Responsible Research and Innovation
Project funding scheme: Horizon 2020, SwafS-04-2016 - Opening Research Organisations in the European Research Area
Project co-ordinator: Università degli Studi di Roma Sapienza
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This project has received funding from the European Union's Horizon 2020 Programme for research and innovation under Grant Agreement no. *741477*

INTRODUCTION

A science fully embedded in society

Responsible Research and Innovation (RRI) and Open Science (OS) have been increasingly proposed to scientists and research organisations as the new governance framework for science, so as to make it **fully embedded in society**, involved in and responsible for the impacts it produces on economy and society at large, open to the external actors and sensitive towards expectations, needs, worries and problems of society.

However, **this process is not free of problems, uncertainties, and risks**. Research organisations are already exposed to strong change processes, from both inside and outside, which are modifying their culture, procedures, decision processes and organisational structures.

Consequently, while researchers and stakeholders perceive that the usual governance structure and the ordinary practices related to scientific production are weakening, they are also uncertain about what will occur next.

The aim of the Guidelines

The Guidelines of governance settings are intended to deal with this complex set of issues, starting from a simple question: **how to effectively embed RRI and OS in research organisations?**

The Guidelines do not purport to offer ready-made solutions to this problem since ready-made solutions simply do not exist. Rather, its main aim is to propose a pathway for activating institutional change processes towards RRI and OS in research organisations.

The focus on governance

In this perspective, a key concept which will be used in the Guidelines will be that of **governance setting**, i.e., a coordinated set of actions serving as a starter to implement RRI and OS or part of them in a given research organisation. Therefore, the focus of the Guidelines is on the first steps to take for creating in the research organisation the minimal conditions necessary to ensure that an evolutionary process towards RRI/OS can take place.

The project and the experiments

The Guidelines are one the main products of the project "Fostering Improved Training Tools for Responsible Research and Innovation - FIT4RRI", co-funded by the EU DG Research and Innovation under Horizon 2020 and coordinated by Sapienza University of Rome. Some of the orientations reported in the Guidelines have been tested in **four experiments** carried out in the framework of FIT4RRI, coordinated by the South-East European Research Centre (SEERC) and conducted respectively at Instituto de Soldadura e Qualidade –ISQ (Portugal), the the University of Liverpool (UK), the Sapienza University of Rome (It-

aly) and the Open University (UK).

This document

This document provides a **summary** of the Guidelines of governance settings, which are available online (see the FIT4RRI project website (https://fit4rri.eu/). As the Guidelines, this Summary Document includes three parts:

Part One - **Guidelines for interpretation**, aimed at providing orientations for interpreting RRI and OS in general and in one's organisation

Part Two - **Guidelines for decision,** intended to help identify and take the basic decisions to activate the governance setting process

Part Three - **Guidelines for action**, focused on the activation, implementation and finalisation of the governance setting process to produce long-term institutional changes towards RRI and OS in research organisations.

At the end of the document, a **set of recommendations** are provided related to the different issues dealt with in the three parts of the Guidelines.

PART ONE - GUIDELINES FOR INTERPRETATION

CHANGES IN SCIENCE

Responsible Research and Innovation and Open Science are part of a **broader context of changes** affecting science and innovation. Being aware of features, contents, and trajectories of these changes are extremely important to approach RRI and OS properly.

An emerging social model for science

Various interpretive models (e.g., Mode 1 - Mode 2 Model, Post-academic science, Quadruple Helix Model, Post-normal science) have been developed to account for these changes. Although different from each other, they overall define an **emerging "social model" for science**, recognising it as:

- fully embedded in society and connected with political, economic, and societal dynamics
- open to the external lay actors
- sensitive towards expectations, needs, worries and problems of society
- able to develop forms of co-direction and co-production with stakeholders and the public at large
- concerned with the actual implications and use of its outputs
- increasingly involved with innovation and producing social and economic benefits and based on interdisciplinary approaches.

Such emerging model tends to overcome the consolidate social model of science – sometimes symbolically associated with the image of the "Ivory Tower" – which defines science as substantially autonomous from society, internally organised in well-defined disciplinary fields, not involved in the actual implications and use of its outputs (in terms of knowledge, discoveries, technologies, but also impacts and risks) and proceeding mainly on the basis of scientists' interests.

Critical transformations

This transition of science towards a new social model is now rapidly evolving. However, it is not occurring smoothly and linearly. A wide range of **critical transformations** is occurring, which are directly or indirectly linked with this shift from a social model of science to another.

The increasing competition among researchers and research organisations on a global scale is leading to an acceleration of the research processes, with impacts on the organisation of the academic life, the researchers' living conditions, the research quality, and research integrity. Peer-reviewing procedures and research evaluation are more and more questioned in terms of both methods and outputs. A crisis in the capacity of scientists to reproduce and reuse research data is also emerging. The organisation of science as a community of peers is fading away while an "industrial" organisational approach is emerging, leading to an increased segmentation of staff (by age, sex, nationality, and contractual status), with effects like overtraining and overexploitation of young researchers, decrease in teaching quality, and increased attitude of self-promotion among scientists.

Key issues

Before dealing with RRI and OS, leaders and managers of research organisations need to understand:

- how these changes are affecting them and with what effects
- how the changes are perceived by the staff (researchers, managers, leaders, students, etc.)
- how the organisation leaders or individual staff members react and attempt to manage the changes affecting the organisation.

A RESPONSIBLE AND OPEN SCIENCE

It is in this context of change that Responsible Research and Innovation (RRI) and Open Science (OS) are to be placed.

Responsible Research and Innovation

The concept of **Responsible Research and Innovation** has, at its core, the idea that science actors should be responsible, in close interaction with other societal actors, of the (ethical) acceptability, sustainability and societal desirability of the scientific knowledge and its economic and social impacts. In the view of the European Commission, RRI includes five keys or pillars (i.e., gender equality, public engagement, research ethics and integrity, science education, and open access), and four dimensions (i.e., anticipation, reflexivity, inclusion, and responsiveness) which could be useful for guiding the process of change.

Open Science

The concept of **Open Science** is more focused on the research process. It emerges as a progressive enlargement of the principles of open access, i.e., making sure that publicly funded research outputs are accessible to all. The idea of "openness", initially limited to publications, was more and more applied to encompass many other products (data, software, peer-review) up to define highly-collaborative practices for doing science.

Barriers to RRI and OS

Although different each other, the two concepts are partially overlapped and are both based on a common view of making science more efficient and open to societal and economic needs and expectations. However, although experiences and practices inspired by RRI and OS are multiplying, different **barriers** to their development are still there. Implementing RRI and OS requires complex institutional change processes to modify consolidated structures, practices, culture and procedures. It is not surprising that this process usually generates resistance, tensions or simply organisational stress. Moreover, RRI and OS are interpreted in different ways, so that a common view is not always simple to achieve. Finally, RRI and OS are often overlooked by researchers and research managers or perceived by them as something producing time-consuming obligations and tasks which add up to the ordinary (already highly absorbing) activities.

Key issues

Hence the importance for research institutions to understand how and under which conditions RRI and OS can be usefully applied in a given specific research organisation. In this regard, three key issues should be considered:

- Which are the actions and strategies already in place or planned to promote RRI and OS in the organisation and how they work
- To what extent staff and leaders express a consent towards RRI and OS
- Which are the external actors and stakeholders the organisation is already working with to carry out RRI and OS.

PART TWO - GUIDELINES FOR DECISION

DEFINING THE RRI/OS PROFILE

The next step to take is taking the necessary decisions to define an RRI/OS profile tailored on features and needs of the research organisation. There are no established procedures in this regard. Each organisation should find its way. However, it can be useful to clarify **some of the components** which come into play in this decision process.

Institutional changes

Deciding on RRI and OS necessarily means making a diagnosis to understand whether, how and why activating RRI/OS-oriented **institu-**

tional changes within the organisation, i.e., irreversible changes inspired to RRI and OS affecting the way in which the research organisation, e.g., makes research, organises its internal life, decides, defines its objectives or interacts with external actors.

Benefits and drivers

In making the diagnosis, it is important to get some ideas about the expected **benefits of RRI and OS for the organisations** (increasing the quality of research and innovation, supporting a democratization of decision-making process, involving people and stakeholders in the research and innovation process, increasing and accelerating the social and economic impacts of research, etc,) and **the potential drivers which can facilitate their implementation (**policy measures, incentives, or mechanisms supporting RRI and OS, the use of RRI and OS to access more resources or to accelerate innovation, the attention towards ethical issues and responsibility, etc.).

Scale and scope

It is also important to take into consideration the **scale** and the **scope** of the RRI/OS profile. The **scale** concerns the parts of the organisation which are involved in the process of change. One can decide to start, for example, a small pilot programme involving only some units of the organisation to then enlarging the process up to cover the entire organisation or, conversely, to start a programme directly involving the organisation as a whole. The **scope** concerns the components of RRI or OS concerned in the governance setting process. One can decide to start, for example, with some specific aspects of Open Science or one key of RRI (gender equality, public engagement, etc.) to then enlarge the scope to RRI or OS as a whole or, conversely, to develop a policy action embracing RRI or Open Science as a whole to then develop specific actions for each keys.

Key issues

Dealing with RRI/OS self-tailored profile, at least three key issues should be touched:

- Why the organisation should start a process of institutional change based on RRI and OS
- Which are the priority areas for RRI and OS, to achieve which goals to manage which risks
- Which constraints and obstacles should be considered before starting the process.

CHOOSING THE GOVERNANCE SETTING

Another aspect to consider is **how to start** the process of institutional embedment of RRI and OS in the organisation**.**

The concept of governance setting

To develop this aspect, the concept of "**governance setting**" has been introduced. **It refers** to a short-term programme or a set of actions serving as a starter for longer-term institutional changes towards RRI and OS in the organisation.

Types of governance setting

Based on an empirical analysis carried out under FIT4RRI on around 300 cases of programmes and projects targeting RRI and OS, two variables have been identified distinguishing governance settings:

- **who starts and manages the process of change** (the organisation itself, an external organisation like a consultancy firm or a funding organization, or a network of actors the organisation is part of)
- **which aspects of an organisation the governance setting addresses first** (the social patters – behaviours, cultural attitudes, etc. – of staff and leaders, the norms – procedures, guidelines, structures, etc. – regulating the life of the organisation or how scientific knowledge is produced).

Crossing these two variables, a typology of governance settings can be developed. Rarely a governance setting process fully falls into a specific type and mixed situations are common. Nonetheless, the typology could help take appropriate decisions about the **best general strategy** to devise for starting the institutional change process in the organisation. Some examples are given below.

GOVERNANCE SETTING MODELS	EXAMPLES OF ACTIONS
Internally-initiated social model	Development of RRI/OS-oriented internal action plans based on the mobilisation of internal and external stakeholders; internal awareness-raising and training programme on RRI/OS
Internally-initiated normative model	Adoption of new internal regulations, procedures, guidelines developed by the organisations' leadership; establishment of internal RRI-oriented research funding criteria
Internally-initiated knowledge-oriented model	Establishment of a new research unit focused on RRI/OS-related issues; activation of RRI/OS-focused research programmes by the research organisation
Externally-initiated social model	Use of external RRI/OS experts; participation in national/international RRI/OS-oriented programmes
Externally-initiated normative model	Use of external research funding schemes adopting RRI/OS-oriented selection criteria; RRI/OS-oriented certification processes
Externally-initiated knowledge-oriented model	RRI/OS-oriented national research funding schemes
Network-initiated social model	Participation of the organisation in RRI/OS-specialised networks; participation of the organisation in cross-institutional RRI-oriented programmes
Network-initiated normative model	The organisation signing up to a network-based charter (such as the UK Athena-SWAN Charted, aimed at supporting research organisations in developing a gender equality action plan)
Network-initiated knowledge-oriented model	Establishment within the organisation of RRI/OS-focused research units or research programmes supported by a pool, network, or association of research institutions

Key issues

For identifying the most appropriate governance setting for the organisation, three key issues should be taken in mind:

- To what extent the organisation is equipped for autonomously activating or accelerating the institutional embedment of RRI and OS (if the answer is negative, an externally-initiated model or a network-initiated model should be more appropriate)
- Which aspects of the organisation's life can be more easily modified in a short-term perspective and with less effort
- Which opportunities, internal or external to the organisation, can be exploited for developing an effective governance setting (for example, the opportunity to apply for research funds connected to RRI or OS, the presence of researchers already skilled in RRI/OS activities, or the presence of policies or incentives to RRI and OS)

PART THREE - GUIDELINES FOR ACTION

ACTIVATING THE GOVERNANCE SETTING PROCESS

The main character of governance settings is variability since many different aspects come into place**.** It is therefore difficult to say what exactly it takes to start the process. Nonetheless, at least three **critical factors** can be highlighted.

A guiding idea

The first factor is the presence of a **guiding idea** around which the governance setting process can be structured. Defining a guiding idea is necessary to provide motivations to act and mobilising internal and external stakeholders on RRI and OS. Examples of guiding ideas can be "Identifying the ethical and societal aspects of technological innovations at an early stage that these can be taken into account in the design process", "Democratising innovation to create a more equitable and inclusive capability to solve problems using science and technology" or "Promoting social responsibility and community involvement of students and teachers and integrating these issues into university teaching". Defining the guiding idea is a useful exercise for a better understanding of what one has in mind about RRI and OS for one's research organisation.

An effective team

Another key factor is the **team** which will drive the governance setting process. The team serves multiple key functions, such as making it possible an institutional learning process, motivating the actors to be mobilised, coping with resistances and constraints, keeping the direction of change or timely changing it when necessary, and negotiating with all the actors involved. Creating a skilled, cohesive and motivated team is, therefore, an aspect not to be overlooked which takes time and engagement.

The support from leaders and managers

The **support from leaders and managers** is another important factor to consider in terms of both benefits and barriers. Their support produces different benefits such as producing a symbolic impact on staff, facilitating the decision-making process, playing as champions of RRI and OS, connecting RRI/OS with the mission of the organisation or managing resistances. On the contrary, the lack of support represents a serious obstacle for the implementation of any action aimed to RRI and OS, entailing, for example, conflicts, waste of time or problems in access resources.

Key issues

Who starts a governance setting process faces a series of questions that need to be treated carefully. At least three of them deserve to be mentioned here:

- To what extent the commitment of leaders and managers with the development of the governance setting process is strong and visible
- To what extent the governance setting process could be based on

volunteering (RRI and OS cannot be considered as fully based on volunteering and therefore a professional core team is necessary, even though forms of voluntary mobilisation are equally necessary)
- How to create effective communication and cooperation among the involved actors.

IMPLEMENTING THE GOVERNANCE SETTING PROCESS

Implementing a governance setting process means **turning ideas and plans** elaborated in the previous phases into new practices, approaches, and views. Each organisation must find its way to do it.

The process of change

It is to keep in mind that institutional changes tend to develop through a set of steps. **Different models** have been elaborated about how the implementation process of RRI and OS is expected to occur.

For example, the model developed by FOTRRIS project identifies four steps in RRI-oriented actions: i) the destabilisation of the regime (e.g., institutionalised organisations, interactions, rules, beliefs, routines, visions); ii) the experimentation of RRI-based alternatives; iii) the phasing-out the non-RRI-based elements of the system; iv) the institutionalisation of RRI-based alternatives.

Under the STAGES project, focusing on gender equality in science, a four-step model has been developed. The first step is the creation of a "transformational agent", i.e., a team able to activate a process of change. The second step is mobilising the key stakeholders (e.g., researchers, leaders, management units, external networks, etc.), so to gain their active support. The third step is that of starting initiatives and actions aimed at modifying the organisation, dealing with resistances and facing technical, cultural or organisational obstacles. The fourth and final step is making the changes sustainable over time through new institutional arrangements and organisational solutions (new rules, structures, norms, agreements, recurrent initiatives, etc.).

The key role of negotiation

Whatever be the model of change adopted, it is quite clear that activating an institutional change process primarily means activating a set of **negotiations** among the many actors involved. Negotiation is a sort of iterative process progressively moving the process of change ahead and weakening consolidated procedures, practices and rules. Different **dimensions of negotiation** are involved in institutional change, including:
- the **interpretive dimension** (concerning the interpretation of the problems to be dealt with and how RRI and OS could help cope with them)
- the **symbolic dimension** (concerning the visibility and attractiveness of RRI and OS within the organisation)

- the **institutional dimension** (concerning the new institutional solutions to be introduced)
- the **operational dimension** (concerning the actual implementation of decisions already made and therefore the actual possibility to have things done effectively and in a reasonable time).

Monitoring and evaluation

Another key role in the governance setting process is played by the establishment and use of **monitoring and evaluation mechanisms** about RRI and OS, which should be appropriate to the nature and contents of the governance setting process.

Key issues

Implementing the governance setting primarily means being pro-active in promoting the governance setting process and reactive or even anticipatory in preventing obstacles and seizing emerging opportunities. Three key issues can be highlighted in this regard.

- How to create spaces for engagement and mobilisation (such as networks, committees, research groups, virtual platforms) allowing to turn passion, interest and willingness to participate into actual participation.
- How to prevent a “saturation effect” about RRI and OS, i.e., the sensation of stakeholders and researchers that RRI and OS are “saturating” their time, thus generating negative reactions or even the refusal of getting involved with RRI and OS
- How to ensure continuity in the governance setting process, preventing the risk that, e.g., people in the organization feel that nothing is occurring or "forget" RRI and OS.

COMPLETING THE GOVERNANCE SETTING PROCESS

The governance setting can be viewed as a "special programme" destined to be ended in a reasonable lapse of time to pave the way to long-term RRI/OS-oriented mechanisms. In this sense, we could define the completion of the governance setting process as a **transition phase**, in which RRI and Open Science start being managed through the ordinary structures and procedures of the research organisations.

Sustainability plan

The transition phase of the governance setting process should be guided by some sort of sustainability plan, i.e., a plan establishing how RRI and OS are expected to evolve in the future in the research organisation. In developing a sustainability plan, some basic issues should be considered, such as:

- Defining a new governance structure or a new team responsible for RRI and OS in the research organization
- Identifying the action lines which are more appropriate for RRI and OS to be sustainable
- Verifying if there are in the organisation the necessary expertise and management capacity for implementing RRI and OS
- Assessing the human, organisational and technical resources needed

- Establishing monitoring and evaluation mechanisms for ensuring a quality assessment of the RRI/OS-related actions
- Verifying if there is comprehensive and sufficient support by the leaders and managers.

Institutional arrangement

The plan should also describe the **institutional arrangements** ensuring the long-term sustainability of the actions initiated during the governance setting process and those to be developed in the future. Examples of institutional arrangements are

- Establishment of permanent agreements with external stakeholders
- Creation of awards and recognitions related to RRI and OS
- Periodical collection of relevant data (for example, on gender dynamics, on the use of open access publications, on the diffusion of public engagement in the organisation)
- Allocation of funds on RRI and OS-related activities
- Establishment of new organisational structures or appointment of new officers (e.g., ethics committees, gender equality officer, open science department, public engagement office)
- Establishment of new physical infrastructures (Open access repository, co-working spaces for favouring public engagement, kindergartens inside the organisation, etc.)
- Establishment of new regulations, standards, and procedures (e.g., new guidelines to develop gender-fair recruitment procedures, new procedures concerning publications, new criteria in research funds allocation allowing the involvement of external stakeholders)
- Organisation of annual events (conferences, galas, theatrical events, etc.)
- Development of new training modules
- Creating new web-based structures (web-pages, websites, blogs, web-based platforms and other forms of institutional communication)

Key issues

About the completion of the governance setting process, three key issues can be identified.

- How to integrate the different RRI keys (e.g., gender equality, research ethics and integrity, or public engagement), the different aspects of the Open Science (e.g., open access to publications, open data, or open science evaluation) and, more in general, RRI with Open Science
- How to foster mobilisation over time so that RRI and OS remain as a priority in the organisation's agenda
- Which risks should be considered before closing the governance setting process (for example, risks related to the bureaucratisation of the activities, the slowing down of the process, the diminishing visibility of the issues related to RRI and OS or the lack of motivation of those who take on the institutional responsibility of RRI/OS-related programmes).

LIST OF RECOMMENDATIONS

CHANGES IN SCIENCE

1 **Mapping the main trends of change affecting one's research organisation**

2 **Fostering an internal debate on the changes occurring in science and the measures to take in the organisation for coping with them**

3 **Establishing tools for monitoring and anticipating the trends of change affecting the organisation**

A RESPONSIBLE AND OPEN SCIENCE

4 **Making an inventory of and assessing the actions and measures already in place or planned pertaining to RRI and OS**

5 **Identifying people and resources already involved with or interested in RRI and OS**

6 **Raising awareness and disseminating knowledge on RRI and OS among leaders, managers and staff**

DEFINING THE RRI/OS PROFILE

7 **Defining the RRI/OS profile for the organisation through an open decision-making process**

8 **Documenting the decision-making process and its results to make them accessible to everyone**

9 **Keeping a process-like view of the RRI/OS profile and following an open and step-by-step approach**

CHOOSING THE GOVERNANCE SETTING

10 **Choosing the governance setting model primarily on the basis of feasibility considerations (concerning, e.g., the availability of resources, the presence of appropriate expertise and skills, the organisational aspects, the risk to activate conflicts, etc.)**

11 **Scrutinizing external resources to learn from (including scientific literature, training tools, national and European networks, or European projects)**

12 **Testing the governance setting before starting the process (for example, launching some pilot actions or organising preliminary activities which are already very practical)**

ACTIVATING THE GOVERNANCE SETTING PROCESS

13 **Establishing a team which is substantially and institutionally able to activate the governance setting process**

14 **Ensuring the transparency, inclusiveness and visibility of the governance setting process**

15 **Making RRI and OS part of the "core business" of the research organisation from the beginning**

IMPLEMENTING THE GOVERNANCE SETTING PROCESS

16 **Activating negotiation processes within the organisation aimed at modifying current practices, rules, and views**

17 **Looking for external backing and links to enhance the governance setting process**

18 **Adopting an iterative approach in implementing the governance setting process**

COMPLETING THE GOVERNANCE SETTING PROCESS

19 **Carefully planning and implementing the changeover of RRI/OS from the governance setting to the structures of the organisation**

20 **Including RRI and Open Science in the organisational standards and practices following a mainstreaming approach**

21 **Creating social and communication spaces and procedures to maintain a high degree of participation in RRI and Open Science**