OS-aware RRA approaches landscape report

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Abstract

The report supports the development of the Open Science Assessment Framework (OSAF) in the GraspOS project. The landscape analysis will provide an overview of the most central policies and frameworks related to OS-aware responsible assessment, related initiatives, use and handling of quantitative indicators and qualitative input, and the current software infrastructures supporting research assessment. The report will pay special attention to the assessment practices of Open Science.

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Abbreviation List

AAI - Authentication and Authorization Infrastructure
ALM - Article-Level Metrics
C4O - Citation Counting and Context Characterization Ontology
CERIF - Common European Research Information Format
CoARA - Coalition for Advancing Research Assessment
CoP - Community of Practice
CRIS - Current Research Information System
DC - Dublin Core
DCAT - Data Catalog Vocabulary
DECP - Dissemination, Exploitation and Communication Plan
DOI - Digital Object Identifier
DOCI - DataCite Open DOI-to-DOI Citations
DORA - The San Francisco Declaration on Research Assessment
EDI - Equity, Diversity and Inclusion
EOSC - European Open Science Cloud
ERA - European Research Area
FAIR data - Findable, Accessible, Interoperable and Re-usable data
FAIReR data - FAIR + Responsible data
FOAF - Friend of a Friend
HEI - Higher Education Institution
NOR-CAM - Norwegian Career Assessment Matrix

OA - Open Access
OAI-PMH - Open Access Initiative Protocol for Metadata Harvesting
OCDM - Open Citation Data Model
OCO - Open Citation Ontology
ORCID - Open Researcher and Contributor ID
OS - Open Science
OSAF - Open Science Assessment Framework
OSAR - Open Science Assessment Registry
OS-CAM - Open Science Career Assessment Matrix framework
PID - Persistent Identifier
RA - Research Assessment
RAE - Research Assessment Exercise
RAiD - Research Activity Identifier
RCF - Research Career Framework
REF - Research Excellence Framework
REST - Representational State Transfer
RPO - Research Performance Organisation
RFO - Research Funding Organisation
ROR ID - Research Organization Registry Identifier
RRA - Responsible Research Assessment
SEP - The Dutch 2021-2027 Standard Evaluation Protocol
SRIA - Strategic Research and Innovation Agenda
SSH - Social Sciences and Humanities
WG - Working Group
WP - Work Package

Introduction to basic concepts

The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines **Open Science** as "an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community. It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities, and it builds on the following key pillars: open scientific knowledge, open science infrastructures, science communication, open engagement of societal actors and open dialogue with other knowledge systems." (UNESCO 2021.)

Curry S. et al define **Responsible Research Assessment (RRA)** as "an umbrella term for approaches to assessment which incentivise, reflect and reward the plural characteristics of high-quality research, in support of diverse and inclusive research cultures" (Curry S. et al. 2020). "Assessment of research, researchers and research organisations recognises the

diverse outputs, practices and activities that maximise the quality and impact of research. This requires basing assessment primarily on qualitative judgement, for which peer review is central, supported by responsible use of quantitative indicators" (Coalition for Advancing Research Assessment 2022). "Assessment of scientific contribution and career progression rewarding good Open Science practices is needed for operationalization of Open Science" (UNESCO 2021).

According to the Global Research Council report, "the definition of **research excellence** and **impact** must be multidimensional. There is no clear, measurable definition of research excellence. It often refers to outstanding performance and relates to reputation and standing, covering both the process and outcomes of research. Excellence is even harder to define than research quality. **Quality** emerges from a diverse system; however there has been a tendency to define quality in unitary ways that are globally applicable. Standards used to define excellence often incorporate the international impact of research, but these same standards often 'score' the research that has a local, regional or problem-solving perspective as lower in quality. If quality is multidimensional, so should be the definition of excellence. Examples include incorporating sex, gender and intersectionality (gendered innovations) into the definition of excellent research. Research ethics is an important consideration, particularly for emerging economies. Open research should be a dimension of excellence, which can in turn support research integrity" (Fraser et al., 2021).

"For an assessment of the **scientific impact** of research in a field at the national level, indicators based on relative, **field-normalized citations** (e.g., average relative citations) offer the best available metrics. At this level of aggregation, when appropriately normalized by field and based on a sufficiently long citation window, these measures provide a defensible and informative assessment of the impacts of past research" (Council of Canadian Academies, 2012). "Scholars should report **citations** to their key publications, but these citation counts should not be compared across fields and should take into account the age of the publication" (ACUMEN, 2014). "The **citation indicators** extracted from the databases limited in their geographical, linguistic and disciplinary scope should not be considered a valid measure to carry out comparison of scientific production between individuals, institutions or countries" (CLACSO-FOLEC, 2022). "**Research quality** is a multidimensional concept, where plausibility/soundness, originality, scientific value, and societal value commonly are perceived as key characteristics… It is argued that **citations** reflect aspects related to scientific impact and relevance, although with important limitations. On the contrary, there is no evidence that citations reflect other key dimensions of research quality. Hence, an increased use of **citation indicators** in research evaluation and funding may imply less attention to these other research quality dimensions, such as solidity/plausibility, originality, and societal value" (Aksnes et al., 2019).

Open Science-aware Responsible Research Assessment (RRA) - Responsible Research Assessment which takes into account the Open Science paradigm.

Monitoring of Open Science and research: Monitoring generates data on an intervention's activity and impact over time in a continuous and systematic way. It helps identify and address any implementation problems of an intervention at the same time as it generates

factual data for future evaluation and impact assessment. (European Commission 2015). UNESCO recommends that "Member States should, according to their specific conditions, governing structures and constitutional provisions, monitor policies and mechanisms related to Open Science using a combination of quantitative and qualitative approaches, as appropriate" (UNESCO 2021).

"**Community-led approaches** are those that are led not by an organisation or other outsiders but by a collective, community process" (Wessells 2018). In this report **Community-led curation** refers to the process of managing, organising information or data by a community of individuals, rather than by a single organisation or institution. Community-led curation enables a group of people with a shared interest to collectively curate and validate information, making it more accurate, comprehensive, and accessible. Whereas **community-led annotation** in this report refers to the process of adding additional information or metadata to existing data or information by members of a community. Community-led annotation can enhance the value and understanding of the information by providing additional context, clarifying meaning, or linking related data.

Open Science Assessment Framework (OSAF) is a living and collaborative guide detailing indicator toolboxes and metrics capturing different Open Science practices and activities in various contexts.

Assessment Portfolios are RRA templates which can be used as fit-for-purpose templates for collecting and structuring both quantitative and qualitative indicators.[1]

Open Science Assessment Registry refers to an online database of OSAF-based Assessment Portfolios and case studies in a structured and systematic way to promote experience sharing and mutual learning.

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[1] After the project proposal, the term Openness Profile was decided to change to Assessment Portfolio. This new term refers to the same subject.

1. Executive Summary

The Open Science-aware Responsible Research Assessment approaches landscape analysis report supports the development of the Open Science Assessment Framework (OSAF) in the GraspOS project.

The landscape analysis report identifies current Open Science assessment practices, qualitative and quantitative data priorities, and associated implementation obstacles.

The report utilises desk research and survey questionnaires to gain the best possible image of the state-of-the-art research assessment practices at the research performing and funding organisations, and other organisations involved with research assessment.

Key findings of the landscape analysis report are as follows:

- The reform of research assessment is a hot topic on many national and international agendas. This has led to a constellation of relevant initiatives working on the issue from a variety of perspectives. Many of the initiatives discussed in this report go beyond solely assessing research activity. Instead, in a larger effort to promote research culture, many of them try to find balance between research, education, and other academic activities in more holistic ways. In addition, Open Science is seen as an integral part of versatile research activities, not as a separate practice.
- Analysis of nearly two decades of responsible assessment policies reveals an increasingly intricate reform landscape that evaluators must navigate. These policies serve as invaluable resources for the OSAF and assessment protocol development. Further, they could be adapted into GraspOS resources or training material, providing context-specific guidelines and recommendations for diverse assessment scenarios.
- Both quantitative and qualitative forms of research assessment have their benefits and limitations. Depending on the context, the value of different approaches must be considered and balanced taking into account the level of assessment.
- A common trend in research assessments is to use quantitative and qualitative approaches in a combined way. Almost every source highlights the supporting character of quantitative metrics, which can be utilised to provide evidence to a narrative description.
- Data used in the research assessment might come from numerous research domain infrastructures (local or global) and interoperability between those infrastructures might be improved by standardisation of cataloguing formats and practices, wide adoption of persistent identifiers (DOI, ORCID, ROR ID, RAiD), and definition of protocols and application interfaces for exchanging information.
- There is discrepancy between elements needed for the purpose of Open Science-aware research assessment and available information in research domain infrastructures.

2. Introduction

● 2.1. Research assessments

● 2.1.1 Research assessments - current practices
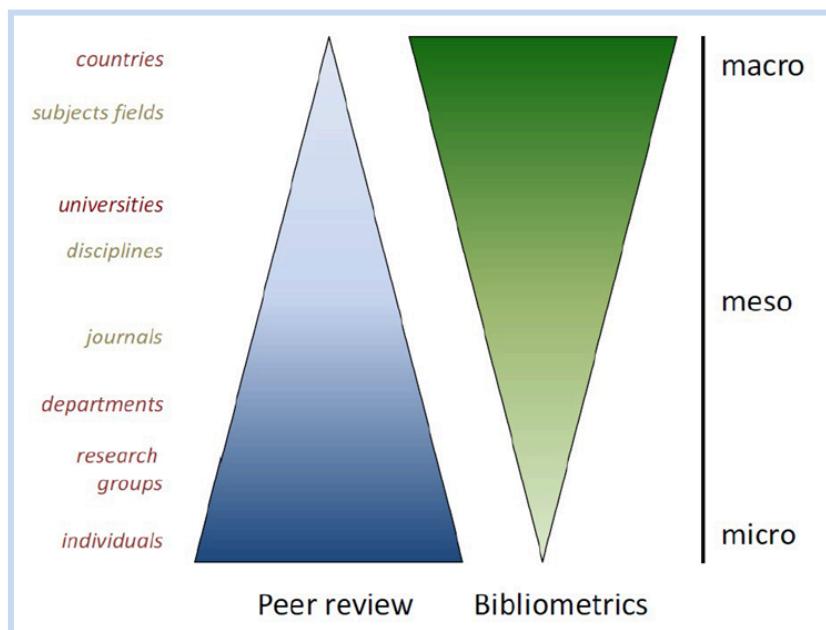
Research and researchers are assessed for many reasons and on many levels. Individual researchers' work is assessed, particularly in recruitment and when deciding on career progression, personal performance, and compensation. Researchers are evaluated both as individuals as well as members of a research team when international and national funders decide on project funding or other grants (Working group for responsible evaluation of a researcher 2020). Higher education institutes and their discipline-specific units are also assessed for a variety of reasons. In many countries research institutes are obliged to evaluate their research activities on a regular basis in a form of Research Assessment Exercise (RAE) or similar. For decades, higher education institutes have also been compared in international university rankings. There is a lot of criticism related to university rankings, e.g. the incompatibility of the indicators used in the evaluations and the lack of transparency of the methods. The research activities of entire countries can also be assessed, for example, for the need for international comparisons.

The way in which research and researchers are assessed affects the practices of how research is performed in many ways. There are many widely recognised problems associated with the current research assessments practices:

- Research outputs, especially scientific journal publications have an exaggerated role in research assessment. Research assessments should take a wider variety of research activities, outputs and impacts into account;
- Quantity over quality is another significant problem, there should be more focus on the quality and impact of research rather than on the quantity of research outputs;
- Irresponsible use of publication and venue based metrics when assessing research and researchers, particularly using quantitative metrics to measure the quality of research;
- Problems associated with the transparency of assessment objectives, criteria, methods, materials and outcomes: these should be openly available to all parties involved in the assessment;
- Lack of recognition and rewards for Open Science practices to encourage a more transparent research processes, open publishing, reviewing and assessment practices, and interaction and dialogue between science and society.

As described above, the unit of assessment can vary from a broad country-specific assessment all the way down to the individual level. The level of assessment is directly related

to the risks associated with research assessments: the smaller the level of assessment the greater the risks associated with it. Research assessment can have greater effects at the individual level than, for example, at the organisational level. As noted by Glänzel W. in 2011, the use of qualitative methods is more emphasised the smaller the unit of assessment is. (Figure 2.1)

Figure 2.1 *Glänzel W. (2011): The use of qualitative methods is more emphasised the smaller the unit of assessment is*

2.1.2 Open Science in context of assessments

Open Science is recognised as an important transformation movement in research in Europe and globally. According to UNESCO's recommendation (2021) Open Science sets a new paradigm that integrates into the scientific enterprise practices for reproducibility, transparency, sharing and collaboration resulting from the increased opening of scientific contents, tools and processes. The General Secretariat of the Council of European Union (2016) brings forward the potential Open Science offers to increase the quality, impact and benefits of science and to accelerate advancement of knowledge by making it more reliable, more efficient and accurate, better understandable by society and responsive to societal challenges. Open Science is seen as an enhancer to growth and innovation through reuse of scientific results by all stakeholders at all levels of society, to the benefit of growth and competitiveness of European research practices. Uptake of best practices, including issues such as adapting reward and evaluation systems, alternative models for Open Access publishing and management of research data, altmetrics, guiding principles for optimal reuse of research data, development and use of standards, and other aspects of Open Science such as fostering research integrity and developing citizen science, needs to be supported.

Open Science and research assessment renewal are closely interconnected. UNESCO (2021) as well as the Council of the European Union (2022) recommend reviewing research assessment and career evaluation systems in order to align them with the principles of Open Science. Assessment of scientific contribution and career progression rewarding good Open Science practices is needed for operationalisation of Open Science. Assessment of researchers against Open Science criteria should be fit for different stages of careers, with particular attention to researchers at the beginning of their careers. According to the European Commission (2017), it is critical that researchers, who are the key agents of change towards OS, are encouraged and incentivised for practising Open Science. Researchers' engagement in Open Science will increase through encouragement and incentives from funding agencies and universities/research organisations through assessment.

● 2.1.3 Open Science policy monitoring

The purpose of monitoring Open Science is to support the development work of organisations in Open Science and research, to support and verify the achievement of the objectives agreed in declarations and policies related to Open Science, and to get an overall picture of the state of openness in science and research.

There are currently many global, European, and national Open Science monitoring frameworks, in which organisations can participate either voluntarily or participation in them is part of national obligations. Some of the currently active Open Science monitoring frameworks are the EUA's Open Science Survey, The EOSC Observatory, OpenAIRE MONITOR and Monitoring Framework for the UNESCO Recommendation on Open Science.

Many of the Open Science monitoring frameworks underline that the monitoring of OS practices is to foster Open Science, not to act as an assessment tool.

● 2.1.4 The reform of assessing research and researchers

The European Commission and many research organisations in Europe have developed ambitious agendas around reforming research assessment and promoting Open Science. The European Commission Directorate-General for Research and Innovation (DG RTD) facilitated the Coalition of reforming research assessment (European Commission 2021a) and the new ERA policy agenda (European Commission 2021b) are setting a fast pace towards bringing relevant changes. However, while there is a reasonably clear vision on the direction in which assessment practices need to develop and the way in which science needs to be made more open, the actual implementation of this vision is lagging and represents a significant challenge for most organisations. The need to tailor assessment practices to differences between disciplines, career stages, and research outputs further increases this challenge. Research assessment has to also deal with different units of assessment, ranging from the level of

individual researchers to teams, departments and faculties to entire institutions and even countries. The lack of a robust high-quality and open infrastructure supporting Open Science-aware assessments is a major obstacle to overcoming this challenge.

GraspOS sets out the ambitious goal to develop, assess and put into operation an open and trusted federated infrastructure for next generation research metrics and indicators, offering data, tools, services and guidance to support and enable policy reforms for research assessment at researcher (individual/group), institutional, organisational and country level.

● 2.2. The Open Science-aware Responsible Research Assessment approaches landscape report

● 2.2.1 GraspOS at a glance

The mission of the GraspOS project is to enable a rewards and recognition system based on a new generation of (qualitative or quantitative) metrics and indicators, leading to a culture and system change that increases the quality and impact, the creativity and the transparency of and trust in science, and to establish a system of qualitative information based on community-led curation and annotations of research outcomes that feeds into a revamped rewards and recognition system.

GraspOS develops, assesses and puts into operation an open and trusted federated dataspace for next generation research metrics and indicators, offering data, tools, services and guidance to support and enable policy reforms for research assessment at three levels: individual/group, institutional, country.

The project is coordinated by Athena Research Center (Greece) and brings forward a multidisciplinary consortium including CNR, CSC, EGI, CWTS Leiden, INRAE, INRIA, OpenAIRE, OPERAS, TSV, UNIBO and Utrecht University.

● 2.2.2 The objective of the WP2

The objective of the WP2 is to co-develop with the pilot participants (WP5) and Community of Practice (CoP) experts (WP6) an Open Science Assessment Framework (OSAF)) that enables a rewards and recognition system based on a set of qualitative and quantitative metrics and indicators. OSAF facilitates the adaptation of the assessment protocols that will be tailored to various stakeholders (pilot cases). Therefore, OSAF will be used to guide the implementation of the Federated Open Metrics Infrastructure (data, tools, services) (WP3 and WP4) as well as the pilot activities (WP5). Outcomes from this work package include:

- a landscape analysis report that identifies current OS assessment practices, qualitative and quantitative data priorities, and associated implementation obstacles;
- a framework for incorporating qualitative information in assessment events and infrastructures;
- assessment protocols for each of the pilots, which include indicator toolboxes;
- assessment portfolio templates for collecting assessment data as prescribed by the assessment protocols that describe the context, content, and rationale for each assessment instance;
- delivery of an assessment repository to register individual assessment protocols and associated indicator toolboxes.

● 2.2.3 The OS-aware RRA approaches landscape report

In the first phase of the project (M1-M8) a landscape analysis report is produced to support the development of the OSAF. The landscape analysis report identifies current Open Science assessment practices, qualitative and quantitative data priorities, and associated implementation obstacles. The landscape analysis will provide an overview of:

- relevant initiatives including projects, organisations and networks who are significant influencers in Open Science research assessment and the reform of assessing research and researcher;
- relevant research assessment framework and policies: traditional and Open Science aware;
- quantitative and qualitative data priorities, including analysis of existing quantitative indicators and qualitative methods used in research assessments;
- current research assessment supporting software infrastructures.

3. Methodology and data

The analysis described in this document is based on resource review and results of the surveys.

● 3.1 Resource review

Resource review was conducted in the period January-May 2023. It was organised in the following phases:

Listing resources (the first phase)

The first step in this review was listing all publicly available resources potentially related to the GraspOS project topic into one Google spreadsheet document. The methodology for finding those resources includes:

- Previous knowledge of the project participants
- Searching of publications/citation databases using keywords of the project
- Social networks
- Relevant resources chaining
  - citation analysis to/from other resources
  - searching of relevant project/network websites

This phase was conducted by representatives of work package 2 during January 2023. The number of resources was 359.

Initial characterisation (the second phase)

The initial characterisation of those resources was conducted in January and February 2023. The goal was to provide information for making decisions which resources should be further analysed in more detail. Therefore, we described all collected resources with the following fields:

- description of relevance,
- type,
- topic of the resource.

Relevance classification of the listed resources (the third phase)

After this characterization, classification of resource relevance was done by using the following five classes: Essential, High, Middle, Low, Not relevant at all. Resources classified as Low and Not relevant at all were cut off from further analysis. The number of resources after this phase was 209. This phase also took place in February 2023. At least two members of work package 2 classified any single resource, if classification was the same, it was adopted as final classification; if not, it was discussed at an online meeting with all members and final decision for those resources was made.

Extension of the list of resources (the fourth phase)

We have extended our list of resources based on the OPUS project deliverables, especially in relation to the OPUS D1.1 Landscaping Initiatives & OPUS D1.2 Literature Review. Moreover, the list of resources was shared with the project consortium members during the second half of February 2023 and March 2023. The list was extended with 27 new resources. The added resources were characterised and their relevance to the project was classified.

Splitting resources into the groups (the fifth phase)

All selected resources from the previous phase was splitted exclusively into one of the following groups:
  - Relevant initiatives
  - Research assessment frameworks and policies
  - Quantitative and qualitative data priorities
  - Infrastructures

The separation into these groups is in accordance with the organisation of the following sections in this report (from 4 to 7). This phase was conducted in the second half of March 2023 and the first half of April 2023.

In-deep characterisation (the sixth phase)

The essential resources were characterised in detail regarding its importance (e.g. size, number of participants, number of research domain resources), relevance (e.g. relation with Responsible Research Assessment, Open Science support), actuality (e.g. time-frame), etc. The result of this phase can be found at this link. This phase was done in May 2023. It was the final step before writing the report. This result was combined with results of the surveys (in sections 4 to 7) to get a comprehensive landscape analysis needed for further activities in the GraspOS project. Besides those resources classified as Essential, the report also includes a brief description of other resources from the fourth phase in the form of a short text in paragraphs.

● 3.2 GraspOS landscape surveys

Two surveys were conducted during the spring 2023 by the Federation of Finnish Learned Societies (TSV):

- GraspOS landscape survey for pilots (March 2023): Annex 2
- GraspOS landscape survey on Reforming Research Assessment (May 2023): Annex 1

The purpose of the surveys was to gain overview of the state-of-the-art research assessment practices at the research performing and funding organisations, and other organisations involved with research assessment. The first and the second survey included 28 and 49 questions, respectively, concerning the respondents' background, assessment frameworks and policies, quantitative and qualitative criteria and practices, as well as supporting software infrastructure, i.e. practices and sources of information used to support assessments. Both surveys were conducted online by using the LimeSurvey tool.

The GraspOS landscape survey for pilots was launched on the 2nd of March 2023 and disseminated to the GraspOS project pilots' representatives. The deadline for responding to the landscape survey questionnaire was the 24th of March 2023. GraspOS has a user-centric approach to the infrastructural development of the new infrastructure, tools and services that is centred around the needs of end users. The purpose of the GraspOS landscape survey for pilots was to build early engagement of pilots, to survey current research assessment practices and to monitor to what extent the current situation of the pilot institutions is in relation to the Coalition for Advancing Research Assessment (CoARA). Nine (9) participating pilots are involved in the project, who represent a highly diverse group of stakeholders from the onset into the requirement acquisition, co-design, validation, evaluation and demonstration of the indicators, metrics, services. All nine pilots provided responses to the questions in the GraspOS landscape survey. For the thematic discipline of Computer Science, responses were received from both INRIA and UniBO, the total number of responses received

being 10. The experience gained from this survey feedback was used for improvements of the questions for the second survey.

The GraspOS landscape survey on Reforming Research Assessment was launched on the 11th of May 2023 on the GrapsOS website. Representatives of the organisations that are or could become signatories of the CoARA Agreement of Reforming Research Assessment were invited to respond to the questionnaire by the 28th of May 2023. Invitations to answer the survey were disseminated both in the social media and by email to targeted stakeholders. Over 40 research assessment and Open Science experts and actors involved in the dissemination of the landscape survey on Reforming Research Assessment. To name a few, CoARA and DORA distributed the survey on their social media accounts, there were news article on OpenAIRE, EUA and CNR-ISTI website, the survey was distributed in mailing lists by Science Europe, INORMS, Euro CRIS and CoNOSC. Also many of the Rectors' conferences in Europe disseminated the survey in their mailing lists. The deadline was extended until the 29th of May upon request from potential respondents. A total of 54 full submitted responses were received.

The surveys' responses from both previously mentioned surveys have been analysed and discussed throughout sections 4-7 of this report. Moreover, the list of the surveys' questions, the anonymised surveys' responses, and the surveys' results and its comparison report are enclosed as an annex at the end of this report.

- ### 3.2.1 GraspOS landscape survey on Reforming Research Assessment - the respondents' background

The respondents represent predominantly higher education institutions. While all types of potential CoARA signatories are represented among the 54 respondents, the vast majority (87%) represent institutions that perform research, including 41 universities and their associations, and 6 research centres, research infrastructures and their associations. Only 7 respondents represent research funding organisations and other institutions related to assessments. Almost all respondents (96.3%) come from European institutions, as only 1 respondent did not indicate the country and one is based in the United States. One of the respondents is an organisation at a broader European-level, whereas the other respondents come from 19 different countries in Europe. One-half (50%) of the respondents come from four countries: Finland (9), Czechia (8), Denmark (5) and Romania (5). There are also 3 respondents from Belgium, 2 respondents from Germany, Ireland, Italy, Norway, Serbia, Slovenia, and Spain, and 1 respondent from Bosnia and Herzegovina, Croatia, Latvia, Luxembourg, Netherlands, Slovakia, United Kingdom, and United States of America.

Strong liaison of the landscaping effort to CoARA is emphasised by the fact that 38 of the 54 respondent organisations (70%) had signed the Agreement on Reforming Research Assessment. Therefore the survey results reflect assessment practices and challenges in

organisations that are already committed to change. The respondents are also in a good position to know the assessment practices at their institutions. Almost all respondents have responsibilities related to at least one of the following: CoARA signatory or point of contact, assessment policies and coordination, criteria and methods, data and analysis, or assessment tools and systems. The 4 respondents who did not identify themselves with any of the predetermined roles, include head of a research group, potential signatory of the agreement, Open Science coordinator and vice-rector for science, research and PhD study. The majority of respondent organisations perform assessments on individual researchers and groups (44) or engage in assessment of institutions (38). Given that respondents represent mainly research organisations, assessment of funding applications or fields are less frequent, and only few respondents perform country level assessments.

● 3.2.2 GraspOS landscape survey for pilots - the respondents' background

The respondents for the 9 GraspOS pilots have diverse responsibilities related to assessment. All respondents indicate responsibilities related to creating or collecting data, 8 perform research and 6 planning or management relating to research assessment. Other specified responsibilities include advising Open Science practises assessment, preparation of the departmental self-assessment reports, and developing monitoring tools. In most pilots, research evaluation is linked to evaluation principles (7), strategic priorities (6), collective values (5), institutional or unit mission statement (5), research evaluation policy (5) and hiring and promotion policy (4). In almost all pilots the intended level of assessment is that of individual researchers or research groups (9). 5 pilots concern assessment at the level of institution as a whole, 3 pilots concern research fields as well as applications for funding, and 2 pilots relate to the national level assessments and monitoring.

4. Relevant initiatives

Key takeaways
- The reform of research assessment is a hot topic on many national and international agendas. This has led to a constellation of relevant initiatives working on the issue. Aligning with ongoing initiatives, learning from and reusing the achievement of previous work is of paramount importance to capitalise on previous investments and achieve the project objectives.
- Many of the initiatives discussed in this report go beyond solely assessing research activity. Instead, in a larger effort to promote research culture, many of them try to find balance between research, education, and other academic activities in more holistic ways. In addition, Open Science is seen as an integral part of versatile research activities, not as a separate practice.

The reform of research assessment is a hot topic on many national and international agendas. This has led to a constellation of relevant initiatives working on the issue. Aligning with ongoing initiatives, learning from and reusing the achievement of previous work is of paramount importance to capitalise on previous investments and achieve the project objectives. GraspOS partners have key roles in relevant national and European initiatives by actively contributing to Open Science policies, performing research on research, and building infrastructures for EOSC. In addition, this landscaping task in WP2 coupled with the community engagement task in WP6 will ensure that the project will reach out to and engage in the co-development activities of the most relevant stakeholders in the area. Thus, it is important to recognise relevant networks and their key outputs and findings that could be of interest for the project. For landscaping purposes, it is important to recognise especially previous work that benefits the development work of OSAF.

The initiatives identified in this report include:

- Expert networks and working groups that are working on the reform of research assessment and/or actively contributing to Open Science policies. These are introduced in subchapter 4.1.
- Open Science-aware Responsible Research Assessment related projects. These are introduced in subchapter 4.2.

In addition to presenting the most relevant initiatives, useful outputs produced by the initiatives are further analysed in later chapters with OSAF development work in mind.

● 4.1. Relevant networks and research groups working on reforming research assessment

The landscaping task started by identifying first the relevant, mostly European networks working on the reform of research assessment and/or actively contributing to Open Science policies. To identify relevant networks, the landscaping team's own expertise was utilised and supplemented by knowledge of the project participants in other work packages, especially the WP6. Liaising with the OPUS projects and their landscaping task in recognising relevant OS and RRA related networks and projects was also utilised. The list of identified networks is introduced in the following Table 4.1. The identified initiatives were also used in the dissemination of the landscape survey. Over 40 research assessment and Open Science experts and actors were involved in the dissemination of the landscape survey on Reforming Research Assessment. The list of networks is not exhaustive, and it prioritises European and international perspectives - for example many national networks are not included.

Table 4.1 *Relevant OS-aware RRA related networks*

Relevant networks working on the reform of research assessment and/or actively contributing to open science policies.	
Researcher representative organisations	
Academia Europa	The Pan-European Academy of Sciences Humanities and Letters.
ALLEA	The European Federation of Academies of Sciences and Humanities
Eurodoc	The European Council of Doctoral Candidates and Junior Researchers, an umbrella association or National associations representing early-career researchers in the European Area.
Global Young Academy	Global Young Academy, an association representing junior principal investigators and junior researchers.
IAP	Inter Academy Partnership (IAP) harnesses the expertise of the world's leading scientific minds to advance sound policies, improve public health, promote excellence in science education, and achieve other critical development goals. IAP members constitute more than 30,000 scientists, engineers and health professionals in over 100 countries.
IGDORE	Institute for Globally Distributed Open Research and Education, an independent research institute dedicated to improving the quality of science, science education, and quality of life for scientists, students and their families. It is composed by individual researchers advocating and practising Open Science.
ISC	International Science Council (ISC) has a growing global membership that brings together over 230 organisations, including international scientific unions and associations from natural and social sciences, and the humanities, and national and regional scientific organisations such as academies and research councils.
ISE	Initiative for Science in Europe, an independent platform of European Learned Societies and Research Organisations. It involves researchers in the design and implementation of European science policies, and advocates strong independent scientific advice in European policy making.
MCAA	The Marie Curie Alumni Association, representing all individual researchers that have benefited from the Marie Curie Sklodowska Actions grant in the European Framework Programs of the European Commission.
RDA	Research Data Alliance, a community-driven initiative which involved research data experts (not only researchers).
Young Academy of Europe	Young Academy of Europe, an association representing junior principal investigators and junior researchers.
RPO and RFO representative organisations	
ALLEA	ALLEA is the European Federation of Academies of Sciences and Humanities, representing more than 50 academies from over 40 countries in Europe.

Cesaer	Cesaer is the strong and united voice of universities of science and technology in Europe.
cOAlition S	Plan S is an initiative for Open Access publishing that was launched in September 2018. The plan is supported by cOAlition S, an international consortium of research funding and performing organisations.
Coimbra Group	Coimbra Group is an association of long-established European multidisciplinary universities of high international standard.
EARMA	European Association of Research Managers and Administrators represents the community of Research Managers and Administrators (RMAs) in Europe.
EARTO	European Association of Research and Technology Organisations, which promotes Research and Technology Organisations (RTOs) and represents their interest in Europe. EARTO network counts over 350 RTOs in more than 32 countries. EARTO members represent 150.000 of highly-skilled researchers and engineers managing a wide range of technology infrastructures.
Erasmus + and European Universities initiative	Erasmus+ is the EU's programme to support education, training, youth and sport in Europe. European University Initiative (EUI) is one of the flagship initiatives of the EU's ambitions to build a European Education Area, aimed at removing barriers to learning and improving access to quality education for all. The aim is to strengthen the strategic partnerships of European universities and increase the international competitiveness of European higher education. After two separate calls (in 2019 and 2020), there are currently 41 university alliances formed. 2020 call includes: ATHENA, Aurora, Circle U., E³UDRES², EC2U, EELISA, ENGAGE.EU, ENHANCE, ENLIGHT, ERUA, EUNICE, EUniWell, EURECA-PRO, EuroTeQ, Eut+, FILMEU, INVEST,Neurotech EU, RUN-EU, T4E, Ulysseus, UNITA, UNIVERSEH. 2019 call includes: ARQUS, 4EUPLUS, CHARM-EU, CIVICA, CIVIS, ECIU, EDUC, EPICUR, EU4ART, EU-CONEXUS, EUGLOH, EUTOPIA, FORTHEM, SEA-EU,UNA Europa, UNITE! and YUFE. (https://education.ec.europa.eu/european-universities-factsheets)
ECIU	The European Consortium of Innovative Universities, a network of 13 universities united since 1997 by a common profile of shared beliefs, interests, and mutual trust.
EUA	The European University Association (EUA) represents more than 850 universities and national rectors' conferences in 49 European countries.
EURASHE	European Association of Institutions in Higher Education is a members' based organisation gathering universities of applied sciences, university colleges, as well as national and sectoral associations and other higher education institutions that offer programmes with a strong involvement of the world of work and conduct applied research within the Bologna cycles.
EUHA	European University Hospital Alliance brings together ten of Europe's leading university hospitals with a strong performance across highly specialised care, research and health professionals' education. The ten university hospitals include: Vall d'Hebron Barcelona Hospital, Charité – Universitätsmedizin Berlin, Greater Paris University Hospitals, Erasmus MC Rotterdam, Karolinska

	University Hospital, King's Health Partners, Ospedale San Raffaele, Universtitätsklinikum AKH Wien, University Hospitals Leuven and Aarhus University Hospital.
The Guild	The Guild comprises twenty-one of Europe's most distinguished research-intensive universities in sixteen countries, and is dedicated to enhancing the voice of academic institutions, their researchers and their students.
LERU	The League of European Research Universities (LERU) is a well-established network of 23 research-intensive universities in 12 countries around Europe. They develop and disseminate their views on research, innovation and higher education through policy papers, statements, meetings and events helping to shape policy at the EU level.
RoRi	RoRI is a consortium of 21 partners, drawn from 13 countries and regions. RoRI is led by a small core team, based at Wellcome and the University of Sheffield in the UK, and the Centre for Science and Technology Studies (CWTS) at Leiden University in the Netherlands. RoRI's mission is to translate ideas and evidence into practical, real world solutions to improve research culture and systems. They do this by bringing together people and organisations that care about research, gathering information and developing tools to inform and improve how research is funded, practised, communicated and evaluated.
Science Europe	Science Europe is the organisation representing major public organisations that fund or perform excellent, ground-breaking research in Europe.
UAS4EUROPE	UAS4EUROPE aims to strengthen the voice of universities of applied sciences (UAS) in Europe in the field of applied research and innovation.
UKRI	UK Research and Innovation (UKRI) is the national funding agency investing in science and research in the UK.
UNIC	The European University of Post-Industrial Cities, an institution composed of ten universities committed to boosting mobility and inclusion for societal impact. The ten universities include: University of Oulu, University College Cork, Erasmus University Rotterdam, Malmö University, University of Deusto, University of Liege, Ruhr University Bochum, University of Lodz, University of Zagreb and Koç University Istanbul.
UNICA	UNICA is an institutional Network of Universities from the Capitals of Europe. It was founded in 1990, and it is currently made up of 56 universities from 41 capital cities of Europe, combining over 150.000 university staff and 1.500,000 students.
Yerun	The Young European Research Universities Network (YERUN), founded in 2016, brings together like-minded young research universities in Europe, with the primary objective of raising the voice of young universities in Europe via a dedicated strategic representation and lobbying action and strengthening their cooperation, maximising opportunities to collaborate in areas of mutual interest and benefit.

Research assessment experts and relevant initiatives working on reforming research assessment (representative organisations)	
CLACSO-FOLEC	The Latin-American Forum on Research Assessment
CoARA	The international Coalition for Advancing Research Assessment (CoARA). The vision is that the assessment of research, researchers and research organisations recognises the diverse outputs, practices and activities that maximise the quality and impact of research. This requires basing assessment primarily on qualitative judgement, for which peer review is central, supported by responsible use of quantitative indicators.
DORA	San Francisco Declaration on Research Assessment (DORA) is the leading international initiative advocating the reform of research assessment that focuses on the value and influence of diversity of research outputs instead of the journal in which they are published.
ENRESSH	European Network for Research Evaluation in the Social Sciences and the Humanities" (ENRESSH) is an association dedicated to the study of research evaluation protocols and policy in the SSH. The network builds on ENRESSH COST Action (ended in 2020) with more than 125 participants from 37 countries. ENRESSH produced its own manifesto and was one of the initiators of the Helsinki Initiative on Multilingualism in Scholarly Communication.
FRAP	The Future Research Assessment Programme (FRAP) aims to explore possible approaches to the assessment of UK higher education research performance. It has been initiated at the request of the UK and devolved government ministers and funding bodies. This programme will be led by the four UK higher education funding bodies: Research England, Scottish Funding Council, Higher Education Funding Council for Wales, and Department for the Economy, Northern Ireland.
HuMetricsHSS	HuMetricsHSS is an initiative that creates and supports values-enacted frameworks for understanding and evaluating all aspects of scholarly life. Comprised of individuals working in academic and nonprofit academic–adjacent sectors, the HuMetricsHSS team is committed to establishing humane indicators of excellence in academia, focused particularly on the humanities and social sciences (HSS).
INORMS	INORMS Research Evaluation Group Community (REG) concentrates on how best to ensure that research evaluation is meaningful, responsible and effective. REG have focussed their attention on two work-packages: 1) how to make the Global University Rankings fairer and more responsible 2) to guide university leaders and practitioners in the adoption and practice of responsible research evaluation. For this purpose, they have designed the SCOPE framework, and a series of 'five arguments' for engaging leaders with responsible research evaluation.
Leiden Manifesto	Leiden Manifesto for Research Metrics describes ten principles of best practice in metrics-based research assessment.
REF	The Research Excellence Framework (REF) is a research impact evaluation of British Higher Education Institutions (HEIs).

Open Science experts and relevant initiatives (representative organisations)	
CoNOSC	The Council for National Open Science Coordination (CoNOSC) is a network of national Open Science coordinators in the UN-European region.
EOSC-Association	The European Open Science Cloud (EOSC) association brings together key stakeholders in the European research environment to agree on strategies for the advancement of Open Science and to optimise the conditions for research outcomes, and ultimately, to make the European Open Science Cloud (EOSC) a reality.
euroCRIS	euroCRIS is an international not-for-profit association founded in 2002 in order to bring together experts on research information in general and research information systems (CRIS) in particular.
PLOS	Public Library of Science (PLOS) is a nonprofit Open Access publisher empowering researchers to accelerate progress in science and medicine by leading a transformation in research communication. PLOS has conceptualised a framework for measuring Open Science practices according to the FAIR principles, and partnered with DataSeer to develop a set of numerical "indicators" linked to specific Open Science characteristics and behaviours observable in published research articles.
Research Data Alliance WG related to research assessment	RDA Working group specialised in topics related to Responsible Research Assessment recognising Open Science.
SPARC	SPARC is a non-profit advocacy organisation that supports systems for research and education that are open by default and equitable by design. SPARC's membership includes about 250 libraries and academic organisations across North America. This membership is complemented by affiliated SPARC coalitions in Africa, Europe, and Japan as well as individual member organisations in Australia, Hong Kong, and Saudi Arabia.
TOPS	The Transform to Open Science (TOPS) mission is a NASA initiative designed to rapidly transform agencies, organisations, and communities to an inclusive culture of Open Science. TOPS is part of NASA's Open-Source Science Initiative.
UNESCO Open Science	UNESCO Global Open Science Partnership brings together all the relevant and interested Open Science stakeholders across the world. The Partnership is open ended and the scientific community, public and private science, technology and innovation institutions, relevant private sector and industry, United Nations agencies and all other relevant Open Science actors.

The landscape analysis delved into the identified networks and analysed their key outputs and findings, that could be of interest for the development work of OSAF, Assessment Portfolio templates and Open Science Assessment Registry (OSAR). Elements of interest include a) research assessment frameworks and policies: traditional and Open Science-aware, b) quantitative and qualitative data priorities, including in particular concrete examples of

quantitative indicators and metrics and the use and handling of qualitative methods, c) software infrastructures related to OS and assessments.

Out of the 48 identified stakeholders, the following 10 networks, research groups or initiatives were selected for further introductions and analysis:

- Coalition for Advancing Research Assessment (CoARA)
- European Open Science Cloud Association (EOSC)
- The European University Association (EUA)
- League of European Research Associations (LERU)
- San Francisco Declaration on Research Assessment (DORA)
- Science Europe
- Strong and United Voices of Universities of Science and Technology in Europe (CESAER)
- UK Research and Innovation (UKRI)
- UNESCO Open Science
- Young European Research Universities Network (YERUN)

Key outputs and findings that are of interest to the development of OSAF, OSAR or Assessment Portfolio templates are further analysed in the following related chapters: Chapter 5. Research assessment framework and policies, Chapter 6. Quantitative and qualitative data priorities and Chapter 7. Infrastructures.

Coalition for Advancing Research Assessment (CoARA)

In July 2022, Science Europe, an organisation representing the European research funders, published The Agreement on Reforming Research Assessment. The agreement is an outcome of the international Coalition for Advancing Research Assessment (CoARA). "The vision is that the assessment of research, researchers and research organisations recognises the diverse outputs, practices and activities that maximise the quality and impact of research. This requires basing assessment primarily on qualitative judgement, for which peer review is central, supported by responsible use of quantitative indicators." (Coalition for Advancing Research Assessment 2022.)

Specific elements of interest for GraspOS:

The Agreement on Reforming Research Assessment consists of four core commitments and six supporting commitments, many of which are related to Open Science and openness. "Openness of research, and results that are verifiable and reproducible where applicable, strongly contribute to quality" (Coalition for Advancing Research Assessment 2022).

The framework is directly related to GraspOS's primary objective to reform the assessment of research and researchers towards a system that incentivises and rewards researchers to adopt OS principles. The agreement on reforming research assessment provides a toolbox to support different commitments including examples of tools to support openness, transparency of research and the research process.

The CoARA commitments are further analysed in Chapter 5. Research assessment framework and policies.

European Open Science Cloud Association (EOSC-Association)

The European Commission launched the European Open Science- Cloud (EOSC) program with the goal of creating an infrastructure that offers its customers services that support Open Science practices. The goal of the EOSC is to offer a federated and open multidisciplinary environment where European researchers, innovators, businesses, and citizens can publish, locate, and reuse data, tools, and services for research, innovation, and educational purposes. (European Open Science Cloud 2023b.)

The EOSC Association brings together key stakeholders in the European research environment to agree on strategies for the advancement of Open Science. The EOSC Association has grown from a few founding members to over 250 Members and observers. (European Open Science Cloud 2023a.)

EOSC Portal is a platform funded by the EU that makes it easier to find tools and resources for data analysis, data storage, computation, training, and security.

Specific elements of interest for GraspOS:

The EOSC Association includes especially two GraspOS-relevant EOSC Task Forces whose outputs and work are useful to monitor. First one is the Research careers, recognition and credit Task Force, "that will address incentives and rewards for researchers to manage and share their data, code and other research outputs, activities, and processes". The second one is the EOSC FAIR metrics and Data Quality Task Force, "that will implement the proposed FAIR metrics for EOSC by assessing their applicability across research communities and testing a range of tools to enable uptake. Recommendations will be made to update metrics and adopt tools as appropriate". (European Open Science Cloud 2023c.). EOSC FAIR metrics and Data Quality Task Force has produced the following article: Wilkinson MD, Sansone SA, Méndez E et al. Community-driven governance of FAIRness assessment: an open issue, an open discussion. Open Res Europe 2022, 2:146 (https://doi.org/10.12688/openreseurope.15364.1).

In addition to Task Forces, monitoring and contributing to the European Open Science Cloud (EOSC Observatory) provides comprehensive assessment of EOSC-relevant Open Science efforts in EU member states and associated countries.

The European University Association (EUA)

The European University Association (EUA) represents more than 850 universities and national rectors' conferences in 49 European countries.

EUA has been actively supporting universities in the transition to Open Science for more than a decade and they have an Expert Group on Science 2.0/Open Science that closely follows developments in this area (European University Association). The Association takes a comprehensive view of the transition to Open Science by gathering information on the current situation in Europe and building a forward-looking dialogue between universities and other main stakeholders. EUA's four key priorities include promoting Open Access policies for

research publications and data; achieving more transparency and greater sustainability in the scholarly publishing system; contributing to the development and implementation of research data management, data sharing and the European Open Science Cloud (EOSC) and raising awareness and supporting universities in reviewing their approach to academic career assessment. (European University Association 2020.)

Specific elements of interest for GraspOS:

EUA's study from the year 2019 on "Research Assessment in the Transition to Open Science" concluded that universities must widen the variety of academic activities incentivised and rewarded and focus on the quality and excellence of research. The EUA Open Science Agenda 2025, published in 2022, addresses three major priority areas for its work on Open Science in the future: Universal and perpetual Open Access to scholarly outputs, in a just scholarly publishing ecosystem; Findable, Accessible, Interoperable and Reusable research data; and Institutional approaches to research assessment. The EUA's Research Assessment in the Transition to Open Science and Open Science Agenda 2025 are further analysed in Chapter 5. Research assessment framework and policies.

League of European Research Associations (LERU)

The League of European Research Universities (LERU) is a network of 23 research-intensive universities in 12 countries around Europe. Through policy papers, statements, meetings, and events, they develop and communicate their opinions on research, innovation, and higher education, which helps to drive policy at the EU level. (The League of European Research Universities 2023.)

LERU works on various research-related topics, with a series of working groups, among which Open Science, Careers of researchers and HR and research integrity.

Specific elements of interest for GraspOS:

LERU has published many interesting publications that are relevant to OSAF development; LERU Research Universities and Research Assessment (2012), LERU Research Universities and Research Assessment (yearly starting from 2013), A Pathway towards Multidimensional Academic Careers - A LERU Framework for the Assessment of Researchers (2022); and "Open Science and its role in universities: a roadmap for cultural change (2018)". All of the mentioned publications are further analysed in Chapter 5. Research assessment frameworks and policies. There is also a LERU subgroup that is tasked to develop next generation metrics in LERU. Their work is still in the early stages and thus not yet usable by the GraspOS project.

San Francisco Declaration on Research Assessment (DORA)

The leading international initiative advocating the reform of research assessment that focuses on the value and influence of diversity of research outputs instead of the journal in which they are published. The Declaration on Research Assessment was developed in 2012 during the Annual Meeting of the American Society for Cell Biology in San Francisco. Over 23,000 individuals and organisations in 160 countries have signed DORA to date. (San Francisco Declaration on Research Assessment n.d. a.). DORA also maintains a toolkit of resources in

the form of a project called Tools to Advance Research Assessment (TARA) and the aim is to facilitate the development of new policies and practices for academic career assessment (San Francisco Declaration on Research Assessment n.d. b).

Specific elements of interest for GraspOS:

DORA recommendations focus primarily on practices relating to research articles published in peer-reviewed journals, but can and should be extended by recognising additional products, such as datasets, as important research outputs. DORA puts emphasis on openness and transparency of data and methods used in calculation on metrics used in assessments. The DORA recommendation is further analysed in Chapter 5.

Science Europe

Science Europe is the organisation representing major public organisations that fund or perform research in Europe (Science Europe 2022 a). In collaboration with its member organisations, the broader research community, and European and national policymakers, Science Europe is working to find solutions to practical aspects of the transition and implementation of Open Access policies. Science Europe's priority is to promote research quality as the most important factor in research assessment. "Research assessment must reward all research contributions and activities, and promote good research practices, reproducibility, and integrity. To that end, it needs to capture the diversity of research outputs and outcomes in a manner that is appropriate to each research field. Ensuring that research assessment processes are transparent, effective, and fair is of fundamental significance". (Science Europe b.)

Specific elements of interest for GraspOS:

Science Europe has published many relevant policy statements, recommendations and agreements related to Reforming Research Assessment practices: Study on Research Assessment Practices (2019), Position statement on research assessment processes (2020), an Agreement on reforming research assessment processes (2022), Science Europe Values Framework (2022) and Recognising What We Value: Recommendations on Recognition Systems (2023). Previously mentioned recommendations emphasise that Open Science practices should be explicitly recognised in assessment processes. Science Europe has also published papers on Open Access (Briefing paper on Monitoring Open Access and Action Plan on Diamond Open Access), Research Data Management (Practical Guide to the International Alignment of Research Data Management). Position Statement on Research Information Systems (2016) introduces the principle that Research information systems should foster the findability, accessibility, interoperability, and reusability of the data on research activity. The Study on Research Assessment Practices (2019), The Science Europe's outputs on reforming research assessment are further analysed in Chapter 5. Research assessment framework and policies.

Strong and United Voices of Universities of Science and Technology in Europe (CESAER)

CESAER is an international association of universities with a strong science and technology profile that advocate, learn from each other and inspire debates. Their members represent

higher education, training, research and innovation, and they contribute to knowledge societies for a sustainable future and deliver significant scientific, economic, social and societal impact. (Strong and United Voices of Universities of Science and Technology in Europe.)

Specific elements of interest for GraspOS:

CESAER has a Task Force on Openness of Science & Technology 2022-2023, that addresses the following three main themes: Open Science, knowledge safety & security and citizen science. Regarding Open Science, their focus is on Research Data Management (RDM), advancement of the European Open Science Cloud (EOSC), advancement of Findable, Accessible, Interoperable and Reusable (FAIR) data and promotion of Open Access. CESAER has published many publications that are of interest to OSAF. The White Paper on Next Generation Metrics is further analysis in Chapter 6.1.2 Quantitative indicators.

UK Research and Innovation (UKRI)

UK Research and Innovation (UKRI) is the national funding body for science and research in the UK. UKRI operates across the whole UK with a combined budget of more than £6 billion, and consists of 7 Research Councils, Innovate UK and Research England. UKRI is an executive non-departmental public body, sponsored by the Department for Science, Innovation and Technology. In August 2021 UKRI published an Open Access policy for research articles and academic books aiming to make published outputs of UKRI-funded research widely and freely accessible, under conditions that allow maximum reuse. UKRI is also updating its research assessment methods to ensure openness and diversity in research are rewarded. (UK Research and Innovation 2023 a.)

Specific elements of interest for GraspOS:

In 2015, UKRI published The metric tide: review of metrics in research assessment, which is a review of the role of metrics in research assessment and management especially in the context of UK REF. This report is further analysed in Chapter 5. Research assessment framework and policies.

UNESCO Open Science

UNESCO Global Open Science Partnership brings together the relevant and interested Open Science stakeholders globally. The Partnership is open to all Open Science actors including the scientific community, public and private science, technology and innovation institutions, relevant private sector and industry, United Nations agencies. The Open Science Partnership is geographically balanced and both basic and applied sciences are represented. (UNESCO Open Science.)

The UNESCO Open Science Toolkit is designed to support implementation of the UNESCO Recommendation on Open Science. The Toolkit is a set of guides, policy briefs, factsheets and indexes (UNESCO Open Science).

The UNESCO Recommendation on OS provides a globally agreed definition on open science. Member States are encouraged to prioritise several areas including; Developing an enabling

policy environment for OS; Investing in training, education, digital literacy and capacity-building, to enable researchers and other stakeholders to participate in OS; and Fostering a culture of OS and aligning incentives for OS. (UNESCO Open Science.)

Specific elements of interest for GraspOS:

Research assessment reform has been included in the UNESCO recommendation on Open Science. It recommends that UNESCO members should "review research assessment and career evaluation systems in order to align them with the principles of Open Science". "Bolstering open science infrastructures for all" document that is part of the UNESCO Open Science Toolkit, is designed to support implementation of the UNESCO Recommendation on Open Science. Both The UNESCO Recommendation on OS and Bolstering open science infrastructures for all is further analysed in Chapter 5. Research assessment framework and policies.

Young European Research Universities Network (YERUN)

The Young European Research Universities Network (YERUN), founded in 2016, brings together young research universities in Europe, with the primary objective to raise the voice of young universities in Europe, strengthen their cooperation and maximise opportunities to collaborate in areas of mutual interest. Promotion of Open Science is one of their key interest areas and many of their member organisations are active in this field. Reform of research assessment is another priority area. (Young European Research Universities Network 2021.)

Specific elements of interest for GraspOS:

YERUN has published many reports and policy papers related to Open Science and research assessments. YERUN's position paper on research assessment from 2021 is further analysed in Chapter 5. Research assessment framework and policies.

● 4.2. Relevant projects

The projects selected, introduced and their outputs that are further analysed in this report are selected from the point of view of the WP2: OSAF, OSAR or Assessment Portfolio development. There are also many projects that are of interest to the other GraspOS WPs but are out of focus of this report. Some of the projects that are of interest to the GraspOS technical WPs (WP3 Tools and Services & WP4 Infrastructures) include the following projects: EGI-ACE , EOSC Future, FAIRsFAIR, OpenAIRE-Nexus and FAIR-IMPACT. Also, Skills4EOSC project that is focusing on creating a training ecosystem for Open and FAIR Science, might be of interest for the WP6 (Communication, engagement, exploitation) related to the training activities.

It is also worth mentioning that some of the projects selected here are at such an early stage that their deliverables cannot yet be further analysed in this report.

Academic hiring in an Open Science environment: The University of Zurich's project (HI-FRAME)

Time frame 09/2021 – 08/2023

HI-FRAME is a project that "promotes open science culture change at University of Zurich and, in this regard, contributes to the implementation of the UZH Open Science Policy. The overarching objective of the project is to develop and pilot a tailor-made and flexible framework that systematically incorporates Open Science activities into the evaluation of candidates in professorial hiring". (HI-FRAME 2023.)

Specific elements of interest for GraspOS:

The framework that will be developed during this project is directly relevant to OSAF development, although the aspect is only at the researcher level assessments. The expected dissemination of the framework is in August 2023.

Academic Careers Understood through Measurement and Norms ([ACUMEN](#))

Time frame 03/2011 – 02/2014

ACUMEN was a Seventh Framework Programme (FP7) European research collaboration aimed at understanding how institutions and peers evaluate researchers, as well as determining how the science system may be strengthened and improved. ACUMEN underlined "that there is a lack of quantitative measures that are applicable at the individual level as well as for recognition for new types of work performed". ACUMEN created criteria and guidelines for good evaluation practices. Each researcher has a portfolio on their career and contributions. They can showcase their most important accomplishments in this way. It also has information related to expertise, outputs and influence of each academic and the portfolio contains a narrative that can be used to explain academic merit. (European Commission 2014.) The project influenced several later initiatives related to assessment of OS.

Specific elements of interest for GraspOS:

ACUMEN Portfolio is one of the first examples that utilises both quantitative and qualitative methods in measuring research performance and it's further introduced and analysed in Chapter 6. Quantitative and qualitative data priorities.

[EOSC Co-Creation projects](#): "European overview of career merit systems" and "Vision for research data in research careers"

Time frame 9/2020 – 3/2021

EOSC Co-Creation was EOSC funded project that aimed to create an overview of the current role of FAIR data in the assessment of researchers and to create a vision and road map for better inclusion of FAIR data in European research assessment as an essential incentive for researchers to engage with FAIR data production and use of EOSC services. According to project findings, Open Science can be supported and rewarded by developing FAIReR assessments recognising Open Science outputs and activities. Such assessments are rooted in both the FAIR guidelines for data management and policies for the responsible assessment of research (FAIReR = FAIR + Responsible). This requires a variety of stakeholders - research communities, policy makers, funders and publishers - to work together to address social and cultural barriers and challenges. It also requires creating a technical infrastructure, which

makes responsible assessments of Open Science practices and outputs possible. (Mustajoki et al. 2021.)

Specific elements of interest for GraspOS:

EOSC Co-Creation handled many aspects of OS-aware assessments relevant for GraspOS from the point of view of the assessment of individual researchers. The recommendation on building a FAIReR assessment process is further analysed in Chapter 5. Research assessment frameworks and policies.

FAIRCORE4EOSC

Time frame 06/2022 – 05/2025

The FAIRCORE4EOSC project focuses on creating and implementing core components for the European Open Science Cloud (EOSC). "Supporting a FAIR EOSC and addressing gaps identified in the Strategic Research and Innovation Agenda (SRIA). Leveraging existing technologies and services, the project will develop nine new EOSC-Core components aimed to improve the discoverability and interoperability of an increased amount of research outputs". (faircore4eosc.)

Specific elements of interest for GraspOS:

The FAIRCORE4EOSC project takes into consideration potential overlaps in services, tools and infrastructures relevant to data collection, discipline-based metadata schemas, AAI and Persistent Identifiers. The RAiD infrastructure is planned to be used by OSAF and it is further introduced in Chapter 7 Infrastructures. In addition to RAiD infrastructure, the use of PID and OpenAIRE Graphs, and AAI infrastructures are also highly relevant to GraspOS, especially work packages 3 and 4.

Observing and Negating Matthew Effects in Responsible Research and Innovation Transition (ON-MERRIT)

Time frame 10/2019 - 03/2022

ON-MERRIT investigated whether and how open and responsible research practices could worsen existing inequalities. The project ON-MERRIT investigated the impact of Open Science practices in academia, industry, and policy. It particularly focused on institutions and individuals working in the areas of agriculture, climate and health (key pillars of the UN Sustainable Development Goals). In addition, ON-MERRIT examined the role of gender across all investigated questions. ON-MERRIT suggested a set of evidence-based recommendations for policies, indicators and incentives, which could address and mitigate cumulative (dis)advantages of OS. (On-merrit; Pontika N. et al 2021.)

Specific elements of interest for GraspOS:

ON-MERRIT covers various aspects relevant to GraspOS. The extent to which Open Science and Responsible Research and Innovation (RRI) are embedded in promotion processes at research performing institutions and analyses the disparity between what is valued by institutions and what is valued by researchers in the context of promotion processes.

Institutional Structures of Reward and Recognition in Open Science & RRI. Literature review, surveys, and interviews on a wide range of OS indicators, and correlation with rankings and other means of verification for impact of different metrics and indicators including recommendations and guidelines.

Open and Universal Science (OPUS)

Time frame 09/2022 - 08/2025

The Open and Universal Science (OPUS) project "develops coordination and support measures to reform the assessment of research and researchers at Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs) towards a system that incentivises and rewards researchers to take up open science practices". "OPUS will develop a set of interventions for open science toward a system that incentivises and rewards researchers to take up practices of providing open access to research outputs, early and open sharing of research, participation in open peer-review, measures to ensure reproducibility of results, and involving all stakeholders in co-creation". (OPUS.)

Specific elements of interest for GraspOS:

The OPUS project is directly relevant to GraspOS and liaising with them is highly important. The OPUS deliverable State-of-the-Art analysis on Open Science initiatives was utilised and used as a benchmark point for GraspOS landscaping, especially for identifying relevant projects and networks. OPUS State-of-the-Art analysis on Open Science initiatives, covered an analysis of projects linked to Open Science and key experts, organisations, and networks associated with Open Science. OPUS project will continue its work on developing realistic indicators and metrics to monitor and drive Open Science at RPOs and RFOs. The final output of the OPUS project is the Open Science Career Assessment Matrix framework (OS-CAM 2.0), an output that should be taken into account and especially in the development of the OSAF. However, it is important to note, that compared to the GraspOS project, OPUS mainly focuses on researcher-level assessment while GraspOS includes also organisational and country-level assessments.

Open Science Impact Pathways (PathOS)

Time frame 09/2022 – 08/2025

The aim of the PathOS project is "to identify and document the Open Science Impact Pathways, i.e., the possible paths that connect the input to output, outcome and impact, including the causal mechanisms linking them and the existing enabling or blocking factors. Impact pathways respond to the need not only to estimate and measure net effects of a policy intervention, but to provide explanations why and how impacts occur" (PathOS). "By investigating, measuring and comparing its costs and benefits together with its pathways, PathOS will a) bring a better understanding of the implications of open science for science, economy and society, b) provide recommendations to policy makers and other actors in the R&I ecosystem as to how and to what extent open science should be promoted in a balanced way, and c) develop innovative tools and methods using a big data to augment traditional ones for studying the causal effects of open science" (openaire.eu).

Specific elements of interest for GraspOS:

PathOS project handles many GraspOS relevant aspects. The project will deliver Key Impact Pathways for the open science framework and a Handbook of OS indicators that are of great interest to the development work of OSAF. The project will also develop data and tools for the long-term evaluation of open science, work that is of interest to WP3 (Tools and Services).

Scientific Understanding and Provision of an Enhanced and Robust Monitoring system for RRI (SUPER MoRRI)

Time frame 01/2019 – 12/2023

The MoRRI project (2014-2018) conceptualised and implemented the first Responsible Research and Innovation (RRI) monitoring system in Europe. The SUPER MoRRI project builds upon and continues the work of MoRRI, ensuring sustained data collection, curation, further assessment and refinement of the MoRRI indicators. SUPER MoRRI sought to create a mature monitoring system with indicators and metrics that are robust, realistic, in themselves responsible, and easy to implement. (SUPER MoRRI.)

Specific elements of interest for GraspOS:

SUPER MoRRI covers various relevant aspects to GraspOS including library of tools and methods for assessing/measuring the added value of RRI, responsible indicators and metrics, information related to monitoring activities and contributing to data collection and reporting in the context of Responsible Research Innovation (RRI) activities, for which one of the keys is OS. The MoRRI indicators are further analysed in subchapter 6.1.2 Quantitative indicators.

The Sustainable Careers for Researcher Empowerment (SECURE)

Time frame 01/2023 - 12/2024

The Sustainable Careers for Researcher Empowerment (SECURE) project "will develop coordination and support measures to create, trial, implement, and mainstream a common Research Career Framework (RCF) that offers a suite of options to support organisations in the recruitment, employment, training, development, progression, and mobility of researchers with the aim of improving research careers and reducing career precarity". (SECURE.)

"The RCF will recognise the research profession across sectors, provide a career development and progression structure for research careers, recognise both research and transferable skills and competences, facilitate intersectoral collaboration and mobility, and offer solutions to the precariousness of research careers in academia. SECURE will test aspects of the RCF and TTL models in trials in four RPOs, one RFO, and one recruitment agency". (SECURE.)

Specific elements of interest for GraspOS:

The Research Career Framework (RCF) which is developed in the project might be useful for the OSAF development, especially from the point of view of individual research assessment.

YUFE Transforming Research and Innovation through Europe-wide Knowledge Transfer ([The YUFERING project](#))

Time frame 03/2021 – 02/2024

The YUFERING project is a three-year project by the YUFE university alliance. The YUFERING project will set out actions and recommendations towards a model of Research and Innovation system (R&I), where excellence and inclusivity unite to transform and enhance European Universities and the R&I ecosystem they are part of through knowledge transfer, community engagement and exploitation across all sectors, stakeholder groups and countries. (YUFERING.)

Specific elements of interest for GraspOS:

As a part of the project output, an OS indicator toolkit has been developed that is intended for individual level assessment. This OS indicator toolkit is further introduced in the subchapter 6.1.2 Quantitative indicators. The project will also develop a so-called YUFERING portfolio, that aims to assist research organisations in learning how to assess researchers more broadly to recognise the efforts and accomplishments of researchers not just in research but also in teaching and mentoring, community engagement and societal outreach, teamwork, leadership, and management. The portfolio includes a researcher-driven narrative CV, which will be supported by measurable evidence (data).

5. Research assessment frameworks and policies

Key takeaways
- Analysis of 98 policies and 1,152 statements (recommendations, principles, actions) from 1994 to 2023 related to responsible assessment highlights the rapid growth and complexity of the landscape of responsible assessment policies that evaluators may want and need to consider. The growing complexity of the policy environment, even if it is highly converging in terms of principles and recommendations, probably contributes to the perceived complexity of the research assessment reform.
- The responsible assessment policies and statements constitute a resource to be investigated as part of the OSAF and assessment protocol development for the pilots. These can be further used, updated and developed as a GraspOS resource or training material for finding recommendations and guidelines for specific contexts and assessment purposes.
- GraspOS landscape survey highlights the importance of the European Charter for Researchers and the national and institutional assessment policies, DORA, and the Agreement on Reforming Research Assessment as the basis of ongoing RRA reform.

> These policies, together with the European Union Council conclusions on Research assessment and implementation of Open Science, the Leiden manifesto, the Helsinki Initiative and Hong-Kong principles, as well as the national policies from the Netherlands, Finland and Norway, provide a comprehensive overview of RRA principles, recommendations and dimensions as a starting-point for the development of OSAF and the pilot assessment protocols.
>
> - Responsible Research Assessment (RRA) entails openness, reproducibility and transparency of the data and criteria necessary for research assessment, balancing qualitative and quantitative methods, rewarding Open Science practices, recognizing diversity of academic work, and respecting differences between fields. Diversity relates to research outputs, (open) practices, activities and roles. Contextual factors causing potential bias and disadvantage in assessment, such as field, interdisciplinarity, inter-sectoral or applied research orientation, as well as career stage, EDI dimensions (sexual orientation, racial/ethnic origin, socio-economic status, disability) and language, should also be considered.

● 5.1. Overview of selected assessment frameworks

In recent years, many national and international assessment frameworks have been developed to support a more diverse assessment of research and researchers. Some of the most central national assessment frameworks include the Research Excellence Framework (REF) used for the research impact evaluation in UK, the Finnish initiative Recommendation for the Responsible Evaluation of a Researcher in Finland, the Dutch 2021-2027 Standard Evaluation Protocol (SEP), developed by a group of Dutch research organisations and the NOR-CAM - A toolbox for recognition and rewards in academic careers developed by the Norwegian Rectors' Conference. Perhaps the best-known international framework is the Open Science Career Assessment Matrix (OS-CAM) by The European Commission, supporting the development of research assessment firmly committed to the principles of Open Science. Common to all these frameworks is that they recognise the broad diversity of academic activities (Table 5.1).

Table 5.1 Overview of high-level assessment categories in selected assessment frameworks[2]

Assessment Framework	Assessment Category		

Finland	Research funding and research supervision and leadership experience Teaching merits and experience Awards and honours Assessment of scientific and academic merit Scientific and academic networking and community development Scientific and societal impact of research work
NOR-CAM	Research output Research process Pedagogical competence Impact and innovation Leadership Other experience
OS-CAM	Research output Research process Service and leadership Research impact Teaching and supervision Professional experience
REF	Information on staff (with significant responsibility for research) Research output Impact Research doctoral degrees awarded, research income and income-in-kind An institutional-level environment statement
SEP	Research products for peers Use of research products by peers Marks of recognition from peers Research products for societal target groups Use of research products by societal target groups Marks of recognition by societal target groups

● 5.2. Analysis of frameworks and policies

There are several recent overviews of the Responsible Research Assessment agenda. RoRI working paper "the changing role of funders in responsible research assessment: progress, obstacles and the way ahead" (Curry et al., 2020) aptly described RRA as an "umbrella term for approaches to assessment which incentivise, reflect and reward the plural characteristics of high-quality research, in support of diverse and inclusive research cultures" connected with four problems:

- Misapplication of narrow criteria and indicators of research quality or impact, in ways that distort incentives, create unsustainable pressures on researchers, and exacerbate problems with research integrity and reproducibility;
- A reduction in diversity of research missions and purposes, as an emphasis on these narrow criteria and indicators leads institutions and researchers to adopt similar strategic priorities, or to focus on lower-risk, incremental work;
- Systemic biases against those who do not meet—or choose not to prioritise—narrow criteria and indicators of quality or impact, or to conform to particular career pathways;
- A diversion of policy and managerial attention towards things that can be measured, at the expense of less tangible or quantifiable qualities, impacts, assets and values – a trend exacerbated by the rise of flawed university league tables.

EOSC Co-creation project report "Making FAIReR Assessments Possible" (Mustajoki et al., 2021) reviewed over 200 studies, documents and resources related to RRA. The report highlighted that recognising and rewarding Open Science practices requires understanding the diversity of practices and development of community curated open infrastructures for supporting assessments:

- Make it meaningful. We need to know what we want to value and evaluate. To do this, we start by considering the goals of Open Science and do not limit our evaluations to what is technically possible or easy to measure. We take into consideration the diversity of practices, outputs, missions and impacts of academic work, and differences between fields.
- Make it possible. We need to make it possible for researchers to report, make visible, and explain their diverse outputs, activities and impact of their work. Integration of relevant information from different sources is facilitated by open assessment infrastructure.
- Make it rewarding. We need to include a broad range of outputs, activities and impacts of academic works in criteria for hiring, promotion and funding.

Harnessing the Metric Tide: indicators, infrastructures and priorities for Responsible Research Assessment in the UK (Curry, Gadd & Wilsdon, 2022) includes an extensive literature review on responsible metrics and assessment. The report extracted common topics from the recommendations and organised them around five main themes:

- Responsible research indicators: using indicators to support, not supplant, expert assessment, aligning indicators with the mission and values of the entity under evaluation and relevance to the context, and broadening the range of quantitative and qualitative information to support assessments.
- Responsible assessment culture: showing commitment towards Responsible Research Assessment, making the research assessment process more transparent, and training evaluators to address diversity and biases in assessment.
- Data infrastructure: enabling reuse, verifiability and interoperability of information and indicators supporting assessment.

- Efficiency and coordination: considering efficiency of assessment processes and coordinating and engaging in mutual learning.
- Evidence building: address the lack of evidence for the benefits of responsible assessment
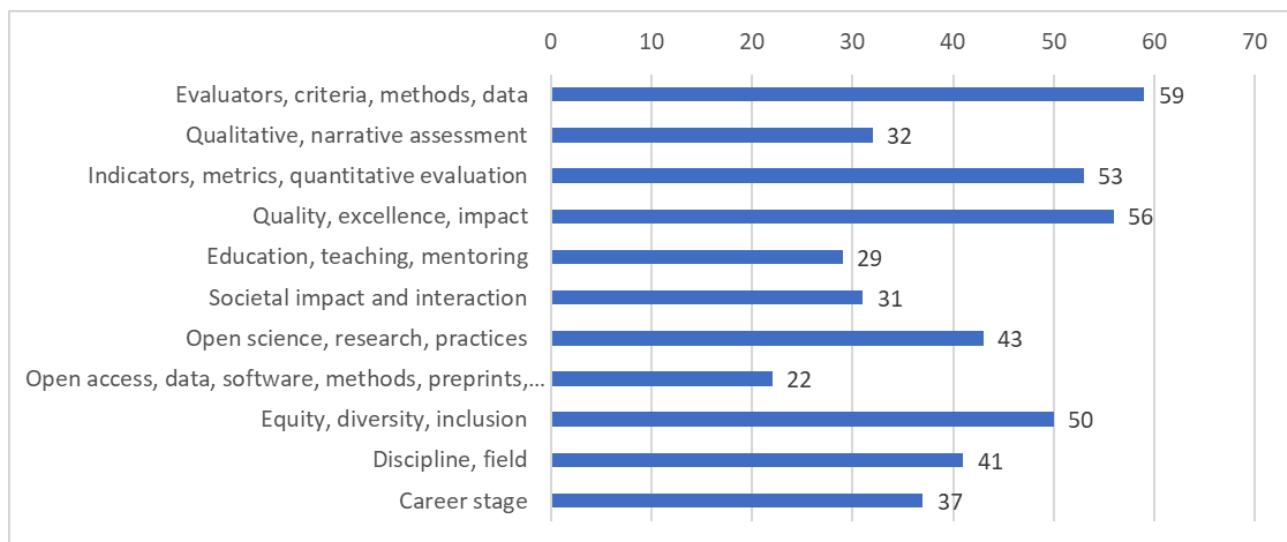
The most recent overview of the RRA development "the Future of Research Evaluation: a Synthesis of Current Debates and Developments" was published in June 2023 by a working group set up by the Global Young Academy (GYA), the InterAcademy Partnership (IAP) and the International Science Council (ISC) (De Rijcke et al., 2023). This report provides significant added value to previous analyses by its global perspectives on regional challenges in promoting the RRA agenda. The report concludes with several actions, including "creating space for sharing lessons and outcomes from relevant initiatives to-date (to build a community of practice); in the medium term, co-convening multistakeholder fora with key constituencies to redesign and implement research evaluation in practicable, context-sensitive and inclusive ways; and, in the longer-term, instigating novel studies that contribute to futures thinking, sensitive to fast-moving developments in AI technologies, peer review methodologies and reform, and communications media."

As previous overviews and reports point out, there is a growing number of RRA policies, initiatives, statements developed at global, regional and institutional level. The purpose of the GraspOS landscape analysis is to support the further development of OSAF and the contextualised assessment protocols tailored to the needs of the pilots. For this purpose, we collected a library of 98 RRA policy documents with recommendations, principles, actions, and other statements related to RRA (Table 5.2). These documents are available in a Google Drive folder for the internal use of the GraspOS project. From these documents we also extracted a corpus of 1,152 statements related to responsible assessment, which are recorded in a spreadsheet that can be further used, updated and developed as a GraspOS resource, tool or training material for finding recommendations and guidelines for specific contexts and assessment purposes. In the spreadsheet it had been indicated, based on keyword searches and reading of the texts, if the statements relate to the one or more of 11 themes:

- Evaluators, criteria, methods, data
- Qualitative, narrative assessment
- Indicators, metrics, quantitative evaluation
- Quality, excellence, impact
- Education, teaching, mentoring
- Societal impact and interaction
- Open Science, research, practices
- Open Access, data, software, methods, preprints, pre-registrations
- Equity, diversity, inclusion
- Discipline, field
- Career stage
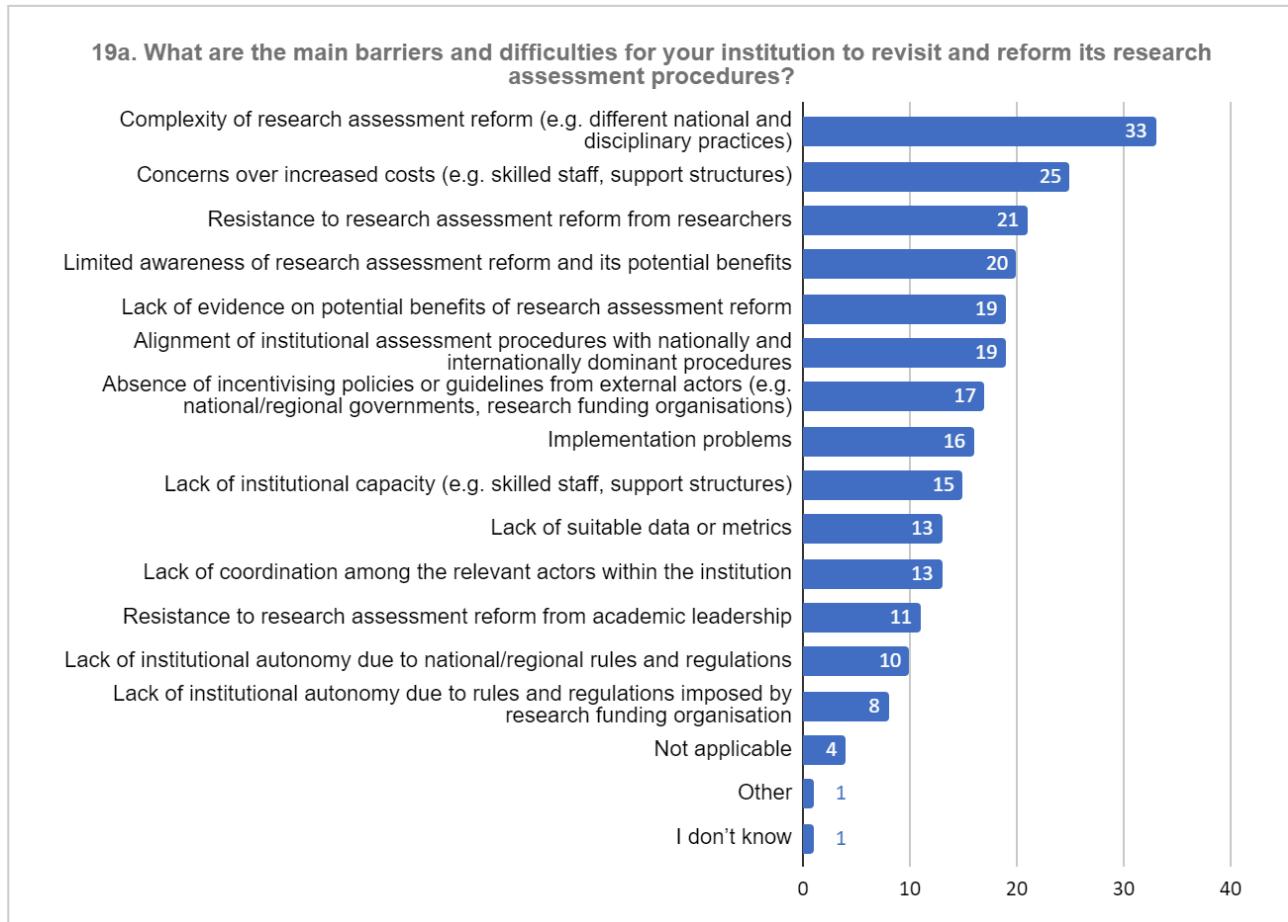
Figure 5.1 shows the number of policies with statements related to these 11 themes, ranging from 22 policies related specifically to Open Access, data, software, methods, preprints,

pre-registrations to 59 policies related to evaluators, criteria, methods and data. This analysis highlights the rapid growth and complexity of the landscape of responsible assessment policies that evaluators may want to consider. It is very difficult to summarise all the policies and statements in a meaningful way that would be applicable to assessments in general, or to the GrapsOS pilots in particular. Rather, the responsible assessment policies and statements should be seen as resources to be investigated as part of the OSAF and assessment protocol development for the pilots.

Figure 5.1 *Number of policies with responsible assessment statements related to 11 broad themes of responsible assessment and open science*

The growing complexity of the policy environment, even if it is highly converging in terms of principles and recommendations, probably contributes to the perceived complexity of the research assessment reform. The 54 participants of the landscape survey perceive the complexity of the reform as the major obstacle to reforming research assessment, with 61.1% expressing this sentiment (Figure 5.2). Anxiety over the expenses associated with skilled personnel and support infrastructures serves as the second most common hindrance, impacting 46.3% of the respondents. These challenges are prevalent among the 38 CoARA signatories and the 16 organisations who haven't signed the Agreement yet. Among signatories, there is a particular worry also about opposition from researchers, limited understanding of the reform, and a dearth of evidence supporting its potential benefits. For non-signatories, problems related to implementation are deemed significantly important.

19a. What are the main barriers and difficulties for your institution to revisit and reform its research assessment procedures?

Figure 5.2 GraspOS landscape analysis survey on Reforming Research Assessment: answers to question 19a.

Table 5.2 Policies analysed for statements on responsible assessment

Policies	Count of Statements
1994	**31**
Guiding Principles For Evaluators	31
2005	**48**
The European Charter for Researchers & The Code of Conduct for the Recruitment of Researchers	48
2012	**22**
Informing research choices	21
LERU Research Universities and Research Assessment	1

2013	**17**
DORA - San Francisco Declaration on Research Assessment	16
LERU Research Universities and Research Assessment	1
2014	**23**
Guidelines for Good Evaluation Practice with the ACUMEN Portfolio	14
Integrating Human Rights and Gender Equality in Evaluations	8
LERU Research Universities and Research Assessment	1
2015	**74**
Horizon 2020 indicators	
Leiden Manifesto for research metrics	26
LERU Research Universities and Research Assessment	1
Open, Transparent and Merit-based Recruitment of Researchers	20
The Metric Tide. Report of the Independent Review of the Role of Metrics in Research Assessment and Management	27
2016	**25**
Amsterdam Call for Action on Open Science	16
LERU Research Universities and Research Assessment	1
Science Europe Position Statement on Research Information Systems	8
2017	**68**
Challenges of the evaluation of social sciences and humanities research (SSH) ENRESSH – European Network for Research Evaluation in the SSH	12
Evaluation of Research Careers fully acknowledging Open Science Practices	7
LERU Research Universities and Research Assessment	1
Measuring scientific impact beyond academia: An assessment of existing impact metrics and proposed improvements	
Next-generation Metrix	12
Perspectives on research excellence in the Global South	10
Quality assessment of scientific outputs using the BWM	1

SGCI Good Practice Guideline on the Quality of Research Competitions	24
Snowball Metrics Recipe Book	1
2018	**140**
EUA Roadmap on Research Assessment in the Transition to Open Science	3
GYA: Publishing models, assessment, and open science	15
ISRIA statement	10
LERU Open Science and its role in universities	41
LERU Research Universities and Research Assessment	1
Open Science Policy Platform Recommendations	36
Open Science: Altmetrics and Rewards	18
Science in Transition	6
Statement of Principles on Peer/Merit Review	10
2019	**87**
Declaration on Sustainable Researcher Careers	23
EUA Reflections on University Research Assessment Key concepts, issues and actors	
EUA Research Assessment in the Transition to Open Science	
Helsinki Initiative on Multilingualism in Scholarly Communication	9
Indicator Frameworks for Fostering Open Knowledge Practices in Science and Scholarship	16
LERU Research Universities and Research Assessment	1
Open data metrics	
Open science challenges, benefits and tips in early career and beyond	
Open Science, Open Data, and Open Scholarship: European Policies to Make Science Fit for the Twenty-First Century	
Room for everyone's talent	12
Science Europe Study on Research Assessment Practices	7

Responsible Research Assessment Global Research Council (GRC) Conference Report 2019	22
SCOPE Guide	17
Towards a reform of the research assessment system: scoping report	13
UNESCO Recommendation on Open Science	15
YERUN Position paper research assessment	16
UKRN Position Statement on Responsible Research Evaluation	11
2022	**165**
A Pathway towards Multidimensional Academic Careers (A LERU Framework for the Assessment of Researchers)	8
Agreement on Reforming Research Assessment	30
Bristol University Academic Promotions Framework	
Building Blocks for Impact	1
CLACSO-FOLEC Declaration of Principles. A new research assessment towards a socially relevant science in Latin America and the Caribbean	14
Community-driven Governance of FAIRness Assessment: An Open Issue, an Open Discussion	3
Deconstructing impact: A framework for impact evaluation in grant applications	3
EUA Open science agenda 2025	
EUTOPIA Open Science in research assessment - An overview of quantitative and qualitative approaches	
Harnessing the Metric Tide	15
HuMetricsHSS	13
ISE Manifesto	22
Monitoring model for open science and research – Principles and practices	9
Open Science Assessment and Incentives at the YUFE Alliance	1
Recommendations for Discipline-Specific FAIRness Evaluation Derived from Applying an Ensemble of Evaluation Tools	8
Research assessment and implementation of Open Science	20

Résumé for Research and Innovation (R4RI)	4
The new European reform of research assessment	6
Transformed UK Athena Swan Charter: Information pack for Universities	8
UNESCO Bolstering open science infrastructures for all	
2023	**151**
Aalborg University Guide to AAU Research Indikator	
Community consensus on core open science practices to monitor in biomedicine	
Future Research Assessment Programme (FRAP)	23
Future Research Evaluation	18
HRS4R Human Resources Strategy for Researchers	
Science Europe Recommendations on Research Recognition Systems: Recognising What We Value	25
The European Code of Conduct for Research Integrity	69
The Principles of Open Scholarly infrastructure	16
University of Turku Policy for Responsible Assessment of Research and Researcher	
Grand Total	**1152**

In the following we provide an overview of the most central assessment policies, which could be considered providing some of the key principles and recommendations for the pilots to take into account in designing the assessment procedures. The first document, Guiding Principles For Evaluators established and regularly revised by the American Evaluation Association since 1994, provides an example of professional evaluation guidelines. The five principles are intended as a guide to the professional ethical conduct of evaluators in a variety of contexts including programs, policies, personnel, products, and organisations, and can provide a sound starting point for conducting Responsible Research Assessments:

- A. Systematic Inquiry: Evaluators conduct thorough, methodical, and contextually relevant data-based inquiries. They adhere to technical standards, involve stakeholders in exploring limitations and strengths, communicate methods clearly, address limitations, discuss relevant factors, and consider ethical implications of emerging technologies in evaluation.
- B. Competence: Evaluators provide skilled professional services to stakeholders. They ensure the evaluation team has the necessary education, abilities, skills, and

experiences. When needed, they communicate any limitations and strive to supplement missing competencies. They also seek competencies for working in the cultural context and engage in ongoing professional development to enhance evaluation practice.

- C. Integrity: Evaluators maintain honesty and transparency to uphold the integrity of the evaluation. They communicate truthfully, disclose conflicts of interest, record and communicate changes, assess stakeholders' values, represent data accurately, address concerns, and disclose financial support and sources of evaluation requests.
- D. Respect for People: Evaluators honour the dignity, well-being, and self-worth of individuals and acknowledge the influence of culture within and across groups. They seek to understand and treat perspectives and interests fairly, adhere to professional ethics, maximise benefits and minimise risks, and ensure voluntary participation and access to evaluation benefits for data contributors.
- E. Common Good and Equity: Evaluators aim to contribute to the common good and promote equity. They balance client and stakeholder interests while protecting evaluation integrity. They address threats to the common good and risks of exacerbating inequity, promote transparency and equitable access to information, and mitigate bias and power imbalances within the evaluation context.

In the European context, which is the context of all GraspOS pilots, certain RRA policies are particularly relevant. The recent advancement of responsible assessment builds on earlier efforts by the European Commission to promote open and transparent recruitment procedures with "The European Charter for Researchers" and "The Code of Conduct for the Recruitment of Researchers" published already in 2005. These documents already provide employers and funders with several key principles on responsible assessment that are found in the CoARA Agreement and other RRA policies, for example:

- Employers and funders should ensure non-discrimination in all aspects of research employment and funding, considering factors such as gender, age, ethnicity, religion, sexual orientation, language, disability, political opinion, or socio-economic condition.
- Recruitment procedures should be open, efficient, transparent, supportive, and internationally comparable, with clear rules and guidelines for the recruitment and appointment of researchers, including postdoctoral researchers. The selection process should consider the whole range of candidates' experiences, focusing on their overall potential as researchers, their creativity, and level of independence.
- Transparent and regular evaluation systems should be introduced for all researchers, taking into account their overall research creativity and results, and these evaluations should be considered in the context of career progression.
- Merit should be judged qualitatively as well as quantitatively, focusing on outstanding results within a diversified career path and not only on the number of publications. The importance of bibliometric indices should be properly balanced within a wider range of evaluation criteria, such as teaching, supervision, teamwork, knowledge transfer, management of research and innovation and public awareness activities.

- The value of various forms of mobility, including geographical, intersectoral, inter- and trans-disciplinary, as well as mobility between the public and private sector, should be recognised as a means of enhancing scientific knowledge and professional development.

A Proposal for a Council recommendation on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe (17 July 2023) includes an Annex II containing a new European Charter for Researchers. The second pillar of the Charter is "Researchers Assessment, Recruitment and Progression".

It is also relevant to consider that the European Commission recognises the "European Code of Conduct", established by ALLEA in 2017 and updated in June 2023, as the reference document for research integrity for all EU-funded research projects. In addition, the European Code of Conduct increasingly serves as a model for organisations and researchers across Europe and beyond. The principles of good scientific practice serve European researchers not only in the conduct of research but also in the conduct of assessment:

- Reliability in ensuring the quality of research, reflected in the design, methodology, analysis, and use of resources.
- Honesty in developing, undertaking, reviewing, reporting, and communicating research in a transparent, fair, full, and unbiased way.
- Respect for colleagues, research participants, research subjects, society, ecosystems, cultural heritage, and the environment.
- Accountability for the research from idea to publication, for its management and organisation, for training, supervision, and mentoring, and for its wider societal impacts.

The code also has a specific section on good research practice on "Reviewing and Assessment", highlighting for example that

- Researchers take their responsibilities in the research community seriously, including refereeing, reviewing, and assessment, and are appropriately recognised and rewarded for these expert activities.
- Submissions for publication, funding, and promotion and rewards are reviewed transparently and justifiably, with any use of AI or automated tools disclosed. Reviewers and editors maintain confidentiality, declare conflicts of interest, and respect authors' rights.
- Assessment practices adopted by researchers and institutions prioritise quality, knowledge advancement, and impact, going beyond quantitative indicators to consider diversity, inclusiveness, openness, and collaboration.

The European Commission has also played a key role in advocating the proper recognition of Open Science practices through research assessment and funding systems. The Amsterdam Call for Action on Open Science, organised by the Dutch Presidency of the Council of the European Union in 2016, formulated a new assessment, reward and evaluation system focused on knowledge creation, impact and citizen science as a pan-European policy. The Open Science Career Assessment Matrix (OS-CAM) was formulated in 2017 by the Working

Group on Rewards established under the European Commission's Open Science Policy Platform (OSPP). The publication of the OS-CAM in the OSPP report titled "Evaluation of Research Careers fully acknowledging Open Science practices" aimed to provide recommendations for recognizing and rewarding Open Science practitioners across Europe. OS-CAM provides 42 possible Open Science assessment criteria across six main areas of Open Science activities: 1) research output, 2) research process, 3) service and leadership, 4) research impact, teaching and supervision, and 6) professional experience.

OS-CAM was complemented by OSPP recommendations (2018) that underscored the need to ensure the public availability of data, metadata and methods that are relevant to research evaluation, and the high interoperability of scholarly infrastructure to enable the simple and open sharing of metadata and credit for research contributions using standardised unique identifiers across Europe. Funders, research institutions and other evaluators of researchers should actively develop/adjust evaluation practices and routines to give extra credit to individuals, groups and projects who integrate Open Science within their research practice. In addition, research institutions should establish a career and reward structure that values diverse research outputs and career paths. Evaluators should use a broader range of indicators, rather than relying solely on journal reputation or Impact Factor, to assess research quality. Indicators capturing the full range of contributions to the knowledge system should be developed to encompass the complexity and diversity of research. In addition, the European Commission has published two expert reports on Open Science: Altmetrics and Rewards (2018) and Indicator Frameworks for Fostering Open Knowledge Practices in Science and Scholarship (2019).

More recently, the European Commission has promoted changes in assessment culture by introducing the reform of the research assessment system to the European Research Area Policy Agenda (European Commission, 2021b), facilitating the report "Toward Reform of Research Assessment Systems" (2021), and the approval of the Council Conclusions on "Research Assessment and the Implementation of Open Science" (2022). These advances have culminated in the establishment of the "Agreement on Reforming Research Assessment" and CoARA - the Coalition for Advancing Research Assessment (2022). Almost simultaneously with this development, in three European countries broad-based coalitions have proposed national level RRA recommendation: "Room for Everyone's Talent" in the Netherlands (2019), "Good Practice in Researcher Evaluation in Finland" (2020), and NOR-CAM A toolbox for recognition and rewards in academic careers Norway (2021).

Important assessment policies have been developed also by the European University Association (EUA) and the European university alliances. EUA Roadmap on Research Assessment in the Transition to Open Science (2018) outlined three recommendations promoting the development of flexible, transparent, and fair research assessment approaches, recognising and rewarding Open Science contributions and accommodating differences in all academic disciplines, inter- and multidisciplinary research, and those between fundamental and applied research, as well as various career stages. For example the

League of 23 European Research Universities (LERU) roadmap titled Open Science and its role in universities (2018) emphasises that Institutions should Integrate Open Science principles into research integrity codes, educational programs, HR frameworks, and research assessment systems, which should be developed from publication-based metrics to reward Open Science practices. LERU roadmap also highlights the importance of recognising the broad range of responsibilities of academic staff, including research output, process, impact, teaching and supervision, leadership, service to the university, public engagement, professional experience, collaborative and team accomplishments in addition to individual accomplishments.

In addition to European policy work, important comprehensive reform programmes have been developed outside Europe. The Latin American Forum for Research Assessment (CLACSO-FOLEC) has produced a diagnosis and proposals for a regional Initiative Towards a transformation of scientific research assessment in Latin America and the Caribbean (2020). This extensive proposal demonstrates the broad range of issues entailed by reform and adaptation of evaluation systems (list below), which are incorporated in the CLACSO-FOLEC Declaration of Principles. A new research assessment towards a socially relevant science in Latin America and the Caribbean (2022).

- Transition from control processes to learning processes
- Moving towards participative, inclusive and socially relevant evaluation
- Review of assessment committee setup for geographical, institutional, and gender equity
- Reduction of evaluation processes and inclusion of self-evaluation and formative experiences
- Defining researcher profiles within scientific policies
- Multidimensional evaluation of academic careers
- Inclusion of work interruptions related to family care in performance evaluations
- Transparency and public availability of profiles, criteria, and evaluation results
- Importance of specialised peer reviews
- Encouragement of open access and open science practices
- Valuing and analysing diverse forms of communication and circulation directions
- Multilingualism and promotion of publishing in local languages
- Valuing the production of books and collaborative publications
- Regional reference framework for art research assessment
- Measurement of social impact in arts and artistic extension
- Evaluated publication indicators without hierarchical distinction
- Integration of knowledge co-production indicators with the community
- Incorporation of indicators for policy-relevant research
- Incorporation of social intervention indicators
- Construction of nationally integrated curricular databases
- Development of new curriculum models with qualitative evaluations and narratives.
- Implementation of interoperable platforms with unique identifiers
- Creation of a regional database for scientific production

- Review of national journal indexes for quality assessment
- Inclusion of content evaluation process descriptions in publications
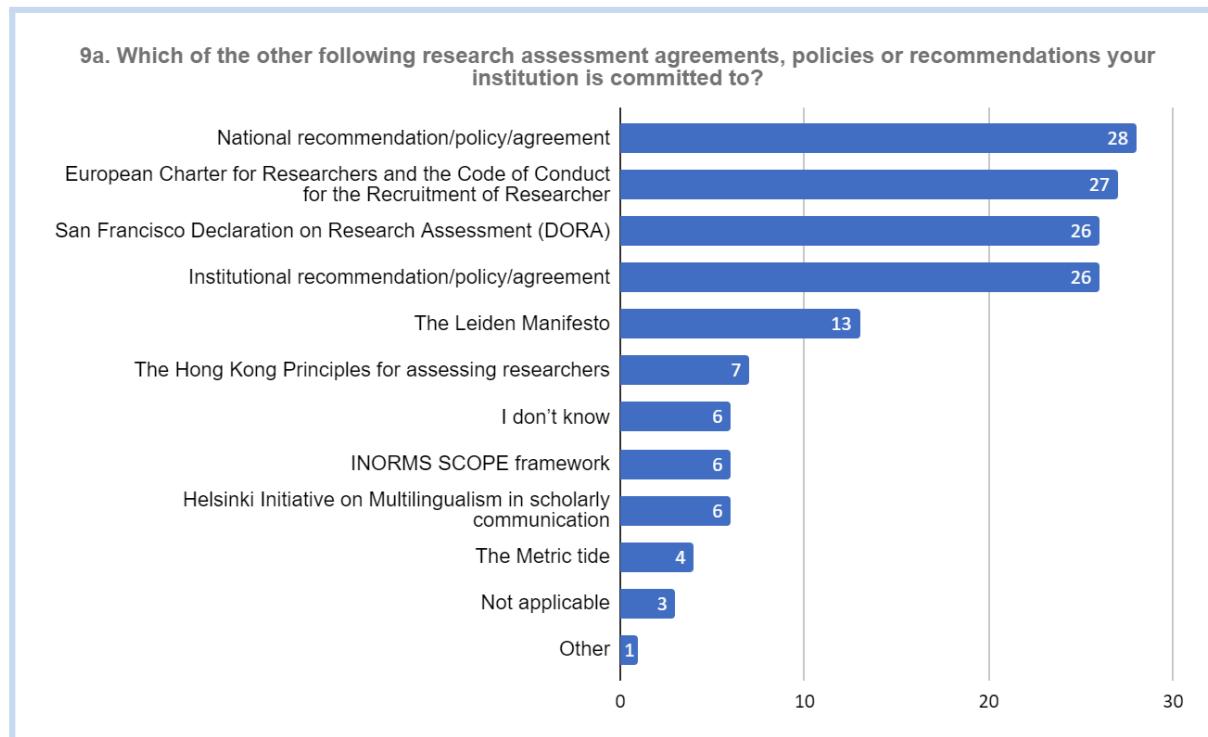
We also highlight the Global Research Council (GRC) Conference Report 2019 on Responsible Research Assessment (2021), which outlines the roles and responsibilities of research funders and emphasises the importance of equity, diversity and inclusion, and the need for nuanced and evolving assessment practices:

- Promoting diversity in the R&I system, broadening recognized contributions beyond direct research outputs, and ensuring that assessment criteria account for diversity and equality.
- Mitigating biases and ensuring equal opportunities during the evaluation process, and the global implications of research assessment criteria and processes that may exacerbate the global north/south divide.
- Necessity of a multidimensional understanding of research excellence and impact, and the need to broaden assessment criteria that currently over-rely on narrow indicators, as well as need for regular reviews and updates of assessment criteria, the importance of trialling new methods, and the critical need for feedback mechanisms.
- Avoiding reliance on University rankings, driven by narrow metrics, which distort research culture by incentivising institutions to conform to these metrics. This may lead to misalignment with broader research and innovation (R&I) system values and overlooking important areas of excellence.

Our GraspOS landscape analysis survey on Reforming Research Assessment highlighted the importance of CoARA Agreement, which had been signed by 38 out of 54 respondents. In addition, 26-28 respondents (around 50%) indicated commitment to the European Charter for Researchers and the DORA Declaration, as well as to national and institutional assessment policies (Figure 5.3). While pilots differed from the landscape survey respondents in a way that only one indicated commitment to the European Charter, among respondents of both surveys all other policies, such as the Leiden manifesto, the Hong Kong principles, SCOPE and the Helsinki Initiative, were indicated less frequently. A recent study shows, however, how DORA, the Leiden Manifesto and and the Metric Tide report are referred to in tandem by many policies.[3] They are also mentioned in the CoARA Agreement, as are Hong Kong, SCOPE and the Helsinki Initiative.

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[3] Rushforth, A., & Hammarfelt, B. (2022, December 10). The rise of 'responsible metrics' as a professional reform movement: A collective action frames perspective. https://doi.org/10.31235/osf.io/cdmqz

Figure 5.3 *GraspOS landscape analysis survey on Reforming Research Assessment: answers to question 9a.*

SCOPE Framework developed by the International Network of Research Management Societies (INORMS) Research Evaluation Group (REG) has a specific relevance to the GraspOS pilots, as the framework is used as a systematic approach for preparing for the assessments. SCOPE operates under three principles:

1. Evaluate only where necessary: evaluation is not always the right strategy. When it comes to incentivising behaviours, for example, it may be more fruitful to enable them than to evaluate them.
2. Evaluate with the evaluated: any evaluation should be co-designed and co-interpreted by the communities being evaluated.
3. Draw on evaluation expertise: we should apply the same rigour to our evaluations that we apply to our academic research.

Figure 5.4 *Overview of the five-stage SCOPE Framework. Source: The SCOPE Framework A five-stage process for evaluating research responsibly*

SCOPE framework has five stages (Figure 5.4):
- START with what you value
  - Clearly articulate what you value about the entity being evaluated
  - Not with what others' value (external drivers)
  - Not with available data sources (the 'Streetlight Effect')
- CONTEXT considerations
  - Ensure your evaluation is context-specific
  - WHO are you evaluating? (Entity size and discipline)
  - WHY are you evaluating?
- OPTIONS for evaluating
  - Consider both quantitative and qualitative options
  - Be careful when using quantities to indicate qualities
- PROBE deeply
  - WHO might your evaluation approach discriminate against?
  - HOW might your evaluation approach be gamed?
  - WHAT might the unintended consequences be?
  - CONSIDER the cost-benefit of the evaluation
- EVALUATE your evaluation
  - Did your evaluation achieve its aims?
  - Was it formative as well as summative?
  - Use SCOPE to evaluate your evaluation.

Numerous other RRA initiatives have addressed key aspects of conducting assessment, such as method, criteria, and data, as well as the diversity of academic work that should be valued

in assessment (Pölönen & Mustajoki, 2021). These initiatives collectively promote more open, ethical, diverse, and inclusive research and assessment cultures. They provide guidance on the responsible use of metrics, the importance of qualitative assessment, and the need to recognise and address biases in assessment processes. To showcase some of the main RRA statements, Table 5.4 provides an overview of DORA, Leiden Manifesto, the Metric Tide, the Helsinki Initiative, the Council Conclusions on Research Assessment and Implementation of Open Science, and the CoARA Agreement.

- The DORA Declaration (2013) is often considered the cornerstone of RRA. It advises against using journal-based metrics, such as Journal Impact Factors, as a measure of individual research article quality or for decisions regarding hiring, promotion, or funding. DORA also emphasises transparency in criteria, methods, and data, as well as the diversity of research outputs.
- The Leiden Manifesto (2015) complements DORA by emphasising the responsible use of metrics. It suggests that quantitative evaluation should support qualitative, expert assessment. It also highlights the importance of portfolios in qualitative assessment, the need to anticipate the effects of metrics and update indicators, and the value of recognising and considering the diversity of missions and fields in assessment.
- The Metric Tide report (2015) aligns with the Leiden Manifesto but also complements it by emphasising the importance of basing metrics on robust, accurate and comprehensive data. It also emphasises the recognition of diversity in research and career paths.
- The Helsinki Initiative (2019) emphasises the importance of recognising the diversity of languages and addressing language biases in both qualitative and quantitative assessments.
- The Hong Kong principles (2020), while not focused on the assessment process itself, recommend that assessment should prioritise ethically responsible research practices that ensure research integrity. They also value a broad range of research activities and Open Science practices.
- The Council conclusions (2022) underscore the importance of gender equality, and promoting women in science are also highlighted as important factors to consider. The conclusions also promote "independence, openness, reproducibility and transparency of the data and criteria necessary for research assessment and for determining research impacts", and consider that "data and bibliographic databases used for research assessment should, in principle, be openly accessible and that tools and technical systems should enable transparency".
- The CoARA Agreement (2022) includes principles and core commitments that encompass practically all aspects of responsible assessment introduced in the previously mentioned initiatives and documents, however it also highlights the importance of avoiding the use of university rankings as a proxy of quality in assessment.

Similar comparison is also provided of the three national recommendations in Table 5.5.

- Netherlands: Room for Everyone's Talent (2019) provides a vision for quality and diverse career paths (Five broad ambitions) created in collaboration with RPOs and RFOs. Key recommendations relate to the
    - diversification and vitalisation of career paths
    - finding a balance between the individual and collective contributions
    - focusing on quality instead of quantity
    - stimulating Open Science
    - encouraging academic leadership
- Finland: Good Practice in Researcher Evaluation (2020) provides guidelines for the process of responsible assessment, including four main areas and 13 recommendations created in collaboration with RPOs, RFOs and Unions. Key recommendations relate to
    - building the evaluation process
    - evaluation of research
    - diversity of activities
    - researchers' role in the evaluation process
- Norway: NOR-CAM - A Toolbox for Recognition and Rewards in Academic Careers (2021) provides a framework for rewarding Open Science, including six principles and four recommendations and an assessment matrix (NOR-CAM) created by Universities of Norway and Research Council. Key principles relate to
    - better balance between quantitative and qualitative assessment
    - recognising several competencies
    - assessing merits in light of Open Science principles
    - transparency of assessment and criteria
    - gender balance and diversity

It emerges from the policies that Responsible Research Assessment entails openness, reproducibility and transparency of the data and criteria necessary for research assessment, balancing qualitative and quantitative methods, rewarding Open Science practices, recognising diversity of academic work, and respecting differences between fields. Diversity relates to research outputs, (open) practices, activities and roles, as well as to equitable assessment and inclusion of researchers (Table 5.3). To ensure inclusion, assessments should consider various aspects of diversity and potential bias, such as field, interdisciplinarity, inter-sectoral research, basic vs. applied research, as well as career stage, EDI dimension (sexual orientation, racial/ethnic origin, socio-economic status, disability) and language.
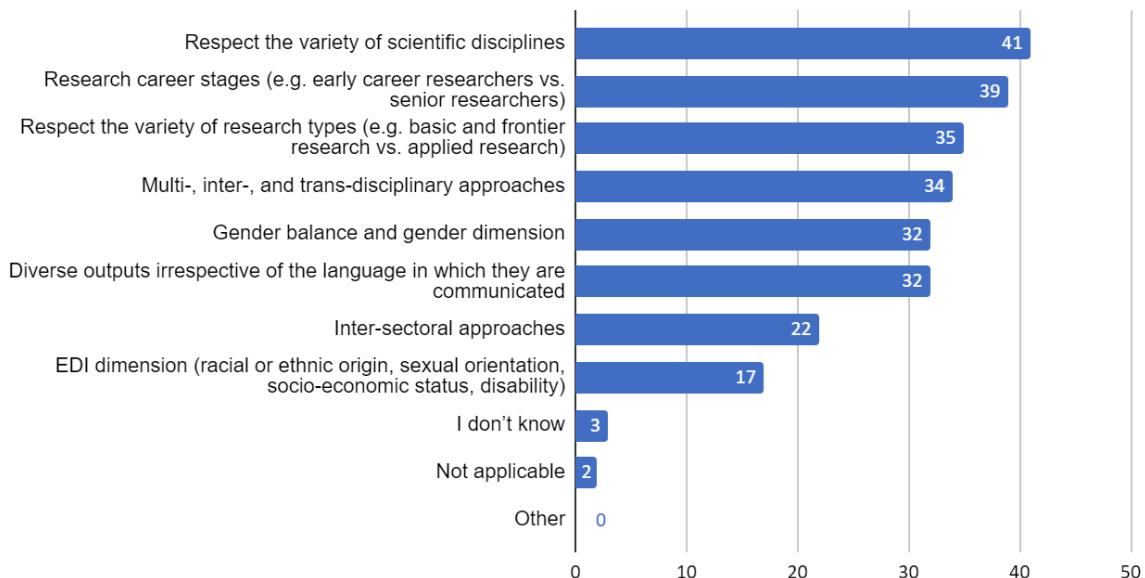
Our landscape survey shows that the various contextual factors contributing to fairness and inclusion of assessments are not universally considered as part of assessments, yet all factors were considered by a substantial number of 54 respondents (Figure 5.5). Respecting the differences between fields and career stages is considered by 75.9% and 72.2% of respondents, and around 60% of organisations also respect the variety of research types (eg. basic vs applied), interdisciplinarity, gender balance and the language diversity of outputs. At least 17 organisations also consider inter-sectoral work and EDI dimensions. For the

landscape survey results regarding the diversity of outputs see Figure 6.2, open research practices see Figure 6.3, and on the diversity of roles see Figure 7.6.

Table 5.3 *Aspects of diversity to be considered in Responsible Research Assessment (not an exhaustive list of examples) based mainly on the Agreement on Reforming Research Assessment.*

Diversity of research outputs	Open research practices	Diversity of activities and roles	Inclusive aspects of diversity
Journal articles Book articles Conference articles Monographs Datasets Software Data models Methods Theories Algorithms Protocols Workflows Exhibitions Strategies Policy contributions	Open collaboration Pre-registrations Preprinting Open access Data sharing Software sharing Methods sharing Open peer-review Citizen science	Team science Contributor roles Peer review Data stewardship Software engineering Teaching Training, mentoring & supervision Knowledge valorisation Science communi-cation & outreach Science advice and diplomacy Leadership roles Entrepreneurship Industry-academia cooperation Roles outside of academia Skills/ competences	Career stage Field or discipline Multi-, inter-, and trans-disciplinarity Basic vs. applied research Inter-sectorality Gender Sexual orientation Racial/ethnic origin Socio-economic status Disability Language

12a. What practises contributing to the inclusiveness of research are considered in research assessment at your institution at the moment?

Category	Value
Respect the variety of scientific disciplines	41
Research career stages (e.g. early career researchers vs. senior researchers)	39
Respect the variety of research types (e.g. basic and frontier research vs. applied research)	35
Multi-, inter-, and trans-disciplinary approaches	34
Gender balance and gender dimension	32
Diverse outputs irrespective of the language in which they are communicated	32
Inter-sectoral approaches	22
EDI dimension (racial or ethnic origin, sexual orientation, socio-economic status, disability)	17
I don't know	3
Not applicable	2
Other	0

Figure 5.5 *GraspOS landscape analysis survey on Reforming Research Assessment: answers to question 12a.*

Table 5.4 *Selected RRA Policies and Statements presented under four Main Topics (Criteria, Methods, Data and Diversity)*

Main Topics, Selected Policies and Statements
CRITERIA
DORA - San Francisco Declaration on Research Assessment • Be explicit about the criteria used in evaluating scientific productivity of grant applicants, to reach hiring, tenure, and promotion decisions. Clearly highlight, especially for early-stage investigators, that the scientific content of a paper is much more important than publication metrics or the identity of the journal in which it was published. • Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles. • Challenge research assessment practices that rely inappropriately on Journal Impact Factors and promote and teach best practice that focuses on the value and influence of specific research outputs. **Leiden Manifesto for research metrics** • Recognise the systemic effects of assessment and indicators

- Scrutinise indicators regularly and update them

The Metric Tide. Report of the Independent Review of the Role of Metrics in Research Assessment and Management

- Reflexivity: recognising and anticipating the systemic and potential effects of indicators, and updating them in response

The Hong Kong Principles for assessing researchers: Fostering research integrity

- Assess researchers on responsible practices from conception to delivery, including the development of the research idea, research design, methodology, execution, and effective dissemination

- Value the accurate and transparent reporting of all research, regardless of the results

Research assessment and implementation of Open Science

- Ensuring that ethics and integrity are accorded the highest priority and are not compromised by counter-incentives;

Agreement on Reforming Research Assessment

- Safeguard freedom of scientific research

- Respect the autonomy of research organisations

- Comply with ethics and integrity rules and practices, and ensure that ethics and integrity are the highest priority, never compromised by any counter-incentives

- Abandon inappropriate uses in research assessment of journal- and publication-based metrics, in particular inappropriate uses of Journal Impact Factor (JIF) and h-index

- Avoid the use of rankings of research organisations in research assessment

METHOD

DORA - San Francisco Declaration on Research Assessment

- When involved in committees making decisions about funding, hiring, tenure, or promotion, make assessments based on scientific content rather than publication metrics

- Use a range of article metrics and indicators on personal/supporting statements, as evidence of the impact of individual published articles and other research outputs

- Account for the variation in article types (e.g., reviews versus research articles), and in different subject areas when metrics are used, aggregated, or compared

Leiden Manifesto for research metrics

- Base assessment of individual researchers on a qualitative judgement of their portfolio

- Quantitative evaluation should support qualitative, expert assessment

- Avoid misplaced concreteness and false precision

The Metric Tide. Report of the Independent Review of the Role of Metrics in Research Assessment and Management

- Humility: recognising that quantitative evaluation should support – but not supplant – qualitative, expert assessment

Research assessment and implementation of Open Science

- Moving to a more balanced approach between the quantitative and the qualitative evaluation of research, by strengthening the qualitative research assessment indicators while developing the responsible use of quantitative indicators;

Agreement on Reforming Research Assessment

- Base research assessment primarily on qualitative evaluation for which peer review is central, supported by responsible use of quantitative indicators

- Focus research assessment criteria on quality

DATA

DORA - San Francisco Declaration on Research Assessment

- Be open and transparent by providing data and methods used to calculate all metrics

- Provide the data under a licence that allows unrestricted reuse, and provide computational access to data, where possible

- Be clear that inappropriate manipulation of metrics will not be tolerated; be explicit about what constitutes inappropriate manipulation and what measures will be taken to combat this

Leiden Manifesto for research metrics

- Keep data collection and analytical processes open, transparent and simple

- Allow those evaluated to verify data and analysis

The Metric Tide. Report of the Independent Review of the Role of Metrics in Research Assessment and Management

- Transparency: keeping data collection and analytical processes open and transparent so that those being evaluated can test and verify the results

- Robustness: basing metrics on the best possible data in terms of accuracy and scope

Research assessment and implementation of Open Science

- INVITES the Member States, the Commission and stakeholders to promote independence, openness, reproducibility and transparency of the data and criteria necessary for research assessment and for determining research impacts; CONSIDERS that data and bibliographic databases used for research assessment should, in principle, be openly accessible and that tools and technical systems should enable transparency;

Agreement on Reforming Research Assessment

- Ensure independence and transparency of the data, infrastructure and criteria necessary for research assessment and for determining research impacts

DIVERSITY

DORA - San Francisco Declaration on Research Assessment

- For the purposes of research assessment, consider the value and impact of all research outputs (including datasets and software) in addition to research publications, and consider a broad range of impact measures including qualitative indicators of research impact, such as influence on policy and practice

Leiden Manifesto for research metrics

- Measure performance against the research missions of the institution, group or researcher

- Account for variation by field in publication and citation practices

- Protect excellence in locally relevant research

The Metric Tide. Report of the Independent Review of the Role of Metrics in Research Assessment and Management

- Diversity: accounting for variation by field, and using a range of indicators to reflect and support a plurality of research and researcher career paths across the system

Helsinki Initiative on Multilingualism in Scholarly Communication

- Promote language diversity in research assessment, evaluation, and funding systems

The Hong Kong Principles for assessing researchers: Fostering research integrity

- Value a broad range of research and scholarship, such as replication, innovation, translation, synthesis, and meta-research

- Value a range of other contributions to responsible research and scholarly activity, such as peer review for grants and publications, mentoring, outreach, and knowledge exchange

- Value the practices of Open Science (open research) — such as open methods, materials, and data

Research assessment and implementation of Open Science

- Ensuring diversity, gender equality, and actively promoting women in science;

- Recognising all forms of research and innovation output and processes, including inter alia, datasets, software, codes, methodologies, protocols and patents, and not only publications; STRESSES that data should be findable, accessible, interoperable and re- usable, in line with the FAIR principles;

- Taking into consideration diverse career pathways and all research and innovation activities, including mentoring, leadership roles, entrepreneurship, data management, teaching, knowledge valorisation, industry-academia cooperation, support for evidence-informed policy making, interaction with society, including citizen science and public engagement;

- Taking into consideration the specificities of the various research disciplines, the range from basic to applied research, the stages of research careers and the missions of research institutions;

Agreement on Reforming Research Assessment

- Recognise the diversity of contributions to, and careers in, research in accordance with the needs and nature of the research

- Recognise the contributions that advance knowledge and the (potential) impact of research results

- Recognise the diversity of research activities and practices, with a diversity of outputs, and reward early sharing and open collaboration

- Use assessment criteria and processes that respect the variety of scientific disciplines, research types (e.g. basic and frontier research vs. applied research), as well as research career stages (e.g. early career researchers vs. senior researchers), and that acknowledge multi-, inter-, and trans-disciplinary as well as inter-sectoral approaches, when applicable

- Ensure gender equality, equal opportunities and inclusiveness

- Acknowledge and valorise the diversity in research roles and careers, including roles outside academia

Table 5.5 *National RRA Recommendations presented under four Main Topics (Criteria, Methods, Data and Diversity)*

Main Topics, Selected Policies and Statements
CRITERIA
Good Practice in Researcher Evaluation in Finland • Objectives and criteria of the evaluation: The objectives and criteria of the evaluation are openly available to all parties • Research ethics: The evaluation takes into account compliance with the ethical principles of research at all stages of research
NOR-CAM • Practice transparency in the assessment and visibility of what should be recognised as merit
METHOD
Room for everyone's talent • Focus on quality
Good Practice in Researcher Evaluation in Finland • Selection of evaluators and evaluation guidelines: Evaluator selection must consider any possible conflict of interest between evaluator and those being evaluated. Diversity of evaluators should be promoted. • Evaluation of scientific quality: Evaluation of scientific quality is primarily carried out by examining the scientific output of the research. Research metrics may also be

used to support the overall evaluation when relevant to the researcher's field of study.

- Researcher self-evaluation: The researcher's self-evaluation is combined with the evaluation by giving an opportunity to express an understanding of the objectives, significance and effectiveness of their work.

- Benefits of evaluation for researcher: The evaluation is designed to also benefit the researcher. The work they have done for the purpose of the evaluation and/or the feedback they have received should enable them to improve their own work.

NOR-CAM

- Measure quality and excellence through a better balance between quantitative and qualitative goals

- Assist in the concrete practice of job vacancy announcements and assessment processes locally

DATA

Good Practice in Researcher Evaluation in Finland

- Evidence used in the evaluation: Any evidence used in the evaluation must be as comprehensive as possible and allow a fair comparison between evaluated individuals

DIVERSITY

Room for everyone's talent

- Diversification and vitalisation of career paths

- Encouraging academic leadership

- Finding a balance between the individual and the collective

- We ensure that academics are assessed not just for their individual performance but also for their contribution, based on their own expertise and competences, to the team, department, consortium, institution or organisation of which they are a part

- Stimulating Open Science

Good Practice in Researcher Evaluation in Finland

- Ensuring equality: In the selection of criteria, methods, evaluation evidence, and experts, it must be ensured that the selection is not discriminatory in terms of gender equality or impartiality

- Considering the characteristics of research fields: In relation to the goals of the evaluation, researchers are evaluated as representatives of their field of research

- Open Access to research Researchers' activities to promote Open Access to research outputs will be considered as part of the evaluation

- Researcher as teacher and supervisor: Teaching and supervisory activities, as well as the skills and merits accumulated in them, are seen as an integral part of a researcher's work. The evaluation shall take into account that different researchers have different opportunities for teaching and supervision.

- Activity in research and other communities: Researchers' activities in research and other communities are to be considered in the evaluation. Researchers' contribution in various roles and the significance of this contribution to the researchers' own work and the research community should be considered.

- Societal impact and interaction: Societal interaction is expected of researchers. To evaluate societal impact and interaction, it is necessary to first define their meaning and to determine the evidence used to examine them and their relative significance with regard to the scientific quality of the research and other work roles.

NOR-CAM

- Promote gender balance and diversity

- Assess all results, activities and competencies in the light of Open Science principles

- Recognise several competencies as merits but not in all areas at the same time or by each employee
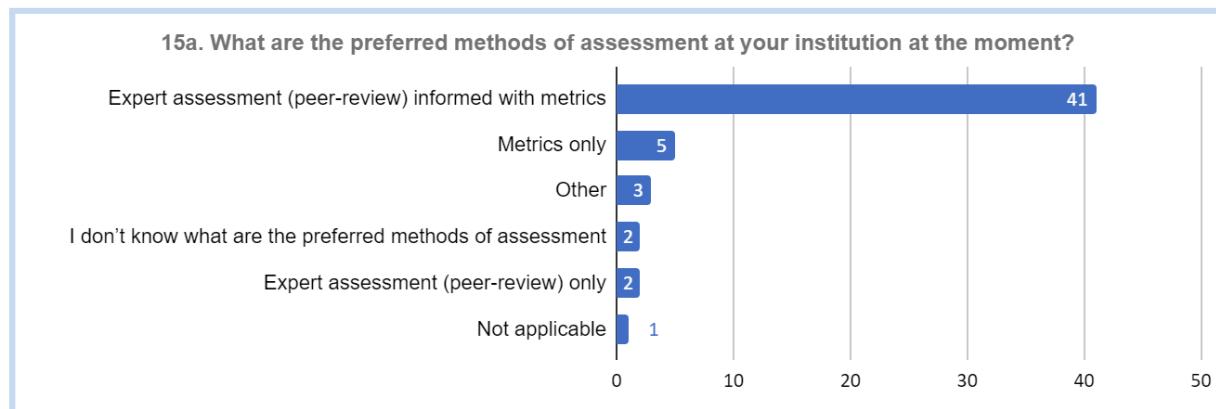
● 6. Quantitative and qualitative data priorities

Key takeaways
- A common trend in research assessments is to use quantitative and qualitative approaches in a combined way. Almost every source highlights the supporting character of quantitative metrics, which can be utilised to provide evidence to a narrative description.

- Quantitative indicators should be selected from widely used and easily understood metrics to ensure the transparency of the process and the appropriate use of indicators. Quantitative goals or benchmarks must also be open to scrutiny. Metrics need to be applied at the correct scale of the subject of investigation. Aggregate level metrics must not be applied to individual subjects, or vice versa.
- The largest number of quantitative metrics are available on the individual research output level, besides peer-reviewed scholarly articles also for e.g., books, non-scholarly articles, research data and software.
- Digital distribution of research outputs has enabled the development of metrics at the research output level, both traditional citation data as well as alternative metrics, e.g., views and download data as well as mentions and citations in non-scientific publications and websites.
- Quantitative metrics on the research output level can be aggregated to assess an individual researcher, research fields and subjects, and research entities of different types and sizes.
- Open Science related metrics are often expressed as the share of research outputs that are Open Access. These indicators can be calculated at different levels, including research output, individual researcher, and university.
- Both quantitative and qualitative forms of research assessment have their benefits and limitations. Depending on the context, the value of different approaches must be considered and balanced.
    - The misuse of quantitative indicators and metrics can lead to gaming and unintended negative results. Especially applying metrics to individual researchers should be avoided, particularly those that do not account for individual variation or circumstances. However, quantitative data, particularly on published outputs, continue to be useful especially in the assessment of research at the national and field level.
    - Reported obstacles related to qualitative methods include that native speakers are at an advantage in producing narrative descriptions, more time and better expertise are required to handle narrative CVs compared to a traditional CV. Some concerns have occurred that not listing the full list of publications provides an incomplete research profile of the applicant and that reviewers are lacking evidence to verify what is claimed in the narratives.

According to the GraspOS landscape analysis survey on Reforming Research Assessment in Figure 6.1, the most common way of performing research assessments is combining quantitative and qualitative methods. The vast majority of 54 respondents (76%) uses expert assessment informed with metrics, while performing research assessments, only 5 organisations use merely metrics and 2 organisations only use peer-review. In other responses it was indicated that in some fields metrics, in others only peer review is used.

Figure 6.1 GraspOS landscape analysis survey on Reforming Research Assessment: answers to question 15a.

This chapter discusses quantitative indicators and qualitative methods in connection with the assessments. Commonly used quantitative indicators are first introduced and analysed, broken down at different levels of assessments. Qualitative data in research assessments are typically data that are not numerical, but rather descriptive or narrative. Currently, there are different ways of utilising descriptive information in the context of assessments. The most commonly used qualitative methods are first briefly introduced, followed by an overview of how different methods are currently utilised in assessments. After the handling of quantitative and qualitative methods, the challenges and biases related to the different methods are discussed.

● 6.1 Quantitative data priorities

The overarching recommendation in the responsible research and researcher assessment related frameworks is that quantitative indicators should support, not supplant, qualitative, expert assessment. This also holds true when assessing the openness and transparency of research that are important factors contributing to research quality. Quantitative indicators should be used responsibly where appropriate to strengthen or complement peer review. They should always be based on the best possible data in terms of accuracy and scope. Regarding research quality, quantitative approaches can only be interpreted as indirect proxies for quality. If goals or benchmarks are expressed quantitatively, care should be taken to avoid the metric itself becoming the target of research activity at the expense of research quality itself. (CoARA; DORA; Metric Tide; UKRN Statement on Responsible Research Evaluation).

Balancing quantitative and qualitative forms of assessment is particularly important when dealing with a range of disciplines with different publication practices and citation norms. Quantitative metrics must not be imposed for assessment in fields where they are neither appropriate nor meaningful. Quantitative data, especially on published outputs, continue to have a place in informing peer review judgements of research quality, especially in the

assessment of research at the national and field level. Quantitative indicators should be selected from widely used and easily understood metrics to ensure the transparency of the process and the appropriate use of indicators. Quantitative goals or benchmarks must also be open to scrutiny. Metrics need to be applied at the correct scale of the subject of investigation. Aggregate level metrics must not be applied to individual subjects, or vice versa. (Informing research choices; Johansen, 2021; Metric tide; UKRN Statement on Responsible Research Evaluation.)

Research funders should develop their own context-specific principles for the use of quantitative indicators in research assessment, management and monitoring activities, and ensure that these are well communicated, easy to locate and understand. (Metric tide)

● 6.1.2 Quantitative indicators

At present, a wide selection of quantitative indicators is available for individual research outputs, most commonly for peer-reviewed scholarly articles. Many of these indicators can be applied to other types of research outputs, including e.g., books, non-scholarly articles, research data and software.

Citations are a traditional metric and defined as the number of times a research output has been cited as a resource in other research publications. Citations can be calculated for publications: journal articles, books and book chapters, as well as for other types or outputs, e.g., research data, software or code. (Hutchins et al., 2016; Metrics toolkit, 2021; Schomberg et al., 2019; Tananbaum, 2013.)

The shift to electronic distribution of research output has enabled the development of a wide variety of article-level metrics (ALM) that include traditional citation data as well as a variety of more recent metrics, e.g., views and download data as well as mentions and citations in non-scientific publications and websites. Including these new types of data sources to measure the impact of a research output, an individual researcher or research entities, is what defines altmetrics, i.e., alternative metrics, not the level of assessment. Altmetrics data points can be selected and combined to match different usage needs and use cases. Both traditional and altmetrics can be used on different assessment levels. (Tananbaum, 2013.)

Web impact metrics can potentially supplement conventional impact metrics by including new or unique types of sources of impact. Web-extracted metrics, e.g., download and read counts, can be used as indicators for reading and usage. However, web impact indicators suffer from a generic lack of quality control compared with scholarly citations, and hence should be used cautiously in research evaluation. (ACUMEN consortium, 2014.)

Citations can be calculated based on non-traditional metrics sources like Google Scholar and Google Books besides traditional indexes for journal articles or books. These sources can be used when traditional citation indexes are not available or have insufficient coverage (e.g., in the humanities and some social sciences). Google Books citations has a clear advantage over other traditional citation indexes which impact metrics commonly coming from journal

articles rather than books and monographs. Hence, Google Books citation could be a valuable source to evaluate academic researchers in book-based fields. (ACUMEN consortium, 2014; Thelwall et al, 2013.)

Scholarly blogs might be a promising source of alternative metrics for scholarly impact. In the ACUMEN Portfolio the researchers can list Mendeley readership counts, their own blogs as well as coverage of their research in blogs maintained by others. The main advantage of these indicators is their timeliness: citations take years to accumulate, while citations in blogs and Mendeley readerships start accumulating within days to weeks after publication, providing indications about the future impact of documents. (ACUMEN consortium, 2014.)

Table 6.1 describes ALMs identified from sources describing and providing definitions for quantitative research indicators. These sources were identified in desk research in the EOSC Co-creation project and complemented with new searches in the GraspOS project.

Table 6.1 *Metrics on research output level*

Indicators/metrics	Source/Framework	Definition
Citations		
Citations	Metrics Toolkit; Schomberg et al.	number of times that a journal article or preprint, a book or book chapter, a data set, or a piece of software or code (or a paper that describes software or code) has appeared in the reference list of other articles and books
Downloads, views and other similar metrics		
Downloads	Metrics toolkit; OpenAIRE UsageCounts; Operas	count of downloads of a journal article or a book or book chapter during a period of time
Download requests, items	Metrics toolkit; OpenAIRE UsageCounts	number of successful item (full-text articles, books and book chapters, software files) download requests

Github: Forks, collaborators, watchers	Metrics toolkit	"Forks" are created when a user makes a copy of a repository (i.e., a group of files). A "collaborator" is another Github user who is able to perform many actions on the files within the repository, including edits. "Watchers" are Github users who have asked to be notified of activity in a repository, but have not become collaborators.
Reads, books	Operas	total sessions on pages where the work can be read
Sessions, books	Operas	a group of visits made by the same user within a continuous time frame
Sessions, book landing pages	Operas	number of sessions recorded at the publication landing page (the publication description page)
Users, books	Operas	unique users accessing a particular publication
Views	BIP! Indicators; Operas	total number of unique article or book or book chapter views
Mendeley Readers	BIP! Indicators; Metrics toolkit	number of Mendeley users that have added a particular document to a Mendeley library

Attention and other non-citation mentions

Altmetric Attention Score	Metrics toolkit	volume of attention received by a research output across a number of online attention sources
Annotations	Operas	number of public annotations left in the html or pdf online version of the publication using the Hypothes.is web annotation tool
Citations, Wikipedia	Metrics toolkit	number of times a scholarly output has been referenced in Wikipedia articles
Mentions	Metrics toolkit, Pietilä et al.	number of times a scholarly output has been linked to from a blog, referenced in a news outlet or cited in policy documents from government bodies or NGOs

Twitter mentions	Metrics toolkit, Pietilä et al.	number of registered Twitter users that tweet or retweet a post that links to a trackable scholarly product
Tweets	Operas	number of tweets that included either the DOI or a URL of the publication
References, books	Operas	number of articles/posts referencing the DOI or the URL of the publication

Comments, review, ratings

Goodreads: Ratings and reviews	Metrics toolkit	a book's overall rating is the average of all ratings provided by Goodreads users
Pubpeer comments	Metrics toolkit	Comments submitted

Other item-related metrics

Field Weighted Citation Impact	Metrics toolkit	ratio between the actual citations received by a publication and the average number of citations received by all other similar publications
Impulse, articles	BIP! Indicators	the initial momentum of an article directly after its publication, based on the underlying citation network
Influence, articles	BIP! Indicators	Overall/total impact of an article in the research community at large. Calculation is based on the PageRank network analysis method on the underlying citation network.
Popularity, articles	BIP! Indicators	"current" impact/attention of an article in the research community at large, based on the underlying citation network
Publons score	Metrics toolkit	perceived quality and significance of a paper on a scale of 1 to 10, according to peer reviews submitted by registered Publons users

Relative Citation Ratio	iCite; Metrics toolkit	field- and time-normalised citation rate

Citations are also used as a basis for calculating aggregated metrics. Journal Impact Factor is a traditional metric that is used as a proxy for a publication's importance. It is a measure reflecting the annual average (mean) number of citations to recent articles published in that journal. Other publication-level metrics include citation percentiles and 'Highly Cited' labels. These indicators value publications based on their position within the citation distribution of their field. (Metrics toolkit, 2021; Tananbaum, 2013.)

Output-level data can be used to calculate aggregated metrics for the individual researcher, research fields and subjects as well as different research entities, ranging from research teams within an organisation to universities and other research organisations. (Hutchins, 2016; Vergoulis et al., 2021.)

Researcher-level metrics are presented in Table 6.2. These metrics vary in complexity starting from the number of publications, datasets and citations, proceeding to metrics calculated from citations, h-index and i10-index, and leading into calculated metrics of aggregated popularity, influence and impulse.

Table 6.2 *Metrics on individual researcher level*

Indicators/metrics	Source	Definition
Number of Data sets	BIP! Indicators	total number of a researcher's data sets
Number of Publications	BIP! Indicators; Schmidt	total number of a researcher's articles and conference publications
Popular press books and publications	Pietilä et al., Schmidt	scholar's popular press books and publications
Popular Works	BIP! Indicators	number of popular works of the researcher
Number of papers co-authored with civil society actors	Pietilä et al., Schomberg et al.	number of papers co-authored with civil society actors
Encyclopedia articles produced, e.g., Wikipedia	Pietilä et al.	number of articles
Citations	BIP! Indicators	total number of citations received by all articles of the researcher

	Metrics toolkit, BIP! Indicators	author-level metric calculated from the count of citations to an author's set of publications[4]
h-index		
i10-index	BIP! Indicators	number of publications with at least 10 citations
Aggregated Popularity	BIP! Indicators	sum of the popularity (current impact) scores of all articles of a researcher
Influential Works	BIP! Indicators	number of influential works of the researcher
Aggregated Influence	BIP! Indicators	sum of the influence (total/overall impact) scores of all articles of a researcher
Aggregated Impulse	BIP! Indicators	sum of the impulse scores of all articles of a researcher

Open science-related metrics are often expressed as the share of research outputs that are open access. These indicators can be calculated at different levels, including researchers, publications and universities. Indicators for dataset can require data to be FAIR (Findable, Accessible, Interoperable and Re-usable) besides Open Access. In the field of open education, the number of open online courses and open educational resources are listed as possible metrics for the university level. Another possible indicator is the number of Open Science courses, workshops or events arranged. Open Science metrics that can be used as individual-level indicators for careers have been developed based on the principles of responsible metrics as formulated by the Metric Tide, the Leiden Manifesto for Research Metrics, and the DORA declaration. These types of indicators that are considered mature in development and measurable by using data sources of sufficient quality are openness on contributorship and publication of co-author statements. Different types of Open Science indicators identified in desktop research are listed in Table 6.3. (Bauer et al., 2020; Schomberg et al., 2019.)

Table 6.3 *Open Science Metrics*

Indicators/metrics	Source	Definition
Open science metrics		

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[4] A scientist has index h if h of his or her Np papers have at least h citations each and the other (Np – h) papers have fewer than ≤ h citations each (Hirsch, 2005).

Life-long learning	Bauer et al.	share of educational income from continuing professional education
Open access share (researchers)	BIP! Indicators	share (proportion) of articles of the researchers of interest that are open access
Open access share (research entity)	Bauer et al.; Losinno et al.; Stilgoe	share of publications published open access
Open access works/publications	BIP! Indicators; Pietilä et al.	total count of articles of the researchers of interest that are open access
Open datasets and metadata	Pietilä et al., Schmidt	openly accessible datasets and metadata
Open software/code	Pietilä et al.	not available in the source used
Open research methods	Pietilä et al.	not available in the source used
Preregistrations	Pietilä et al.	not available in the source used
Open peer review (as author or reviewer)	Pietilä et al.	as author or reviewer
Open licences	Pietilä et al.	using open licences
Open educational resources	Bauer et al.	number of open educational resources, i.e. free and available material that is created and offered by the university to other universities
Use of open learning resources	Pietilä et al.	downloads of one's open educational resources
Open on-line courses	Bauer et al.; Pietilä et al., Schmidt	number of free and available on-line courses
Open Science training	Bauer et al., Pietilä et al.	number of Open Science courses or workshops or events run
OS in the content of teaching	Pietilä et al.	incorporation of OS principles and methods in the content of teaching
Openness on contributorship	Schomberg et al.	not available in the source used

Publication of co-author statements	Schomberg et al.	not available in the source used

Some quantitative indicators are best applicable for research entities. They are presented in Table 6.4. Entities-level metrics. Interdisciplinary publications can be used as an indicator for specific research fields. Indicators for universities vary from outreaching to society and internationally (publications with non-academic sector, citizen science projects, international PhD students and postdocs) to institution-specific (repository traffic).

Table 6.4. *Entities-level metrics.*

Indicators/metrics	Source	Definition
Interdisciplinary publications	Bauer et al.	share of publications within the field's top 10% of publications with the highest interdisciplinarity scores
Publications with non-academic sector	Bauer et al.	share of publications that have at least one co-author from the non-academic sector
International PhD students and postdocs	Bauer et al.	share of the PhD students and postdocs which are of foreign nationality.
Citizen science projects	Bauer et al., Pietilä et al.	number of citizens involved in citizen science projects
Citizen science publications	Stilgoe	number of citizen science publications
Repository traffic	Bauer et al.	number of searches in the institutional repository

The SuperMoRRI project presents a set of indicators / metrics at the country level in its 1st RRI monitoring report. These indicators are summarised in Table 6.5. These indicators / metrics include only secondary data. They were not developed with RRI as the driving concept and should therefore be used with caution for the purpose of monitoring RRI. All indicators / metrics presented have technical limitations, data gaps, and other restrictions of applicability that fiches need to be considered carefully if these indicators are used in other RRI-related activities (Losinno et al., 2020).

Table 6.5 *Overview of indicators / metrics in the 1st SuperMoRRI Monitoring Report (Losinno et al., 2020)*

Indicator title	Source	Description
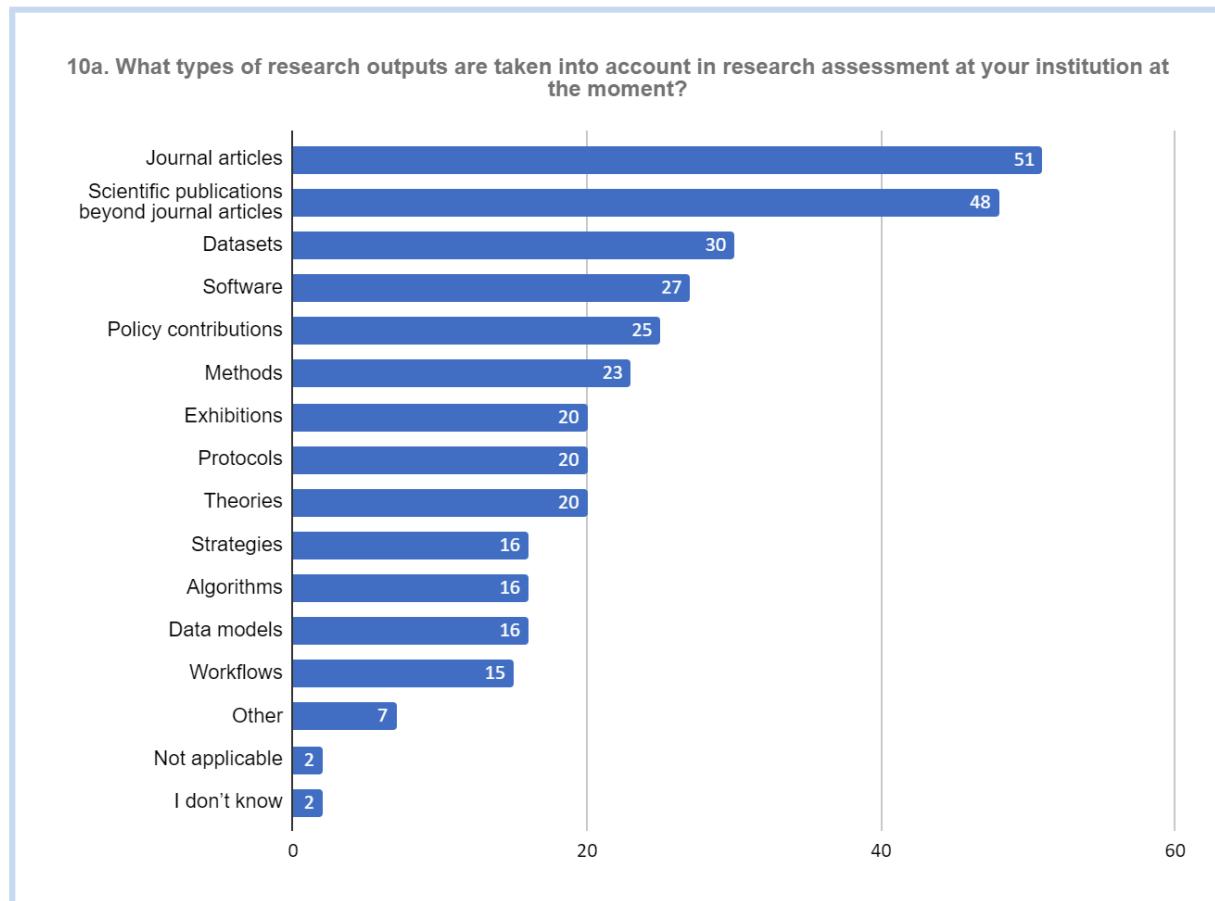
Intramural R&D expenditure per inhabitant in all sectors	Eurostat	member state gross domestic expenditure on research and development (GERD) divided by number of member state inhabitants
Intramural R&D expenditure as a percentage of GDP in all sectors	Eurostat	member state gross domestic expenditure on research and development (GERD) divided by member state gross domestic product (GDP)
Patent applications to the EPO by priority year per million inhabitants	Eurostat	number of patent applications in a member state divided by member state inhabitants in millions
Share of female researchers by sectors of performance (all sectors)	Eurostat	The indicator provides an aggregate measure of how the labour market participation of women researchers is developing over time in the member states.
Share of female researchers by sectors of performance (business enterprise sector)	Eurostat	Ibid.
Share of female researchers by sectors of performance (higher education sector)	Eurostat	Ibid.
The Glass Ceiling Index	She Figures	The Glass Ceiling Index (GCI) is a relative index comparing the proportion of women in academia (grades A, B, and C) to the proportion of women in top academic positions (grade A positions; equivalent to full professorships in most countries), for a given year.
Dissimilarity Index (higher education sector)	She Figures	The Dissimilarity Index (DI) indicates the percentage of either women or men (all scientific fields combined) who would have to move across different scientific fields to ensure that the proportions of women (out of the total number of women across all

		scientific fields) and men (out of the total number of men across all scientific fields) were equal in each scientific field. Note that this does not ensure parity of the sexes in each scientific field.
Dissimilarity Index (government sector)	She Figures	Ibid.
Gender pay gap (%) in the economic activity 'Scientific research & development'	She Figures	This indicator provides a metric of the difference between the average gross hourly earnings of paid male employees and of paid female employees as a percentage of the average gross hourly earnings of paid male employees.
Percentage of a country's publications with a sex or gender dimension in their research content	She Figures	This indicator shows the proportion of peer-reviewed publications that integrate gender or sex-sensitive analysis.
Women to men ratio of inventorships, all International Patent Classification (IPC) sections	She Figures	This indicator is the ratio of women to men inventorships, or equivalently, the ratio of the proportion of women inventorships (in total inventorships) compared to the equivalent proportion for men. The absolute number of inventorships used in computing this indicator is based on fractionalised counts of patent applications across their corresponding inventors: for example, if a patent application involves 10 inventors, each inventor is attributed an equal fraction of the inventorships (i.e. 1/10 of the invention). A score above 1 indicates that women in a given country produced a larger proportion of the country's inventions than men, whereas a score below 1 means the opposite.
Women to men ratio of corresponding authorship in all fields of R&D	She Figures	This indicator is the ratio of publications authored by a woman to those authored by men. It is based on peer-reviewed scientific publications (articles, reviews,

		conference papers). A score above 1 indicates that women in a given country contribute more to the research output than men whereas a score below 1 means the opposite.
Percentage of open access publications	WoS and Unpaywall	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country.
Percentage of open access publications (Green)	WoS and Unpaywall	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country. Green OA is a form of OA publishing in which publications are stored in an openly accessible database, also called an archive or repository.
Percentage of open access publications (Gold)	WoS and Unpaywall	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country. Green OA is a form of OA publishing in which publications are stored in an openly accessible database, also called an archive or repository. Gold OA relates to publications in OA journals.
Percentage of open access publications (Hybrid)	WoS and Unpaywall	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country. Hybrid OA is a form of OA publishing in which the author(s) of a publication pay for OA publishing in a non-OA journal, thereby creating open accessibility to a single publication in an otherwise toll access journal.

Percentage of open access publications (Bronze)	WoS and Unpaywall	Proportion of publications from WoS (with DOI) that are registered as published in an open access publication by Unpaywall in a given year for a given country. Bronze OA is a form of OA publishing where publishers make publications openly accessible without a clear licence.
Percentage of the EU-public interested in scientific discoveries	Eurobarometer	the accumulated yearly proportion of respondents replying that they are either "Very interested" or "Moderately interested
Percentage of the EU-public that feels informed about science	Eurobarometer	the accumulated yearly proportion of respondents that answer either "Very well" or "Moderately well", "Very well informed" or "Moderately well informed", "Very well informed" or "Fairly well informed"
Percentage of correct science quiz answers in the EU-public	Eurobarometer	the yearly proportion of correct quiz answers, measured as an average for each respondent
Percentage of the EU-public that believes that scientists are among the best qualified to explain the impact of scientific and technological developments	Eurobarometer	the yearly proportion of respondents choosing scientists, either publicly or privately employed, as part of their answer
Percentage of the EU-public that attends public meetings or debates about science and technology	Eurobarometer	the accumulated yearly proportion of respondents that answer either "Regularly" or "Occasionally", "Yes, regularly" or "Yes, occasionally"
Percentage of the EU-public that sign petitions or join street demonstrations on science and technology matters	Eurobarometer	the accumulated yearly proportion of respondents that answer either "Regularly" or "Occasionally", "Yes, regularly" or "Yes, occasionally"
WoS = Web of Science		

The respondents of the GraspOS landscape survey are already taking into account a large selection of research outputs in research assessment. The replies on the usage of the different types of research outputs are presented in Figure 6.2.

10a. What types of research outputs are taken into account in research assessment at your institution at the moment?
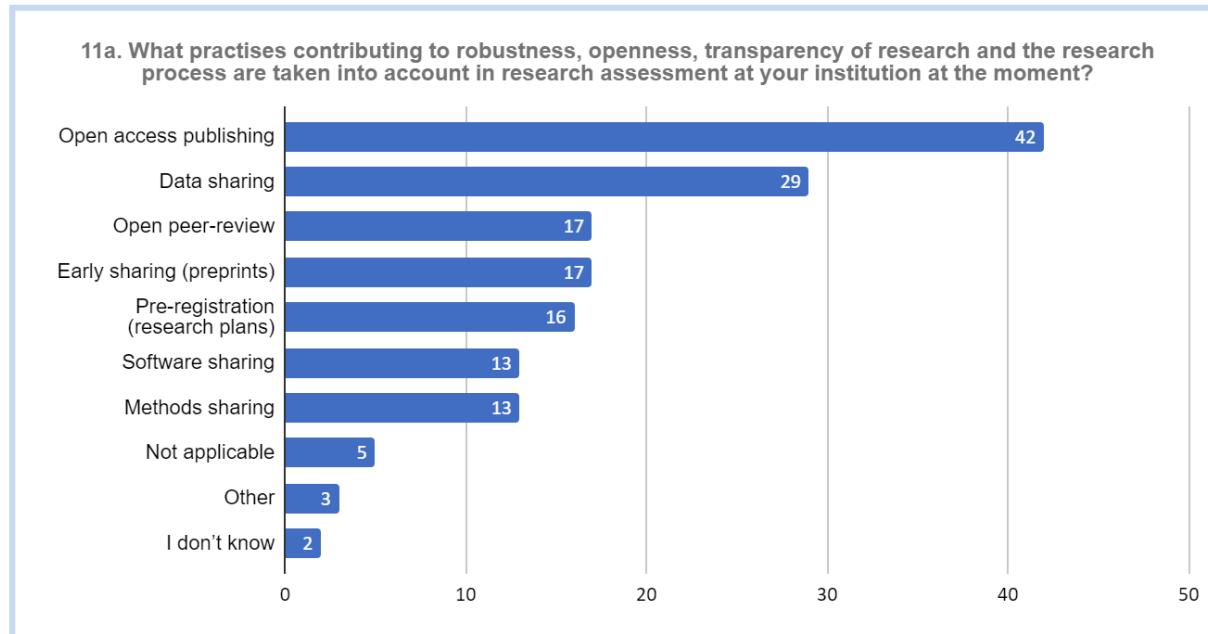
Figure 6.2 GraspOS landscape analysis survey on Reforming Research Assessment: answers to question 10a.

Publications are most commonly used in research assessment with 51 (98%[5]) of the organisations using journal articles and almost as many, 48 (92%) organisations, taking scholarly publications beyond journal articles into consideration. 30 (58%) organisations use datasets. Software is taken into account almost as often, in 27 (52%) of the responding organisations. However, other ICT-related outputs, algorithms and data models are clearly less frequently used, by 16 (31%) organisations. Close to one half of the respondents, 25 organisations (48%) include policy contributions to research assessment. Methods are considered by 23 (44%) organisations. Each of the three divergent types of research outputs, exhibitions, protocols and theories, are taken into account by 20 (38%) respondents.

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[5] The percentages in the context of Figure 6.2 have been calculated by not including the organisations replying "Not applicable". The total number of respondents excluding the "Not applicable" replies is 52.

Strategies and workflows are among the least commonly used outputs in research assessment, the former in 16 (31%) and the latter in 15 (29%) organisations.

11a. What practises contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment at your institution at the moment?

Figure 6.3 GraspOS landscape analysis survey on Reforming Research Assessment: answers to question 11a.

Practices contributing to robustness, openness and transparency of research and the research process in the respondents of the GraspOS landscape survey are opened up in Figure 6.3. Open access publishing is by far the practice most often considered with 42 (90%[6]) organisations using it, followed by data sharing in use in 29 (62%) organisations. These are the only practices that are used in more than one half of the responding organisations. Open peer review, early sharing and pre-registration are used in slightly over one third and software and methods sharing in slightly over one quarter of the respondent organisations.

● 6.2 Qualitative data priorities

The core message in most of the recommendations and guidelines for Responsible Research Assessment is to base the evaluation of research on qualitative methods. Just to name a few of them; the Agreement on Reforming Research Assessment recommends that research assessment should rely primarily on qualitative assessment for which peer review is central, supported by responsibly used quantitative indicators where appropriate (Coalition for Advancing Research Assessment 2022); the first principle of Leiden Manifesto is that quantitative evaluation should support qualitative expert assessment and the seventh principle recommends to base assessment of individual researchers on a qualitative

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[6] The percentages relating to figure 6.3 have been calculated by excluding the respondents "Not applicable" and "I don't know". The total number of respondents excluding the "Not applicable" and "I don't know" replies is 47.

judgement of their portfolio (Hicks et al., 2015); the new research assessment towards a socially relevant science in Latin America and the Caribbean indicates, that one of the three aims of the assessment is that adaptation to the current stage of Open Science is needed, through new assessment policies that give priority to the qualitative assessment of research (The Latin American Forum for Research Assessment 2022).

● 6.2.1 Qualitative methods

This chapter handles the different ways of using qualitative methods in research assessment. Based on the GraspOS landscape survey on Reforming Research Assessment, the most common way of handling qualitative input in research assessment at the moment is self-assessments which was reported by 57% of the respondents. The second most common qualitative assessment method is using structured CV formats (43% of respondents). 32% of the organisations use some form of narrative methods in research assessments, either a narrative CV, competency-based CV or evidence-based CV, or impact stories and case narratives. Other narrative descriptions and surveys are less frequently used. In other responses it was specified that grant proposals are qualitative and narrative, and that one organisation uses surveys, cases, etc. in major evaluation every ten years (Figure 6.4).

16a. Which of the following ways qualitative input is used in research assessment at your institution at the moment?

Category	Value
Self-assessments	31
Structured CV	23
Impact stories or case narratives	17
Narrative CV, Competency-based CV or Evidence-based CV	17
Other narrative descriptions	10
Surveys	6
Not applicable	4
Qualitative input is not used	4
I don't know	2
Other	1

Figure 6.4 GraspOS Landscape analysis survey on Reforming Research Assessment: answers to question 16a.

Self-assessment

UNESCO (UNESCO International Bureau of Education 2013) defines self-assessment as "Assessment by which the learner gathers information about and reflects on his or her own learning, judges the degree to which it reflects explicitly stated goals or criteria, identifies

strengths and weaknesses, and revises accordingly. It is the learner's own assessment of personal progress in knowledge, skills, processes, and attitudes." Self-assessment process usually begins with instructions from the accrediting body regarding the criteria for evaluation. These instructions generally provide a template for self-assessment that enables the unit of assessment e.g., researcher or research unit to respond to a series of questions. The issues and questions posed are usually of a general nature so that units can present their answer in different ways. These responses are then judged by external reviewers and provide the basis of a unit's qualification. (National Research Council [US] and Institute of Medicine [US] Committee on Assessing Integrity in Research Environments, 2022.)

Structured CVs

A structured CV is a type of curriculum vitae (CV) that follows a standard format and structure. The purpose of a structured CV template is to provide guidance for the writer of a CV so that the individual's merits are presented as comprehensively, truthfully, and comparably as possible. The structured way of presenting merits in CV, also helps the evaluators to quickly see the qualifications and skills of the applicants. (The Finnish National Board on Research Integrity TENK 2021.)

Narrative, Competency-based and Evidence-based CVs

A narrative CV is a résumé style in an application that directs to written descriptions of contributions and accomplishments that showcase a variety of skills and expertise. Narrative CVs are produced typically by responding to a series of open-ended questions. This serves as an alternative to so called metrics-based CV, where positions, publications, etc are typically just listed, without any additional context. Narrative CVs are a way to foster the use of qualitative methods in assessments. (Imperial College London 2023.)

Recent study from Bordignon et al. 2023 recognise 5 commonly reported features of the narrative CV:

- against the misuse of metrics
- against lists
- against a narrow definition of impact and in favour of a broader range of research contributions
- in favour of contextualisation and selection
- in favour of inclusivity and diversification.

Bordignon et al. 2023 also points out, that there is a change in terminology and some actors have begun to replace the term narrative with new expressions: the CWTS (Centre for Science and Technology Studies at Leiden University) introduced the term "substantiated CV" in connection to the framework of a new system of recognition and rewards for academics; the Dutch Research Council (NWO) announced that a new version of their narrative CV is called "evidence-based CV". The VITAE Career Development Centre for the UK uses the term competency-based CV.

Impact stories or case narratives

Narratives can also be used to describe the impact of research. Impact stories or impact case studies, as called specially in the context of UK REF, are evaluations of the significance and reach of impact that can be attributed to research (Reed M.S et al. 2021).

● 6.2.2 Qualitative methods in context of research assessments

The different assessment frameworks also strongly consider the qualitative methods and highlight the supportive role of quantitative indicators. OS-CAM clarifies that "good decisions require qualitative judgement" and that "It is important for evaluators to consider profile and balance of the collective criteria". NOR-CAM notes that quantitative indicators indicate only one aspect of research but don't tell the whole story. "Figures and measurable information must therefore be used with caution and supported with other evidence when making assessments related to appointments, promotions, or the allocation of resources''. CESAER's Next Generation Metrics recommends using "a polychrome approach and to use indicators to complement qualitative expert assessment".

While OS-CAM and CESAER instructs in a written form to use a combination of quantitative and qualitative assessment methods, NOR-CAM also includes in its evaluation matrix a separate column for narrative descriptions. NOR-CAM matrix (UHR, Universities Norway 2021) consists of four columns: 1) The first column shows the proposed six areas of competence that represent the breadth of relevant academic activities at higher education institutions; 2) The second column gives examples of results and competencies that could be included in the various competence areas; 3) the column three refers to the systematic documentation of results and competence; 4) and fourth column in the matrix brings a narrative perspective to the matrix, this column concerns the applicant's own reflection on the various activities. The idea is that the applicant gives a subjective assessment of their own results and competencies. The aim is to facilitate interaction between the documentable and/or measurable quantities in column 3 and the applicant's qualitative assessment of these. This will ensure that quantitative measures and bibliometrics are only a part of the whole. (UHR, Universities Norway 2021.)

6.2.2.1 NARRATIVE CV EXAMPLES UTILISED IN RESEARCHER ASSESSMENTS

Narrative CVs play a central role in current attempts to base the assessment of research on qualitative evaluation. Perhaps, the two most well-known narrative CV examples are the ACUMEN portfolio that was developed as a product of the project Academic Careers Understood through Measurement and Norms (ACUMEN) already in 2014 and The Résumé for Researchers, developed by the Royal Society in 2019.

ACUMEN was an European research collaboration aimed at understanding the ways in which researchers are evaluated by their peers and by institutions, and at assessing how the science system can be improved and enhanced. ACUMEN emphasises that there is a lack of quantitative measures that are applicable at the individual level as well as for recognition for new types of work performed. ACUMEN created criteria and guidelines for good evaluation

practices. Each researcher has a portfolio on their career and contributions. In this way, they can highlight their key achievements. The ACUMEN portfolio contains an evidence-based narrative that the researcher can use to tell their academic value in their own way but tying it to evidence, using quantitative indicators, when appropriate. In an evaluation of a researcher, the ACUMEN good evaluation practices recommends taking into account the importance of each indicator considering the evaluation purpose and the reliability of each indicator and then performing the evaluation of the researcher based on the narrative description, supported by the quantitative indicators. ACUMEN also pays attention to gender and age considerations in the form of Academic Age calculation, which is defined as follows: "the measure of the age of an academic in terms of the amount of time they have spent in academia, subtracting time to make allowances for special circumstances". (ACUMEN Consortium 2014.)

Recognising that a researcher's relative importance will be context-dependent, the Résumé for Researchers is designed to be a flexible tool that can be adapted to a variety of different processes that require a summative evaluation of a researcher (The Royal Society 2019). The Résumé for Researchers template consists of three supplementary sections: personal information, a personal statement, and additions and the following four main modules: 1) contribution to the generation of knowledge, 2) contribution to the development of individuals, 3) contribution to the wider research community and 4) contribution to broader society. Each module is instructed to be filled in a narrative style, even though some parts of the personal details and additions can also be written in list form. UK Research and Innovation (UKRI), which is the national funding agency investing in science and research in the UK, has adopted the Résumé for Researchers in its processes (UKRI 2021b) including the following four modules: 1) contributions to the generation of new ideas, tools, methodologies or knowledge, 2) the development of others and maintenance of effective working relationships, 3) contributions to the wider research and innovation community, and 4) contributions to broader research or innovation-users and audiences, and towards wider societal benefit.

There are also other examples of narrative CVs used in funders processes on a national level. The Dutch research funder NWO (The Dutch Research Council NWO 2022), The Swiss funder SNSF (Swiss National Science Foundation 2020, 2022) and the Luxembourgish funder FNR (Luxembourg National Research Fund) are all utilising narrative CV formats instead of traditional CVs. NWO and SNSF are using CV templates that combine quantitative and qualitative approaches. FNR also includes the aspect of quantitative information in its funding criteria, in addition to their narrative CV format, applicants are requested to include an updated ORCID profile which replaces the traditional CV listing scholarly outputs, funding acquired, and history of academic affiliations.

In NWO CV templates, applicants are asked to write a narrative academic profile, which enables candidates to decide what is/is not important to mention in their CV. Second part of NWO CVs are to inform the key outputs but the list must also include a description of why the applicant considers this an important output. It is also worth mentioning that NWO CVs pay specific attention to the merits of Open Science. The CV template instructs to mark openly

available outputs. In addition, in the narrative academic profile, applicants are invited to explain their contributions to FAIR open data and Open Science. NWO uses narrative CV format, for example in its Talent Programmes Veni, Vidi, and Vici. (The Dutch Research Council 2022.)

SNSF first piloted a standardised CV format called SciCV in spring 2020 for project funding in biology and medicine. In autumn 2022 SNSF adopted an updated, condensed and shorter version of the SciCV. The objective of the new CV format is to allow researchers to present their most important scientific contributions in the form of short narratives in combination with a limited number of research results, rather than extensive publication lists (max 10 outputs). This new format will no longer include publication metrics, such as impact factors, as a means of assessing the quality of individual research articles, rather the actual content of the articles will be assessed. SNSF states that this mixed approach will help promote equal opportunities and increase the visibility and value given to work other than publications, particularly for those disciplines and research institutions that may be at a disadvantage in the race to publish. The SNSF CV also introduces a uniform method of calculating the academic age of applicants, which will be based on the duration of the applicant's research activity rather than their biological age. Instead of the twelve initial elements included in SciCV pilot template, the new CV is made up of five elements; 1) Education and training, 2) Previous and current employment, 3) Major achievements with selected works, 4) Net academic age and 5) ORCID iD number. (Swiss National Science Foundation 2020, 2022.)

FNR informs that the narrative CV is complementary to the applicant's ORCID profile and will be used in the evaluation process for the reviewers and panel to have a deeper view of the applicant as a researcher, and to evaluate the important aspects of research contribution beyond traditional metrics. Stating citation metrics, h-indices (or similar), journal impact factors, journal rankings, institutional rankings or any other surrogate measures of scientific quality is not allowed. The narrative CV is mandatory for main applicants, PIs, and Co-PIs applying for FNR funding programmes, and is required for all funding programmes where a CV is requested. (Luxembourg National Research Fund 2023.)

Examples of narrative description instruction used in previously mentioned narrative CV templates is described in Table 6.6.

Table 6.6 Examples of narrative description instructions used in narrative CV templates

Write a few sentences briefly summarising your **theoretical** expertise. Include evidence to support your claim, such as citing a relevant paper in which you used it. This could include the main theoretical frameworks that you follow or the paradigms that you work in. This may not be applicable to you, particularly if you work in an empirical field. If so, please write: "Not applicable to my research area."	**ACUMEN Portfolio:** Scientific/scholarly expertise
Write a few sentences briefly summarising your **subject** expertise. Include evidence to support your claim, such as citing a relevant paper of	

yours. This would normally be the main subject areas or specialist fields that you have researched in or have detailed knowledge of. Write a few sentences briefly summarising your **methodological** expertise. Include evidence to support your claim, such as citing a paper in which you used it. This refers to the primary methods that you have used in your research. Write a few sentences briefly summarising your **originality/independence** expertise. Include evidence to support your claim, such as citing a paper in which you demonstrated it. In other words, explain how you have demonstrated originality in your research.	
This module can include various activities you have engaged in to progress the research community. It can be used to mention commitments including editing, reviewing, refereeing, committee work and your contributions to the evaluation of researchers and research projects. It can be used to mention the organisation of events that have benefited your research community. It can highlight contributions to increasing research integrity, and improving research culture (gender equality, diversity, mobility of researchers, reward and recognition of researchers' various activities). It can be used to mention appointments to positions of responsibility such as committee membership and corporate roles within your department, institution or organisation, and recognition by invitation within your sector.	**The Royal Society, Résumé for Researchers:** Module 3, How have you contributed to the wider research community?
Please provide a description (with evidence if possible) of your output, contributions, and achievements, related to contributing to the wider research and innovation community – engagement to progressing the local and international research community. This can include commitments including editing, reviewing, refereeing, committee/panel work and your contribution to the evaluation of researchers and research projects. It can highlight contributions to increasing research integrity, and improving research culture (gender equality, diversity, mobility of researchers, and reward/recognition of researchers' broad range of activities, open science initiatives). It can be used to mention appointments to positions of responsibility such as committee membership and corporate roles within your department, institution or organisation, and recognition by invitation within your sector.	**Luxembourg National Research Fund (FNR):** description related to the narrative description of contribution to the wider research and innovation community

A comprehensive review of the way individual research organisations use narrative CV as part of their research assessment processes is beyond the scope of this report. However, it can be stated based on the the GraspOS landscape survey on Reforming Research Assessments, that out of the 41 universities and their associations, 13 informs using either narrative CVs, Competency-based CVs or Evidence-based CVs in research assessments and three out of six research centres, research infrastructures, and their associations. Also Universities Norway

(UHR) informs that their NOR-CAM-formatted CV will be a combination of lists of metrics, often expressed quantitatively, but also in the form of short narratives, as well as reflections on each of these (UHR, Universities Norway 2021).

6.2.2.2 QUALITATIVE METHOD UTILISED IN RESEARCH ASSESSMENT

Related to institutional-level assessment, by far the most utilised qualitative assessment method is self-assessment, commonly used in higher education institutes and their discipline-specific units while performing Research Assessment Exercise (RAE) or similar. Another interesting and large-scale example is the impact case studies in the context of the Research Excellence Framework (REF) in the UK. According to UK REF 2021 the impact is defined as "an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia". It was mandatory for Higher Education Institutes to provide impact case studies that demonstrate the impacts their research has had beyond academia. "An impact case study is a five-page document, describing the impact of research undertaken within the submitting unit. It also contains information about the research that underpins the impact that took place." A massive amount of over 6,700 impact case studies were submitted to REF 2021. The UK REF Impact case study template consists of four sections: a) background information of the unit of assessment and title of the case study; b) a summary of the impact described in the case study and an outline of the main research insights or findings that have contributed to the impact, giving details of what research was carried out, when and by whom; c) references to the research in form of key outputs from the research described in the previous section, and evidence about the quality of the research. The template instructions highlight that the outputs are "not limited to printed academic work" and all forms of output cited as underpinning research will be considered equitably, with no one type of output being preferred over others". d) the fourth section should provide a narrative, with supporting evidence, to explain how the research underpinned the impact and the nature and extent of the impact. (UK Research and Innovation 2021a, 2022.)

6.2.2.3 NARRATIVE DESCRIPTIONS IN CONTEXT OF OPEN SCIENCE

The achievements of Open Science were not yet acknowledged comprehensively in the first narrative CV examples, the ACUMEN portfolio from 2014 and The Résumé for Researchers, developed by the Royal Society in 2019. The Open Science aspect was not emphasised in the production of narrative descriptions. However, the ACUMEN portfolio included the Open Science aspect in their instruction on providing evidence, for instance instructing to provide links to open access publications. ACUMEN also recommended using openly available Google Scholar for retrieving citation information instead of the subscription-based databases Web of Science and Scopus. (ACUMEN Consortium 2014.) The recent qualitative efforts have begun to pay more attention to the Open Science aspect of narrative descriptions. A particularly good example is the NOR-CAM, where it is instructed to highlight the Open Science aspects of different research activities in the narrative self reflection column. For example emphasis is placed on open access to published works, as well as whether the data adhere to the FAIR principles, transparency in the research process, open education and the sharing of

educational resources and contribution to strategies and policy development in relation to Open Science. Of the national funders, NWO CVs pay specific attention to the merits of Open Science. The CV template instructs to mark openly available outputs. In addition, in the narrative academic profile, applicants are invited to explain their contributions to FAIR open data and Open Science. (The Dutch Research Council 2022.)

● 6.3 Associated implementation obstacles and biases related to quantitative and qualitative methods

● 6.3.1 Problems and biases associated with quantitative indicators

Both quantitative and qualitative forms of research assessment have their benefits and limitations. Depending on the context, the value of different approaches must be considered and balanced. This is particularly important when dealing with a range of disciplines with different publication practices and citation norms. In fields where quantitative metrics are not appropriate nor meaningful, their use for assessment should not be imposed in that area. The research community should also develop a more sophisticated and nuanced approach to the contribution and limitations of quantitative indicators. The misuse of quantitative indicators and metrics can lead to gaming and unintended negative results. (ISRIA statement; Metric tide; UKRN Statement on Responsible Research Evaluation.)

Applying metrics to individual researchers should be avoided, particularly those that do not account for individual variation or circumstances. For example, the h-index should not be used to directly compare individuals, because the number of papers and citations differs dramatically among fields and at different points in a career. (UKRN Statement on Responsible Research Evaluation.)

Many factors need to be considered when using citation counts as indicators as they can be impacted by e.g., database coverage, differences in publishing patterns across disciplines, citation accrual times, self-citation rates, the age of the publication, observation period, or journal status. Another limitation in using citation databases is that they favour English-language research, missing local and regional research published in other languages. Citation-related issues need to be paid attention to when using metrics that are based on citations, e.g., percentile-based indicators. Regarding other types of research outputs, it is more difficult to find comprehensive citations to a monograph or to its chapters than for a journal article, due to the limited scope of major book citation databases. Data citations and direct citations to software packages are still relatively rare. (Metrics toolkit.)

New and alternative metrics on the reception, usage, and value of all types of research output are continuously developed. When considering using this type of metrics, the sources and

methods behind such metrics must be evaluated whether they are vulnerable to being gamed, manipulated, or fabricated. Metrics can be sourced from a variety of services, with differing levels of coverage, quality and accuracy. These aspects should be considered when selecting a source for data or metrics. (UKRN Statement on Responsible Research Evaluation.) Another problem related to alternative metrics is that the popularity of research works in social platforms (like Mendeley or Twitter) are not only affected by the attention the work gets but also by the changes in popularity of the social platform itself.

Item downloads should not be equated with usage. Downloaded files may remain unread in personal libraries (resulting in an inflated count of readership) or may be shared with other individuals (resulting in an underestimate of readership). Automated crawling and downloading of content may also result in inaccurate counts. Web analytics tools need to be configured to monitor and count these events to provide an accurate count. Page views data is problematic as visits may be double counted. This is an important drawback, hence using this indicator should be done with extreme caution. (Metrics toolkit.)

● 6.3.2 Problems and biases associated with qualitative methods

One of the most frequently presented critical perspectives related to qualitative methods is that more time and better expertise are required, like handling narrative CVs compared to a traditional CV. This perspective was also indicated in the Landscape analysis survey on Reforming Research Assessments. The second most commonly identified barrier associated with research assessment, was the concerns over increased costs (46% of all respondents). The University of Glasgow tested the résumé for researchers with early career researchers using mock review panels. According to the study report, the objectives of the narrative CV were appreciated but the additional workload deemed a challenge. Recommendations stemming from the study highlight that the narrative CV "does not exist in isolation from the rest of the system" and that, for example, attention needs to be paid to unconscious bias and that support to fill in the narrative template is needed. (The UK Reproducibility Network 2021.) Similar indications are also presented in the Luxembourg National Research Fund 2022 and Fritch et al. 2021; the workload in producing and evaluating narrative CV is remarkably high.

However, evidence to the contrary can also be shown. The results from Narrative CV: implementation and feedback results by the Luxembourg National Research Fund indicated in their 2022 report that compared to a traditional CV, reviewers did not perceive evaluation of the narrative CV to be longer or more complicated compared to a traditional CV. The report also indicated that researchers are becoming more in favour of the shift towards a broader recognition of research outputs as well as a more open and diverse evaluation of these outputs. (Luxembourg National Research Fund 2022.)

Some concern has been raised about omitting a full list of publications in connection with the CV. The applicants are concerned that not listing the full list of publications provides an

incomplete profile of their research and reviewers are lacking evidence to verify what is claimed in the narratives. (Luxembourg National Research Fund 2022 and Strinzel et al. 2022.)

DORA members 2020 and National Research Fund 2022 state that the misuse of metrics is difficult to prevent. Although publication metrics are prohibited from being used, The ORCID identifiers, typically indicated in connection with the CV, offers the reviewer an easy way to retrieve the information e.g. the h-index or citation counts from international citation databases.

There is still also a concern that native speakers are at an advantage in producing narrative descriptions (Fritch et al 2021).

Report by DORA and Funding Organisations for Gender (2021) on "Using Narrative CVs: Process optimisation and bias mitigation" points out that the adoption of narrative CVs has been welcomed as a departure from traditional bulleted lists, allowing researchers to provide context and detail about their contributions. However, challenges arise regarding the content and evaluation of narrative CVs, requiring guidance for applicants and training for evaluators to ensure consistency. The use of language in narrative CVs can introduce bias and noise, and longer narratives may increase the use of gendered language. Funding organisations should monitor the effectiveness of narrative CVs and consider the impact on non-native language applicants. Addressing these challenges can optimise the value of narrative CVs in grant funding decisions.

● 7. Infrastructures

Key takeaways
- Data used in the research assessment might come from global data sources (global platforms for cataloguing academic data) or from local data sources (institutional, or national platforms built for the purpose of capturing local academic records' metadata).
- Building the federated software infrastructure for supporting Open Science-aware research assessment is necessary.
- Some existing research domain software infrastructure components might be useful in the new era of Open Science-aware research assessment, and only some new elements should be ingested in the complete ecosystem.
- However, there are some challenges in making existing infrastructures part of the federated system, such as semantic interoperability between those infrastructures and sustainability of those platforms.
  - Interoperability between existing research domain software components might be improved by standardisation of cataloguing formats and practices, wide adoption of persistent identifiers (DOI, ORCID, ROR ID, RAiD), and definition of protocols and application interfaces for exchanging information.

- - Research domain software infrastructure should be supported by a contingency. fund for 12 months per year, preferably the infrastructure should be published as open source software, and data should be the academic-community property.
- There is discrepancy between elements needed for the purpose of assessment and available information in research domain infrastructures.
  - Nowadays, there is wide variety of academic outputs which might be important for responsible researcher assessment: academic publications (journal articles, conference articles, monographs, theses, etc.), research datasets, software, policy contributions, methods, protocols, exhibitions, theories, strategies, algorithms, data models, and workflows.
  - Besides research outputs, teaching activities are very often included in the researchers assessment (probably at Universities for the teaching positions), as well as mentorship and other contribution roles, cooperation with industry, and skills for communication with society.
  - Global research domain data sources mostly capturing the common research outputs (journal articles, conference articles, monographs) and linking them with researchers, organisations, fundings, and citation sources. Moreover, the importance of cataloguing research dataset is recognised and adopted by those data sources as well. However, support for other research output types should be improved.
  - Local data sources are better adopted for the needs of comprehensive research assessment especially in the domain of researchers' activities, non-academic roles, skills and competences, as well as in the domain of cataloguing non so common academic outputs (for instance software, patent, algorithm, etc). Moreover, researchers are involved in the cataloguing process in the local data sources very often as cataloguers of its own results which are verified by librarians, and sometimes only as validators/claimers of records imported from other systems, or catalogued by librarians or coauthors.
  - The well-known models for representation of research entities (CERIF and VIVO) cover variation of outputs, roles, activities, and PIDs needed for research assessment quite well.
- A researcher's or organisation's Open Science contributions can be recognized by publishing publication and research dataset in the open access mode. Global research domain platforms and data models allow assigning flags for definition of open-access publications and datasets. Some platforms also support cataloguing software and services, and one of the metadata which can be assigned to a record is an open-source flag. Moreover, some platforms support assigning license to a publication, dataset or software. However, capturing information about participation or organisation of Open Science related courses, events or projects, leadership in Open s´Science, such as transforming a journal to OA should be improved in the available infrastructure.

- DOI and ORCID are very-well recognised PIDs in the academic infrastructures. ROR ID is also adopted by the majority of platforms. Although, RAiD is not yet widely adopted, there are some signals that might be changed in the future. This PID is included in the CERIF data model, and is being integrated into the EOSC platform through the FAIRCORD4EOSC project (https://faircore4eosc.eu/eosc-core-components/research-activity-identifier-raid).
- Applications with modern software architecture usually are using REST API for exposing resources which is also the case in the research domain data platforms. Available REST APIs might enable integration of those platforms in a unique dataspace which might be used for open science-aware research assessment.

Besides changing research assessment practices, and publishing Open Science-aware research assessment policies and frameworks, development of federated software infrastructure supporting those changes is necessary. This software infrastructure includes:

- Data sources - Platforms and repositories for preserving and cataloguing research results. Those platforms and repositories should enable also recording Open Science results and activities. Moreover, it should include recording information about popularisation of science and communication with wider society including all tax payers and non-academic communities.
- Representation of research entities - Researchers can be included in the community-led research entities' cataloguing, but it is important to catalogue one and use it everywhere. The Internet is a distributed platform with a lot of information across different platforms which can offer different services. Interoperability between those platforms and data exchange is necessary in such architecture, and it might be achieved by consistent usage of persistent identifiers and standardisation of protocols, application interfaces, models and interchange formats.
- Services and tools - Platforms which might help in the research assessment. For instance, those services might offer enrichment of research assessment data sources, or provide altmetrics and other research assessment indicators.

The software infrastructure might be built from scratch once a framework for reform research assessment is created. However, it is likely that some existing software infrastructure components might be useful in the new era of Open Science-aware research assessment, and only some new elements should be ingested in the complete ecosystem. Therefore, the existing software infrastructure landscape has been analysed hereinafter.

The research assessment should be fully under control of the academic community, i.e. it is important that software infrastructure belongs to the academic community. Building research assessment on top of software infrastructure belonging to the commercial player (proprietary data sources) might lead to coupling research assessment with external players and make a research assessment process unreliable. External players might change its policy and community practices, might change the price of the service and data, or even decide to shut down the infrastructure and move focus to another domain. Therefore, in the following

subsections only academic community infrastructures which are free of charge for usage have been analysed in depth.

This approach is in accordance with the set of principles for running and sustaining open scholarly infrastructure presented in The Principles of Open Scholarly Infrastructure (Bilder et al., 2020). Those principles are grouped in three groups: Governance, Sustainability, and Insurance. Scholarly infrastructure should be supported by a contingency fund for 12 months per year, preferably the infrastructure should be published as open source software, and data should be community property.

Moreover, Stehouwer and Wittenburg (2018) analysed data practices and identified some challenges for making data open. Proposed recommendations in this document include sustainability in funding, i.e. establishing trusted and reliable repositories with sustainable funding; and improvement of standards for interoperability of research domain ecosystem, i.e. making federation technology mature so that everyone can easily create integrative platforms.

Knowledge Exchange, which is a network organisation, consists of six national research supporting organisations - DFG (Germany), Jisc (UK), DeiC (Denmark), SURF (The Netherlands), CSC (Finland), and CNRS (France), conducted research to understand developments in evaluation, incentives, and dissemination within scholarly communications and research (Jones & Murphy, 2021). This study found a number of policy and infrastructure initiatives in recent years aimed at accelerating the transition to Open Science. This study explores a system for open academic CVs from a more technical point of view. Adoption of Persistent identifiers (PIDs) should be improved, as well as integration of modern IT platforms. At the moment, research funding organisation information systems are underfunded and underdeveloped. Institutional current research information systems and institutional repositories (IRs) are evolving and going in the direction of integration, but there is still much work to be done around standards for information interchange and best practices.

Position Statement on Research Information Systems (Science Europe, 2016) contains recommendations on how CRIS systems should be developed in the Open Science and FAIR era. One of the recommendations is to make CRIS systems open to support new research objects which can be popular in the future and can be used for research assessment.

FAIR principles should derive directives on how to make research more open, transparent, and reusable. FAIR principles were built with the idea to be applicable to research data, but nowadays those principles can be applied to any research domain information or artefact. For instance, an interchange format, protocol or guideline can be assessed about compliance with those principles, such as OpenAIRE guidelines for CRIS managers (Czerniak et al., 2023). Moreover, compliance of research information systems with FAIR principles can be discussed (Azeroual et al., 2022). However, the level of compliance with FAIR principles is not so easy to assess. Therefore, FAIR assessment tools are being developed and compared (Peters-von Gehlen et al., 2022).

The EU's research and innovation programme published a report (European Commission, 2015) which describes the new information system and data sources which support the
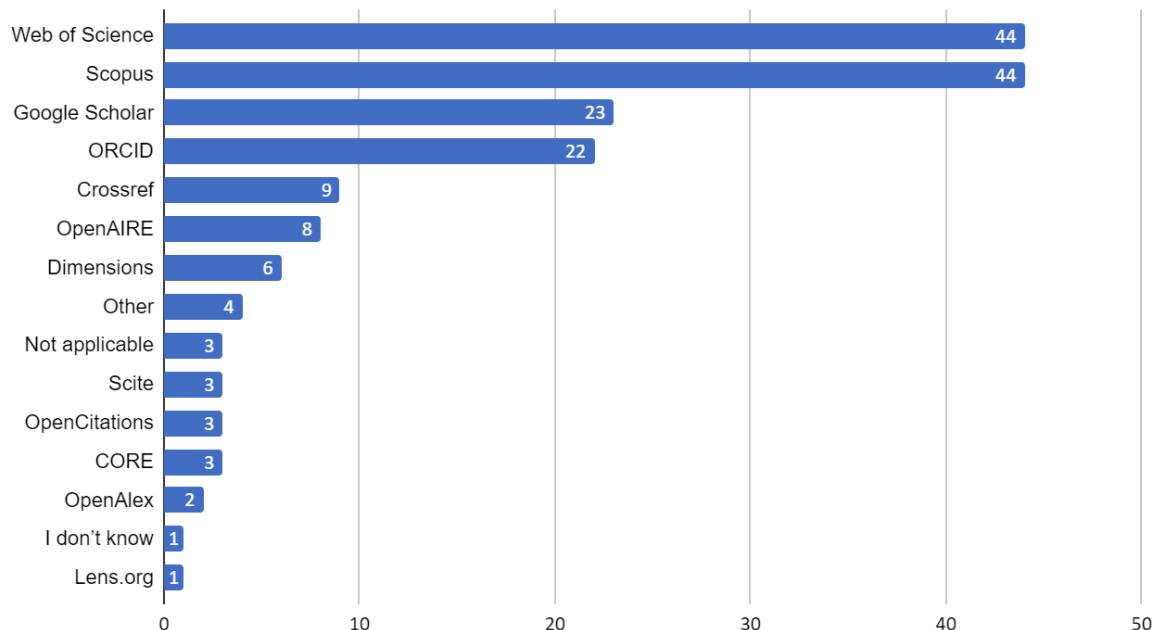
monitoring and evaluation strategy for Horizon 2020. This report found that it is essential to have structured and reliable access to the relevant information sources to ensure a comprehensive research assessment and reporting system. The report discussed building a comprehensive data source which might be the basis for research assessment and monitoring. This data source might be built by integrating different sources such as CORDIS, OpenAIRE, the EU Open Data Portal, etc.

The science communication channels have been changed in the Open Science age. Popularisation of science and communication with wider society including all tax payers and non-academic communities should be incentivised by reforming research assessment. There are some platforms which can help researchers in accelerating research impact beyond the academic community such as the Kudos platform (https://www.growkudos.com/). This platform helps researchers to ensure their publications get found, read and cited in a world of information overload, and aggregates all the most relevant metrics about researchers' activities in one place, and maps outreach activities against those metrics. Besides Kudos, there are also PlumX (https://plumanalytics.com/) and Altmetrics (https://www.altmetric.com/) widgets which can be used for getting metrics about the impact of academic work beyond the academic community.
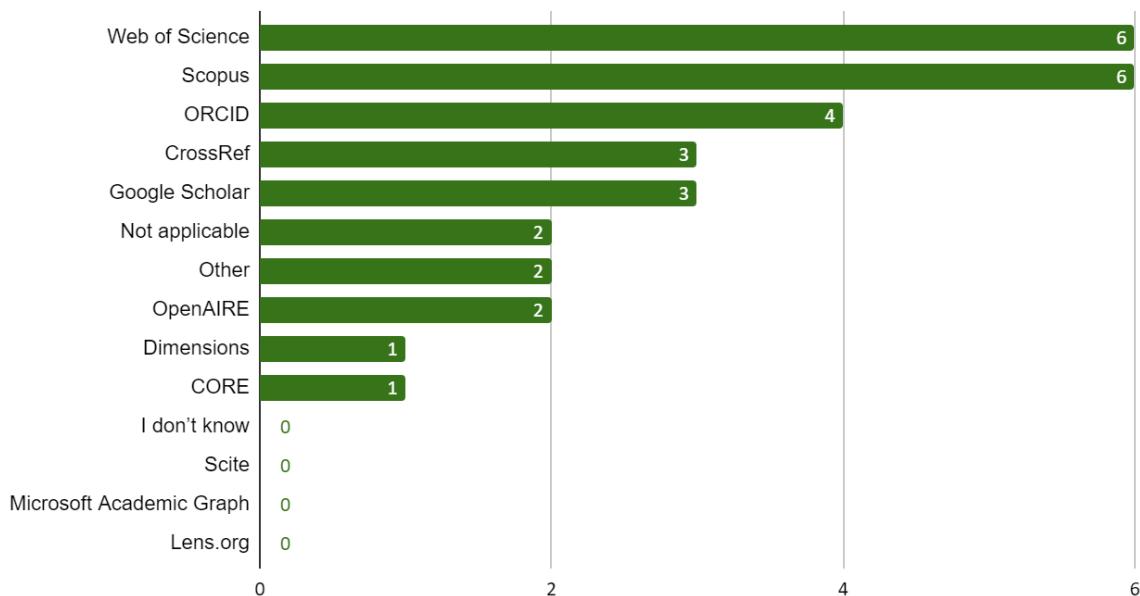
● 7.1 Data sources - research results cataloguing platforms

Global or home-made publications and citation databases can be used as a source for assessment of a researcher or an organisation unit. There are commercial players who are cataloguing and selling publications data such as Elsevier (in charge of maintaining Scopus database), Clarivate (in charge of Web of Science database), or Digital Science (in charge of Dimensions). Those global platforms maintained by commercial players are quite popular for being a data source for organising research assessment according to the results of the conducted survey (Fig 7.1). As it has been already stated above, the research assessment should be fully under control of the academic community, therefore it is important that software infrastructure belongs to the academic community. For this reason, hereinafter we analysed in more detail platforms belonging to the non-for-profit organisations or platforms which have been built as a result of the EU project. Those platforms are offering catalogued data free of charge.

21a. Which of the following global data sources are used for research assessment at your institution?

Source	Value
Web of Science	44
Scopus	44
Google Scholar	23
ORCID	22
Crossref	9
OpenAIRE	8
Dimensions	6
Other	4
Not applicable	3
Scite	3
OpenCitations	3
CORE	3
OpenAlex	2
I don't know	1
Lens.org	1

17. Which of the following global data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?

Source	Value
Web of Science	6
Scopus	6
ORCID	4
CrossRef	3
Google Scholar	3
Not applicable	2
Other	2
OpenAIRE	2
Dimensions	1
CORE	1
I don't know	0
Scite	0
Microsoft Academic Graph	0
Lens.org	0

Figure 7.1 *Responses to the survey question 21a (listed above the diagram) in the global survey (above), and question 17 in the pilot institutions survey (below)*

OpenAlex

OpenAlex is an index of hundreds of millions of interconnected entities across the global research system. The application of OpenAlex could improve the transparency of research evaluation, help in navigation, representation, and discovery over open and partly-open science knowledge graphs such as OpenCitations, PID Graph, Open Research Knowledge Graph, Semantic Scholar, and the OpenAIRE Graph (Priem et al., 2022). A persistent OpenAlex ID is assigned to each entity in the OpenAlex index. This internal ID is expressed as a URL and acts as a primary key in the dataset. Besides this internal ID, external systems IDs can be also assigned to an item in OpenAlex in order to increase interoperability and disambiguate records. Five types of entities are catalogued and preserved in OpenAlex:

- Works - journal articles, books, datasets, and theses, more than 200 millions in total, around 50 thousands added on daily basis.
- Authors - people who create works, more than 200 millions in total, with thousands added daily. ORCIDs assigned to authors are used to disambiguate authors of works. In the case when ORCID is not assigned to an author, the OpenAlex platform is using authors' publication records and citation histories in the disambiguation algorithm.
- Venues - places that host works such as journals, conferences, preprint repositories, and institutional repositories. There are around 124,000 venues preserved in OpenAlex. Some of those venues have assigned ISSNs which are used to disambiguate venues (journals and other serial publications). Works (articles, books, etc.) are very often hosted in multiple venues, and a fingerprinting algorithm is used to match the same work hosted in multiple venues.
- Institutions - organisations to which authors claim affiliations. There are more than 100,000 institutions preserved in OpenAlex. The ROR ID is assigned to the majority of those organisations.
- Concepts - abstract ideas that works are about. There are more than 50,000 concepts assigned to academic works indexed in OpenAlex. Those concepts are uniquely identified by assigned Wikidata IDs.

OpenAIRE (+ OpenAIREGraph)

OpenAIRE started as a set of Horizon infrastructure projects, and it is a legal entity since 2018, which has been created to ensure a permanent open scholarly communication infrastructure to support European research. OpenAIRE Explore enables search and browsing of a comprehensive and open dataset of research information covering 165 millions publications, 58 millions research data, 331 thousands research software items, harvested from 126 thousands data sources, and linked to 3 millions grants and 198 thousands organisations. Harvesting is done based on a set of OpenAIRE guidelines for different types of data sources. Those guidelines are based on the OAI-PMH protocol by using different formats and vocabularies inside this protocol. One of those guidelines is the OpenAIRE guideline for CRIS managers. Numerous services have been built on top of the OpenAIRE dataset such as OpenAIRE Graph, Monitor, Observer, ScholeXplorer. Some of those services are trying to establish additional links between records from the research domain ecosystem which might be useful in Open Science-aware research assessment. In order to make it possible to establish those links some PIDs are used in the OpenAIRE to disambiguate records (ORCID,

ISNI, DOI, Handle, etc). The OpenAIRE data are offered through different free of charge APIs - https://graph.openaire.eu/develop/.

Crossref

The Crossref database preserves more than 100 millions of scholarly records with established links between those records. The database contains journal articles, books, conference proceedings articles, working papers, technical reports, and data sets. Crossref provides the technical and business infrastructure for publishing and registration of digital object identifiers (DOIs) which is a very important PID for unique identification of academic digital work. Moreover, Crossref collects event data which represent any mention of academic work by using DOI, URL or publication name. Data archives, Wikipedia, social media, blogs, news, and other sources are monitored for finding new mentions of academic work. Crossref data about all records including event data are available via an open API https://www.crossref.org/documentation/retrieve-metadata/rest-api/.

ORCID profiles / record registry

ORCID provides a persistent digital identifier (an ORCID iD) that can be assigned to any single researcher to make it uniquely identified. The ORCID platform enables researchers to connect their own ORCID with their professional information — affiliations, grants, publications, peer review, and more. Accessibility to any single piece of information preserved in the ORCID platform can be defined (public, private or only trusted parties). There are almost 15 millions of open ORCID profiles at the moment. ORCID offers a public XML-like and JSON-like restful API that allows machine-to-machine communications with the ORCID registry. This API enables retrieval of public data from a researcher's ORCID record.

BIP! Services

BIP! is a platform that exploits scholarly knowledge graphs to provide various services to facilitate scientific knowledge discovery and research assessment (comprising BIP! DB, BIP! Finder, and BIP! Scholar) leveraging advanced citation-based indicators of scientific impact (but also other types of indicators). The BIP! Database (i.e., BIP! DB) provides calculated impact indicators of more than 130 million articles capturing distinct aspects of scientific impact such as the popularity of research articles (i.e., their current impact), their influence (overall impact), and their impulse (initial momentum).[7] Those indicators are calculated on top of a citation network of 1.38 billion citations harvested from different sources such as Crossref, Open Academic Graph, and OpenCitations. Moreover, access to records of BIP! DB is available via the open access API (https://bip.imsi.athenarc.gr/site/data).

BIP! Finder (https://bip.imsi.athenarc.gr/search) is an academic search engine that enables literature exploration leveraging the aforementioned impact indicators for ranking search results (i.e., offering impact-based ranking functionalities).

Last but not least, BIP! Scholar (https://bip.imsi.athenarc.gr/scholar) is a tool that allows researchers to create researcher profile pages representing their research activities in detail

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[7] The list of available indicators can be found at https://bip.imsi.athenarc.gr/site/indicators.

and highlight different aspects of their research career. A researcher can create a profile page by logging in with their ORCID credentials and granting BIP! Scholar the permission to read their ORCID public records.[8] The researcher's profile consists of two parts, the first one is a career summary of the researcher, providing different indicators that reflect the productivity, the impact, the level of practice of Open Science principles, and the career stage of the researcher. The second part is the complete track record of all of their works; each work is presented by a useful set of metadata collected or calculated by BIP! such as title, authors, venue, availability, various impact indicators, and the contributions of the researcher in each work classified using the CRediT taxonomy.

OpenCitations Meta

OpenCitations is an independent not-for-profit organisation dedicated to enable access to open bibliographic and citation data by the use of Semantic Web (Linked Data) technologies. OpenCitations Meta is a recently created database which stores bibliographic metadata for all publications involved in the OpenCitations citation index. Bibliographic records in this database are presented by using the following metadata - the publication's title, type, venue (e.g. journal name), volume number, issue number, page numbers, and publication date. Besides those metadata fields, the database records include assigned DOI and PubMed identifiers, as well as established links to researchers' profiles (authors, editors, etc.) by using ORCID identifiers. At the end of 2022, this database contained metadata describing almost 90 millions bibliographic entities, more than 250 millions authors, more than 2 millions editors, 17 thousands publishers, and 700 thousands publication venues (e.g. journal names). Those data are mostly ingested by using Crossref as primary source. Moreover, there is a plan for OpenCitations Meta database to be expanded to include bibliographic metadata for all citing and cited publications involved in the 170 millions citations from the OpenCitations Index of DataCite open DOI-to-DOI citations (DOCI). Besides REST API available at https://opencitations.net/meta/api/v1, the data can be collected through a SPARQL API available at https://opencitations.net/meta/sparql.

DataCite Commons

DataCite is an international not-for-profit organisation which aims to establish easier access to research data on the Internet by assigning digital object identifiers (DOIs) to digital publications and data sets. It also defines a minimal set of metadata assigned to those digital objects catalogued in the DataCite Commons database. This database catalogues research works (30 millions), people (9 millions), organisations (100 thousands) and repositories and their connections. Those records are identified by various persistent identifiers: DOI for works, ORCID ID for people, ROR ID for organisations, and re3data repository ID for repositories. Moreover, those records are catalogued using a standard set of metadata that describe them and the connections to each other. Those entities are accessible through the user interface, REST API, and GraphQL API.

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[8] Note that accessibility to a research profile in BIP! Services can be defined as private or public.

Basic characteristics of the analysed platforms regardings its size, ownership and payment model are summarised in the Table 7.1.
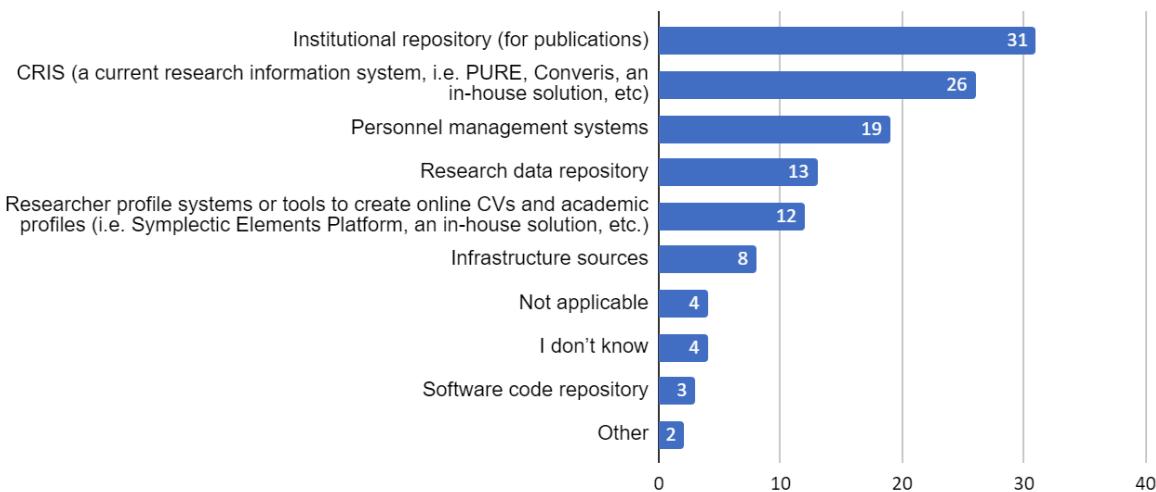
Table 7.1 *Global data source characteristics*

Data source	Size	API	Ownership	Payment model
OpenAlex	> 240 millions of works (> 40 millions of open access works)	https://docs.openalex.org/	non for profit organisation	Freemium
OpenAIRE	> 160 millions of publications > 55 millions of datasets	https://graph.openaire.eu/develop/api.html	project result (OpenAIRE)	Free
Crossref	> 100 millions of works (> 20 millions of open access works)	https://www.crossref.org/documentation/retrieve-metadata/rest-api/	non for profit organisation	Free
ORCID profiles / record registry	15 millions of ORCID profiles	https://info.orcid.org/documentation/features/public-api/	non for profit organisation	Free
BIP! Services	> 130 millions of works > 1.3 billions of citations	https://bip.imsi.athenarc.gr/site/data	project result (ATHENA RC)	Free
OpenCitations Meta	Almost 90 millions of works	https://opencitations.net/meta/api/v1	non for profit organisation	Free
DataCite Commons	> 30 millions of works	https://support.datacite.org/reference/introduction	non for profit organisation	Free
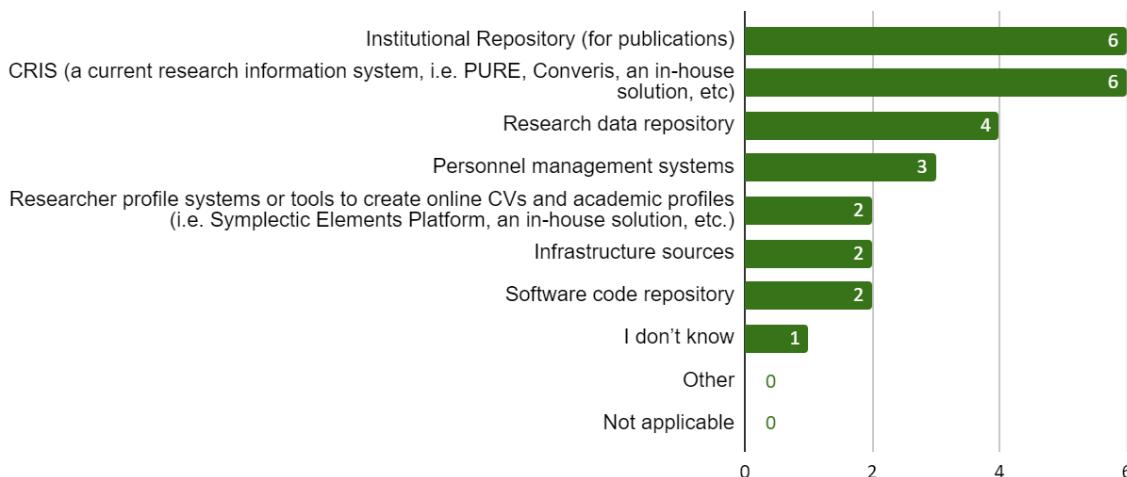
Local/institutional data sources

Besides those global repositories and data sources, some institutions might be developing their own software infrastructure for the purpose of research assessment. Almost two thirds of all survey respondents stated there is a local platform/data source used in the research assessment process (Fig 7.2). Those local platforms might be publications, data or software repositories, or research information systems. The platforms might be based on a commercial or open source solution, or built from the scratch. For instance, it might be based on commercial solutions such as Figshare for institutions, Pure, Converis, or open source solutions such as DSpace, Eprints, DSpace-CRIS, VIVO. Moreover, there might be some local (home-made) solutions. In-house solutions mentioned in the survey responses are SICRIS, CRORIS, GISMO, SoleCRIS, IS Věda, and CRISTIN.

23a. Which of the following local data sources are used for research assessment at your institution?

Category	Value
Institutional repository (for publications)	31
CRIS (a current research information system, i.e. PURE, Converis, an in-house solution, etc)	26
Personnel management systems	19
Research data repository	13
Researcher profile systems or tools to create online CVs and academic profiles (i.e. Symplectic Elements Platform, an in-house solution, etc.)	12
Infrastructure sources	8
Not applicable	4
I don't know	4
Software code repository	3
Other	2

19. Which of the following local data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?

Category	Value
Institutional Repository (for publications)	6
CRIS (a current research information system, i.e. PURE, Converis, an in-house solution, etc)	6
Research data repository	4
Personnel management systems	3
Researcher profile systems or tools to create online CVs and academic profiles (i.e. Symplectic Elements Platform, an in-house solution, etc.)	2
Infrastructure sources	2
Software code repository	2
I don't know	1
Other	0
Not applicable	0

Figure 7.2 *Responses to the survey question 23a (listed above the diagram) in the global survey (above), and question 19 in the pilot institutions survey (below)*

● 7.2 Representation of research entities

The information spread through numerous platforms might be used in the research assessment. Therefore, the interoperability between those platforms is necessary for building unified research assessment dataspace. Semantic interoperability between research domain platforms requires alignment of research domain data models/ontologies/formats, as well as wide adoption of PIDs and standardisation of protocols. This section is analysing state-of-the-art in this field.

● 7.2.1 Models, formats, and ontologies

Common European Research Information Format (**CERIF**)

The Common European Research Information Format (CERIF) is a data model providing machine-processable representation of research information. This model is recommended by the European Union to its Member States - https://joinup.ec.europa.eu/collection/eu-semantic-interoperability-catalogue/solution/common-european-research-information-format/about. CERIF might be used as an interchange format between research information systems. CERIF records and links between records can be classified, meaning validation and curation status might be recorded in CERIF. CERIF enables customisation by making profiles such as OpenAIRE guidelines for CRIS managers, or by using customised vocabularies. CERIF has the ability, as a model, to store or provide links to all the needed information needed for a researcher assessment. For instance, how the system based on CERIF might implement assessment in accordance with OSCAM can be found at https://doi.org/10.5281/zenodo.4701374. Metrics and indicators can be preserved in CERIF in a generic way, meaning brief description and classification of any metric or indicator can be described in CERIF and linked with publication, person, project, or any other CERIF record. CERIF supports a wide range of research output types which can be found at https://github.com/EuroCRIS/CERIF-Vocabularies/blob/master/OutputTypes.xml. Records about research outputs could have assigned information whether output is published in open-access mode or not, as well as assigned licence. Besides representing research outputs, memberships in organisations, participation in events and projects, and other research activities can be represented in CERIF. Some of those activities can be used for Open Science-aware research assessment such as: open peer-review, participation in open science projects, participation in open science courses, organising a popular presentation on the topic of Open Science. A concept (keyword) "Open Science" might be linked with organisation units, researchers, research outputs, events, projects. CERIF also supports and promotes assigning PIDs to research entities such as ORCID, DOI, ROR ID, RAiD, ISNI, etc.

VIVO

VIVO is an ontology used for representation of research entities. There are different extensions/adjustments of VIVO ontology, such as the adoption of the VIVO ontology for the
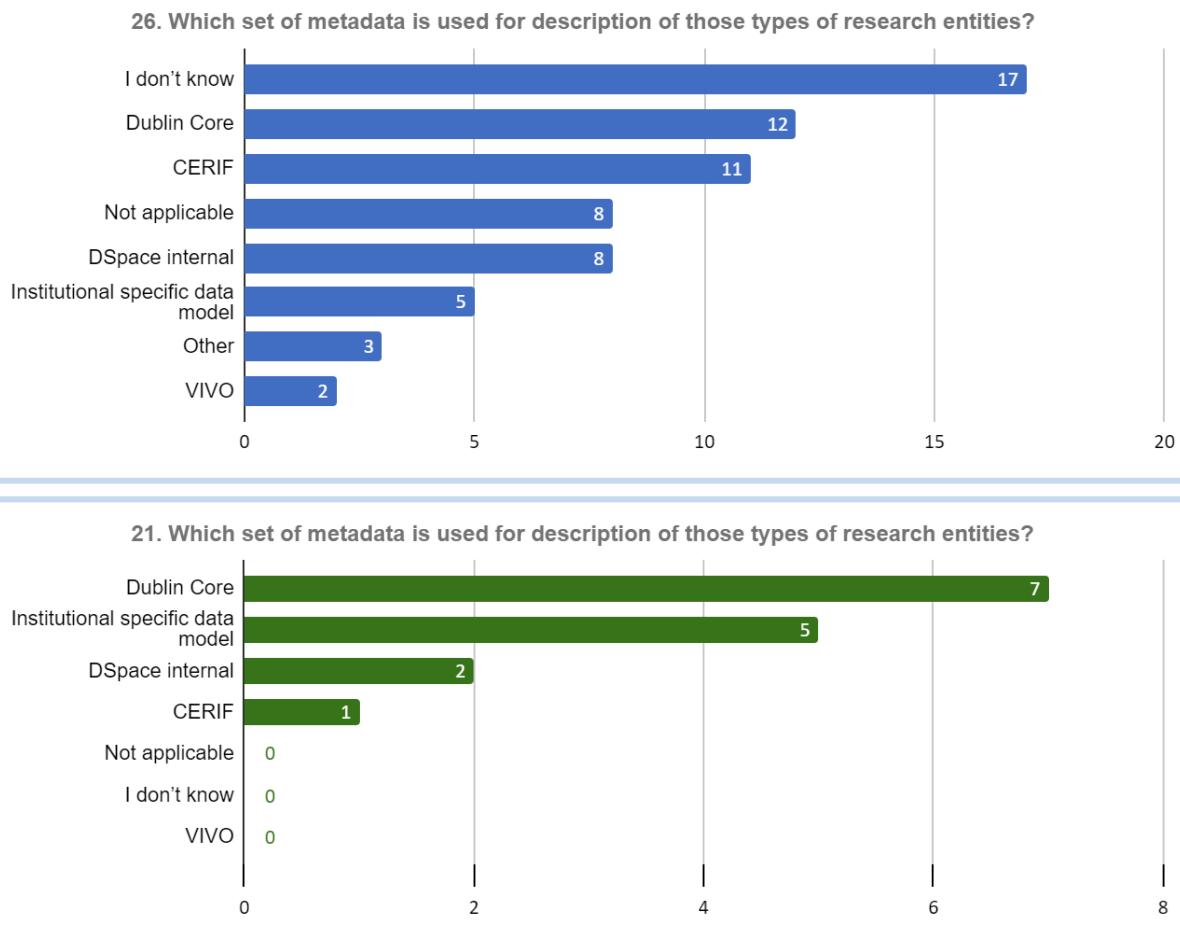
German scholarship context (https://github.com/VIVO-DE/vivo-de-ontology-extension). VIVO is not adopted by a commercial player, it is intended for the open-source VIVO platform which can enable academic community-led curation. There are more than 70 active instances of the VIVO platform across the world (https://registry.lyrasis.org/). The VIVO ontology might be used as interchange format between VIVO platforms and beyond, meaning between numerous research management systems. Data provenance can be preserved in the ontology by using annotations and data properties. Moreover, there are annotations for specifying whether some property is displayed or not, which enables integration of the validation and evaluation processes in the community-led curation. The ontology supports the evaluation, and impact assessment of individual people and groups of people. For instance, the Citation Counting and Context Characterisation Ontology (C4O) is integrated as a part of the VIVO ontology. The VIVO ontology includes a wide range of scholarly output entities such as publications, dataset, software, patents, reports, etc. Moreover, the list of VIVO classes is easily extendable with new types of outputs. Furthermore, other activities can be described in the VIVO ontology as well: teaching activities, participation in an organisation, participation in Open Science projects, mentorships, roles outside of academia, participation in Open Science courses. The VIVO ontology enables assigning PIDs to persons, organisation units and research results. Some of the supported PIDs are ORCID, ROR, and DOI. Moreover, the list of PIDs are also easily extensible in the VIVO ontology.

Shared ontologies

Previously mentioned CERIF and VIVO ontology are comprehensive and rich enough to describe complete research domain information. However, there are ontologies and models with narrower scope which usage is quite popular in research infrastructures. Also, those smaller ontologies might be included as a part of the VIVO ontology for instance. Some of them are DC (Dublin Core), FOAF (Friend of a friend), DCAT, C4O (Citation Counting and Context Characterization Ontology). Dublin Core can be used for representing research outputs. Friend of a friend can be used for describing people/researchers. DCAT can be used for describing research datasets. C4O permits the number of in-text citations of a cited source to be recorded, together with their textual citation contexts, along with the number of citations a cited entity has received globally on a particular date. Besides this ontology there is also OCO (Open Citation Ontology) related to the representation of the citations. This ontology is created by OpenCitations. OpenCitation is building the common model for representing citation information (OCDM) . Open citations are also part of transparency of science, meaning the Open Science paradigm. Information about citation might help in citation based assessment. Some tools have been built on top of OpenCitation which might help in research assessment (https://opencitations.net/tools). The OCDM also supports usage of PIDs associated with the bibliographic entities such as DOI, ORCID, PubMedID, Open Citation Identifier. On the top of the OCDM model, the OCO (Open Citation Ontology) is built. The ontology also can include provenance information by adoption of the Provenance ontology (https://www.w3.org/TR/prov-o/).

We have investigated through the survey which models, ontologies and formats for descriptions of research entities are popular across Europe and the results are present in Fig
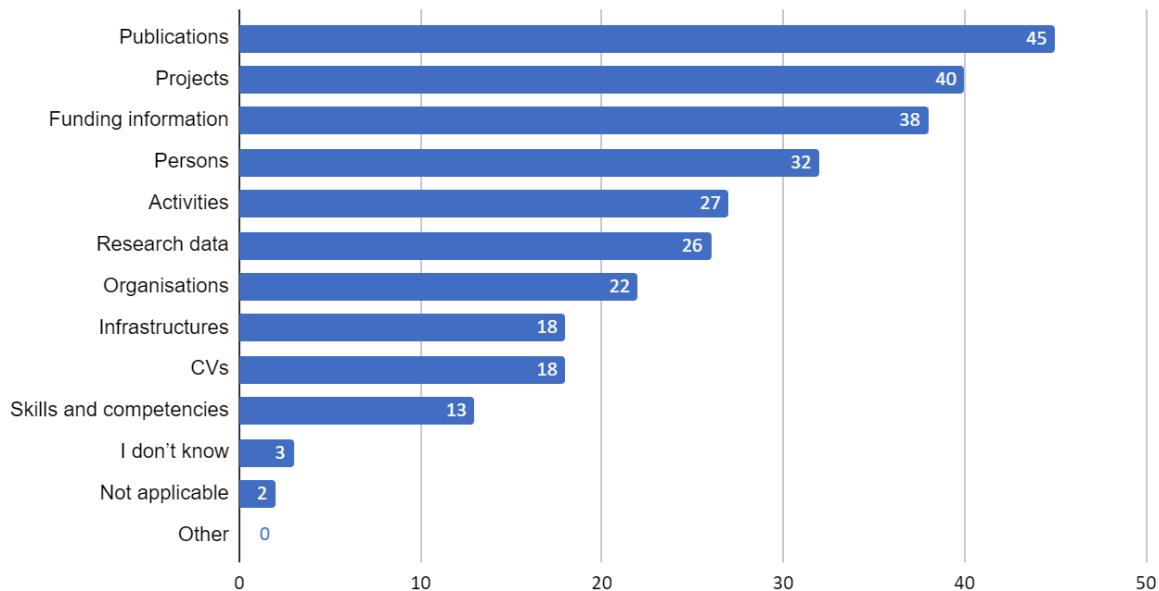
7.3. Although Dublin Core is not so comprehensive for the purpose of research assessment it looks it is quite popular probably due to its simplicity for the implementation and wide support by open source tools.
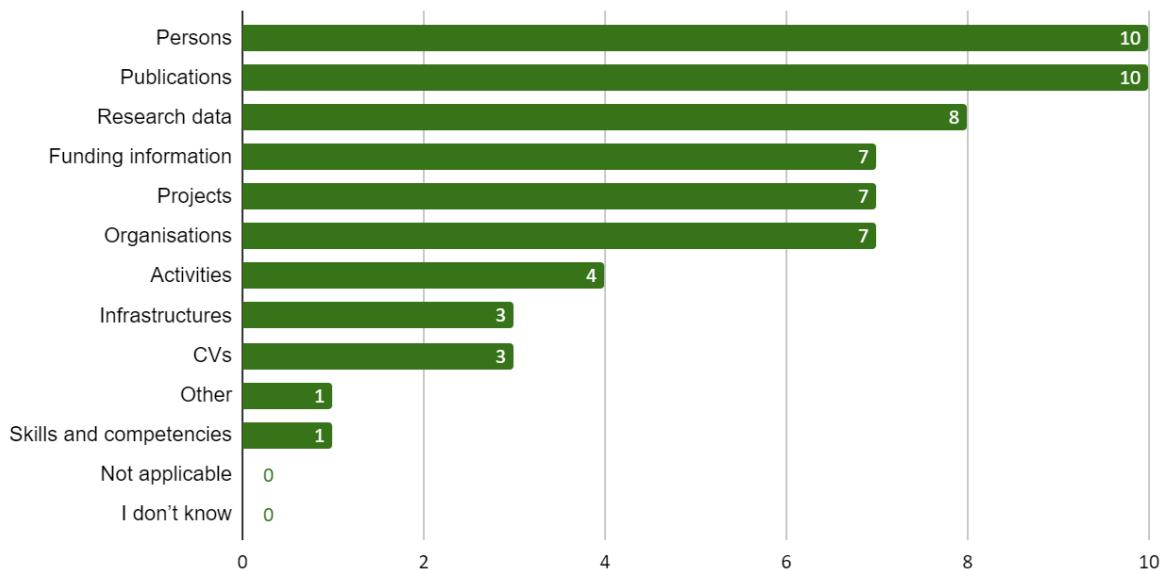
Figure 7.3 *Responses to the survey question 26 (listed above the diagram) in the global survey (above), and question 21 in the pilot institutions survey (below)*

Moreover, we also studied which research results and activity types should be represented for the needs of Open Science-aware research assessment. At the highest level of abstraction, we investigated which type of research entities might be of interest for research assessment. For the in-house solutions (local platforms) we collected the information from the survey respondents (Fig 7.4). However, we also investigate the presence of those types of research entities in global data sources, research domain models and ontologies (Table 7.2). We can notice that local data sources are better adopted for the needs of research assessment especially in the domain of Projects, Activities, Infrastructures, Skills and Competences. However, the well-known models for representation of research entities (CERIF and VIVO) are covering those entities.

25a. Which type of research entities are preserved in local data sources used for research assessment?

20. Which type of research entities are preserved in local data sources used for research assessment or monitoring?
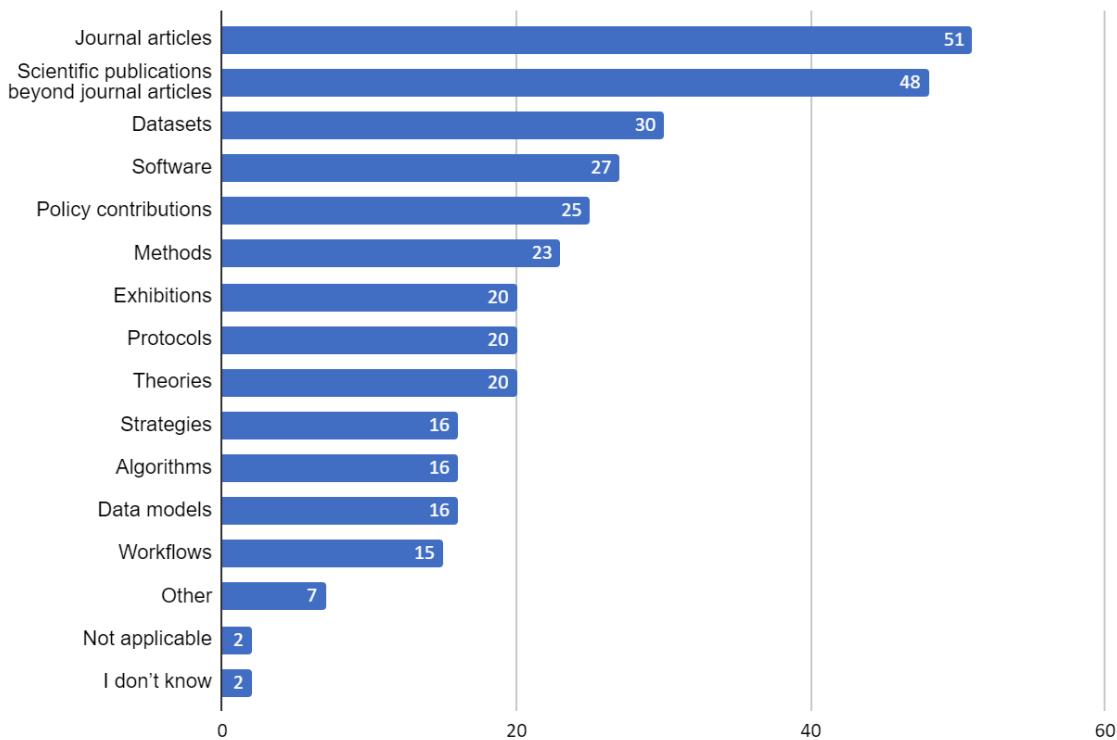
Figure 7.4 *Responses to the survey question 25a (listed above the diagram) in the global survey (above), and question 20 in the pilot institutions survey (below)*

Table 7.2 *Support for representation of research entities in global platforms and models*
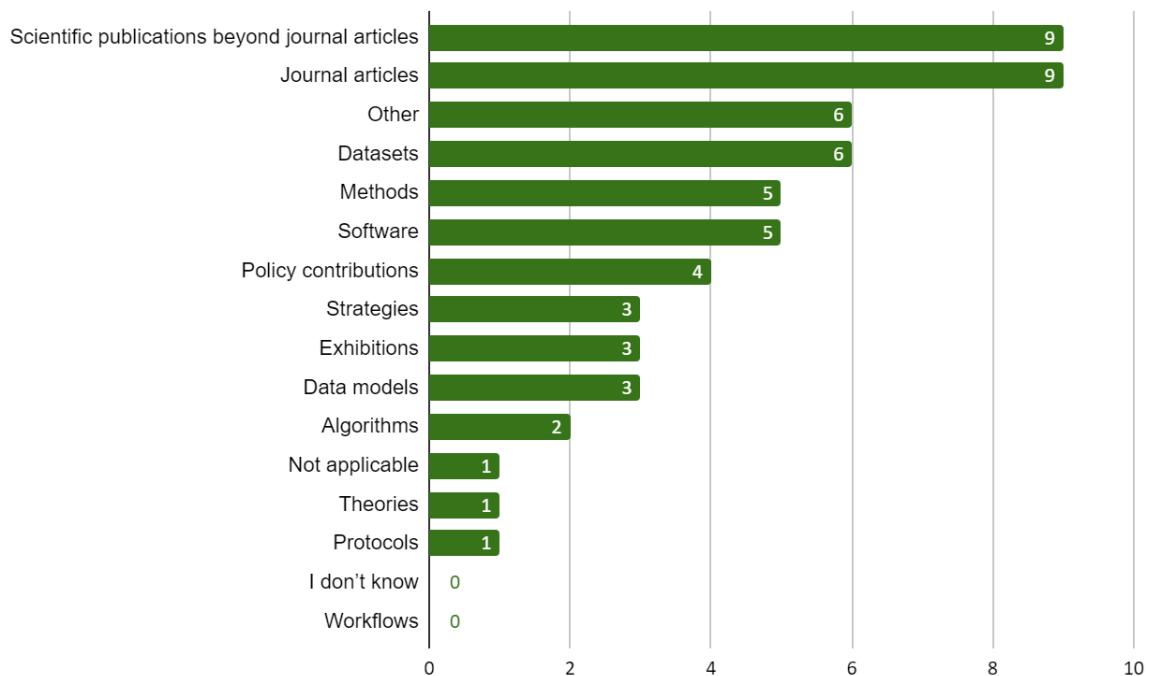
Entity type	OpenAlex	OpenAIRE	ORCID profiles	Crossref	BIP! Services	CERIF	VIVO
Publications	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Projects	No	Yes	No	No	No	Yes	Yes
Funding information	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Persons	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Activities	No	Yes	Yes	No	No	Yes	Yes
Research data	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Organisations	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Infrastructures	No	Yes	Yes	No	No	Yes	Yes
CVs	No	No	Yes	No	Yes	Yes	Yes
Skills and competences	No	No	Yes	No	No	Yes	Yes

Then, we also investigated which subtypes of research outputs (publications, research data and infrastructure subtypes) might be needed for research assessment (Fig 7.5), and supported by global research domain platforms and models (Table 7.3). Global research domain data sources are mostly cataloguing the common research outputs (journal articles, conference articles, monographs). Moreover, the importance of cataloguing research dataset is recognised and adopted by those data sources as well. However, support for other research output types should be improved (Software, Policy contributions, Methods, Protocols, Exhibitions, Theories, Strategies, Algorithms, Data models, and Workflows).

10a. What types of research outputs are taken into account in research assessment at your institution at the moment?

Research output	Count
Journal articles	51
Scientific publications beyond journal articles	48
Datasets	30
Software	27
Policy contributions	25
Methods	23
Exhibitions	20
Protocols	20
Theories	20
Strategies	16
Algorithms	16
Data models	16
Workflows	15
Other	7
Not applicable	2
I don't know	2

6. What types of research outputs are taken into account in research assessment or monitoring at your institution (or relevant stakeholders) at the moment?

Output type	Count
Scientific publications beyond journal articles	9
Journal articles	9
Other	6
Datasets	6
Methods	5
Software	5
Policy contributions	4
Strategies	3
Exhibitions	3
Data models	3
Algorithms	2
Not applicable	1
Theories	1
Protocols	1
I don't know	0
Workflows	0

Figure 7.5 *Responses to the survey question 10a (listed above the diagram) in the global survey (above), and question 6 in the pilot institutions survey (below)*

Table 7.3 *Support for representation of research output types in global platforms and models*

Output type	OpenAlex	OpenAIRE	ORCID profiles	Crossref	BIP! Services	CERIF	VIVO
Journal articles	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scientific publications beyond journal articles	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Datasets	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Software	No	Yes	Yes	No	No	Yes	Yes
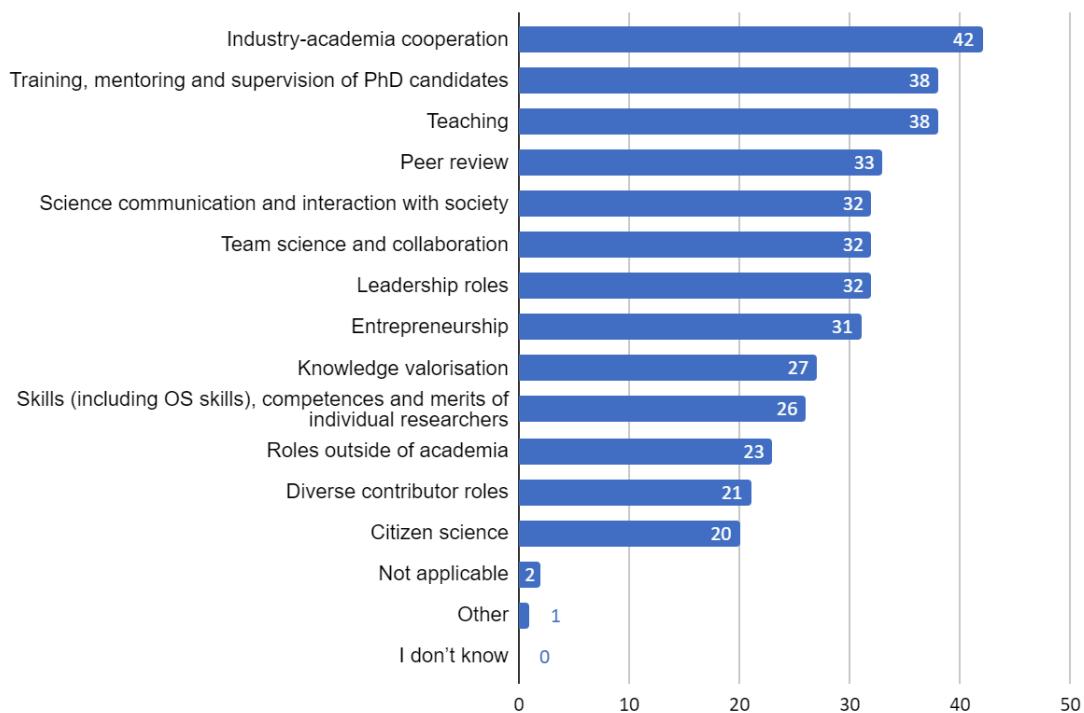
Policy contributions	No	Yes	Yes	No	No	Yes	Partially[9]
Methods	No	No	Yes	No	No	Yes	Yes
Protocols	No	No	No	No	No	Yes	Yes
Exhibitions	No	No	Yes	No	No	Yes	Yes
Theories	No	No	No	No	No	No	No
Strategies	No	No	Yes	No	No	No	No
Algorithms	No	No	Yes	No	No	No	No
Data models	Yes	Yes	No	No	No	Yes	No
Workflows	No	No	No	No	No	No	No

We also investigate other activities which might be the subject of research assessment (survey result presented at Fig 7.6), and how those activities cataloguing are supported by global research domain platforms and models (Table 4). Global research domain data sources are usually focused on research domain outputs (e.g., publications, datasets). Teaching activities are very often included in the researchers assessment (probably at Universities for the teaching positions), as well as mentorship, and cooperation with industry. The ORCID profiles, CERIF and VIVO cover quite well listed activities, practices, and roles.

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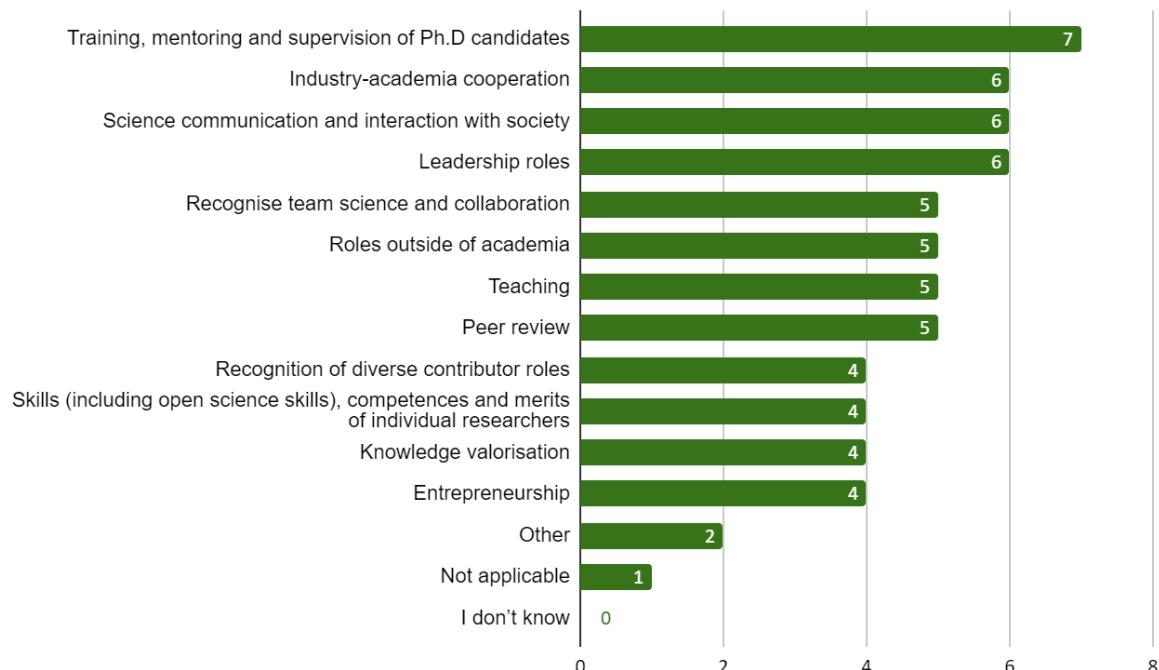
[9] legislations, and standards can be represented in the VIVO ontology

13a. What diverse research activities, practices and roles are considered in research assessment at your institution at the moment?

Activity	Value
Industry-academia cooperation	42
Training, mentoring and supervision of PhD candidates	38
Teaching	38
Peer review	33
Science communication and interaction with society	32
Team science and collaboration	32
Leadership roles	32
Entrepreneurship	31
Knowledge valorisation	27
Skills (including OS skills), competences and merits of individual researchers	26
Roles outside of academia	23
Diverse contributor roles	21
Citizen science	20
Not applicable	2
Other	1
I don't know	0

9. What diverse research activities, practices and roles are considered in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Figure 7.6 *Responses to the survey question 13a (listed above the diagram) in the global survey (above), and question 9 in the pilot institutions survey (below)*

Table 7.4 *Support for representation of other research activities and roles in global platforms and models*

Activities and roles	OpenAlex	OpenAIRE	ORCID profiles	Crossref	BIP! Services	CERIF	VIVO
Industry-academia cooperation	No	No	Yes	No	No	Yes	Yes
Training, mentoring and supervision of PhD candidates	No	Yes	Yes	No	Yes	Yes	Yes

Teaching	No	Partially[10]	Partially[11]	No	No	Partially[12]	Yes
Peer review	No	No	Yes	Yes	Yes	Yes	Yes
Leadership roles	Partially[13]	Yes	Yes	No	No	Yes	Yes
Entrepreneurship	No	No	Yes[14]	No	No	Yes	Yes
Science communication and interaction with society	No	No	No	Yes[15]	No	Patrially[16]	Partially[17]
Team science and collaboration	No	No	No	No	No	No	No
Skills, competence and merits	No	No	Yes	No	No	Yes	Yes
Knowledge valorization	No	No	Yes	No	No	Yes	Yes
Roles outside of academia	No	No	Yes	No	No	No	Yes

[10] Learning material (such as lecture) can be catalogued and linked with the author of the material

[11] Learning material (such as lecture, speech) can be catalogued and linked with the author of the material

[12] Learning material (such as course, presentation) can be catalogued and linked with the author of the material

[13] There is a role of the publication corresponding author

[14] Spin-off companies, inventions, and patents can be listed in a ORCID profile

[15] Event data can be used for assessment of "science communication and interaction with society" (twitter post' views, blog views, etc.)
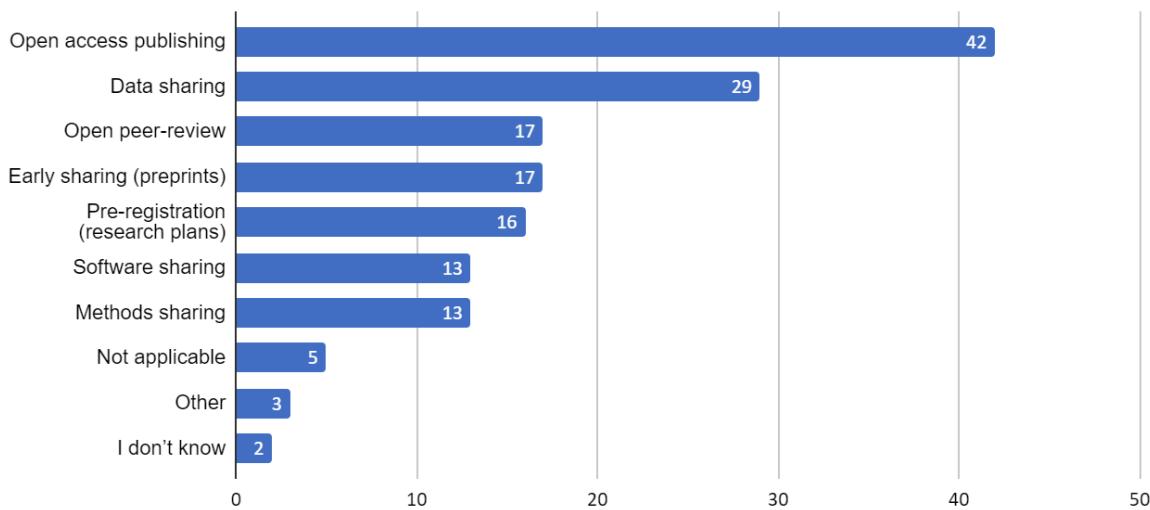
[16] Newsclipping can be represented in the CERIF data model

[17] Blogs, interviews, newsletters can be represented in the VIVO ontology

Diverse contributor roles (Data steward, software engineer, and data scientists)	No	No	No	No	Partially[18]	Yes	Yes
Citizens science	No	No	No	No	No	No	No
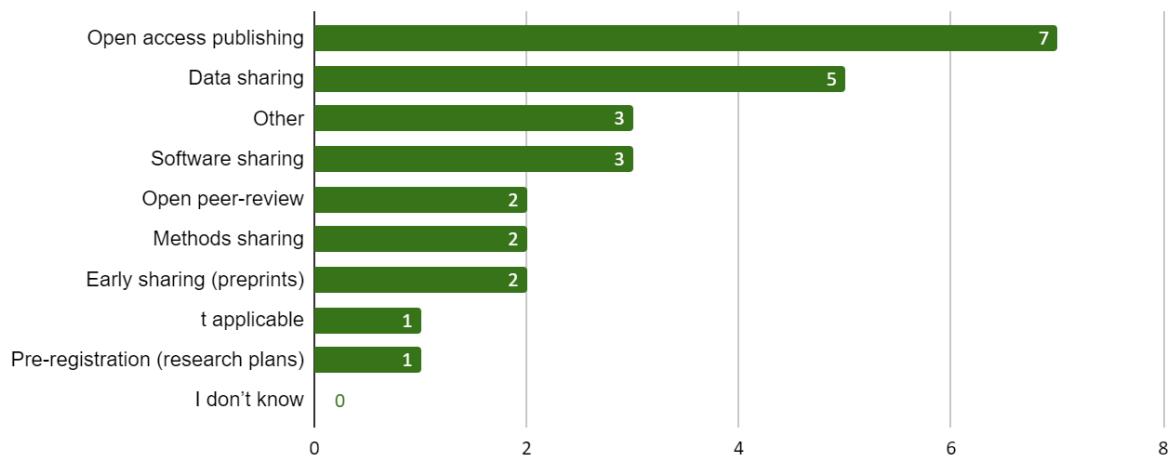
At the end, we analysed supporting Open Science results and activities within the research assessment process at the surveyed institutions (Fig 7.7). Open access to publications and research data are very often recognised in the research assessment process. Moreover, we analysed the possibility of representing those results and activities in the global data sources and research domain models and ontologies (Table 5). Flags for definition of open-access publications and datasets exist in global platforms and data models. Additionally, research domain data models support assigning licence to publication or dataset. Some platforms also support cataloguing software and services, and one of the metadata which can be assigned to a record is an open-source flag.

11a. What practises contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment at your institution at the moment?

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[18] CRediT taxonomy for contribution roles is supported which includes Data curation and Software

7. What practises contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

- Open access publishing: 7
- Data sharing: 5
- Other: 3
- Software sharing: 3
- Open peer-review: 2
- Methods sharing: 2
- Early sharing (preprints): 2
- t applicable: 1
- Pre-registration (research plans): 1
- I don't know: 0

Figure 7.7 *Responses to the survey question 11a (listed above the diagram) in the global survey (above), and question 7 in the pilot institutions survey (below)*

Table 7.5 *Support for Open Science paradigm in global platforms and models*

Element	OpenAlex	OpenAIRE	ORCID profiles	Crossref	BIP! Services	CERIF	VIVO
Open access publications	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Open research data	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Open source software	No	Yes	Yes	No	No	Yes	Yes
Other open science elements (open-science	No	No	No	Partially[19]	No	Yes	Yes

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[19] Event data collected by Crossref with additional processing can be used for this purpose

related events, courses, projects)							

7.2.2 Persistent Identifiers

Digital Object Identifier (DOI)

The DOI Foundation is a not-for-profit organisation responsible for governance of the Digital Object Identifier (DOI) system on behalf of the agencies who manage DOI registries. A DOI is a digital identifier of an object, such as a publication or a dataset. This identifier is designed to identify objects persistently, uniquely, and reliably. The DOI is designed to be both human and machine-readable and ensures persistent identification of research objects. DOIs can be used for persistently identifying e.g. authors, funding agencies, research objects and links between research objects. This unique identification of research outputs helps in organising research assessment and linking properly Open Science results with other research domain entities.

Open Researcher and Contributor IDentifier (**ORCID)**

The Open Researcher and Contributor IDentifier (ORCID) is a unique, open digital identifier that distinguishes a researcher from every other researcher with the same or a similar name. A researcher can register an ORCID iD for himself/herself free of charge and use that iD throughout his/her whole career even if name, discipline, affiliation, or country is changed. A researcher can use his/her ORCID iD in the process of submission of a manuscript, applying for a grant, or setting up an institutional profile page. The consistent use of ORCID iD enables researchers name disambiguation, and appropriate linking of researchers and other research domain entities (publications, projects, events, etc.), i.e. ORCID iDs ensure that researchers are correctly identified in the research assessment dataspace. Major manuscript submission systems, some popular CRIS systems and global academic databases support usage of ORCID iDs, as well as some research domain models and ontologies (Table 6).

Research Organization Registry Identifier (**ROR ID)**

The Research Organization Registry (ROR) is a global, community-led registry of open persistent identifiers for more than 100 thousands research organisations. Registry data is published under Creative commons licence and openly available via a search interface, REST API, and data dump. The consistent use of ROR IDs enables organisations name disambiguation, and appropriate linking of organisations and other research domain entities (researchers, publications, projects, events, etc.), i.e. ROR IDs ensure that organisations are correctly identified in the research assessment dataspace. ROR ID is the default identifier supported in Crossref and DataCite DOI metadata, and ORCID. Moreover, it is used in journal publishing systems, data repositories, funder and grant management platforms, popular CRIS

systems and global academic databases, and research domain models and ontologies (Table 6) to disambiguate institutional affiliations.

Research Activity Identifier (RAiD)

The Research Activity Identifier (RAiD) provides persistent, unique and resolvable identifiers for research activities. It is a not-for-profit service delivered by the Australian Research Data Commons (ARDC). RAiD can ensure keep track of project activities including information such as who is involved, who funded the project, what outputs they produce, and even what tools they use. It means that RAiD can ensure that research activities are correctly identified in the research assessment dataspace.

We analysed usage of PIDs in global academic data sources and research domain models (Table 7.6). DOI and ORCID are very-well recognised PIDs in the academic infrastructures. ROR ID is also adopted by the majority of platforms, although it is a question of what is a ratio of catalogued organisations with assigned ROR ID in total number of catalogued organisations. Although, RAiD is not yet widely adopted, there are some signals that might be changed in the future. This PID is included in the CERIF data model, and there is a plan to be included in the EOSC infrastructure (https://faircore4eosc.eu/eosc-core-components/research-activity-identifier-raid).

Table 7.6 Support for PIDs in global platforms and models

PID	OpenAlex	OpenAIRE	ORCID profiles	Crossref	BIP! Services	CERIF	VIVO
DOI	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ORCID	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ROR ID	Yes	Yes	Yes	Yes	No	Yes	No
RAiD	No	No	No	No	No	Yes	No

● 7.2.3 Protocols and application interfaces

REpresentational State Transfer (REST) APIs

An API is used for integrating application software. It enables client-server communication, there is the content required from the consumer (the call) and the content required by the producer (the response). A REST API is an API that conforms to the constraints of REST architectural style which defines a set of constraints for how the architecture of an Internet-scale distributed hypermedia system, such as the Web, should behave. The majority of modern applications have some API, and usually it is a JSON-like REST API. REST API enables exposing the same resource in numerous representation formats such as JSON, XML, RDF, etc. Usually, JSON representation is supported. REST API can be documented by using

OpenAPI or AsyncAPI specification. There are tools which might be used for developing and testing REST API.

Open Archives Initiative Protocol for Metadata Harvesting (**OAI-PMH)**

The Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) is a HTTP protocol for exchanging records metadata between data and service providers. It consists of six verbs and could include metadata in different formats such as Dublin Core, CERIF, ETD-MS, MARC, etc. It is widely used for the creation of a network of repositories such as OpenAIRE, NDLTD, and DARTEurope. The central node is harvesting data from the network nodes by using this protocol and provides a service based on harvested metadata.

OpenAIRE created a set of guidelines for various types of research domain data sources. Those guidelines are based on the OAI-PMH protocol, but differ in the interchange formats used within the protocol: OpenAIRE Guidelines for Literature, institutional, and thematic Repositories; OpenAIRE Guidelines for Data Archives; OpenAIRE Guidelines for CRIS Managers; Draft OpenAIRE Guidelines for Software Repository Managers; Draft OpenAIRE Guidelines for Other Research Products. For instance, OpenAIRE Guidelines for CRIS Managers is based on a CERIF profile.

Besides OAI-PMH, Open Archives Initiative also created OAI-ORE (Open Archives Initiative Object Reuse and Exchange). This protocol should enable exchange of aggregations of Web resources which may combine distributed resources with multiple media types including text, images, data, and video. It should support the changing nature of scholarship and scholarly communication in the Open Science era.

Table 7.7. presents status of implementation of the REST API and the OAI-PMH protocol by global academic data sources and research domain data models. Applications with modern software architecture usually are using REST API for exposing resources. It is also the case in the global academic data platforms which might help in integration of those platforms in a unique dataspace which might be used for Open Science-aware research assessment.

Table 7.7. Support for protocols in global platforms and models

Platforms/models	REST API	OAI-PMH
OpenAlex	Implemented - https://docs.openalex.org/	Not supported
OpenAIRE	Implemented - https://graph.openaire.eu/develop/api.html	Supported for harvesting from different sources - https://guidelines.openaire.eu/en/latest/ , and for exporting metadata - http://195.134.66.145/documentation/src/oai-pmh.html

ORCID profiles	Implemented - https://info.orcid.org/documentation/features/public-api/	Not supported
Crossref	Implemented - https://www.crossref.org/documentation/retrieve-metadata/rest-api/	Supported - https://www.crossref.org/documentation/retrieve-metadata/oai-pmh/
BIP! Services	Partially implemented - https://bip.imsi.athenarc.gr/site/data	Not supported
CERIF	Specified only for XML representation - https://dspacecris.eurocris.org/bitstream/11366/398/3/CERIF_REST_API_Specification_v1.0.pdf	Supported as a representation format - https://openaire-guidelines-for-cris-managers.readthedocs.io/en/v1.1.1/
VIVO	Under development - https://github.com/orgs/vivo-project/projects/2	Not supported
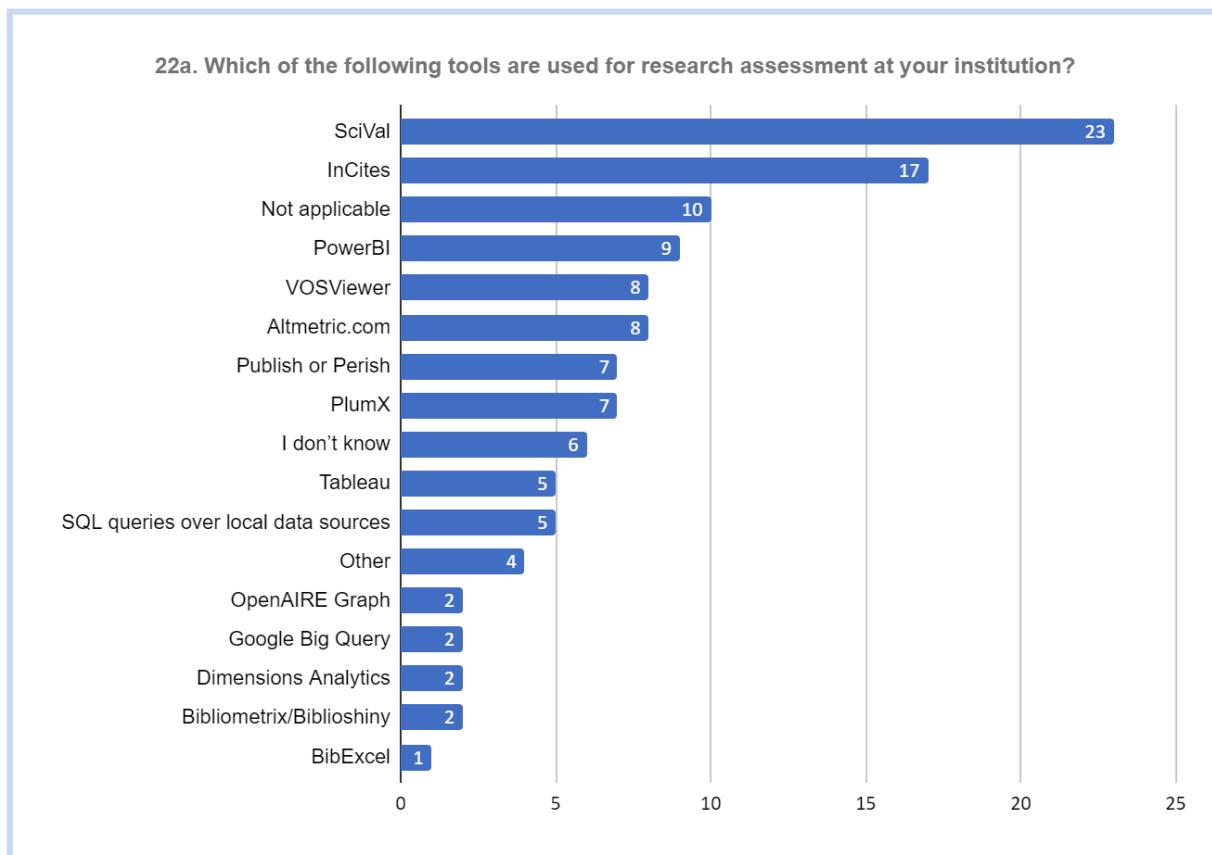
● 7.3 Services and tools
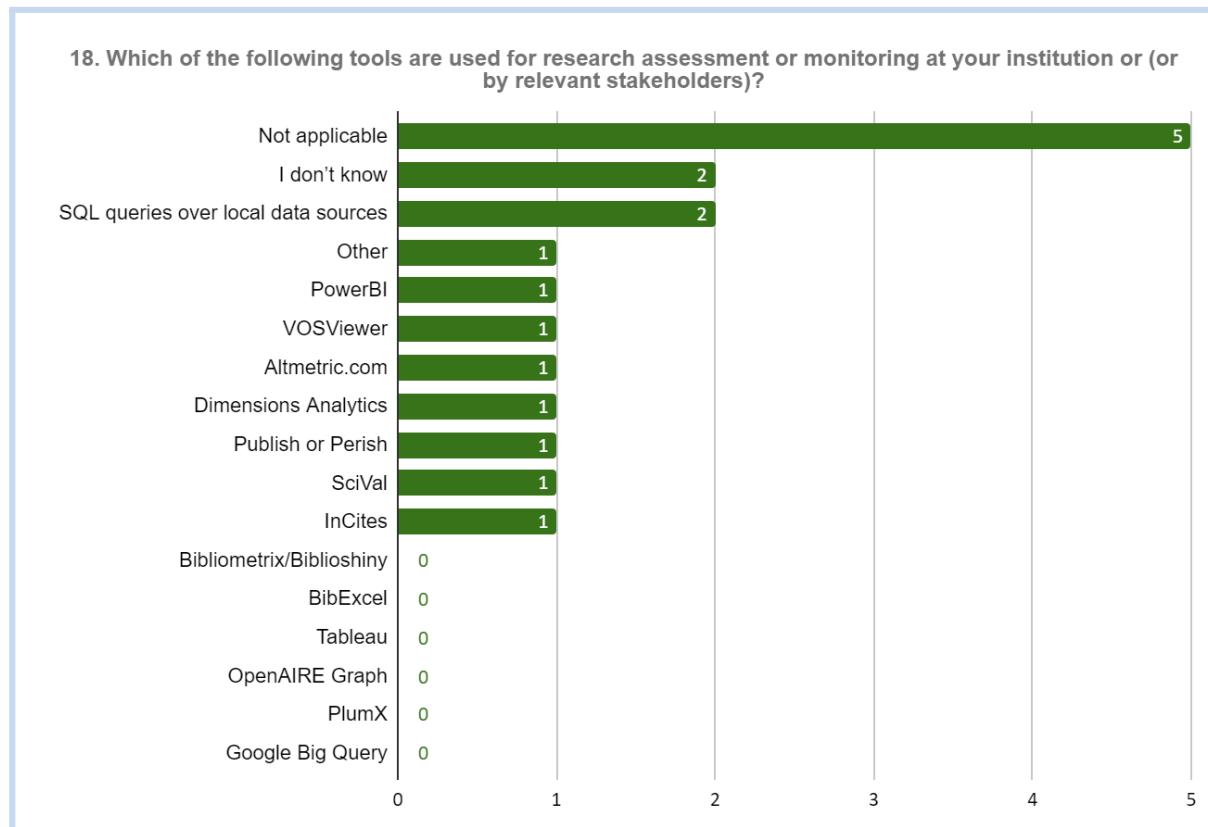
There are numerous platforms which might help in the research assessment. Those platforms (web services or tools) might offer enrichment of research assessment data sources, provide altmetrics and other research assessment indicators, or offer reporting and monitoring. Some of those services and tools will be briefly listed here, while a more in-detail overview of research assessment services and tools will be presented in D3.1 of this project.

- OpenAIRE broker - enables content providers (repositories, CRIS systems, aggregators, knowledge graphs, publishers) to enrich content with additional metadata.
- OpenAIRE observatory - enables better understanding of the European open research landscape, tracking trends for open access to publications, data, software, revealing hidden potential on existing resources, and monitoring open collaboration patterns.
- OpenAIRE monitor - enables research institutions to make dashboards populated with well-documented metrics and indicators of their research activities.
- ScholeXplorer - populates and provides access to a graph of links between dataset and literature objects and dataset and dataset objects.
- PlumX (Elsevier) and Altmetric (Digital Science) widgets can be used for getting metrics about the impact of academic work beyond the academic community

- SciVal (Elsevier), InCites (Clarivate), and VOSviewer enable visualisation of research performance, analysing institutional productivity and research trends, and monitoring collaboration activity.

Fig 7.8 depicts the usage of tools for research assessment. As it was already mentioned above a more in-depth analysis will be presented in the Deliverable 3.1 of this project.

22a. Which of the following tools are used for research assessment at your institution?

Tool	Value
SciVal	23
InCites	17
Not applicable	10
PowerBI	9
VOSViewer	8
Altmetric.com	8
Publish or Perish	7
PlumX	7
I don't know	6
Tableau	5
SQL queries over local data sources	5
Other	4
OpenAIRE Graph	2
Google Big Query	2
Dimensions Analytics	2
Bibliometrix/Biblioshiny	2
BibExcel	1

18. Which of the following tools are used for research assessment or monitoring at your institution or (or by relevant stakeholders)?

Tool	Value
Not applicable	5
I don't know	2
SQL queries over local data sources	2
Other	1
PowerBI	1
VOSViewer	1
Altmetric.com	1
Dimensions Analytics	1
Publish or Perish	1
SciVal	1
InCites	1
Bibliometrix/Biblioshiny	0
BibExcel	0
Tableau	0
OpenAIRE Graph	0
PlumX	0
Google Big Query	0

Figure 7.8 Responses to the survey question 22a (listed above the diagram) in the global survey (above), and question 18 in the pilot institutions survey (below)

● 8. Conclusions

The GraspOS Landscape analysis and report provides an overview of state of the art assessment frameworks, information, tools, and policies, relevant projects and networks, community-led curation and annotation practices, and existing open science evaluation practices, tools and platforms. Analysis is based on desk research and two surveys, one addressed to nine GraspOS pilots (Annex 2) and another to research performing and funding organisations with 54 respondents from 19 European countries (Annex 1).

Feasibility of the GraspOS project

A lot of care was taken in the planning of the GraspOS project to include nine pilots that represent relevant and different assessment contexts and challenges to ensure that the assessment protocols, data and experiences are useful for a broad range of other institutions reforming research assessment. The two surveys conducted for the landscape analysis show that the situation and challenges of the nine GraspOS pilots via-à-vis CoARA Agreement and assessment practices are indeed very similar compared to the 54 Landscape survey participants from 19 European countries:

- Both groups mainly rely on expert-assessment informed with metrics (often including those based on author or venue) but have not yet fully embraced the use of narrative CV for qualitative input.
- While relying as information sources on commercial databases and local systems, they have not yet found ways to recognize the full diversity of contributions and aspects of inclusion.
- The report findings also underscore the need for development of open and interoperable infrastructure, data and tools to support assessment of diverse contributions, activities and open science practices.

Further use of the landscape analysis by GraspOS project

The most frequently mentioned barriers to research assessment reform (by both nine pilots and 54 landscape survey participants) are complexity, such as resulting from different national and disciplinary practices, and increased costs due for example in terms of skilled staff and support structures. It also emerges from the surveys that major implementation obstacles for OS-aware assessments include limited use of narrative CV/self-assessment portfolios for qualitative input, as well as limited recognition and coverage in global and local data sources of the full range of diverse research outputs, open science practices, and academic activities and roles.

By identifying common open science assessment practices, qualitative and quantitative data priorities, and associated implementation obstacles, the main goal of this report is to support the development of the WP2 Open Science Assessment Framework (OSAF) in collaboration with pilot participants (WP5) and Community of Practice (CoP) experts (WP6). The report provides relevant information also to WP3 (Tools and services to support OS-aware RRA), WP4 (Federated Open Metrics Infrastructure), and WP6 (Community, engagement, and exploitation). WP2, WP3, WP4 and WP5 may especially consider the following recommendations as regards requirements and data priorities:

1. Align assessment practices with the Responsible Research Assessment agenda by using the SCOPE model and CoARA Agreement commitments as a starting-point but also consider a broader range of assessment policies and recommendations (see Chapter 5 and table 5.2, especially tables 5.2, 5.4 and 5.5).
2. Pay special attention to the responsible use of metrics to support expert assessment (as outlined in the Leiden manifesto and the Metric tide report, table 5.4) taking into account the level of assessment (individual, unit, institution) (Figure 2.1).
3. Improve input and structure of qualitative information in assessments by using narrative CV templates or self-assessment portfolio (chapter 6.2, especially Résumé for Researchers and ACUMEN portfolio).
4. Focus efforts to produce and use qualitative and quantitative information for assessments on diversity of outputs (not just scientific publications), open science practices (not just open access), practices contributing to inclusiveness (not just fields and career-stage), as well as activities and roles (see table 5.3 and chapter 6.1.2).

The data from two surveys and the corpus of 1,152 RRA statements extracted from 98 policies can also be further exploited by the GraspOS project (especially WP2 and WP6) to develop analyses, training materials, toolkits, and presentations.

Research assessment frameworks and policies

An analysis of 98 policies and 1,152 related statements from 1994 to 2023 highlights the fast-paced growth and intricacy of responsible assessment policies. This landscape's escalating complexity probably contributes to the perceived challenge of research assessment reform, despite the convergence in principles and recommendations.

The GraspOS landscape survey underscores the relevance of the European Charter for Researchers, the CoARA Agreement, DORA, as well as the national and institutional assessment policies for European organisations. These policies, together with the EU Council conclusions (on Research assessment and the implementation of Open Science), the Leiden Manifesto, the Helsinki Initiative, the Hong Kong principles and SCOPE, along with national policies from the Netherlands, Finland, and Norway, provide a broad overview of RRA principles and aspects for the development of OSAF and pilot assessment protocols.

RRA involves openness, reproducibility, transparency of assessment data and criteria, balancing diverse methodologies, rewarding Open Science, recognising academic diversity, and differences between fields. Diversity, here, is connected to research outputs, practices, and roles. It's vital to also consider potential bias and disadvantage-causing factors in assessments, like field, interdisciplinary or applied research orientation, career stage, EDI dimensions, and language.

Quantitative and qualitative data priorities

Combining quantitative and qualitative methods is a typical trend in research assessments. Almost every source highlights the supporting character of quantitative metrics, which can be utilised to provide evidence to a narrative description.

Quantitative indicators should be selected from widely used and easily understood metrics to ensure the transparency of the process and the appropriate use of indicators. Metrics also need to be applied at the correct scale of the subject of investigation.

Both quantitative and qualitative forms of research assessment have their benefits and limitations. Depending on the context, the value of different approaches must be considered and balanced.

Applying metrics to individual researchers should be avoided, particularly those that do not account for individual variation or circumstances. The misuse of quantitative indicators and metrics can lead to gaming and unintended negative results. However, quantitative data, particularly on published outputs, continue to be useful especially in the assessment of research at the national and field level. Reported obstacles related to qualitative methods include that native speakers are at an advantage in producing narrative descriptions and secondly, more time and better expertise are required to handle narrative CVs compared to a traditional CV

Infrastructures

Data used in the research assessment might come from numerous research domain infrastructures (local or global) and interoperability between those infrastructures might be improved by standardisation of cataloguing formats and practices, wide adoption of persistent identifiers (DOI, ORCID, ROR ID, RAiD), and definition of protocols and application interfaces for exchanging information. Applications with modern software architecture usually are using REST API for exposing resources which is also the case in the research domain data platforms. After alignment of used cataloguing formats and practices, as well as wide adoption of persistent identifiers, available REST APIs might enable integration of those platforms in a unique dataspace which might be used for Open Science-aware research assessment.

There is discrepancy between elements needed for the purpose of Open Science-aware research assessment and available information in research domain infrastructures. A researcher's or organisation's Open Science contributions can be recognised by publishing publication and research dataset in the open access mode. Global research domain platforms and data models allow assigning flags for definition of open-access publications and datasets. Some platforms also support cataloguing software and services, and one of the metadata which can be assigned to a record is an open-source flag. Moreover, some platforms support assigning licence to a publication, dataset or software. However, capturing information about participation or organisation of Open Science related courses, events or projects, leadership in Open Science, such as transforming a journal to OA should be improved in the available infrastructure.

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● **Annexes**

● Annex 1. GraspOS landscape survey on Reforming Research Assessment

Key takeaways
- GrapsOS landscape survey provides a panorama of Responsible Research Assessment (RRA) practices in 54 organisations, mainly universities (41) and research

centres (6), from 19 European countries (one-half from Finland (9), Czechia (8), Denmark (5) and Romania (5)).

- Vast majority of organisations conduct assessments at individual and institutional levels, and see research assessment as a strategic priority to align with the RRA agenda and to improve recognition of open science practices.
- Over 70% of the respondent organisations had signed the Agreement for Reforming Research Assessment. Other most frequently mentioned assessment policies (by around 50% of organisations) include the European Charter for Researchers, DORA, and national and/or institutional assessment policies.
- Sharing good practices in recognition of diverse contributions is much needed. The GraspOS Landscape survey organisations face very similar challenges in recognising diversity of outputs, open science practices, practices contributing to inclusiveness, as well as activities and roles in assessments
  - Almost all organisations consider scientific publications - journal articles (94%) and other formats (84%) - and more than half include datasets, software, policy contributions and methods, whereas exhibitions, protocols, theories, strategies, algorithms, data models and workflows are recognized by 27-37%.
  - Most frequently considered open science practices are open access publishing (78%) and open data sharing (54%) but open peer review, preprints, pre-registrations as well as the sharing of methods and software are included by 24-31%.
  - Most organisations take field and career-stage into account in assessment (75.9% and 72.2% respectively), around 60% consider research types, interdisciplinarity, gender balance and the language diversity, and 41% address inter-sectoral work and 31% EDI dimensions.
  - Over 70% of the organisations consider industry-academia cooperation, training, mentoring and supervision roles as well as teaching activities, and around 60% include peer review, science communication and interaction with society, team science and collaboration, leadership roles and entrepreneurship. At least 37% recognized knowledge valorisation, skills, competences and merits of individual researchers, roles outside of academia, diverse contributor roles and citizen science.
- There is an urgent need to understand what responsible use of metrics means. Expert assessment informed with metrics was by far the most preferred method of assessment (76% of organisations), while only few respondents - most of whom were research organisations - use only metrics or peer-review. The majority of organisations also make some use of author-based metrics (77.8%) and/or metrics relating to publication venues (57.4%).
- Only 5 organisations (9%) indicated using university ranking in assessment, while 61% paid some attention to them, which may or may not affect assessment.
- The ways for including qualitative input in assessments differed considerably between organisations, 58% using some form of self-assessment and 43% a

structured CV. The use of narrative CV, competency-based CV or Evidence-based CV, or impact stories and case narratives, is still relatively rare (31.5%).

- Complexity (e.g. different national and disciplinary practices) is the most frequently mentioned barrier to research assessment reform (61% of the organisations), followed by concerns over increased costs (46.3%). Signatories of CoARA Agreement are more concerned about resistance from researchers, limited awareness of the reform and lack of evidence on its potential benefits, while implementation problems are more important to non-signatories.

- There is a need to accelerate the development of open science infrastructure for supporting assessments. The vast majority (82%) of the organisations relied on commercial Web of Science (WoS) and Scopus databases, and almost all use both. Other global sources are less frequently used: Google Scholar (43%), ORCID (41%), Crossref (17%), OpenAIRE (15%), Dimensions (11%), Scite, Open citations, Core (6%), OpenAlex (4%) and Lens (2%).

- The most frequently used tools are SciVal and InCites by these same commercial WoS and Scopus providers. Plethora of other tools, including for example PowerBi and VOSViewer, are mentioned by 2-17% of the organisations.

- The main solutions for community-curated information supporting research assessments are provided by local repositories and the Current Research Information Systems (CRIS) used by 57% and 48% of organisations respectively. The majority of organisations (76%) have a local publication repository and/or CRIS, and 70% of organisations use local datasource in addition to WoS and/or Scopus.

- Local CRIS and repositories require further development to support recognition of the full diverse range of contributions. Local data sources used by respondent organisations cover most frequently publications, followed by projects, funding and persons. Activities, research data and infrastructures are somewhat less common entities in the local systems, and CVs, activities, skills and competences are less frequently registered.

Federation of Finnish Learned Societies (TSV) conducted this survey during May 2023 for the landscape analysis of EU project GraspOS. The purpose of the survey was to gain overview of the state-of-the-art research assessment practices at the research performing and funding organisations, and other organisations involved with research assessment, who already are, or could become, signatories of the Agreement on Reforming Research Assessment. The landscape report supports the development of OSAF.

The questionnaire was structured based on CoARA core-commitments and principles. The Agreement on Reforming Research Assessment sets a shared direction for changes in assessment practices for research, researchers and research performing organisations, with the overarching goal to maximise the quality and impact of research. The Agreement includes

the principles, commitments and timeframe for reforms and lays out the principles for a Coalition of organisations willing to work together in implementing the changes.

The survey was conducted online using the LimeSurvey tool. Our target audience for the survey were individuals who are responsible for policies and criteria for research assessment in their institutions. The respondents were guaranteed confidentiality of the shared information. The questionnaire included 27 questions concerning the respondents' background, assessment policies, criteria and practices, as well as practices and sources of information used to support assessments. Answering the survey was estimated to take around 20 to 30 minutes.

The survey was launched on the 11 of May 2023 on the GrapsOS website. Representatives of the organisations that are or could become signatories of the Agreement of Reforming Research Assessment were invited to respond to the questionnaire by May 28th, 2023. Invitations to answer the survey were disseminated both in the social media and by email to targeted stakeholders. The deadline was extended until 29 May upon request from potential respondents. A total of 54 full submitted responses were received.

Background of respondents
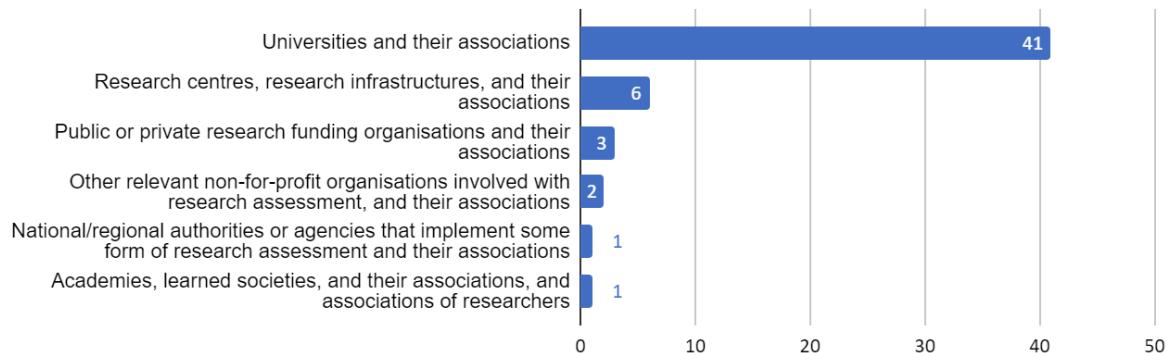
1. At which type of institution do you work?

The respondents represent predominantly higher education institutions. While all types of potential CoARA signatories are represented among the 54 respondents, the vast majority (87%) represent institutions that perform research, including 41 universities and their associations, and 6 research centres, research infrastructures and their associations. Only 7 respondents represent research funding organisations and other institutions related to assessments.
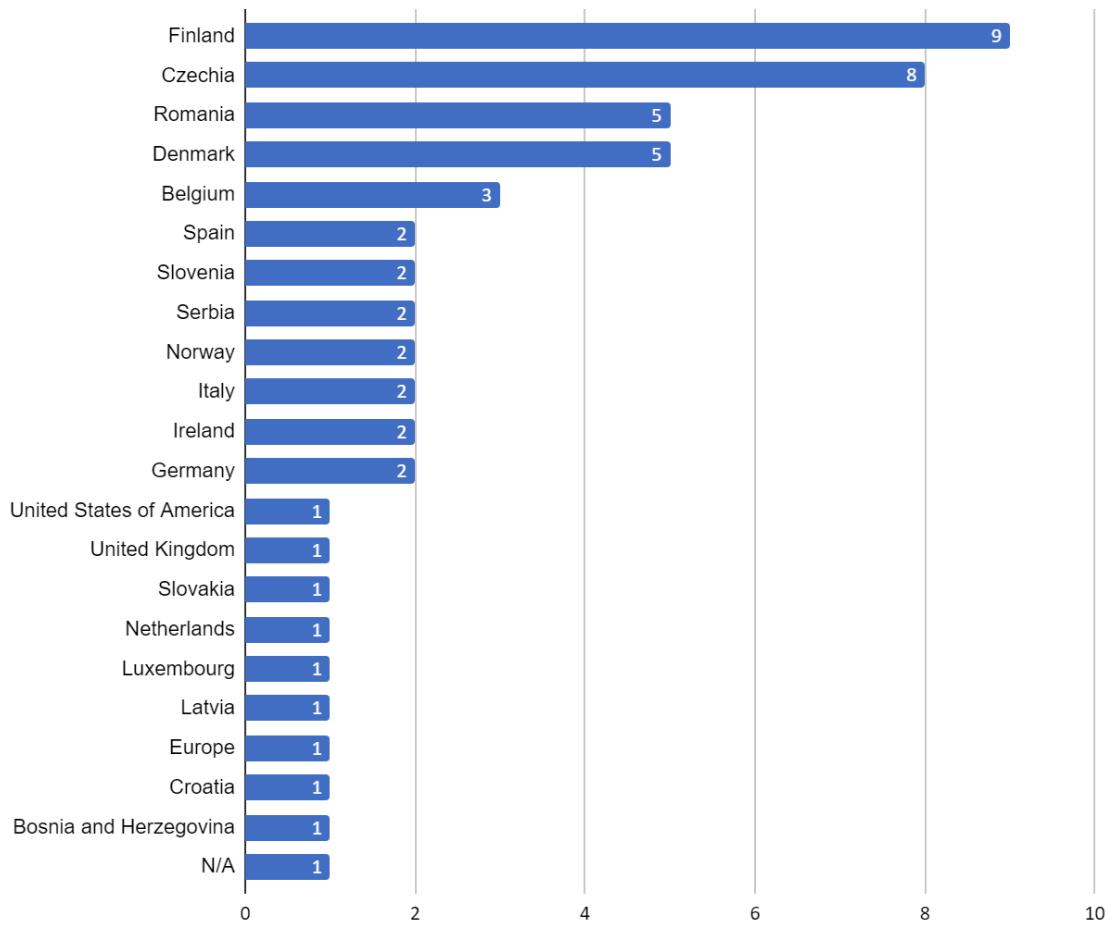
2. Where is your institution located?

Almost all respondents (96.3%) come from European institutions, as only 1 respondent did not indicate the country and one is based in the United States. One of the respondents is a European level organisation, whereas the other respondents come from 19 different countries in Europe. One-half (50%) of the respondents come from four countries: Finland (9), Czechia (8), Denmark (5) and Romania (5). There are also 3 respondents from Belgium, 2 respondents from Germany, Ireland, Italy, Norway, Serbia, Slovenia, and Spain, and 1 respondent from Bosnia and Herzegovina, Croatia, Latvia, Luxembourg, Netherlands, Slovakia, United Kingdom, and United States of America.

1. At which type of institution do you work?

Institution type	Count
Universities and their associations	41
Research centres, research infrastructures, and their associations	6
Public or private research funding organisations and their associations	3
Other relevant non-for-profit organisations involved with research assessment, and their associations	2
National/regional authorities or agencies that implement some form of research assessment and their associations	1
Academies, learned societies, and their associations, and associations of researchers	1

2. Where is your institution located?

Country	Count
Finland	9
Czechia	8
Romania	5
Denmark	5
Belgium	3
Spain	2
Slovenia	2
Serbia	2
Norway	2
Italy	2
Ireland	2
Germany	2
United States of America	1
United Kingdom	1
Slovakia	1
Netherlands	1
Luxembourg	1
Latvia	1
Europe	1
Croatia	1
Bosnia and Herzegovina	1
N/A	1

3a. What are your professional responsibilities related to research assessment at your institution?

The respondents are in a good position to know the assessment practices at their institutions. Almost all respondents have responsibilities related to at least one of the following: CoARA signatory or point of contact, assessment policies and coordination, criteria and methods, data and analysis, or assessment tools and systems. The 4 respondents who did not identify themselves with any of the predetermined roles, include head of a research group, potential signatory of the agreement, Open Science coordinator and vice-rector for science, research and PhD study.

3a. What are your professional responsibilities related to research assessment at your institution?

Responsibility	Value
Member of body, group or unit in charge of assessment policies and coordination	27
Member of body, group or unit in charge of assessment criteria and methods	26
Member of body, group or unit in charge of assessment data and analytics	22
Registered CoARA Point of Contact for my organisation	21
Signatory of The Agreement on Reforming Research Assessment	19
Member of body, group or unit in charge of assessment tools and systems	13
Other	8

4a. At which level are research assessments performed at your institution?

The majority of respondent organisations perform assessments on individual researchers and groups (44) or engage in assessment of institutions (38). Given that respondents represent mainly research organisations, assessment of funding applications or fields are less frequent, and only few respondents perform country level assessments. Also departments and programmes were mentioned.

4a. At which level are research assessments performed at your institution?

Level	Value
Individual researchers or research groups	44
Assessment or monitoring of the institution as a whole	38
Applications for funding	28
Research fields	23
Assessment or monitoring of entire countries or other large geographical areas	3
Other	3
Not applicable	3
I do not know which types of assessment or monitoring is performed	0

Responsible assessment policies

5a. Research evaluation at your institution is linked to
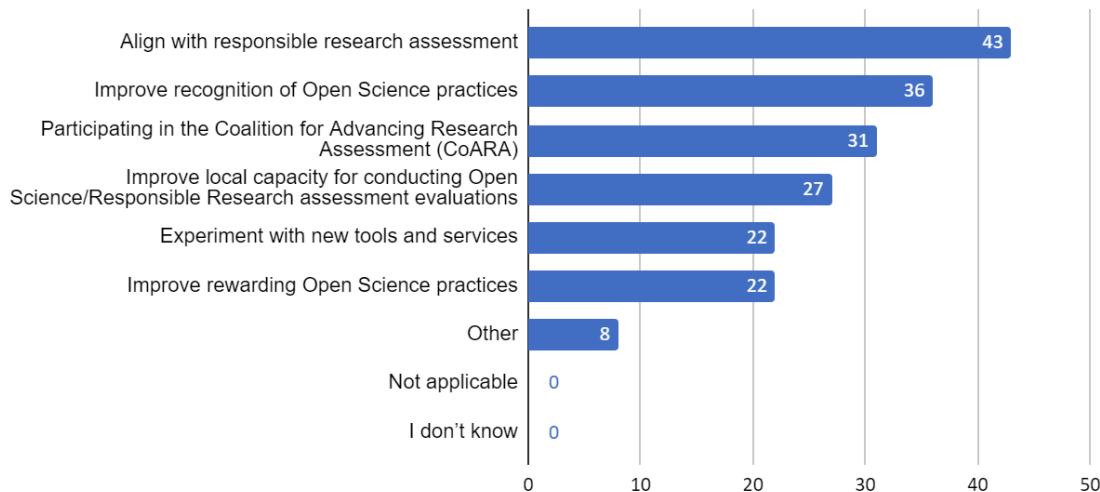
In most institutions (75.9%), research assessment is linked to strategic priorities. In many institutions, research assessment is also linked to policies on research evaluation (61.1%), hiring and promotion (57.4%), mission statement (51.9%) or evaluation principles (50%). Link to collective values is more rarely indicated (25.9%). Links are also indicated to government policies, internal learning and improvement, and revenue.

6a. What are the underlying motivations for reforming the research assessment at your institution?

Assessment reform is motivated in 79.6% of the respondent institutions by alignment with the Responsible Research Assessment movement (in case 57.4% participation in CoARA). In addition, 66.7% of the organisations aim at improving recognition of open science practices, while 40.7% look to improve rewarding OS and experimenting new tools and services. Other underlying motivations include contributing to a broader and more equitable, diverse and inclusive research culture, and improving the conditions and prospects for early-career researchers, and moving away from narrow indicators to considering diversity of outputs and whole academic portfolios. Also obtaining projects, reputation and revenue was mentioned.

6a. What are the underlying motivations for reforming the research assessment at your institution?

Align with responsible research assessment	43
Improve recognition of Open Science practices	36
Participating in the Coalition for Advancing Research Assessment (CoARA)	31
Improve local capacity for conducting Open Science/Responsible Research assessment evaluations	27
Experiment with new tools and services	22
Improve rewarding Open Science practices	22
Other	8
Not applicable	0
I don't know	0

7. Has your organisation signed the Agreement of Reforming Research Assessment?

The respondents show relatively strong commitment to changing assessment culture. The majority of the respondent organisations (38, 70.3%) had signed the Agreement on Reforming Research Assessment, and one organisation had decided to sign (in other responses one organisation indicated that it is planning to consider signing). Three organisations had considered signing but decided not to, and one organisation indicated in category "other" that it had decided not to sign individually but is an implicit signatory via university alliance. 5 respondents were not sure if their organisation had signed.

7. Has your organisation signed the Agreement of Reforming Research Assessment?
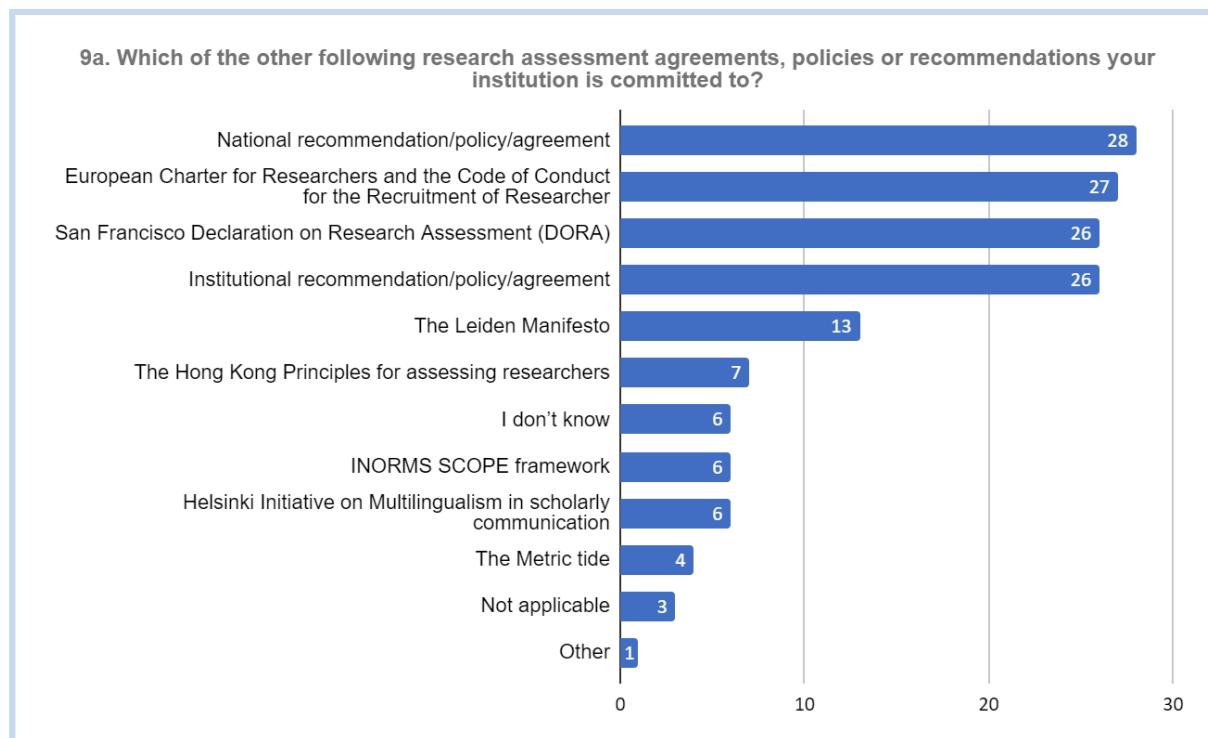
Yes	38
No, we didn't consider that yet	5
I don't know if my organisation has signed or consider signing the agreement	5
No, we considered and decided not to sign	3
Other	2
No, we considered and decided to sign the agreement	1

8. What were the main reasons why your institution decided to sign the agreement or not to sign it?

Free text responses:

- The necessary transition to responsible research evaluation, the need for increase of collaboration with the international community, support in responsible evaluation implementation efforts. The enthusiasm as well...
- The problems identified with regard to the publication culture itself and the underlying merit criteria both within universities (position) and within foundations and research councils (funding) are significant and should be addressed. [Organisation name] is a LERU remember and we benefit from discussions within this and other university alliances.
- The university management has not been sufficiently informed about this possibility yet.
- [Organisation name] is committed to the national-level recommendation of researcher evaluation which provides us with a framework of good practices. We have been developing our operation and processes in terms of researcher evaluation in accordance with the good practices of the national recommendation. This work continues. It is also in line with our strategic goal to strengthen the attractiveness of academic education and careers.
- To accelerate and promote Responsible Research Assessment.
- To follow the general guidelines of responsible research.
- To participate in the international development in the area. To boost the development and process internally. Because the agreement is in line with ongoing developments at the national level. Because we are dependent on this development occurring at the international level, not only nationally.
- We agree fundamentally with the principles and ideas underlying the agreement
- We agree with the principles and are committed to playing our part in making sector-wide changes.
- We already signed DORA and started to implement it. CoARA was a logical next step.
- We are already aligned with the principles, and felt that signing the agreement was a natural step.
- "We did not sign yet for several reasons. The main and first reason is for internal reasons: The university is currently very much occupied with its application for the national excellence strategy and the development of the University's strategy. To implement the reform resources, time and the commitment of large parts of the university would be needed. For the moment the capacities are bound elsewhere.
- Second: The criteria for what qualifies as "excellent research" change within the reform. Implementing such a softer concept of excellent research could weaken the research output as such.
- We signed because we connect to some of the principles in the agreement and because it is a good opportunity for inspiration now that we are implementing a new indicator.
- We will decide to sign the agreement because we want to implement the changes, working together with researchers and research performing organisations from other countries.

9a. Which of the other following research assessment agreements, policies or recommendations your institution is committed to?

While 38 respondents had signed CoARA agreement, organisations show lesser degree of commitment to most other assessment related policies. In addition to the European Charter for Researchers and DORA, national and institutional assessment policies are mentioned by 26-28 respondents (around 50%). All other policies, including the Leiden manifesto and the Hong Kong principles, are indicated less frequently.

Some respondents described their responses further:

1. Could be some other, too, but I do not know which.
2. National and institutional policies for now do not meet the European recommendations for assessing researchers. Those policies rely on open science in general.
3. The indication of research assessment agreements, policies or recommendations in the Q 9a means that [organisation name] unit that is in charge of evaluation procedures is committed to these best practices principles. It does not mean that these values are shared collectively by the whole institution (senior management, faculty management, researchers).
4. [Organisation name] is committed to the national-level recommendation of responsible researcher evaluation [link removed] as a member of The League of European Research Universities (LERU) network,[organisation name] is committed to A LERU Framework for the Assessment of Researchers:

https://www.leru.org/publications/a-pathway-towards-multidimensional-academic-careers-a-leru-framework-for-the-assessment-of-researchers
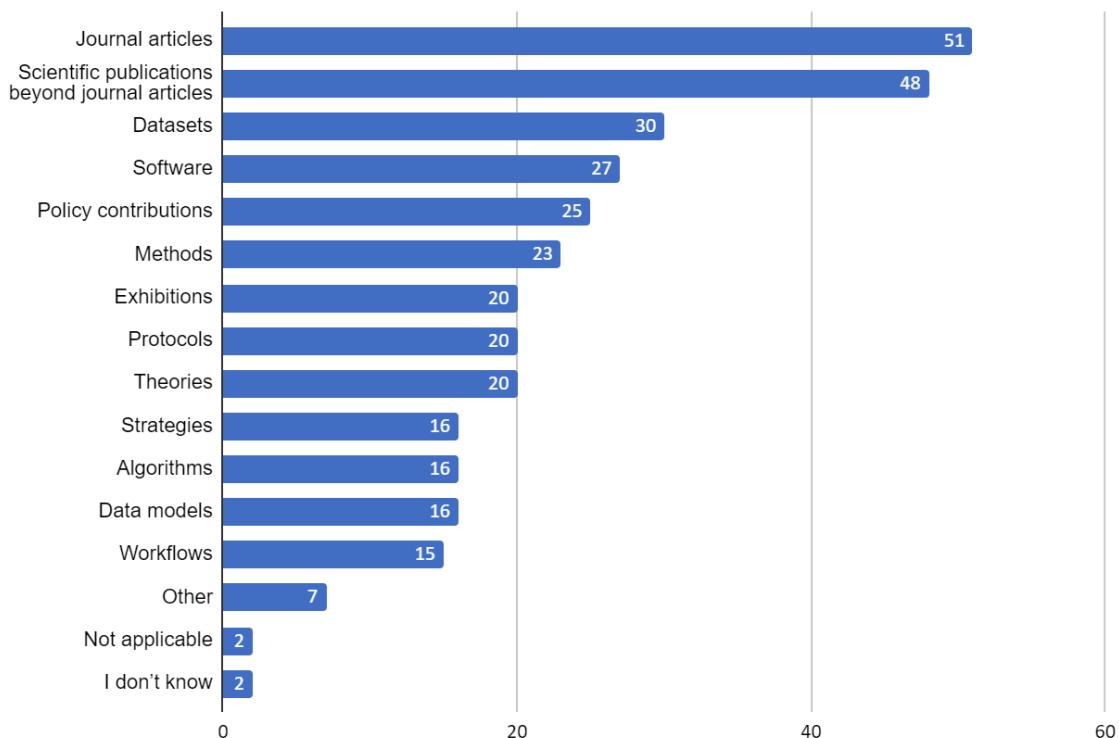
5. We care about multilingualism and it's embedded in our institutional RRA policy but we aren't a formal signatory to the Helsinki Agreement (if that's even possible?).

Responsible assessment practices

10a. What types of research outputs are taken into account in research assessment at your institution at the moment?

Practically all respondents organisations consider in assessments journal articles (94%) as well as other scientific publications (84%) . The diversity of research output beyond scientific publications remains relatively limited, even if 55.6% consider datasets, 50% software and 46.3% the policy contributions. On the other hand, it is a positive sign that over 15 organisations considered workflows, data models, algorithms, strategies, theories, protocols, exhibitions and/or methods.

Other outputs indicated by the respondents included outputs of artistic activities, patents and patent applications, innovation announcements and invention disclosures, audiovisual publications and ICT software applications, as well as software licences.

Some respondents described their responses further:

1. All the publications, of all types recognized by the Web of Science, for example, should be taken into account, not only main/review articles. All the papers, even a letter to the editor, need time, work, research, energy, and creativity.
2. In the latest research assessment the units to be evaluated were free to choose the best outputs to be shown. However the main emphasis is and has been on Journal articles.
3. Scientific publications beyond journal articles are less important. Exhibitions only in some fields "artistic" fields (e.g. architecture).
4. These are all able to be described and discussed in our narrative CV or project reporting templates.
5. [Organisation name] is composed of 6 faculties and 36 departments jointly they are home to 5000 scientists from hundreds of different (sub)disciplines. Some are clinical or application oriented – most are focused on fundamental basic science. Scientists from different fields have developed slight different (in)formal publication traditions. Both panels at the department level (every 5 years) and panels for specific positions (continuously) assess value and significance of different publication types differently. We do not have a centrally devised "one size fits all"-model with regard to specific publication types that could fit e.g. both theology and neurobiology.
6. Varies a lot between disciplines
7. We advocate for all of them to be taken into account in research assessment practices
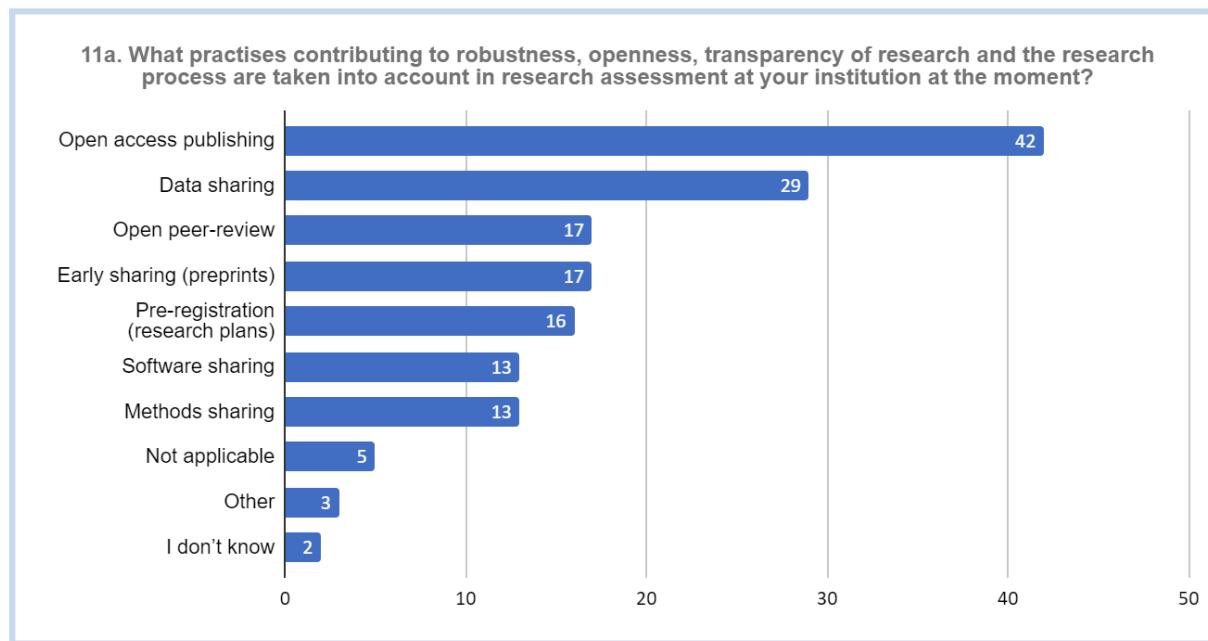
11a. What practices contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment at your institution at the moment?

Open Access publishing followed by Open Data sharing are by far the most frequently recognised Open Science practices, considered by 77.8% and 53.7% of the respondents, respectively. Again, it is a positive sign that 13-17 organisations out of 54 indicated taking into account open peer review, preprints, pre-registrations as well as the sharing of methods and software. Other indicated practices included leadership in Open Science, such as transforming a journal to OA, and publishing in recognized journals. One respondent shared that some hiring committees (e.g. psychology, informatics) have included Open Science criteria in advertisements for professorships (e.g. as desirable experiences applicants were asked to explain how they pursue the goals of open, transparent and replicable research, or intend to do so in the future).

Some respondents described their responses further:

1. All of these things are encouraged and embedded in our Open Research Position Statement but may not be practised universally.
2. None explicitly at the moment
3. None of these practices is taken into account.

4. Research assessment is bound by national legislation, so up to recently the individual institutions did not have a possibility to include the above additional elements.
5. Same as 10b. The central administration do not monitor this systematically / in details across disciplines and departments
6. Same as above [These are all able to be described and discussed in our narrative CV or project reporting templates]
7. We don't understand what open peer review refers to (is it non-blind peer review of publications, or openness of peer evaluation in recruitment)

11a. What practises contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment at your institution at the moment?

Category	Value
Open access publishing	42
Data sharing	29
Open peer-review	17
Early sharing (preprints)	17
Pre-registration (research plans)	16
Software sharing	13
Methods sharing	13
Not applicable	5
Other	3
I don't know	2

12a. What practices contributing to the inclusiveness of research are considered in research assessment at your institution at the moment?
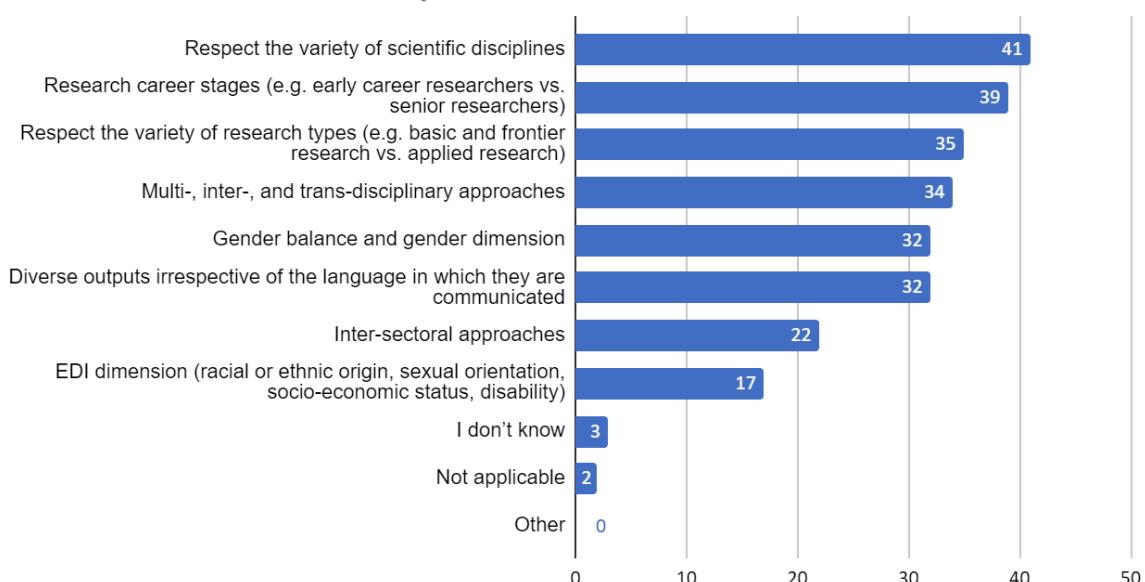
The most frequently considered contextual factors contributing to fairness and inclusion of assessments include respecting the differences between fields and career-stages (75.9% and 72.2% respectively). Around 60% of organisations also respect the variety of research types (eg. basic vs applied), interdisciplinarity, gender balance and the language diversity of outputs. At least 17 organisations also consider inter-sectoral work and EDI dimensions.

Some respondents described their responses further:
1. [Organisation name] is only frontier/basic research. The format is centers that are typically trans-disciplinary.
2. EDI and gender issues are taken into account in Code of Conduct
3. Multi-, inter-, and trans-disciplinary approaches are usually mentioned in the descriptive sections of promotion applications and may be taken into account as qualitative criteria.

4. same as above [These are all able to be described and discussed in our narrative CV or project reporting templates]
5. Within SSH publishing in Danish and other languages besides English is common to some degree. Panels assessing SSH departments can include one panel member from another Danish university particularly to assess the university contribution to society assesses in a Danish context

13a. What diverse research activities, practices and roles are considered in research assessment at your institution at the moment?

Relatively broad range of roles are considered in assessments. Over 70% of the respondent organisations take into consideration industry-academia cooperation, training, mentoring and supervision of PhD candidates as well as teaching activities. Around 60% of the organisations also consider peer review, science communication and interaction with society, team science and collaboration, leadership roles and entrepreneurship. Even if less frequently considered, at least 20 respondent organisations paid attention to knowledge valorisation, skills, competences and merits of individual researchers, roles outside of academia, diverse contributor roles and citizen science. In other responses also grant revenue was mentioned.
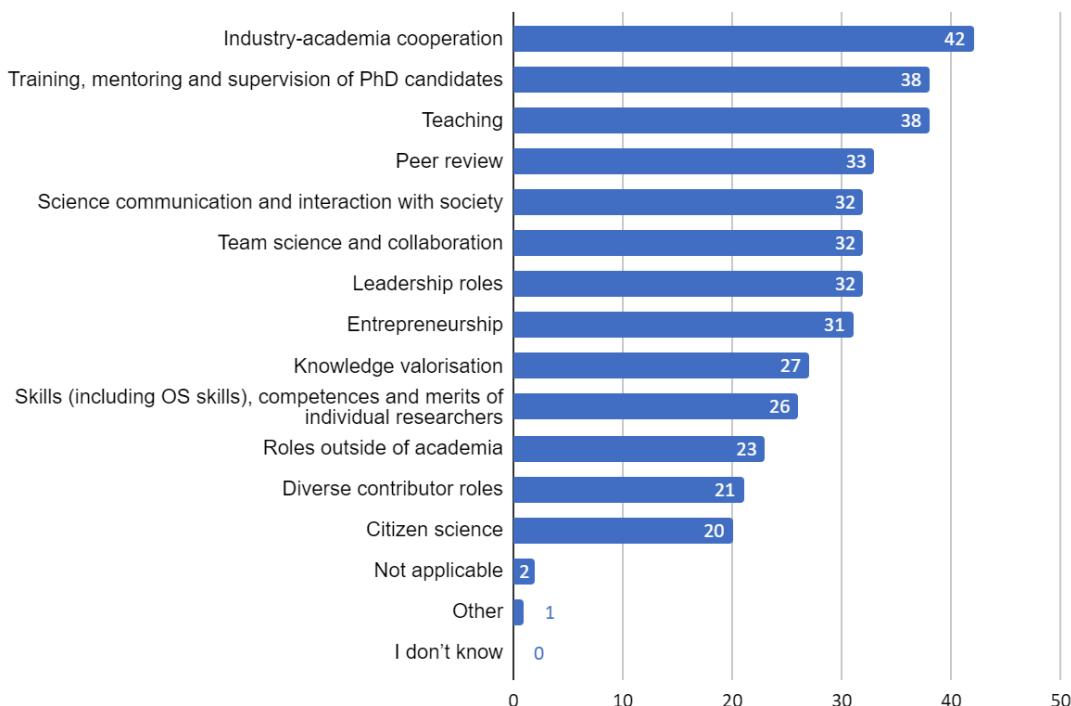
Some respondents described their responses further:
1. Organization is also key
2. same as above [These are all able to be described and discussed in our narrative CV or project reporting templates. In addition, we have awards for outstanding mentorship

and promotion of science to the public. We have funding schemes for science communication as well.

3. The emphasis varies between disciplines as the form of impact does.

13a. What diverse research activities, practices and roles are considered in research assessment at your institution at the moment?

Activity	Value
Industry-academia cooperation	42
Training, mentoring and supervision of PhD candidates	38
Teaching	38
Peer review	33
Science communication and interaction with society	32
Team science and collaboration	32
Leadership roles	32
Entrepreneurship	31
Knowledge valorisation	27
Skills (including OS skills), competences and merits of individual researchers	26
Roles outside of academia	23
Diverse contributor roles	21
Citizen science	20
Not applicable	2
Other	1
I don't know	0

14a. Which of the following European or global Open Science monitoring surveys does your institution participate or consider to participate?

While 20 respondents indicated participation in the EUA's Open Science Survey, and 13 mentioned OpenAIRE MONITOR and the EOSC Observatory, 16 respondents did not know if their organisation contributed data to the monitoring frameworks. UNESCO's Open Science monitoring framework is not yet very well established.

14a. Which of the following European or global Open Science monitoring surveys does your institution participate or consider to participate?

Survey	Value
EUA's Open Science Survey	20
I don't know	16
OpenAIRE MONITOR	13
The EOSC Observatory	13
Other	7
Monitoring Framework for the UNESCO Recommendation on Open Science	5
Not applicable	4

In other responses national monitoring frameworks were mentioned, such as the Finnish Open Science Monitor and CRISTIN as the source of national statistics in Norway and researchportal.be in Belgium. While there is no national OS monitoring, the KPI's of the Flemish Open Science roadmap are monitored (ORCID adoption, DMP in Flemish projects, open access to publications, FAIR and open data).
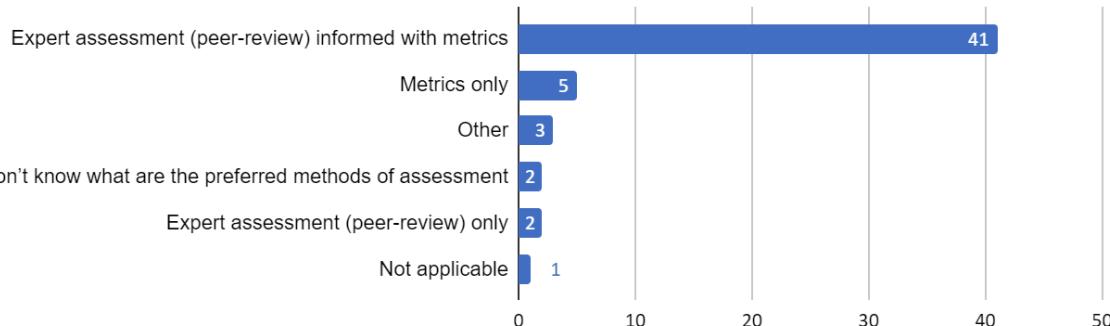
Some respondents described their responses further:
1. as a member of EOSC Association, we fill out the EOSC Partnership Monitoring Framework and the Additional Activities Plan (AAP) survey
2. Institutional dashboard, via OpenAIRE: [link removed]
3. Nothing formally as far as I'm aware but individuals may participate?
4. OpenAIRE MONITOR for a whole University not just for our Faculty: [link removed]
5. The EOSC response is given by TSV in the national level. [Organisation name] has been testing OpenAIRE MONITOR but has not participated in it.
6. The institute doesn't participate in any of these surveys but is potentially interested in participating in the OpenAIRE Monitor (if free of charge).
7. TSV is responding on behalf of Finland into EOSC and UNESCO surveys, not us.

15a. What are the preferred methods of assessment at your institution at the moment?

The vast majority of 54 respondents (75.9%) expert assessment informed with metrics, while only 5 organisations use only metrics and 2 organisations only use peer-review. In other responses it was indicated that in some fields metrics, in others only peer review is used. In one example the responsible committee applied metrics with limited qualitative assessment, while in other examples research group self-evaluation, performance appraisals and career development discussions, and publication metrics were considered.

15a. What are the preferred methods of assessment at your institution at the moment?

Method	Count
Expert assessment (peer-review) informed with metrics	41
Metrics only	5
Other	3
I don't know what are the preferred methods of assessment	2
Expert assessment (peer-review) only	2
Not applicable	1

15b. For what purposes are the preferred methods of assessment used at your institution?

Peer review informed with metrics
- assessment at the level of departments (every 5 years) and well as assessment of individual applicants for positions
- Assessment methods are used to evaluate academic staff at the university.
- Evaluation of research proposals, individual researchers, and research teams
- feedback, improving research and research environment. The expert assessment is not directly linked to money distribution and the design of the evaluation is rather formative.
- "Habitation: peer-review + metrix
- Advancement: metrics only"
- Hiring and promotion, funding applications
- "Hiring of scientific staff
- Personal promotion to professor positions"
- Incontestable criteria
- Institutional and researcher evaluation
- Promotion; appraisal; recruitment; department monitoring; demand-managed calls.
- Recruitment and career assessment, research assessments exercises (RAE)
- "Tenure and promotion
- Prices and other salary complements"
- To judge the applications against the [organisation name] purpose.

Metrics only:
- Assessment performed by experts with recognitions for best researchers
- For better visibility of scientific work.
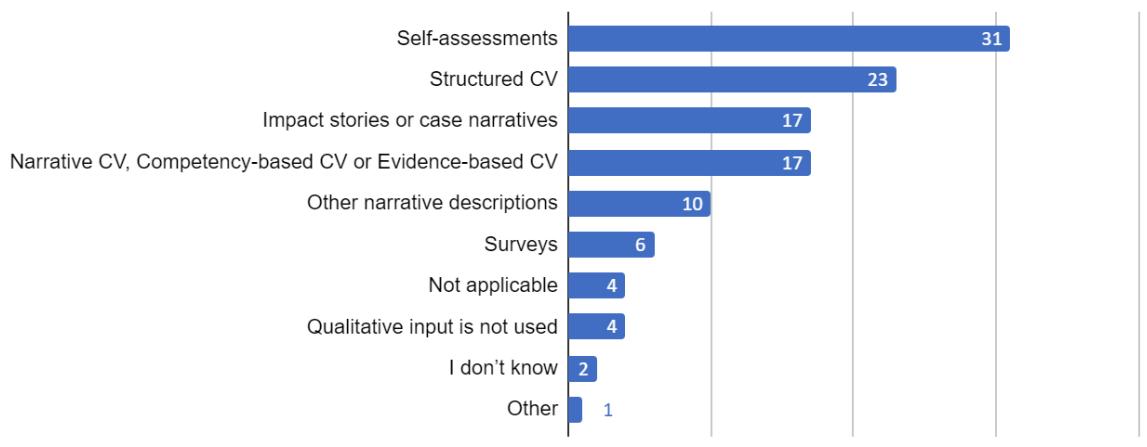
Peer review only:
- Evaluation of applications for funding.
- We do not allow discussion of metrics, but we do cannot prohibit evaluators from looking up these numbers and having them implicitly influence the evaluation. However, they cannot be brought up explicitly in the evaluation.

16a. Which of the following ways qualitative input is used in research assessment at your institution at the moment?

For qualitative input, most organisations use some form of self-assessment followed by structured CV (57.4% and 42.6% of the respondents, respectively), while 31.5% of the organisations use a narrative CV, competency-based CV or Evidence-based CV, or impact stories and case narratives. Other narrative descriptions and surveys are less frequently used. In other responses it was specified that grant proposals are qualitative and narrative, and that one organisation uses surveys, cases, etc. in major evaluation every ten years.
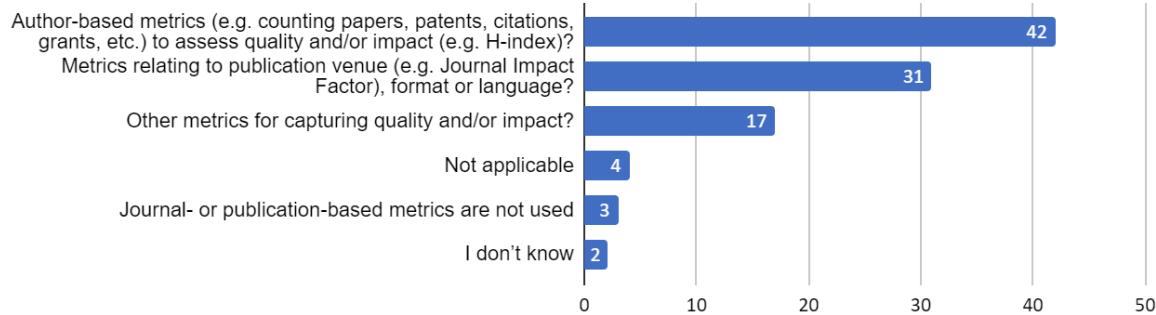
16a. Which of the following ways qualitative input is used in research assessment at your institution at the moment?

17a. Are the following uses of metrics in research assessment employed at your institution

The majority of respondent organisations use author-based metrics (77.8%) and/or metrics relating to publication venue (57.4%). Around one-third of the organisations (31.5%) also use other quality or impact metrics. Only three respondents affirm that journal or publication based metrics are not used.

17a. Are the following uses of metrics in research assessment employed at your institution

Category	Value
Author-based metrics (e.g. counting papers, patents, citations, grants, etc.) to assess quality and/or impact (e.g. H-index)?	42
Metrics relating to publication venue (e.g. Journal Impact Factor), format or language?	31
Other metrics for capturing quality and/or impact?	17
Not applicable	4
Journal- or publication-based metrics are not used	3
I don't know	2

17b. If author-based metrics, metrics relating to publication venue or other metrics for capturing quality and/or impact are used in research assessment at your institution, please describe how the mentioned methods are used

11 respondents answering "Yes" to both questions on use of "Author-based metrics" and "Metrics relating to publication venue":

1. As supporting evidence but not as a primary source
2. "Author based metrics are used in hiring to support qualitative evaluations. Instructions on the responsible use of indicators are available to the evaluators. In the larger scale evaluations, information on the number of publications by type and by language have been provided, as well as information about the publication channel classification levels of the publications. Bibliometric indicators capturing citation impact have been provided at the departmental level.
3. Author-based metrics is used in the Research Assessment of the university. Metrics related to publication venue (national publication ranking/forum) is part of funding allocation model for Finnish universities.
4. Based on the above mentioned metrics part of a budget of single university units is estimated and also based these metrics quality of academics is being evaluated – i.e. whether they have publications of preferred quality (Q1 or Q2 journals) in the fields their subjects and study programmes are related to.
5. Centrally institutional research assessment that evaluates faculties/institutes and departments is based on expert peer review (see 16a and 16b). However, each faculty/institute has its own system of internal money distribution which may include metrics (and mostly does). Metrics are therefore used mostly for distributing money (or part of the core budget) and at some departments perhaps also for assessing individuals' careers (appointments). These practices are quite diverse and they differ from faculty to faculty. "
6. E.g. Field-Weighted Citation impact is used the the research indicator
7. Impact Factor, Article Influence Score are used in research assessment viewing promotion.
8. The mentioned methods are used as one of the data input (according with peer review outputs, comments on the impact, social relevance, junior researchers etc.) that are presented to the evaluators. It is one of the information that is taken into account by

the evaluators – it is not the only one, definitely not the most important one, but think that for some scientific disciplines the metrics can be a relevant input for assessment.
9. They are used with qualitative methods but we are working that their role would be smaller in the near future
10. To support the peer-review in recruitments and assessments, to indicate the career step goals, to divide funding between Faculties yearly, to follow the outputs of Faculties
11. we use journal level metrics as a means to put article level metrics in perspective (to field normalise & journal normalise)

9 respondents answering "Yes" to questions on use of "Author-based metrics" and "No" to use of "Metrics relating to publication venue":
1. As part of the Incentive Program, the metrics are used for the annual evaluation of the academic staff.
2. Author-based metrics are used in personal promotion decisions, as part of set criteria. Furthermore we use journal independent, normalized citation analyses to support research impact claims at department level
3. Author-based metrics are used to gain an overview of the author's profile and achievement (e.g. highly cited papers) or disciplinary areas or the institution (e.g. proportion of top 10% publications, cf. Leiden Ranking). Metrics related to publication venue: weighted counting of publications based on JIF or journal lists for performance-based funding allocation. Other metrics: metrics used in university rankings, e.g. industry collaborations.
4. Author-based metrics is used to support decision
5. Counting papers, patents, citations, grants
6. H-index is not directly used, but can be used indirectly. We explicitly do not use JIF.
7. It is used everywhere to access new positions, grants, and projects, and to make institutional/national/international hierarchies.
8. We are not asking for metrics, but we receive CV's where this often is included, and this may play a role to some board members, among other factors
9. We do not measure across departments and faculties how indicators might be used in a local context. Some department ask the university library to provide (additional) metrics. Some departments are thought to have local initiatives e.g. salary bonuses for publication accepted in certain journals. Journal Impact factor play a significant factor in the annual report on research publications from the university hospitals

2 respondents answering "No" to questions on use of "Author-based metrics" and "Yes" to use of "Metrics relating to publication venue":
1. Just to say in response to 17a, we use journal metrics in appropriate disciplines as indicators of VISIBILITY, not quality.
2. Metrics relating to publication venue - journal IF, journal quartile or decile

3 respondents answering "Yes" to use of "Other metrics" or "Not applicable":
1. See our target papers here: [links removed]

2. The amount of journal articles in the top classes of the Finnish Jufo-classification are being measured at the organisation level
3. Venue-based metrics should be excluded; author- and publication-based metrics should be used in a limited and responsible way, only.
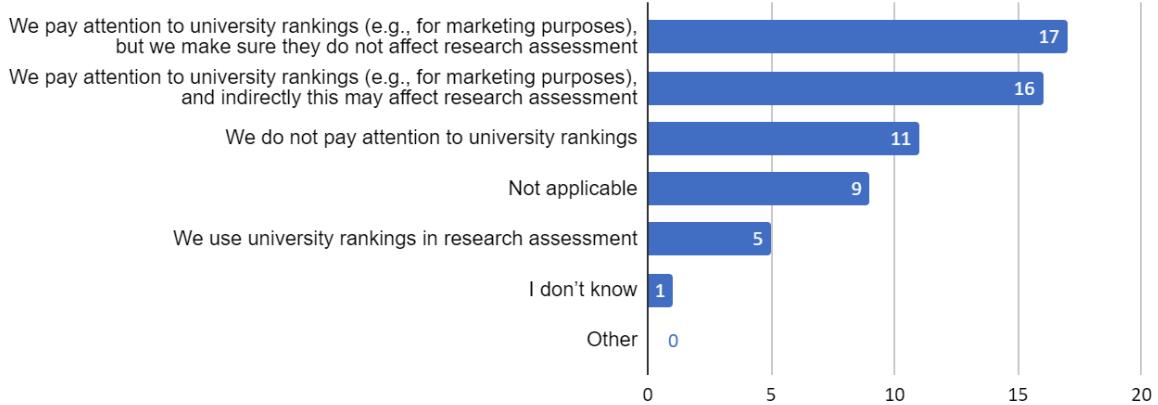
18a. Are university rankings used as a criterion or indicator in research assessment at your institution at the moment?

The majority of respondent organisations (70.4%) make use of university rankings: 17 pay attention but make sure they do not affect research assessment, 16 acknowledge that they may indirectly affect assessment, and 5 organisations use them in research assessment. 20% of the respondents say they do not pay attention to the university rankings.

Some respondents described their responses further:
1. Habitations: university rules are used; Advancement: faculty specific rules
2. In theory rankings should not affect our assessment, but there may be cases in which they do.
3. Not taken into account when a researcher is assessed during recruitment or career promotion. But when departments are assessed in internal institutional research assessment, they do highlight their own ranking results.
4. The strategic goals are followed by ranking positions.
5. [Organisation name] is a specific research university. The founder is the Ministry of Defense and it is primarily intended to meet the requirements of the Ministry of Defense.
6. University and national ranking systems are mostly based on JCR impact factors.
7. University rankings should not be employed as indicators
8. We just monitor rankings but they have no influence on research assessment and money distribution.

18a. Are university rankings used as a criterion or indicator in research assessment at your institution at the moment?
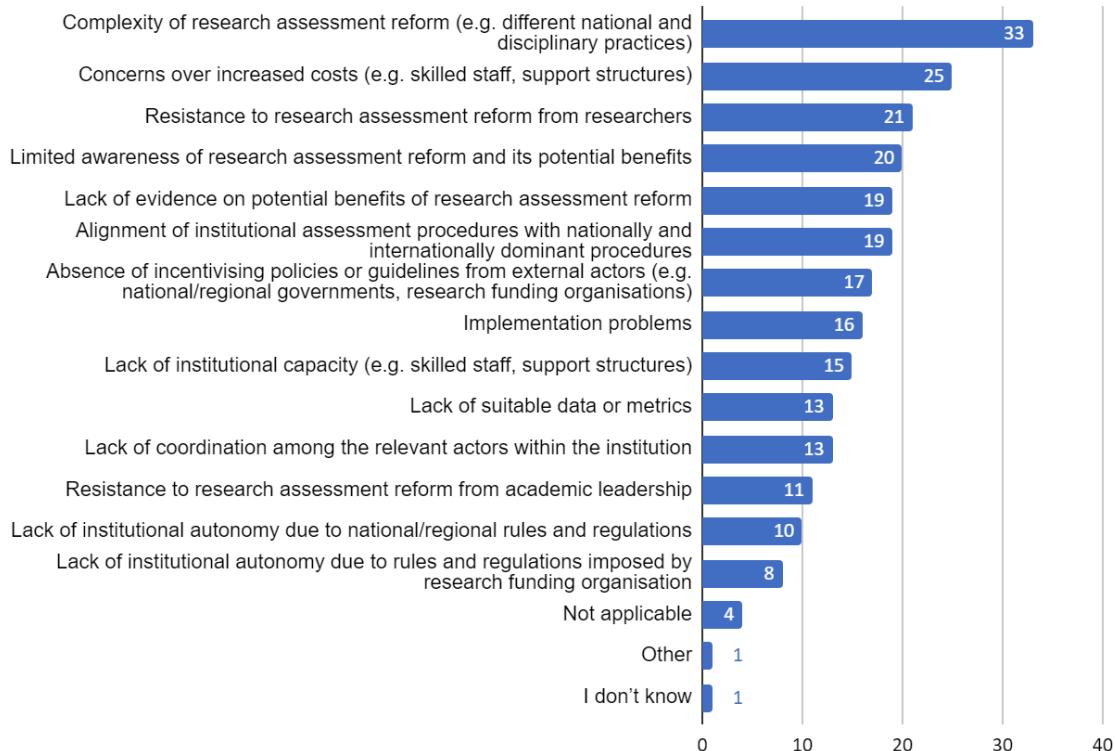
19a. What are the main barriers and difficulties for your institution to revisit and reform its research assessment procedures?

The most frequently mentioned barrier to reform of research assessment (61.1% of the respondents) is the complexity of reform due for example to different national and disciplinary practices. The second most frequent barrier (46.3%) is constituted by concerns over costs, for example in terms of skilled staff and support structures. These are the top barriers among both 38 CoARA signatories, as well as 16 respondent organisations that indicated not having yet signed the Agreement. Especially signatories are concerned about resistance from researchers, limited awareness of the reform and lack of evidence on its potential benefits, while implementation problems are relatively important to non-signatories.

Some respondents described their responses further:

1. As long as funding organizations do not follow principles of responsible research assessment, universities can not change priorities in research assessment.
2. I've indicated most often occuring barriers, however, our university has signed CoARA and strives to implement responsible assessment practices. The limitation of the acceptance of the reform also lays in external requirements, e.g. the requirements of funders/national level,often based on basic bibliometrics. We try to promote responsible evaluation despite of requirements of third parties.
3. In a local culture, abandoning metrics and relying on mostly "non-independent" peer review might worsen the situation; the way forward is in the meaningful combination of both, not "abandoning"
4. The Ministry of education is using metrics when distributing the basic funding of the universities. Rectors continue to use a funding model when giving funding to deans. It incentivize metrics in all levels. Finally, in a personal level it is possible to use qualitative indications and expert statements.
5. The complexity of assessing more qualitative information with limited quantitative substantiation makes reform quite challenging
6. The leadership as well the researchers do not want make changes to the current practice. They love to use h-index as well to count high quality (=JIF) articles and/or JUFO rankings. This is seen objective way and they are afraid of changes.
7. The national Danish BFI system has been abolished thus on an institutional level there is no longer a financial incentive for the universities to publish in specific journals. But the situation at the level of individual researchers still depend heavily on 1) the assessment criteria of private and public foundations and 2) the assessment criteria used by committees in recruitment and promotion of scientists. Some fear that reduced use of metrics in the assessment process will lead to a significant increase of the work burden for committee members.
8. We are in the process of implementing the new indicator, so we will have to see.
9. We consider our policy to be well aligned with the agreement

19a. What are the main barriers and difficulties for your institution to revisit and reform its research assessment procedures?

Barrier	Count
Complexity of research assessment reform (e.g. different national and disciplinary practices)	33
Concerns over increased costs (e.g. skilled staff, support structures)	25
Resistance to research assessment reform from researchers	21
Limited awareness of research assessment reform and its potential benefits	20
Lack of evidence on potential benefits of research assessment reform	19
Alignment of institutional assessment procedures with nationally and internationally dominant procedures	19
Absence of incentivising policies or guidelines from external actors (e.g. national/regional governments, research funding organisations)	17
Implementation problems	16
Lack of institutional capacity (e.g. skilled staff, support structures)	15
Lack of suitable data or metrics	13
Lack of coordination among the relevant actors within the institution	13
Resistance to research assessment reform from academic leadership	11
Lack of institutional autonomy due to national/regional rules and regulations	10
Lack of institutional autonomy due to rules and regulations imposed by research funding organisation	8
Not applicable	4
Other	1
I don't know	1

Information supporting responsible assessment

20a. How are data for research assessments captured at your institution?

The large majority of respondent organisations (85.2%) capture data supporting research assessment by using bibliographic databases (i.e. Web of Science, Scopus, Dimensions, Crossref, OpenAlex, etc.). In around 60% of the respondent organisations data are submitted/uploaded in structured formats, for example using templates, web formats and instructions, often using local platforms/data sources, and using ORCID. Altmetrics databases and unstructured formats are more rarely applied. Other specified options include ad hoc procedures and also printed paper.

Some respondents described their responses further:

1. "Local platforms" seems to overlook national CRIS systems that include quality assurance by a governmental organisation. Such platforms exist, they offer advantages over commercial databases (being publicly funded and in the public domain), as well as advantages over non-verified data sources (like ORCID) being quality-controlled (that is, verifying all entries through mandatory evidence) by a public/governmental actor

2. Individual reviewers may occasionally use bibliographic databases to look up individual applicants, even though this practice is discouraged.
3. More info about the latest RAE [link]
4. "The Current research information system of the University has a central role in research evaluations and smaller scale analysis. Data from international citation databases is used as well.
5. In the larger scale evaluations the data used has been captured from the Current research information system of the University as well as using bibliographic database Web of Science. University Library's publication data and publication metrics specialists deliver the data in the agreed format to all the stakeholders of research assessment. Units that have been assessed have had a possibility to check the data used in the analysis.

20a. How are data for research assessments captured at your institution?

Using bibliographic databases (i.e. Web of Science, Scopus, Dimensions, Crossref, OpenAlex, etc.)	46
Data are submitted/uploaded in structured formats (i.e. templates are provided, structured web formats are specified, detailed instructions are given, etc.)	33
Data are submitted/uploaded using local platforms/data sources	33
Using ORCID	31
Using altmetrics databases (i.e. PlumX, Altmetric.com, etc.)	11
Data are submitted/uploaded in unstructured formats (no templates are provided, no structured web formats are specified, no detailed instructions are given, etc.)	10
Other	2
Not applicable	2
I don't know	1

21a. Which of the following global data sources are used for research assessment at your institution?

By far the most frequently used data sources are commercial Web of Science (WoS) and Scopus databases, both indicated by 81.5% of the respondents. To further emphasise their dominant role, almost all these organisations (41) use both databases, not just one or the other. Over 20 organisations make use of Google Scholar and ORCID, and 9 other potential information sources are used by less than 10 organisations. But not a single university or research centre or funder relied only on sources other than WoS and Scopus. Other specified resources include CRIS, DBLP, EC expert database and VABB and own institutional repository.

Some respondents described their responses further:
1. I've indicated data sources that are used systematically, repeatedly for research assessments. In some individual case, we also use Google Scholar and others.
2. Individual reviewers may occasionally use global data sources to look up individual applicants.

3. Some of the data sources marked above are used only by some of the organisational units of the university.
4. We use scopus/SciVal for long-term evaluations, ie aggregated data on total activity over, say, ten years for all recipients
5. Web of Science data was used in larger scale evaluations. In addition to Web of Science, Scopus and Google Scholar data have been used for smaller scale analysis.

21a. Which of the following global data sources are used for research assessment at your institution?

Data source	Count
Web of Science	44
Scopus	44
Google Scholar	23
ORCID	22
Crossref	9
OpenAIRE	8
Dimensions	6
Other	4
Not applicable	3
Scite	3
OpenCitations	3
CORE	3
OpenAlex	2
I don't know	1
Lens.org	1

22a. Which of the following tools are used for research assessment at your institution?
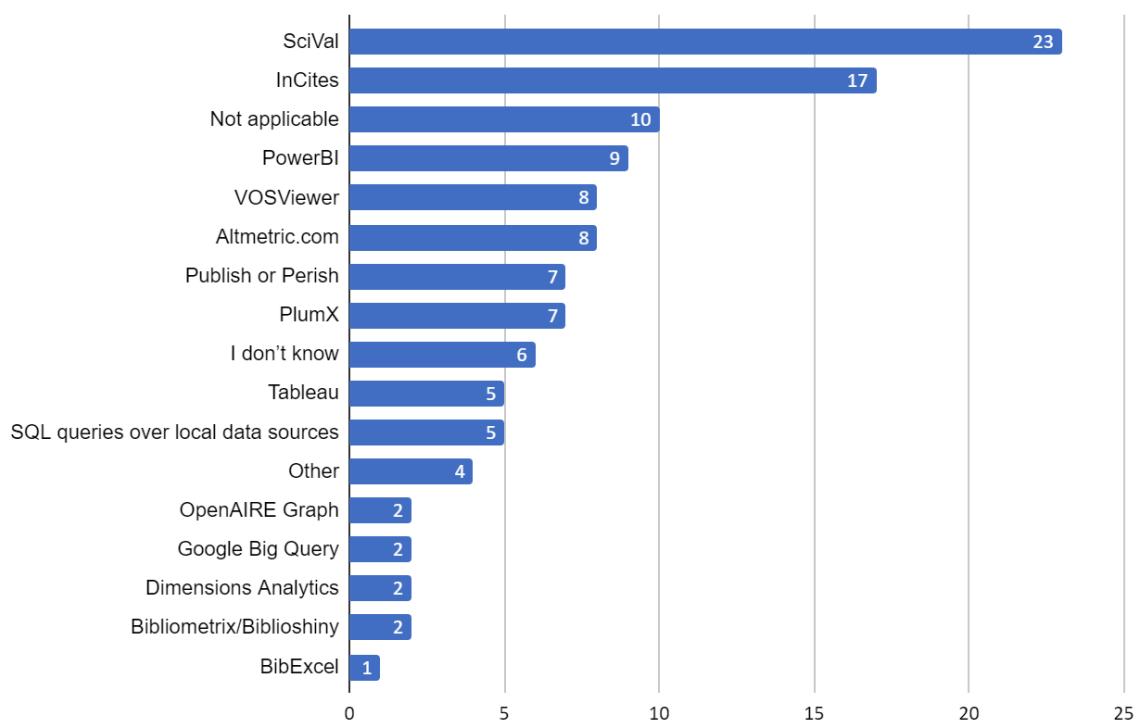
Most frequently used tools for research assessment are SciVal and InCites attached to the commercial Scopus and WoS databases (42.6 and 31.5% of the respondents, respectively). Ten other tools mentioned were used by 1-9 organisations. Other specified tools include internal publication metadata, Overton, Sicris and OpenAlex (listed in previous question among data sources).

Some respondents described their responses further:
1. Different databases and tools are used in the smaller scale bibliometric analysis.
2. none systematically
3. PowerBI and SQL are not used for assessment, but for statistical purposes etc.
4. These tools are used to perform further analyses to support research assessment procedures, with proper explanation

5. We just follow the results through external application "Authors, Projects, Publications" (APP), browse and search authors and funding information. APP also enables metadata export and displays Altmetric scores and Dimensions, Scopus and Web of Science citation counts: [link removed]

6. We use these sources for bibliometric analyses and strategies, not necessarily for research assessment. In case of individuals, the bibliometric analyses are supporting career assessments, e.g. appointments. In case of departments/faculties/whole institution just for monitoring and strategic purposes.

22a. Which of the following tools are used for research assessment at your institution?
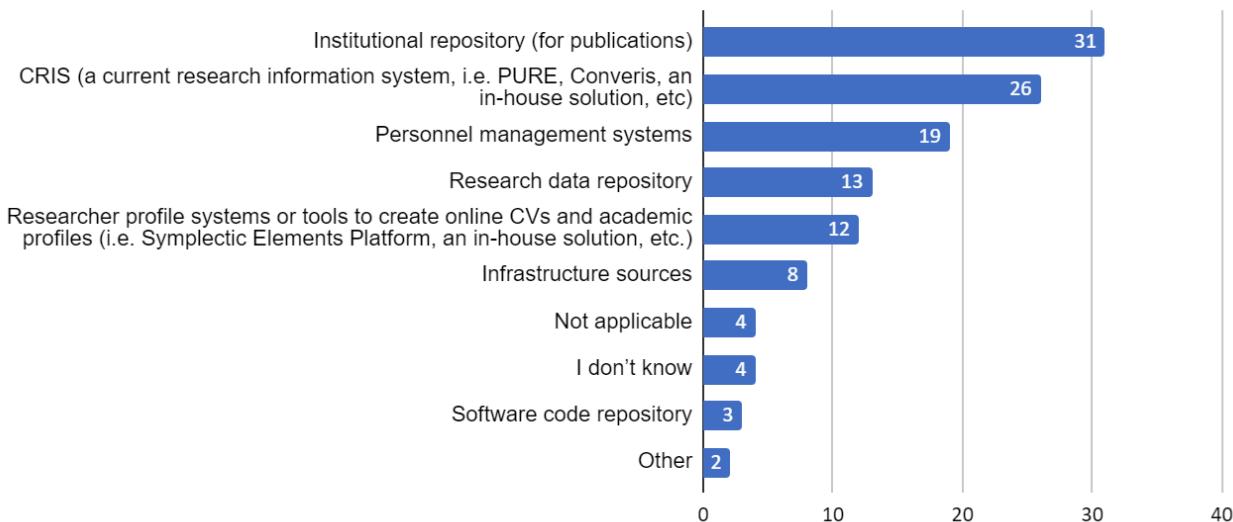
Tool	Count
SciVal	23
InCites	17
Not applicable	10
PowerBI	9
VOSViewer	8
Altmetric.com	8
Publish or Perish	7
PlumX	7
I don't know	6
Tableau	5
SQL queries over local data sources	5
Other	4
OpenAIRE Graph	2
Google Big Query	2
Dimensions Analytics	2
Bibliometrix/Biblioshiny	2
BibExcel	1

23a. Which of the following local data sources are used for research assessment at your institution?

Majority of the organisations use for research assessment either institutional repository (57.4% of the respondents) or a CRIS - Current research Information System (48.1%). 41 organisations (75.9% of all respondents) have a local publication repository and/or CRIS, and 25 of them have one or the other kind of local system. Almost all (38/41) organisations that have a local CRIS and/or publication repository, also use WoS and/or Scopus databases, meaning that the local and international sources are to a very large extent used simultaneously. Other local systems, such as personnel management or profiling systems or data or software repositories, are more rarely used and almost always in conjunction with

local CRIS or publication repositories. Other specified systems include E-grant and national repository cobiss.

23a. Which of the following local data sources are used for research assessment at your institution?

Data source	Count
Institutional repository (for publications)	31
CRIS (a current research information system, i.e. PURE, Converis, an in-house solution, etc)	26
Personnel management systems	19
Research data repository	13
Researcher profile systems or tools to create online CVs and academic profiles (i.e. Symplectic Elements Platform, an in-house solution, etc.)	12
Infrastructure sources	8
Not applicable	4
I don't know	4
Software code repository	3
Other	2

23b. If known, please also indicate the names of local platforms used (i.e. PURE, Converis, Symplectic Elements Platform, CKAN, Dataverse, in-house solutions, etc.).

More than one-half of the respondents indicated the name of the local platform. Some of the institutions are using commercial solutions such as Converis (Clarivate), Pure (Elsevier), Symplectic Elements (Digital Science), and COBISS (IZUM). There are also institutions which build their local platform by adoption, customisation, and integration of open-source solutions such as DSpace, DSpace-CRIS, Dataverse or VIVO. In the end, some institutions or countries developed research information systems from scratch.

24. Point out main shortcomings and disadvantages of using the current data sources or tools used for research assessment?

There are different survey responders' points of views regarding main shortcomings and disadvantages of using the current data sources. Some of them stated additional time which can be spent on creation and maintaining of local data sources and lack of compliance of some researchers to provide data as shortcomings. One respondent stated the main shortcoming is the coverage of the international citation databases, while one another thinks the shortcoming of the local system used at her/his institution is reliance on an external provider.

Some respondents indicated shortcomings and disadvantages:
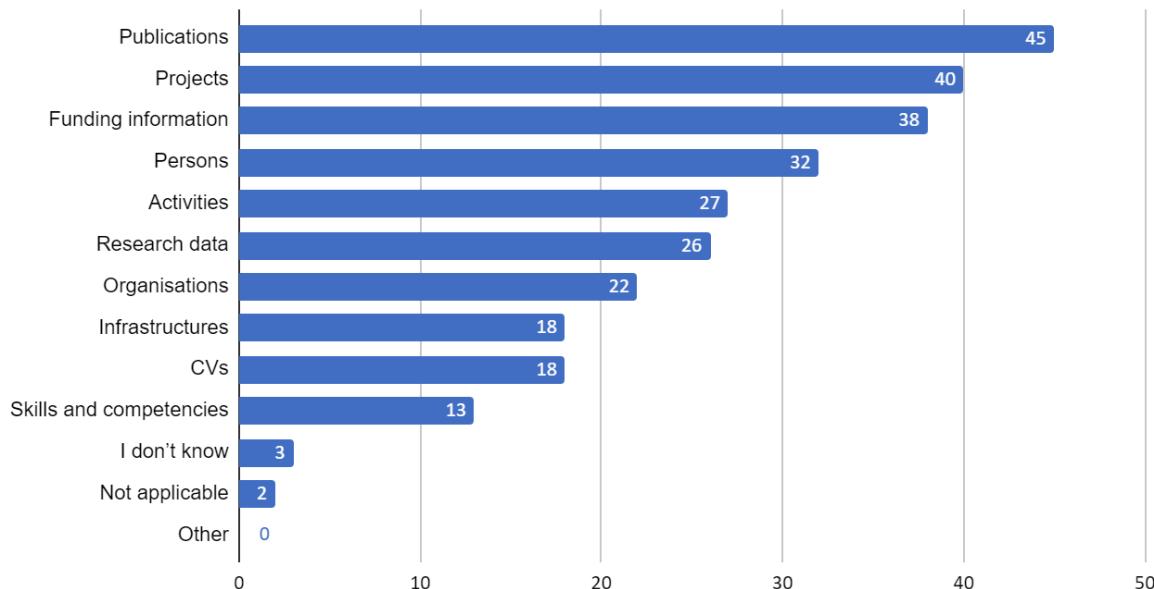
1. compliance of researchers to provide data; interfacing with other systems

2. "CRIS-system is based on researchers' own activity, i.e. they register their publications and we must follow to ensure that is done. We would like the possibility to put outputs other than publications in our CRIS, which is a Pure product."

3. Data related to researcher's research activities, roles, skills, and competencies are collected as part of performance appraisals and career development discussions in unstructured format in our personnel management system. This limits the possibilities to analyze the gathered data. In addition, the data is meant to be used only as part of these processes by the people involved in the process. Hence, it cannot be used for research assessment in organizational level.

4. Difficult to monitor societal impact from research. We don't have good data on funding.

5. Entering data is restricted by affiliation with a national institution

6. Fact Science data is incomplete. GRO.publications is used for creating publication lists, it is not mandatory for researchers to update and curate this information. GRO.data is the institutional data repository but not a registry of all research data outputs.

7. I do not know.

8. Insufficient monitoring based on the Rulebook for open science in institution.

9. lack of 'lean and agile' integration lack of 'lean and agile' visualisations

10. Limited scope, inflexible information sharing and linking, lack of a diverse portfolio

11. Reliance on an external provider. Complicated structure due to fragmentation and multiple intertwined systems built from multiple foundations. Any greater change is slow to take effect. Not very deeply linked to global/national databases.

12. The main shortcoming is the coverage of the international citation databases. The coverage of these databases is focused on publications from science and medicine.

13. The quality and amount of data

14. The use of e-grant is not systematic/uniform across our scientific councils.

15. Too many assessments

16. too much time spent

17. Up to date information related to other outputs than publications.

18. We are about to switch to another platform, very used and consolidated

25a. Which type of research entities are preserved in local data sources used for research assessment?

Local data sources are most frequently used to register publications (83% of all respondents), projects (74.1%), funding (70.4%), and persons (59.3%) probably because this information is typically used for research intelligence at organisational level. Activities, Research data and infrastructures are somewhat less common entities in the local systems. Also information related to individuals, such as CVs as well as skills and competences, is less frequently registered.

25a. Which type of research entities are preserved in local data sources used for research assessment?

Entity	Value
Publications	45
Projects	40
Funding information	38
Persons	32
Activities	27
Research data	26
Organisations	22
Infrastructures	18
CVs	18
Skills and competencies	13
I don't know	3
Not applicable	2
Other	0
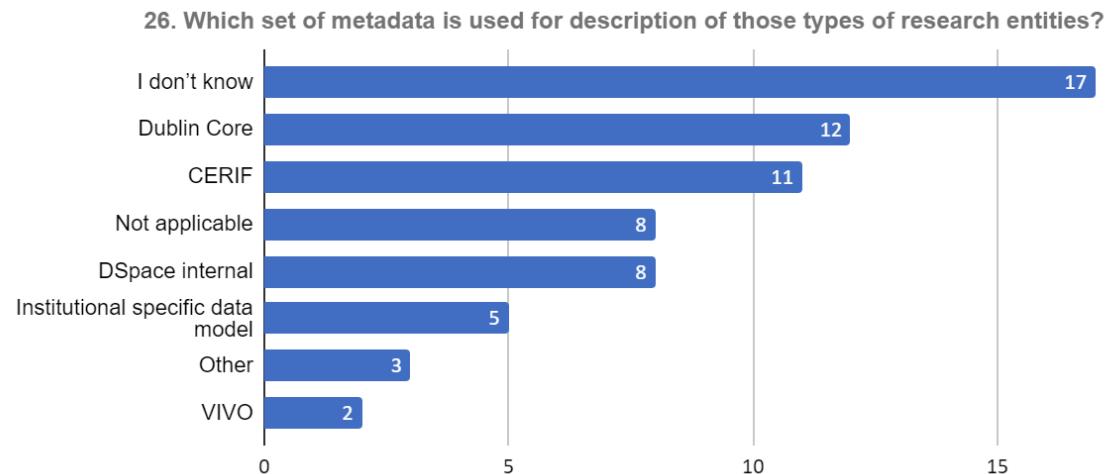
Some respondents described their responses further:

1. In the future the following resource will be helpful: https://www.tiedejatutkimus.fi/fi/
2. Not perhaps research data itself, but metadata.
3. Some of this information is saved as structured data (projects, persons, funding information), while other information is not (e.g. CVs and publications).
4. The data inserted in the union catalogue is used by our national CRIS (SICRIS)

26. Which set of metadata is used for description of those types of research entities?

The most frequently indicated metadata schemes were Dublin Core (12) and CERIF (11), followed by DSpace (8), institutional "in-house" data model (5), and VIVO (2). This is a fairly technical question, so many respondents (17) did not know which metadata scheme the local system uses for research entities. Other specified data models include COMARC and "in-house" scheme used in the national information system.

26. Which set of metadata is used for description of those types of research entities?

Metadata	Count
I don't know	17
Dublin Core	12
CERIF	11
Not applicable	8
DSpace internal	8
Institutional specific data model	5
Other	3
VIVO	2

27. If you are using institutional specific data model, please provide set of metadata used for description of type of research results for assessment or provide the link to web resource where those information can be found:

1. COBISS - Cooperative Bibliographic Information System and Services
2. https://apps.izum.si/ecris/si/en
3. Metadata of the publications is stored according to the data model of Pure system. Data model of Pure system is in accordance with CERIF.
4. Since our system was developed to cover multiple data-collecting solutions from multiple sources, our data model is yet to be properly described.
5. We do not use.
6. xml structure of the national data model is here: https://www.isvavai.cz/dokumenty/StrukturyXML_2023_3.2.0_v2.pdf. The same model must be used by all institutional bibliographic databases from which the data are reported into the national system."

28. Please describe the cataloguing process, i.e. process of ingestion of research results into your local system as well as actors involved in this process:

Usually, the research entity records are initially catalogued by researchers while librarians check and verify those records. However, some institutions are using the opposite approach, meaning initial cataloguing is done by librarians, while researchers are checking catalogued data.

Some respondents indicated shortcomings and disadvantages:
1. All research outputs are deposited in the institutional repository by the librarian.
2. Data storage can be done in several different ways, personal users can store their own data in the system, in addition to which the university's information systems and

international databases are utilised as a source of information. Library staff verifies the publication information entered in the information system.

3. Due to the national policy we have to register most of the research results. This duty is being fulfilled by authors themselves, or by responsible person at each faculty. All outputs are being verified by senior administrators.

4. For most cases the researcher register the content (publication, activity), a local administrator approves and a central team validates. For a fouth of the departments a central team import content eg. from Scopus.

5. Library imports data in our local CRIS and departments/authors validate and supplement results

6. Manual at HR, project management at Research Office, financial info at financial services, patent & license info at TTO, additional info by individual researchers

7. Not applicable (research results are typically described in CV's which are not processed and catalogued).

8. Personnel informs library about their publications. Library is responsible for verifying each publication and recording it to Justus. Data related to projects is recorded to the project management system. Data on individual's research activities, roles, skills, and competencies is recorded into personnel management system. In future, individual researchers can record their research activities to Justus and publish them in research.fi (national data service related to research conducted in Finland), if they wish. Decisions have not been made if data on research activities would be used for research assessment at our institution.

9. Process: don't know Actors: experts (research support staff) Research Department & IT department; researchers themselves

10. Publications (and other types of research results) are entered into the internal database of [organisation name] by the authors themselves or, in the case of some faculties/institutes, by authorized persons. The basic data structure of the fields of the form for entering bibliographic data about a publication is prescribed by the national database, but [organisation name] (and other institutions) may extend this information for internal needs in its own internal database. Usually once a year, bulk scientific results are submitted to the national database via a data file. This data file is then exported from the institutional database, inserted into the app (temporary database of the national information system). In the app, this data delivery has to be approved by the funder, who then confirms it for publication in the live database.

11. Researchers are responsible for the storing of research results with the support of library

12. Researchers deposit their new items by using a web-based submission form or by engaging directly with a repository manager (to perform the deposition on their behalf). Only registered users who are granted appropriate credentials can deposit data. In order to help researchers in meeting the requirements, training and consultations are provided prior to data submission. This helps in ensuring data and metadata quality, resolving legal issues, and reducing costs linked to data ingest and curation.

13. Researchers input their publications into the CRIS system, which our Library then checks and verifies.
14. Researchers update own outputs and activities to the CRIS. Library supports the process and checks the data.
15. SICRIS: Confirmed librarians at national RPOs and HEIs perform the ingestion.
16. The cataloguing process includes authority files and document typology. These information is used by SICRIS.
17. The process of cataloging, i.e. the process of accepting research results into our internal system, is carried out by the researchers themselves and checked by the responsible employee of the science and research support department.
18. The university's research office takes care of data ingestion and curation.
19. "We feed activities and prizes into PURE manually. This is done by service personnel and researchers. We integrate research project information from our financial bookkeeping system. We import metadata of publications from international electronic databases (e.g.Scopus) and metadata of data sets via PURE built-in Data Monitor automatically.

Feedback and comments regarding the questionnaire and/or the answers given:

1. Actually my institution is not using a compact data collection, research evaluation and platforms for research assessment.
2. [Organisation name] consists of 17 faculties and 4 university institutes, therefore the organisational structure is very fragmented. Every 5 years there is a big research assessment organized centrally from the rectorate. The aim of this exercise is to assess research areas and faculties. Besides that, each faculty has its own assessment system that focuses on smaller units – evaluation of research fields, research teams, individual researchers and academics. Therefore, it is hard to give exhausting answers to the questions above. The answers are given primarily from the rectorate´s point of view, regarding to the "big" university evaluation.
3. Our processes are handled by different people at the university which makes it difficult for one person to answer all questions. The short time frame for the survey response (five days) also made it difficult to collate responses from all relevant university staff.
4. Pitäisi tehdä eroa tutkijan ja tutkimuksen arvioinnin kanssa. Narratiivit ja metriikka ovat käyttökelpoisia eri tavoin näissä. Nyt kyselyssä oli vaikea tietää kumpaa – vai molempia – tarkoitettiin missäkin kohdassa.
5. Thank you
6. The concept of research assessment seemed very broad in this questionnaire. In our organization, research assessment generally refer to evaluating research groups or research project. However, evaluating an individual is generally referred as researcher assessment.
7. The questionnaire was understandable.

8. We do an institutional research assessment every 5 years with common setup and templates. This is done in a somewhat homogeneous way – but with room for local variation and additions (36 departments and 6 faculties). Besides that we post more than 1000 scientific positions every year including postdoc and PhD positions. There is (huge) variation between different positions (Tenure non-tenure, internal/external funding, different levels and different fields of science). We only regulate the recruitment process and criteria to a certain degree. People from HR and policy units do not participate in all meetings of all assessment committees – thus it is difficult to answer your questionnaire "one reply per university" with this variation in mind.

9. Well designed survey overall. A little deferential to metadata vendors.

● Annex 2. GraspOS landscape survey for pilots

Key takeaways
- The situation and challenges of GraspOS pilots via-à-vis CoARA Agreement and assessment reform are, by and large, very similar compared to the 54 Landscape survey participants (see Annex 1):
  - Are motivated to reform assessment practices by alignment with Responsible Research Assessment and improving recognition and rewards of Open Science practices.
  - Conduct assessments at levels of individuals, institutions, funding applications and fields, commit to quite similar sets of assessment policies, rely mainly on expert-assessment informed with metrics, and often use structured CV for qualitative input.
  - Face similar gaps in recognition of diversity of outputs, open science practices, practices contributing to inclusiveness, as well as activities and roles, and also make some use of author and/or venue based metrics, as well as university rankings.
  - Frequently see complexity, costs and alignment with national and international dominant procedures as major barriers for the reform of assessment procedures.
  - Capture data for assessments often using both global (mainly commercial Wos and/or Scopus) and local (mainly CRIS and/or repository) platforms and variety of tools, while altmetrics and other platforms are rarely used,
  - Almost always have information available in the local systems on publications and often also on research data, funding, projects and persons, while activities, skills and competences are rarely covered.

- The most notable differences in pilot responses compared to the Landscape survey:
  - The European Charter for Researchers may have been overlooked by pilots, as it was among the most frequently mentioned policies by the landscape survey respondents (27/54) but indicated by only one pilot.
  - Pilots see lack of incentivising policies, implementation problems, and lack of suitable metrics more often as barriers to reform.
  - Only one pilot indicated use of SciVal or Incites as tools, whereas the Landscape survey participants use these tools more frequently. The pilots are frequently motivated to participate in the GrapOS project by experimentation of new tools and services.
- Identifying initial requirements for WP2, WP3, WP4 and WP5
  - Use the SCOPE model and CoARA commitments as a starting-point but also consider the European Charter for Researchers and a broader range of assessment policies and recommendations (see Chapter 5, especially tables 5.4 and 5.5)
  - Make an effort to use narrative CV and/or self-assessment for qualitative input (chapter 6.2), and pay special attention on the responsible use of metrics to support expert assessment, especially as outlined in the Leiden manifesto and the Metric tide report (Table 5.4).
  - Focus on diversity of outputs (not just scientific publications), open science practices (not just open access), practices contributing to inclusiveness (not just fields and career-stage), as well as a broad range of activities and roles (see table 5.3 and chapter 6.1.2).

GraspOS has a user-centred approach to the infrastructure development of new infrastructure, tools and services that is focused on the needs of end users. Nine (9) participating pilots are involved in the project, who represent a highly diverse group of stakeholders from the onset into the requirement acquisition, co-design, validation, evaluation and demonstration of the indicators, metrics, services. The pilots represent three types of Open Science enabled research assessment: 1) funding agencies and national stakeholders who are operating infrastructure and use for evaluation of funding, 2) universities, including departments and research groups, interested in recruiting and assessment, and 3) thematic disciplines who can set general assessment criteria based on infrastructure and discipline needs. The nine participating pilots are the following:

Funding agencies and national stakeholders who are operating infrastructure:
- Pilot A: National CRIS, funders, Finland (CSC)
- Pilot B: National funding monitoring platforms, Romania (UEFISCDI)

Universities, incl. departments and research groups:
- Pilot C: Institution/research group, Netherlands (UU)

- Pilot D: National research organisation, Italy (CNR)
- Pilot E: University, Finland (UEF)
- Pilot F: University department, Serbia (U. Belgrade)

Thematic disciplines who can set general assessment criteria based on infrastructure and disciplinary needs:
- Pilot G: Computer Science (INRIA, UniBO, ATHENA)
- Pilot H: Agricultural and veterinary sciences (INRAE)
- Pilot I: SSH (Operas)

The purpose of the GraspOS landscape survey for pilots was to build early engagement of pilots, to survey current research assessment practices and to monitor to what extent the current situation of the pilot institutions is in relation to the CoARA Agreement on reforming research assessment. The GraspOS landscape survey for pilots was carried out in cooperation with WP5 Pilot Analysis, the purpose of which was to describe the current status of the pilot's research evaluation aims, context, and resources.

The GraspOS landscape survey for pilots was launched on the 2nd of March 2023 and disseminated to the GraspOS project pilots' representatives together with the WP5 Pilot Analysis template. The survey was introduced to pilots in a WP5 monthly meeting and disseminated via e-mail, which was customised and addressed separately to each of the pilot representatives. A separate workshop was also organised where pilot representatives were able to ask questions related to the GraspOS landscape survey for pilots and the WP5 Pilot Analysis. The deadline for responding to the landscape survey questionnaire was 24th of March 2023 and the deadline for the WP5 Pilot Analysis template was due later 14th of July 2023. All nine pilots provided responses to the questions in the GraspOS landscape survey. For the thematic discipline of Computer Science, responses were received from both INRIA and UniBO, the total number of responses received being 10.

The GraspOS landscape survey for pilots was conducted online using the LimeSurvey tool. The pilot respondents were guaranteed confidentiality of the shared information. The survey data was fully anonymised and is openly available in the Zenodo data repository.

The responses for the GraspOS landscape survey for pilots are being reported and analysed in this Annex. In addition, The GraspOS landscape survey for pilots results are analysed in comparison with the global GraspOS landscape survey on Reforming Research Assessment results. The WP5 Pilot Analysis report will be published as a separate report D5.1: Report on pilot setup, current practices & initial requirements in August 2023.

The survey results of GraspOS landscape survey for pilots together with the WP5 report on pilot setup, current practices & initial requirements will describe the current status on how research assessment (practices, tools, challenges) is performed by the pilot owners,
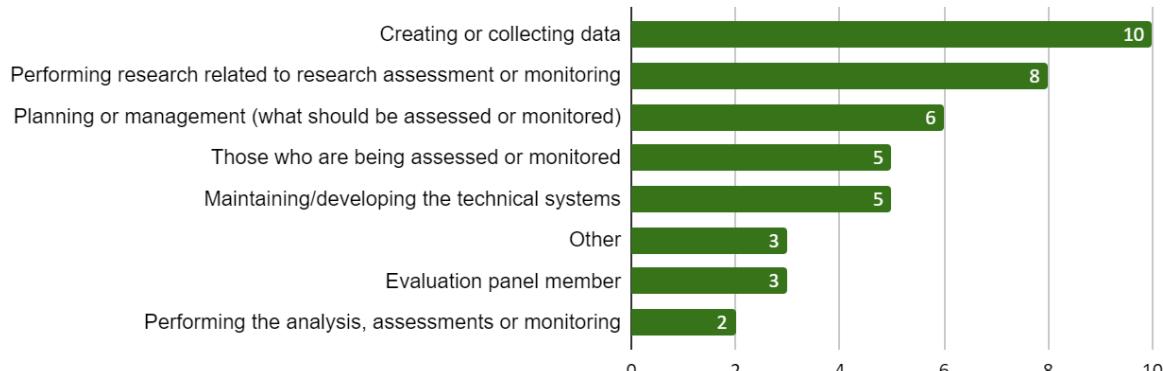
positioning them in the research assessment landscape and identifying initial requirements for WP2, WP3, WP4 and WP5.

Background of respondents

1. What are your professional responsibilities related to research assessment or monitoring?

The respondents for the nine GraspOS pilots have diverse responsibilities related to assessment. All 10 respondents indicate responsibilities related to creating or collecting data, 8 perform research and 6 planning or management relating to research assessment. Other specified responsibilities include advising open science practices assessment, preparation of the departmental self-assessment reports, and developing monitoring tools.
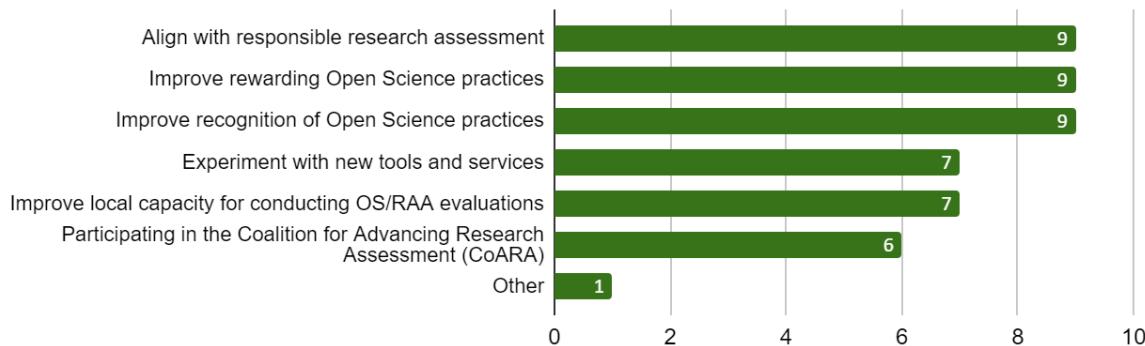
2. What are the underlying motivations for participating in the GraspOS pilot?

Almost all pilots are motivated to participate in the GraspOS project by alignment with Responsible Research Assessment and improving recognition and rewards of Open Science practices. 7 pilots are motivated by experimenting new tools, improving local capacity of Open Science-aware and responsible assessment, and 6 indicate participating in CoARA.

One pilot indicates that "[organisation name] is already committed to CoARA. Also, we view our engagements, besides the points already indicated, as ways of assessing the need for new tools and services, rather than departing from an underlying motivation to experiment with new tools and services in the first place".

2. What are the underlying motivations for participating in the GraspOS pilot?

Align with responsible research assessment	9
Improve rewarding Open Science practices	9
Improve recognition of Open Science practices	9
Experiment with new tools and services	7
Improve local capacity for conducting OS/RAA evaluations	7
Participating in the Coalition for Advancing Research Assessment (CoARA)	6
Other	1
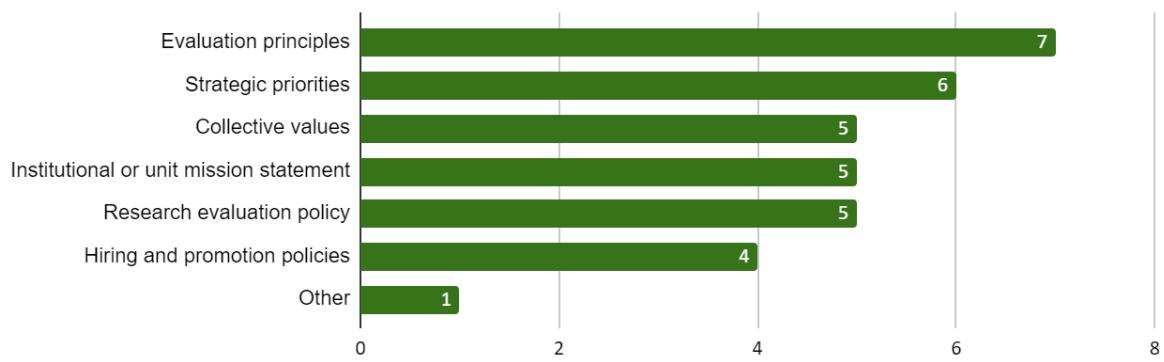
3. Research evaluation in this pilot context is linked to?

In most pilots, research evaluation is linked to evaluation principles (7), strategic priorities (6), collective values (5), institutional or unit mission statement (5), research evaluation policy (5) and hiring and promotion policy (4).

One pilot specified that "If the question is "Research evaluation in the context of the [national framework] is linked to", then the current answers apply. If the question implies "Research evaluation in our activities as pilots in GraspOS at [organisation name] is linked to" then hiring and promotion policies could be added."

3. Research evaluation in this pilot context is linked to?

Evaluation principles	7
Strategic priorities	6
Collective values	5
Institutional or unit mission statement	5
Research evaluation policy	5
Hiring and promotion policies	4
Other	1
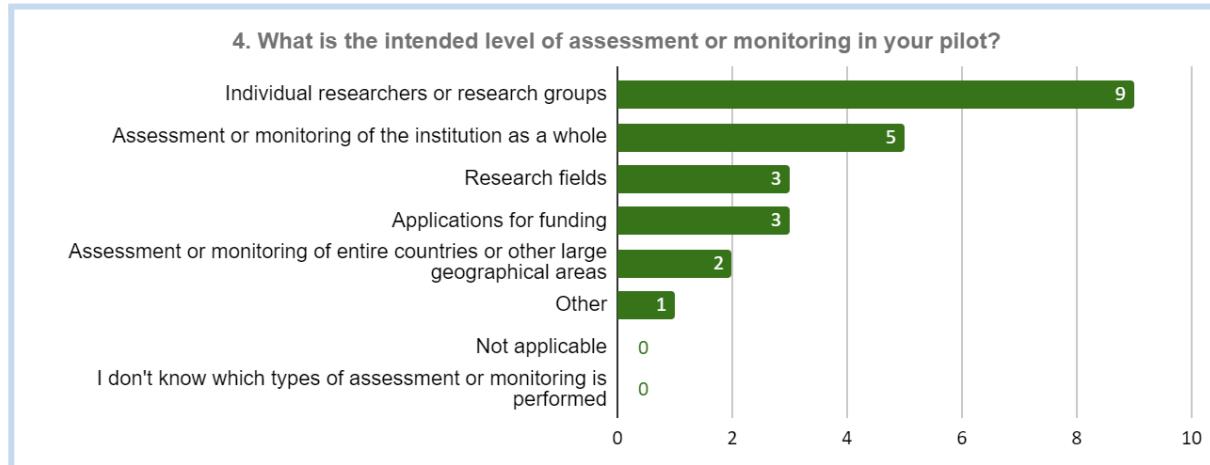
4. What is the intended level of assessment or monitoring in your pilot?

In almost all pilots the intended level of assessment is that of individual researchers or research groups (9). 5 pilots concern assessment at the level of institution as a whole, 3 pilots concern research fields as well as applications for funding, and 2 pilots relate to the national level assessments and monitoring.

One pilot specified also that "potentially, we also plan at convening key actors and facilitating reflection on the use of current indicators for describing the [name] institute's achievements

in the upcoming reporting period [of national framework], with a special focus on the inclusion of assessment criteria relating to Open Science.

Comparison with the landscape survey (Q4a): GraspOS pilots focus on levels of assessment that are also most relevant to the 54 respondents of the landscape survey: individuals (44), institutions (38), funding applications (28) and fields (23).
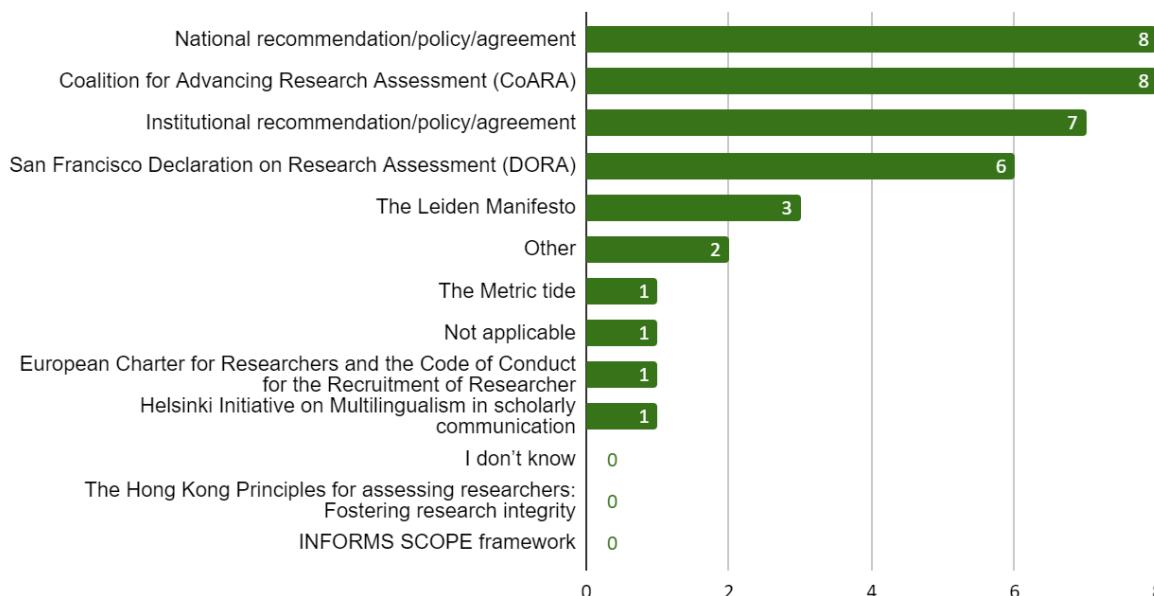
Responsible assessment policies

5. Which of the following assessment agreements, policies or recommendations your institution (or relevant stakeholders) is committed to?

The pilots are committed most frequently to four types of policies: CoARA agreement (8), national (8) and institutional (7) policies, as well as DORA (6). All the other responsible assessment initiatives are mentioned 0-3 times. One pilot also specified another policy (HRS4R - The Human Resources Strategy for Researchers), and another specified that "When it comes to research assessment we relate to most of them, but we have formally adhered only to those selected".

Comparison with the landscape survey (Q9a): the pilots are most frequently committed to the same assessment policies as the 54 respondent organisations of the landscape survey: CoARA (38 signatories), national (28) and institutional (26) policies, and DORA (26). The most notable exception is the European Charter for Researchers, which was among the most frequently mentioned policies by the landscape survey respondents (27) but indicated by only one pilot.

5. Which of the following assessment agreements, policies or recommendations your institution (or relevant stakeholders) is committed to?

Category	Value
National recommendation/policy/agreement	8
Coalition for Advancing Research Assessment (CoARA)	8
Institutional recommendation/policy/agreement	7
San Francisco Declaration on Research Assessment (DORA)	6
The Leiden Manifesto	3
Other	2
The Metric tide	1
Not applicable	1
European Charter for Researchers and the Code of Conduct for the Recruitment of Researcher	1
Helsinki Initiative on Multilingualism in scholarly communication	1
I don't know	0
The Hong Kong Principles for assessing researchers: Fostering research integrity	0
INFORMS SCOPE framework	0

6. What types of research outputs are taken into account in research assessment or monitoring at your institution (or relevant stakeholders) at the moment?

Almost all pilots indicate that journal articles and scientific publications beyond journal articles are taken into account in assessments. Next most frequently mentioned outputs are datasets (6), methods (5) and software (5). Less than half of the pilots mention policy documents (4), data models (3), exhibitions (3), strategies (3), algorithms (2), protocols (1) and theories (1), and workflows received 0 mentions.

Other research outputs specified by the pilots include:
1. patents, technical reports. Methods, models and algorithms are considered in the software category at [organisation name].
2. Courses, patent, scientific outreach
3. patents, inventions
4. For institute-level assessment, indicators used for assessing quality of research for peers, societal relevance for societal target groups and PhD policy and training (as indicated in Self-Assessment of Research of [name of institution]). Further than that, the [national framework, a national periodic evaluation (six years intervals), has three assessment criteria: research quality, societal relevance and visibility. Each is approached through at least four specific angles: open science, PhD policy and training, academic culture and human resources policy. Further outputs include:
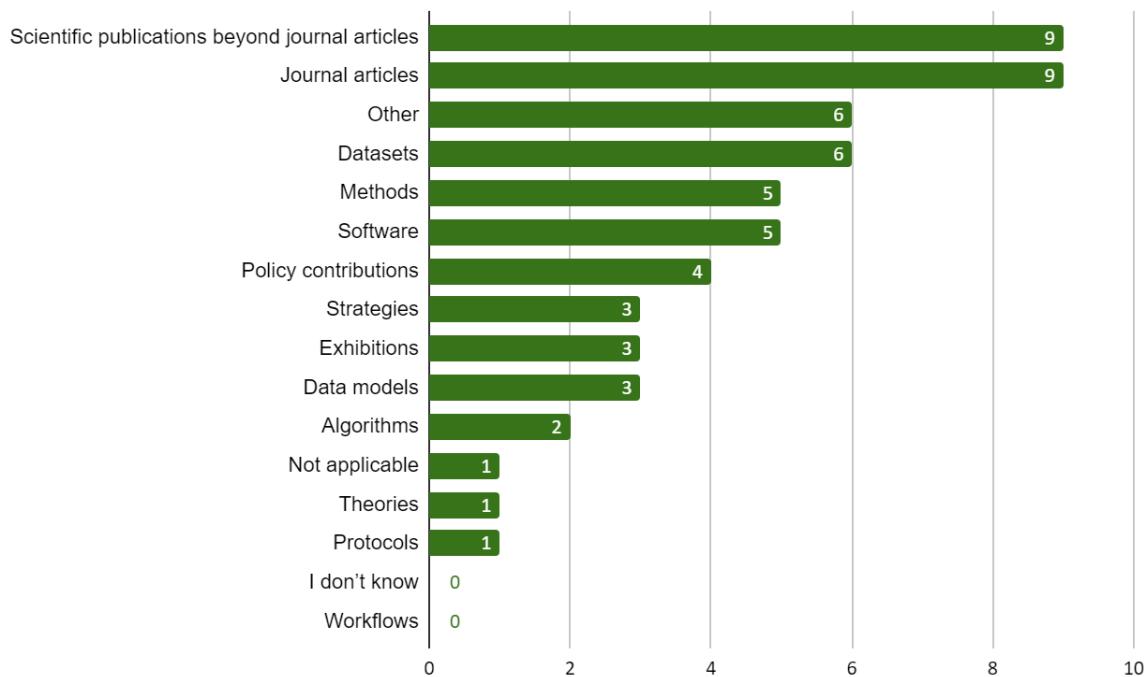
Interactions with stakeholders, based on research (App 8); research outputs for different audiences (App 8); contract research (App 3); website visits (App8).

5. Transfer, management
6. Hirsch Index, no. of citations, no. of citations in ISI articles, ISI impact factor aggregated number for all publications, patents, grants/ projects for which the researcher has obtained funding, course manuals, etc.

Comparison with the landscape survey (Q10a): the frequency different types of research outputs recognised in the pilot organisations reflect quite closely the frequency of recognition of outputs in the 54 landscape survey respondent organisations: Journal articles (51) and Scientific publications beyond journal articles (48) being almost universally recognized, followed by datasets (30), software (27), policy contributions (25), methods (23), theories (20), protocols (20), exhibitions (20), data models (16), algorithms (16), strategies (16), workflows (15).

6. What types of research outputs are taken into account in research assessment or monitoring at your institution (or relevant stakeholders) at the moment?

7. What practices contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?
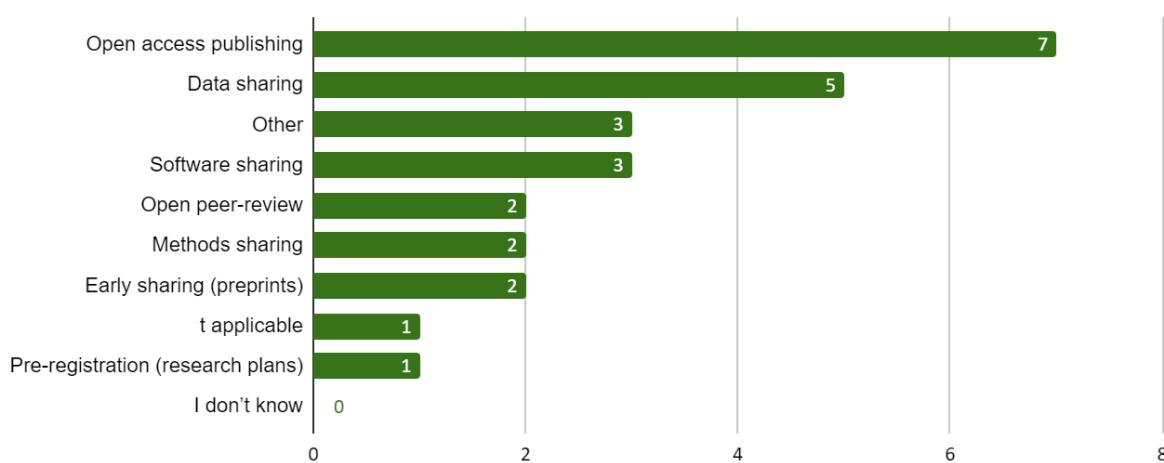
There is a lot of variation in recognition of different types of Open Science practices related to the research process. Most pilots indicated that open access publishing (7) and data sharing (5) are recognised but other practices received only 1-3 mentions: software sharing (3), preprints (2), methods sharing (2), open peer-review (2), and pre-registration (1).

Some pilots specified other practices as follows:

1. it's complicated. Career progressions in [organisation name] are structured as a main call providing general criteria which are then declined and adopted by the single committees for each discipline sector throughout all the institutes. In this picture, the "mother call" provides no guideline for the aforementioned practices.
2. The self-assessment report also elaborates on Revised HR policies to improve open access publishing, data sharing and data management (p.7)
3. [Organisation name] is the Programme Operator for Research [name] Financial Mechanism. This financial mechanism has an OS policy similar to Horizon 2020. In it's role as the PO for Research [name] looks at the following indicators tracking OS:- No. of scientific publications available in OA - No. of research data sets available in OA - No. of DMPs

Comparison with the landscape survey (Q11a): the frequency of different types of Open Science practices being recognised in the pilot organisations reflect quite closely the frequency of recognition of such practices in the 54 landscape survey respondent organisations: open access publishing (42), data sharing (29), early sharing (preprints) (17), open peer-review (17), pre-registration (research plans) (16), methods sharing (13) and software sharing (13).
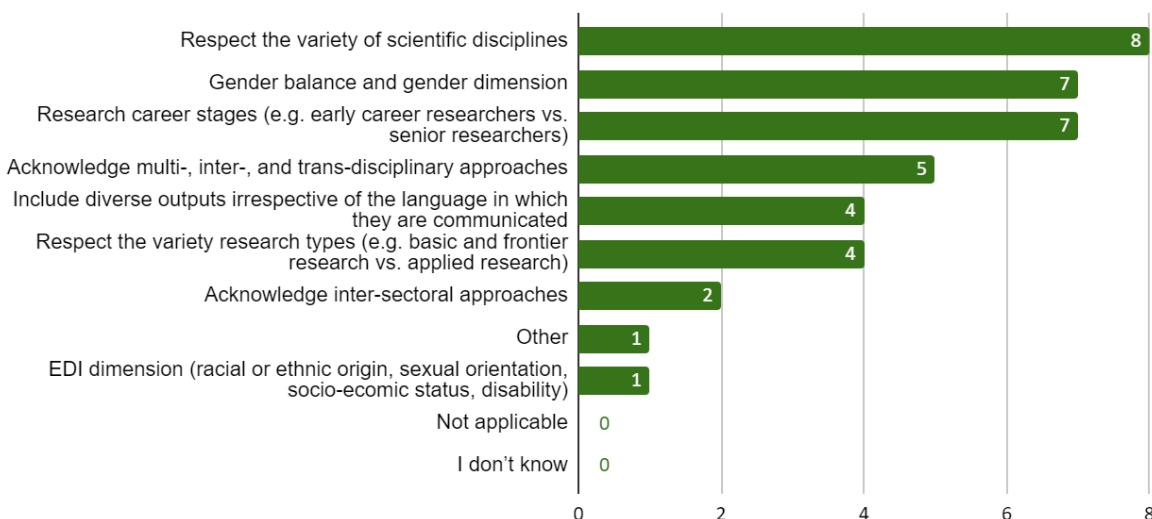
8. What practices contributing to the inclusiveness of research are considered in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Respecting the variety of scientific disciplines (8), research career stages (7) and gender balance (7) are among the most frequently considered practices contributing to inclusiveness of research among pilot organisations. Some pilots also mention considering multi-, inter-, and trans-disciplinary approaches (5), variety research types (4) and diverse outputs irrespective of the language (4). Inter-sectoral approaches (2) and EDI dimension (racial or ethnic origin, sexual orientation, socio-economic status, disability) (1) are only rarely acknowledged. One pilot also indicates Internationality of the personnel.

Comparison with the landscape survey (Q12a): the pilots show quite similar differences in consideration of inclusion related practices as the 54 respondents of the landscape survey: respecting the variety of scientific disciplines (41) and Research career stages (39) are the most frequently mentioned, and inter-sectoral approaches (22) and EDI dimensions (17) the least recognized practices. However, it seems that these latter two are somewhat more prominently present among the landscape survey respondents and should perhaps receive more focused attention also from the pilots.
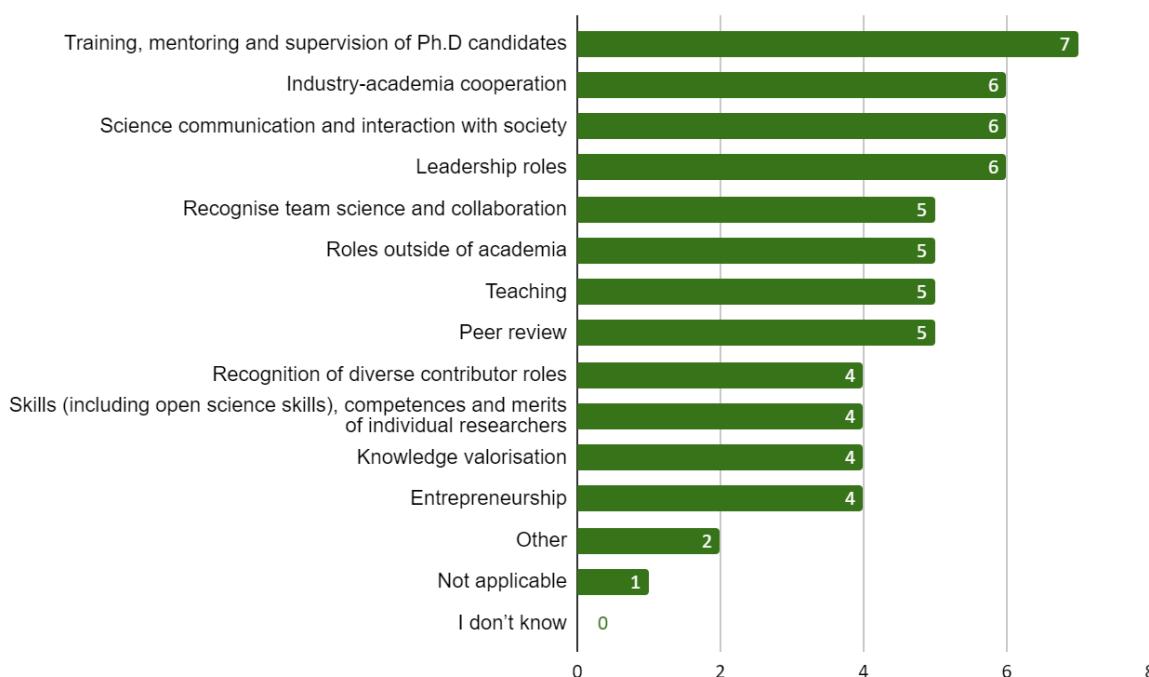
13a. What diverse research activities, practices and roles are considered in research assessment at your institution at the moment?

There are relatively little differences between activities, practices and roles considered in the pilot organisations. Training, mentoring and supervision of Ph.D candidates mentioned by 7, leadership roles, science communication and interaction with society and industry-academia

cooperation by 6, peer review, teaching, roles outside of academia and team science and collaboration by 5, and entrepreneurship, knowledge valorisation, skills, competences and merits of individual researchers and diverse contributor roles by 4 pilots.

Pilots also specified other roles:
1. prestigious funding decisions, Centres of Excellence, Academy Professors, ERC- and other major EU-funded projects, collaborations, major awards, acknowledgements, expert tasks, societal relevance, spin-offs, start-ups etc; open science actions (open access publications, data, methods, software/codes, citizen science activities), dissemination activities, interaction and co-creation activities
2. Editorial positions (p.15); (peer review box) Organisation of events (conferences/workshops); (p.15) Leading networks of scientific communities (p.15); Presenting research elsewhere (p.15); Advisory functions (p.56)

Comparison with the landscape survey (Q13a): recognition of diverse roles among pilot organisation quite closely reflects the situation among 54 respondent organisations to the landscape survey: industry-academia cooperation (42), teaching (38), training, mentoring and supervision of phd candidates (38), peer review (33), leadership roles (32), team science and collaboration (32), science communication and interaction with society (32), entrepreneurship (31), knowledge valorisation (27), skills (including os skills), competences and merits of
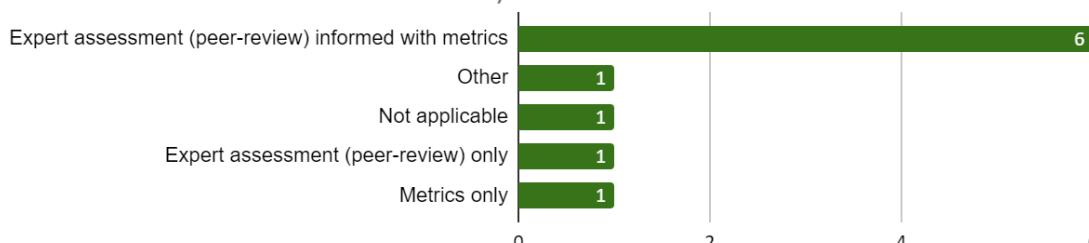
individual researchers (26), roles outside of academia (23) and diverse contributor roles (21). In the landscape survey citizen science (20) was the least recognised practice, and this option was not included in the questionnaire for the pilots.

10. What are the preferred methods of assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

The most frequently preferred method of assessment is expert assessment informed with metrics indicated in 6 pilot organisations. One pilot organisation uses only expert assessment or metrics. One pilot specified that it is mostly "Expert assessment (peer-review) informed with metrics", however, the individual committee can adopt local criteria different from other selections within the same "mother call".

Comparison with the landscape survey (Q15a): expert assessment informed with metrics is also by far the most frequently preferred method among 54 respondent organisations in the landscape survey (41), whereas only few organisations preferred metrics (5) or expert assessment (2) only. This should underscore the importance of responsible use of metrics, such as outlined in the Leiden manifesto and the Metric tide report.

11. In which of the following ways qualitative input is used in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?
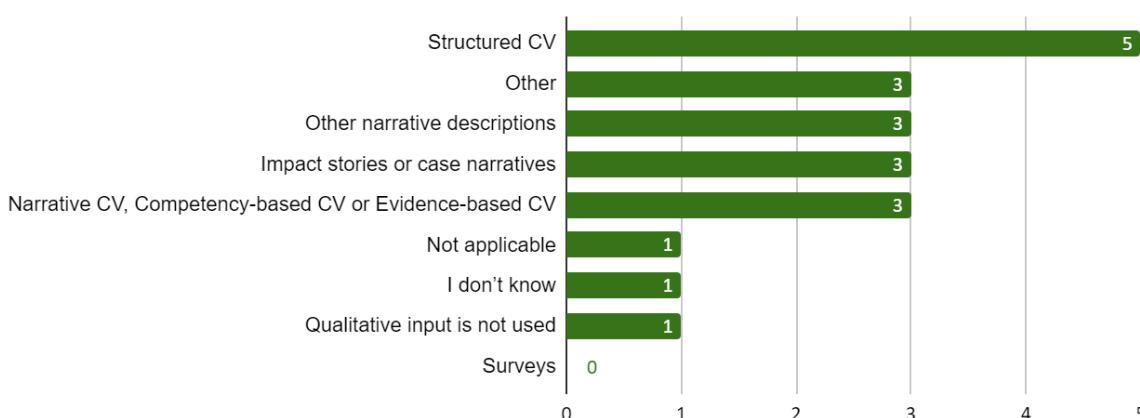
In the pilot organisations structured CV's are the most frequently used for providing qualitative input to assessment (5), followed by Narrative CV, Competency-based CV or Evidence-based CV, and Impact stories or case narratives and other narrative descriptions mentioned by 3 pilots. Surveys are not used by any of the pilots.

Some other specified methods for qualitative input include
1. It's not a CV, it's more an activity's report
2. Self-assessment of research communities, narrative, competency- and evidence based CVs of research communities (not of individual researchers)
3. As part of both the self-evaluation, but also as part of the onsite visit of the evaluation committee, focus groups and interviews were organised and conducted. This forms the basis of the assessment, in connection with the indicators as described above.

Comparison with the landscape survey (Q16a): compared to the pilots, the 54 respondent organisations of the landscape survey have a very similar approach to qualitative input. In the landscape survey self-assessments were the most frequently indicated format for qualitative input (31), however this option was not yet included in the pilot survey. With regard to the other options, which were the same in both surveys, structured CV (23) was the most common format while surveys are rarely used for qualitative input (6).
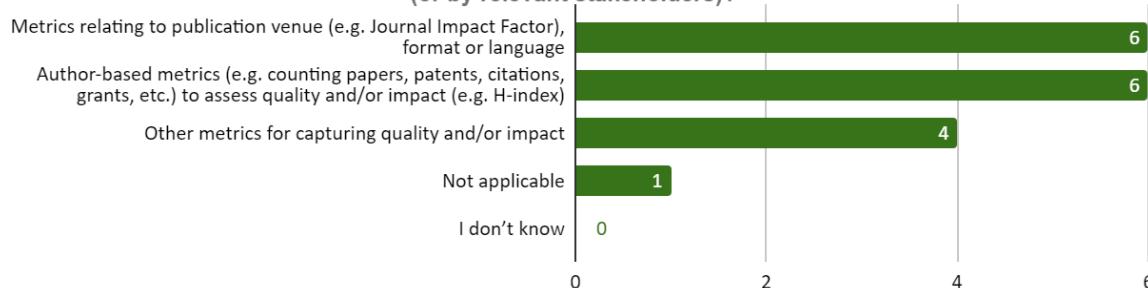
11. In which of the following ways qualitative input is used in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Category	Value
Structured CV	5
Other	3
Other narrative descriptions	3
Impact stories or case narratives	3
Narrative CV, Competency-based CV or Evidence-based CV	3
Not applicable	1
I don't know	1
Qualitative input is not used	1
Surveys	0

12. Are the following uses of metrics in research assessment or monitoring employed at your institution (or by relevant stakeholders)? If yes, please describe any of your responses further.

Both the metrics related to the publication venue, format or language, as well as author-based metrics are used in 6 pilot organisations, in addition to which 4 pilot organisations indicated the use of other metrics for capturing quality and/or impact of research.

12. Are the following uses of metrics in research assessment or monitoring employed at your institution (or by relevant stakeholders)?

Category	Value
Metrics relating to publication venue (e.g. Journal Impact Factor), format or language	6
Author-based metrics (e.g. counting papers, patents, citations, grants, etc.) to assess quality and/or impact (e.g. H-index)	6
Other metrics for capturing quality and/or impact	4
Not applicable	1
I don't know	0

In comments, the other metrics were specified as follows:

1. Single-author outputs are given more points. co-authored outputs in some cases have a threshold above which they are heavily penalised. The author order can be used to derive the autonomy of an author (first = lead, last = lab head, middle = gregarious)).
2. There are a number of author-based metrics in use, but it is explicitly mentioned that they should not be interpreted as reflecting research quality. Rather, a column, next to the indicator description, elucidates that these indicators show e.g. 'accessibility to peers' (proportion of OA pub) or 'societal interest' (research output for different audiences). These include: Number of peer reviewed publications, books, book chapters, conference proceedings, scientific reports (App 5); Proportion of OA publications (App5); Examples of high-impact publications (App 12); Examples of research output for different audiences (App 8); Number of policy reports at national, European, global level (App 8), full list (App 13); Number of citations by peers and relative citation score compared to field average (App 6); Number of highly cited papers (top1%-10%) (App 13); Number of mentions related to publications, national/international newspaper items, radio, television appearances, policy documents, other media (App 9); Number of publications funded by [name of country] ministries, abroad, EC (App 9, App 13); Examples of use of research products in knowledge networks, platforms (App9); Examples of use of research products by societal target groups at international level (App 9); Examples of use of research products by societal target groups at national level (App 9)
3. Extent to which the PI s scientific output has led to progress in their field of expertise, importance of PI s scientific discoveries as reflected in their track record or other achievements
4. OA indicators (number of readings, etc.)

In comments, the author-based metrics were specified as follows:

1. h-index, citations
2. Number of papers and citations.
3. IF or H-index are not used
4. Papers, books and citations count
5. Number of successful highly competitive personal grants; (App 7) Collaborative research grants and carch (App 3ontract rese)
6. no. of citations, Hirsch index, no. of articles in ISI indexed journals or in other international databases, no. of patents, no. of grants, no. of books published or chapter in books

In comments, the metrics related to publication venue were specified as follows:

1. JUFO (Publication Forum) classification is available for publications as a filter
2. top-tier and top-quartile journals are given more points
3. JIF in format of national evaluation system.
4. Bibliometric analysis of Principal Investigators (PI) done from the Web of Science, Scopus and Google Scholar databases
5. Scimago quartiles (Computer Science) and National classification of journals excellence
6. no. of articles in ISI indexed journals or in other international databases, publications in English, French, German, Italian or Spanish

One pilot commented the non-applicability of metrics as follows:
1. Metrics are not part of recruitment or promotion files

Comparison with the landscape survey (Q17a): overall, the pilot organisations use author and venue based metrics as extensively as 54 respondent organisations to the landscape survey: author-based metrics (42) and metrics related to publication venue (31).

13. Are university rankings used as a criterion or indicator in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment - If used, briefly describe in what way?

Four pilots indicated that they do not use rankings in assessment, and three other pilots did not respond, implying a negative answer. Three pilots indicate some use of the rankings:
1. not formally or at least not in official criteria
2. We use the Essential Science Indicators (ESI) ranking
3. Rankings are not used in research assessment.
4. No that we are aware of.
5. The Times Higher Education ranking is used in a description around 'impact measured by citations', elaborating how the institute's impact in 'Environmental Sciences' is the highest in the world (2011-2015). (p.14); Academic Ranking of World Universities is used to describe [organisation name] position as-a-whole and in particular in the subject area of Geography. (p.14) In said paragraph, these rankings and highly cited authors that belong to the faculty are named, including research collaborations across other 'top universities as well as renowned institutes' (p.14). This paragraph stands under the heading of 'Use of research products by peers' (p.14).
6. "Yes. Order no. 3126/2022 of February 11, 2022 for the approval of the Methodology on the funding of university scientific research within public higher education institutions in 2022. Ministry of Education allocates the national fund dedicated to funding scientific research at public universities. 45% of the fund dedicated to funding scientific research within public higher education institutions for 2022 depended on the score obtained by the universities in the meta-ranking of [name of country] universities for the year 2021.
7. no
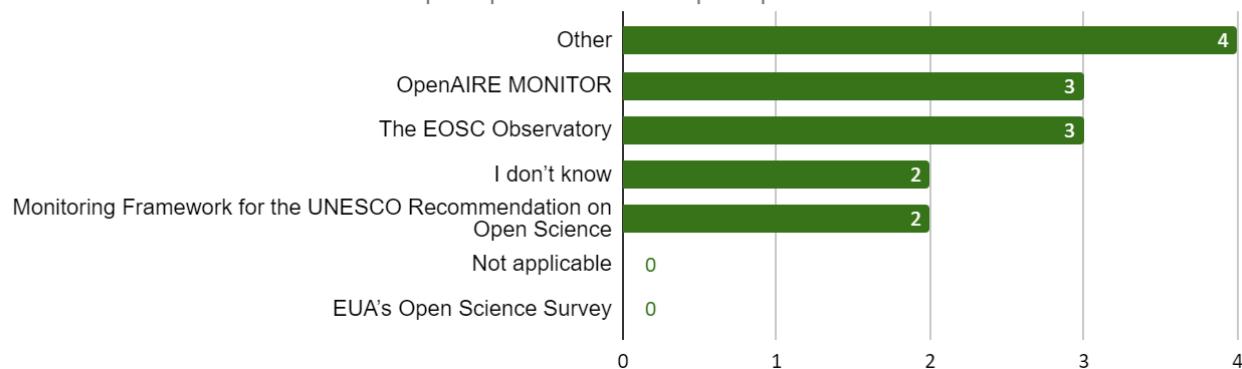
The landscape survey participants were asked the same question with multiple choices (Q18a), so the answers cannot be easily compared. Overall, it seems that pilots exhibit similar uses of rankings.

14. Which of the following European or global OS monitoring surveys your institution (or relevant stakeholders) participate or consider to participate?

There is a lot of variation in the pilot organisations' participation in the international OS monitoring activities, the OpenAIRE monitor and EOSC observatory being mentioned by 3 pilots, UNESCO recommendation framework by one, and EUA survey by none of the pilots. Two respondents did not know if their organisation participated in the international OS surveys, and four pilots indicated participation in other, national level, Open Science monitoring surveys.

Comparison with the landscape survey (Q14a): the pilot organisations' participation is comparable to the 54 landscape survey organisations, of which 16 respondents did not know whether their organisation participated or not. The main difference is that among the landscape survey respondents the EUA Open Science survey was the most frequently mentioned (20), followed by the OpenAIRE monitor (13) and EOSC observatory (13), and the UNESCO recommendation framework (5).
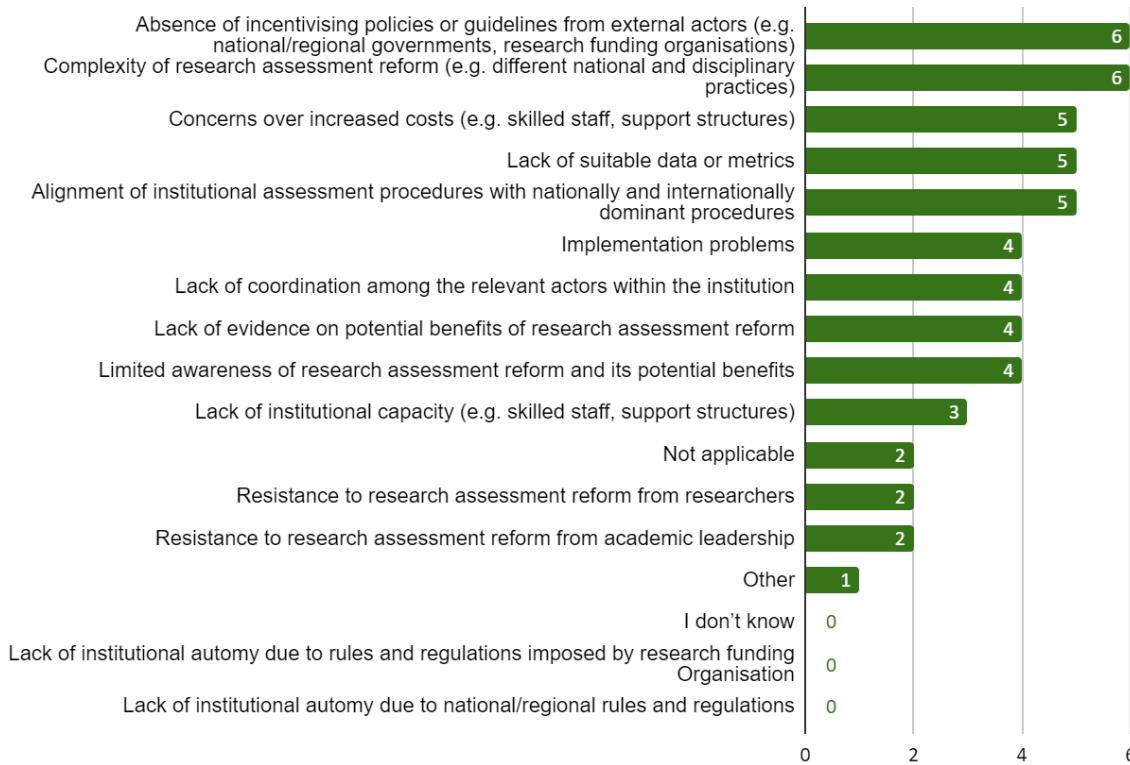
15. What are the main barriers and difficulties for your institution (or relevant stakeholders) to revisit and reform its research assessment procedures?

The most frequently identified barriers for reforming assessment by the pilots are complexity of the reform (6) and absence of external incentives (6), concerns over increased costs (5), lack of suitable data or metrics (5) and alignment of institutional policies with national or international dominating procedures. Implementation problems, lack of coordination and lack of awareness and evidence of the benefits are mentioned by four pilots, two mention resistance from researchers and academic leadership, and none mention lack of institutional autonomy. One pilot specified other barriers: "changing work routines of individual researchers and providing clear incentives in the form of recognition and rewards on the workfloor for open science practices".

15. What are the main barriers and difficulties for your institution (or relevant stakeholders) to revisit and reform its research assessment procedures?

Barrier	Value
Absence of incentivising policies or guidelines from external actors (e.g. national/regional governments, research funding organisations)	6
Complexity of research assessment reform (e.g. different national and disciplinary practices)	6
Concerns over increased costs (e.g. skilled staff, support structures)	5
Lack of suitable data or metrics	5
Alignment of institutional assessment procedures with nationally and internationally dominant procedures	5
Implementation problems	4
Lack of coordination among the relevant actors within the institution	4
Lack of evidence on potential benefits of research assessment reform	4
Limited awareness of research assessment reform and its potential benefits	4
Lack of institutional capacity (e.g. skilled staff, support structures)	3
Not applicable	2
Resistance to research assessment reform from researchers	2
Resistance to research assessment reform from academic leadership	2
Other	1
I don't know	0
Lack of institutional autonomy due to rules and regulations imposed by research funding Organisation	0
Lack of institutional autonomy due to national/regional rules and regulations	0

Comparison with the landscape survey (Q19a): the pilots show some similarities and differences compared to the 54 landscape survey organisations (Q19a). Complexity (33) and costs (25) are barriers most frequently experienced also by landscape survey participants but while many of them also mention alignment with national and international dominant procedures (19), they see lack of incentivising policies (17), implementation problems (16), or lack of suitable metrics (13) to a somewhat lesser extent as barriers. This may highlight the pilots' more practical focus to the assessment reform.

Information supporting responsible assessment
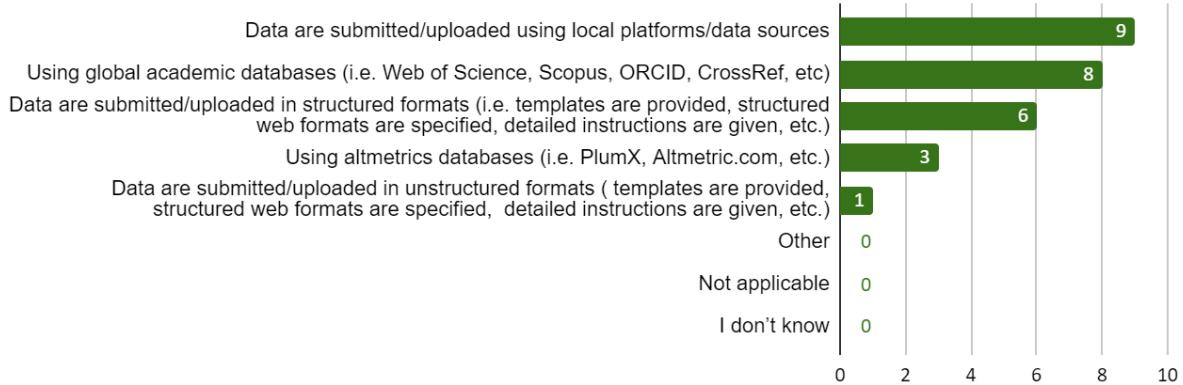
16. How are data for research assessments or monitoring captured at your institution?

Almost all pilot organisations captured data for research assessments using local platforms/data sources (9) and global academic databases, such as Web of Science, Scopus, ORCID, CrossRef, etc (8), and structured formats (i.e. templates are provided, and more than half use structured web formats are specified, detailed instructions are given, etc.) (6). Use of altmetrics databases, such as PlumX, Altmetric.com, etc. (3) and unstructured formats

(templates are provided, structured web formats are specified, detailed instructions are given, etc.) (1) is less common.

Comparison with the landscape survey (Q20a): the pilot organisations capture data for assessments mainly using the same sources and tools as the 54 landscape survey participants that strongly prioritised global (46) and local (33) platforms, structured formats (33) and ORCID (31) over altmetrics databases (11) or unstructured formats (10).
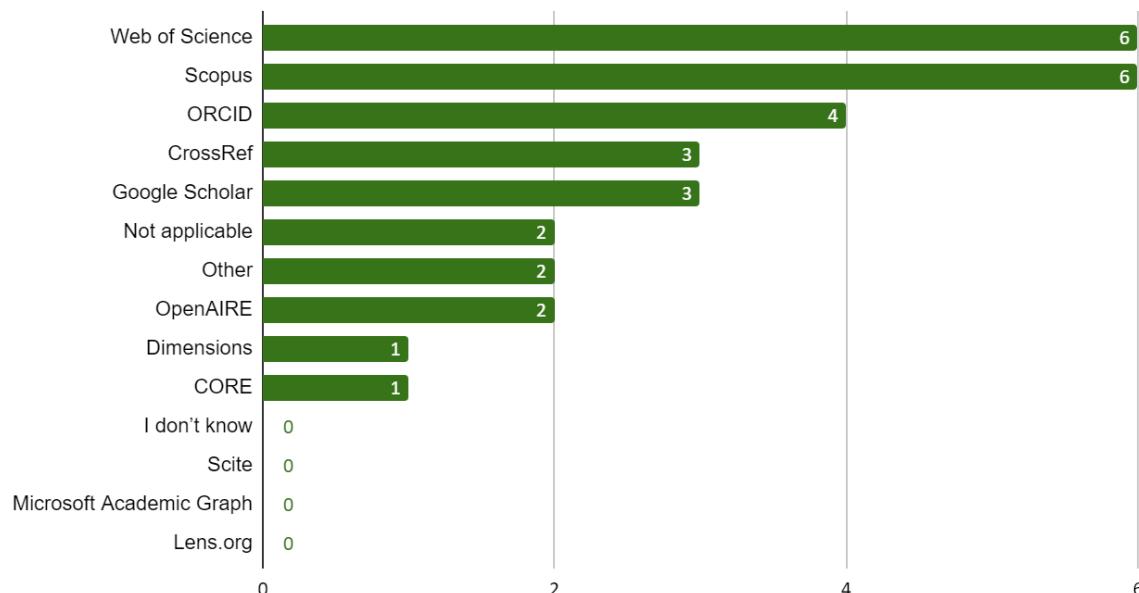
17. Which of the following global data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?

The global platforms most frequently used by the pilot organisations are Scopus (6) and Web of Science (6), followed by ORCID (4), Google Scholar (3), CrossRef (3), OpenAIRE (2), CORE (1) and Dimensions (1). Lens.org, Microsoft Academic Graph (now OpenAlex) and Scite are not used by the pilot organisations. One pilot specified that additional sources included HAL , and another pilot indicated that there are "possibly more, but these are the ones that the team and the data steward of the institute is aware of (for assessment)."

Comparison with the landscape survey (Q21a): the pilots use global platforms much the same way as the 54 participants of the landscape survey that prioritised even more strongly the Web of Science (44) and Scopus (44) databases compared to Google Scholar (23) and ORCID (22). Crossref (9), OpenAIRE (8), Dimensions (6) and other platforms were used relatively rarely.

17. Which of the following global data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?

Data source	Count
Web of Science	6
Scopus	6
ORCID	4
CrossRef	3
Google Scholar	3
Not applicable	2
Other	2
OpenAIRE	2
Dimensions	1
CORE	1
I don't know	0
Scite	0
Microsoft Academic Graph	0
Lens.org	0

18. Which of the following tools are used for research assessment or monitoring at your institution or (or by relevant stakeholders)?

None of the tools proposed in the questionnaire are predominantly used by the pilot organisations, however at least one organisation uses one of the following: Altmetric.com, Dimensions Analytics, InCites, PowerBI, Publish or Perish, SciVal, SQL queries over local data sources and VOSviewer. No use of Google Big Query, PlumX, OpenAIRE Graph, Tableau, BibExcel or Bibliometrix/Biblioshiny was indicated.
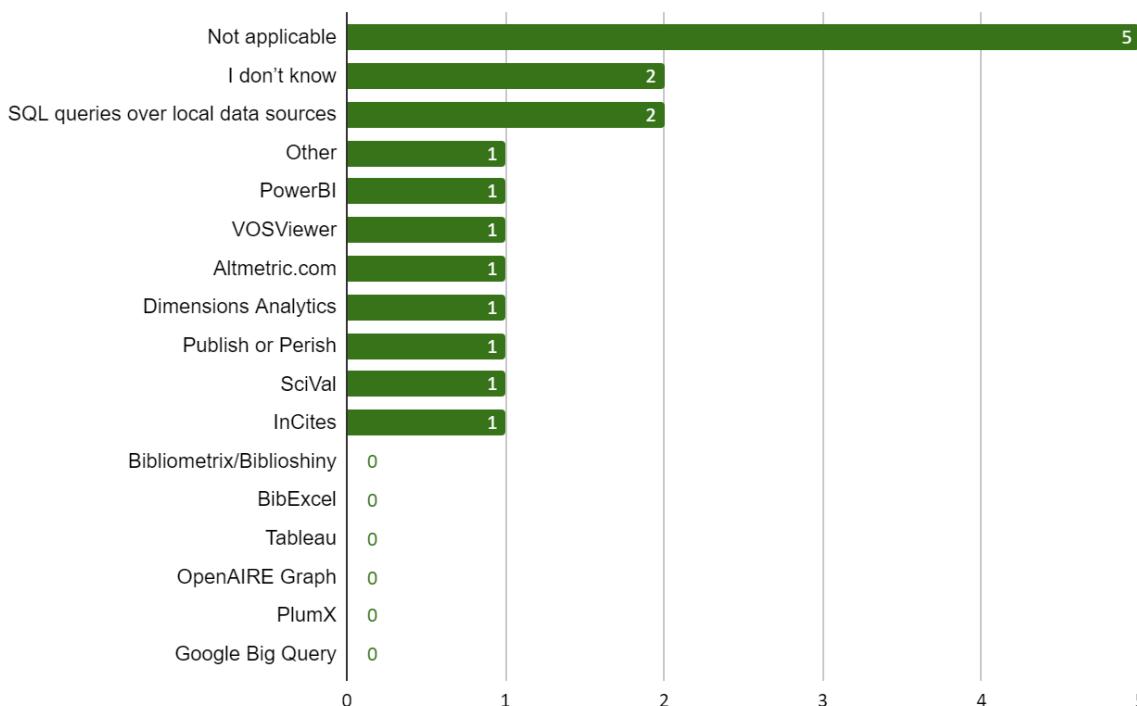
Comparison with the landscape survey (Q22a): the major difference between pilot organisation and 54 organisations answering the landscape survey is that in the latter SciVal (23) and Incites (17) were clearly more frequently used than the other proposed tools.

19. Which of the following local data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?
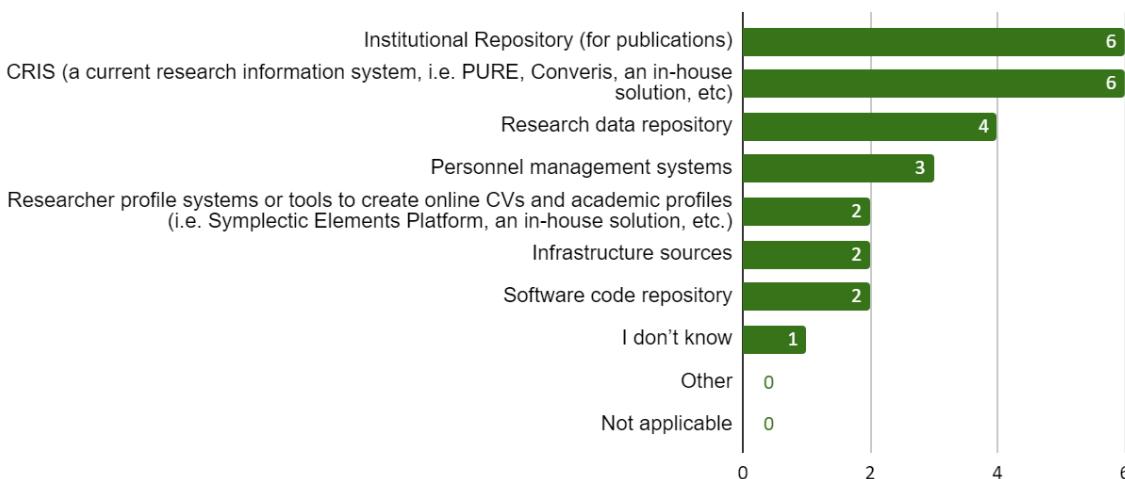
Most frequently mentioned local data sources mentioned by pilots are institutional repository (6) and a CRIS - Current research Information System (6). Three pilot organisations have a local publication repository and CRIS, and 6 have one or the other kind of local system. Large majority (7) of pilot organisations that have a local CRIS and/or publication repository, also use WoS and/or Scopus databases. Other local sources include research data repository (4), Personnel management systems (3), Software code repository (2), Infrastructure sources (2) and Researcher profile systems or tools to create online CVs and academic profiles (i.e. Symplectic Elements Platform, an in-house solution, etc.) (2).

Comparison with the landscape survey (Q23a): local resources are used by pilots in much the same way by 54 landscape survey participants. 41 organisations used local publication repositories and/or CRIS, and almost always in conjunction with WoS and/or Scopus. Other local systems were used less frequently.

18. Which of the following tools are used for research assessment or monitoring at your institution or (or by relevant stakeholders)?

Tool	Count
Not applicable	5
I don't know	2
SQL queries over local data sources	2
Other	1
PowerBI	1
VOSViewer	1
Altmetric.com	1
Dimensions Analytics	1
Publish or Perish	1
SciVal	1
InCites	1
Bibliometrix/Biblioshiny	0
BibExcel	0
Tableau	0
OpenAIRE Graph	0
PlumX	0
Google Big Query	0

19. Which of the following local data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?

Data source	Count
Institutional Repository (for publications)	6
CRIS (a current research information system, i.e. PURE, Converis, an in-house solution, etc)	6
Research data repository	4
Personnel management systems	3
Researcher profile systems or tools to create online CVs and academic profiles (i.e. Symplectic Elements Platform, an in-house solution, etc.)	2
Infrastructure sources	2
Software code repository	2
I don't know	1
Other	0
Not applicable	0

20. Which type of research entities are preserved in local data sources used for research assessment or monitoring?

All pilot organisations have records of publications (10) and Persons (10) in the local sources, and most of them also have research data (8), organisations (7), projects (7) and funding information (7). Activities (4), CVs (3), Infrastructures (3) and Skills and competencies (1) are less common entities in local sources. One pilot considered this question ambiguous.

Comparison with the landscape survey (Q25a): the pilot organisations have it in common with the 54 landscape survey respondent organisations that publications (45), projects (40), funding (38) and persons (32) are relatively well covered in the local sources, while CVs (18) and skills and competences (13) are less frequently included. Pilots seem to have somewhat better availability of information on persons and research data.
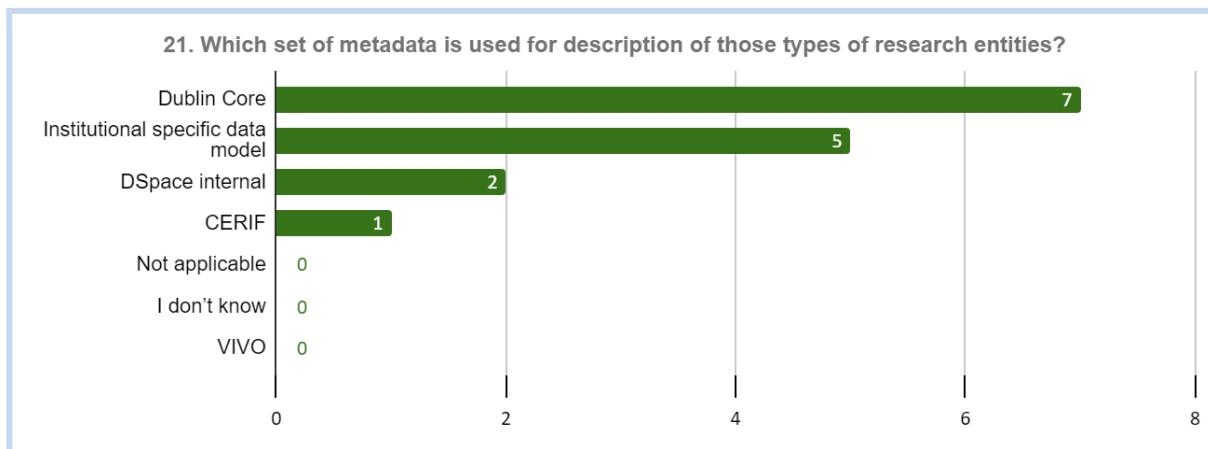
20. Which type of research entities are preserved in local data sources used for research assessment or monitoring?

Entity	Count
Persons	10
Publications	10
Research data	8
Funding information	7
Projects	7
Organisations	7
Activities	4
Infrastructures	3
CVs	3
Other	1
Skills and competencies	1
Not applicable	0
I don't know	0

21. Which set of metadata is used for description of those types of research entities?

The most frequently used metadata set by pilots are Dublin Core (7) and institution specific data models (5). Some pilots also mention DSpace internal (2) and CERIF (1). VIVO is not used by any of the pilots.

Comparison with the landscape survey (Q26): pilot organisations have in common with the 54 landscape survey participants that Dublin Core is the most frequently used datamodel. Pilots also appear to use more institutional data models and less CERIF.

21. Which set of metadata is used for description of those types of research entities?

Category	Value
Dublin Core	7
Institutional specific data model	5
DSpace internal	2
CERIF	1
Not applicable	0
I don't know	0
VIVO	0

- Annex 3. The questionnaire for GraspOS landscape survey on Reforming Research Assessment

GraspOS landscape survey on Reforming Research Assessment

Introduction

The purpose of this survey is to gain overview of the state-of-the-art research assessment practices at the research performing and funding organisations, and other organisations involved with research assessment, who already are, or could become, signatories of the Agreement on Reforming Research Assessment. The survey is conducted by the Federation of Finnish Learned Societies (TSV) for the landscape analysis of EU project GraspOS. The landscape report supports the development of Open Science Assessment Framework (OSAF).

The questionnaire is structured based on CoARA core-commitments and principles. The Agreement on Reforming Research Assessment sets a shared direction for changes in assessment practices for research, researchers and research performing organisations, with the overarching goal to maximise the quality and impact of research. The Agreement includes the principles, commitments and timeframe for reforms and lays out the principles for a Coalition of organisations willing to work together in implementing the changes.

Signatories commit to a common vision, which is that the assessment of research, researchers and research organisations recognises the diverse outputs, practices and activities that maximise the quality and impact of research. This requires basing assessment primarily on qualitative judgement, for which peer-review is central, supported by responsible use of quantitative indicators.

We invite the representatives of the organisations that are or could become signatories of the Agreement of Reforming Research Assessment to respond to the questionnaire by May 28th, 2023.

Answering the survey takes around 20 to 30 minutes. If you want to take a look at the survey or ask your colleagues for advice, you can download the questionnaire here in word-format.

GraspOS at a glance

The mission of the project is to enable a rewards and recognition system based on a new generation of (qualitative or quantitative) metrics and indicators, leading to a culture and system change that increases the quality and impact, the creativity and the transparency of and trust in science, and to establish a system of qualitative information based on community-led curation and annotations of research outcomes that feeds into a revamped reward and recognition system.

GraspOS develops, assesses and puts into operation an open and trusted federated infrastructure for next generation research metrics and indicators, offering data, tools, services and guidance to support and enable policy reforms for research assessment at three levels:

- individual/group
- institutional
- country

Project is coordinated by Athena Research Center (Greece), and it brings forward a multidisciplinary consortium including CNR, CSC, EGI, CWTS Leiden, INRAE, INRIA, OpenAIRE, OPERAS, TSV, UNIBO and Utrecht University.

The survey is conducted and analysed by a working group including Janne Pölönen, Anna-Kaisa Hyrkkänen, Dragan Ivanović and Marita Kari.

If you have any questions you may contact:

Anna-Kaisa Hyrkkänen

Coordinator, Responsible Assessment & GraspOS

Federation of Finnish Learned Societies

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Janne Pölönen

Head of Planning of Publication Forum

Federation of Finnish Learned Societies

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Part 1. Background questions:

1. At which type of institution do you work?
Single choice - List (radio):
- Universities and their associations
- Research centres, research infrastructures, and their associations
- Public or private research funding organisations and their associations
- Academies, learned societies, and their associations, and associations of researchers
- National/regional authorities or agencies that implement some form of research assessment and their associations
- Other relevant non-for-profit organisations involved with research assessment, and their associations
- Other. Please specify in the comment field:

2. Where is your institution located?
Single choice list of countries (dropdown)

3a. What are your professional responsibilities related to research assessment at your institution?
Multiple choice (select all that apply)
- Signatory of The Agreement on Reforming Research Assessment
- Registered CoARA Point of Contact for my organisation
- Member of body, group or unit in charge of assessment policies and coordination
- Member of body, group or unit in charge of assessment criteria and methods
- Member of body, group or unit in charge of assessment data and analytics
- Member of body, group or unit in charge of assessment tools and systems
- Other. Please specify in the comment field.

3b. If necessary, please describe any of your responses further.
Long free text.

4a. At which level are research assessments performed at your institution?
Multiple choice (select all that apply)
- Individual researchers or research groups
- Assessment or monitoring of the institution as a whole
- Assessment or monitoring of entire countries or other large geographical areas
- Applications for funding
- Research fields
- I do not know which types of assessment or monitoring is performed.
- Not applicable
- Other assessment or monitoring is performed. Please specify in the comment field:

4b. If necessary, please describe any of your responses further.
Long free text.

5a. Research evaluation at your institution is linked to:
Multiple choice (select all that apply)
- Strategic priorities
- Evaluation principles
- Research evaluation policy
- Institutional or unit mission statement
- Hiring and promotion policies
- Collective values
- I don't know
- Not applicable
- Other. Please specify in the comment field:

5b. If necessary, please describe any of your responses further.
Long free text.

6a. What are the underlying motivations for reforming the research assessment at your institution?
Multiple choice (select all that apply)
- Improve recognition of Open Science practices
- Improve rewarding Open Science practices
- Align with Responsible Research Assessment
- Improve local capacity for conducting Open Science/Responsible Research assessment evaluations
- Experiment with new tools and services
- Participating in the Coalition for Advancing Research Assessment (CoARA)
- I don't know
- Not applicable
- Other. Please specify in the comment field:

6b. If necessary, please describe any of your responses further.
Long free text.

7. Has your organisation signed the Agreement of Reforming Research Assessment?
Single choice - List (radio):
- Yes
- No, we considered and decided to sign the agreement
- No, we considered and decided not to sign
- No, we didn't consider that yet

- I don't know if my organisation has signed or consider signing the agreement
- Other. Please specify in the comment field:

8. What were the main reasons why your institution decided to sign the agreement or not to sign it?
Long free text.

9a. Which of the other following research assessment agreements, policies or recommendations your institution is committed to?
Multiple choice (select all that apply)
- European Charter for Researchers and the Code of Conduct for the Recruitment of Researcher
- Helsinki Initiative on Multilingualism in scholarly communication
- INORMS SCOPE framework
- Institutional recommendation/policy/agreement
- National recommendation/policy/agreement
- San Francisco Declaration on Research Assessment (DORA)
- The Hong Kong Principles for assessing researchers: Fostering research integrity
- The Leiden Manifesto
- The Metric tide
- I don't know
- Not applicable
- Other. Please specify in the comment field.

9b. If necessary, please describe any of your responses further.
Long free text.

Part 2. Advancing Research Assessment

The following questions are formulated based on the four core commitments of the Agreement of Reforming Research Assessment.

Core-commitment 1. Recognise the diversity of contributions to, and careers in, research in accordance with the needs and nature of the research.
Purpose: This commitment will broaden recognition of the diverse practices, activities and careers in research, considering the specific nature of research disciplines and other research endeavours.
Scope: Changes in assessment practices should enable recognition of the broad diversity of:
- valuable contributions that researchers make to science and for the benefit of society, including diverse outputs beyond journal publications and irrespective of the language in which they are communicated

- practices that contribute to robustness, openness, transparency, and the inclusiveness of research and the research process including: peer review, teamwork and collaboration
- activities including teaching, leadership, supervision, training and mentoring

10a. What types of research outputs are taken into account in research assessment at your institution at the moment?

Multiple choice (select all that apply)
- Journal articles
- Scientific publications beyond journal articles
- Datasets
- Software
- Data models
- Methods
- Theories
- Algorithms
- Protocols
- Workflows
- Exhibitions
- Strategies
- Policy contributions
- I don't know
- Not applicable
- Other. Please specify in the comment field.

10b. If necessary, please describe any of your responses further.
Long free text.

11a. What practises contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment at your institution at the moment?

Multiple choice (select all that apply)
- Data sharing
- Early sharing (preprints)
- Methods sharing
- Open access publishing
- Open peer-review
- Pre-registration (research plans)
- Software sharing
- I don't know
- Not applicable
- Other. Please specify in the comment field.

11b. If necessary, please describe any of your responses further.

Long free text.

12a. What practises contributing to the inclusiveness of research are considered in research assessment at your institution at the moment?
Multiple choice (select all that apply)
- Diverse outputs irrespective of the language in which they are communicated
- EDI dimension (racial or ethnic origin, sexual orientation, socio-economic status, disability)
- Gender balance and gender dimension
- Inter-sectoral approaches
- Multi-, inter-, and trans-disciplinary approaches
- Research career stages (e.g. early career researchers vs. senior researchers)
- Respect the variety of scientific disciplines
- Respect the variety of research types (e.g. basic and frontier research vs. applied research)
- I don't know
- Not applicable
- Other. Please specify in the comment field.

12b. If necessary, please describe any of your responses further.
Long free text.

13a. What diverse research activities, practices and roles are considered in research assessment at your institution at the moment?
Multiple choice (select all that apply)
- Citizen science
- Entrepreneurship
- Industry-academia cooperation
- Knowledge valorisation
- Leadership roles
- Peer review
- Recognition of diverse contributor roles (data steward, software engineer and data scientist roles, technical roles, public outreach, science diplomacy, science advice and science communicator etc.)
- Recognise team science and collaboration
- Roles outside of academia
- Science communication and interaction with society
- Skills (including open science skills), competences and merits of individual researchers
- Teaching
- Training, mentoring and supervision of PhD candidates
- I don't know
- Not applicable
- Other. Please specify in the comment field.

13b. If necessary, please describe any of your responses further.
Long free text.

14a. Which of the following European or global Open Science monitoring surveys does your institution participate or consider to participate?
Multiple choice (select all that apply)
- The EOSC Observatory
- Monitoring Framework for the UNESCO Recommendation on Open Science (link to working draft)
- EUA's Open Science Survey (link to survey 2020 - 2021 results)
- OpenAIRE MONITOR (link to dashboards)
- I don't know
- Not applicable
- National OS monitor, please specify which_____

14b. If necessary, please describe any of your responses further.
Long free text.

Core-commitment 2. Base research assessment primarily on qualitative evaluation for which peer review is central, supported by responsible use of quantitative indicators.
Purpose: This commitment will enable the move towards research assessment criteria that focus primarily on quality, while recognising that responsible use of quantitative indicators can support assessment where meaningful and relevant, which is context dependent.
Scope: Research assessment should rely primarily on qualitative assessment for which peer review is central, supported by responsibly used quantitative indicators where appropriate.

15a. What are the preferred methods of assessment at your institution at the moment?
Single choice - List (radio):
- Expert assessment (peer-review) only
- Metrics only
- Expert assessment (peer-review) informed with metrics
- I don't know what are the preferred methods of assessment
- Not applicable
- Other. Please specify in the comment field:

15b. For what purposes are the preferred methods of assessment used at your institution?
Long free text.

16a. Which of the following ways qualitative input is used in research assessment at your institution at the moment?
Multiple choice (select all that apply)
- Self-assessments
- Structured CV
- Narrative CV, Competency-based CV or Evidence-based CV
- Impact stories or case narratives

- Other narrative descriptions
- Surveys
- Qualitative input is not used
- I don't know
- Not applicable
- Other. Please specify in the comment field:

16b. If necessary, please describe any of your responses further.
Long free text.

Core-commitment 3. Abandon inappropriate uses in research assessment of journal- and publication-based metrics, in particular inappropriate uses of Journal Impact Factor (JIF) and H-index. Purpose: This commitment will reduce the dominance of a narrow set of quantitative journal- and publication-based metrics.
Scope: Inappropriate uses of journal- and publication-based metrics in research assessment should be abandoned. In particular, this means moving away from using metrics like the Journal Impact Factor (JIF), Article Influence Score (AIS) and H-index as proxies for quality and impact. 'Inappropriate uses' include:

- relying exclusively on author-based metrics (e.g. counting papers, patents, citations, grants, etc.) to assess quality and/or impact
- assessing outputs based on metrics relating to publication venue, format or language
- relying on any other metrics that do not properly capture quality and/or impact

17a. Are the following uses of metrics in research assessment employed at your institution?
Multiple choice (select all that apply)
- Author-based metrics (e.g. counting papers, patents, citations, grants, etc.) to assess quality and/or impact (e.g. H-index)?
- Metrics relating to publication venue (e.g. Journal Impact Factor), format or language?
- Other metrics for capturing quality and/or impact?
- Journal- or publication-based metrics are not used
- I don't know
- Not applicable

17b. If author-based metrics, metrics relating to publication venue or other metrics for capturing quality and/or impact are used in research assessment at your institution, please describe how the mentioned methods are used:
Long free text.

Core-commitment 4. Avoid the use of rankings of research organisations in research assessment. Purpose: This commitment will help avoid that metrics used by international

rankings, which are inappropriate for assessing researchers, trickle down to research and researcher assessment.

18a. Are university rankings used as a criterion or indicator in research assessment at your institution at the moment?
Multiple choice (select all that apply)
- We use university rankings in research assessment
- We pay attention to university rankings (e.g., for marketing purposes), and indirectly this may affect research assessment
- We pay attention to university rankings (e.g., for marketing purposes), but we make sure they do not affect research assessment
- We do not pay attention to university rankings
- I don't know
- Not applicable
- Other. Please specify in the comment field:

18b. If necessary, please describe any of your responses further.
Long free text.

19a. What are the main barriers and difficulties for your institution to revisit and reform its research assessment procedures?
Multiple choice (select all that apply)
- Absence of incentivising policies or guidelines from external actors (e.g. national/regional governments, research funding organisations)
- Alignment of institutional assessment procedures with nationally and internationally dominant procedures
- Concerns over increased costs (e.g. skilled staff, support structures)
- Complexity of research assessment reform (e.g. different national and disciplinary practices)
- Implementation problems
- Lack of coordination among the relevant actors within the institution
- Lack of evidence on potential benefits of research assessment reform
- Lack of institutional autonomy due to national/regional rules and regulations
- Lack of institutional autonomy due to rules and regulations imposed by research funding organisation
- Lack of institutional capacity (e.g. skilled staff, support structures)
- Lack of suitable data or metrics
- Limited awareness of research assessment reform and its potential benefits
- Resistance to research assessment reform from academic leadership
- Resistance to research assessment reform from researchers
- I don't know
- Not applicable

- Other barriers and difficulties: Please specify in the comment field. Free text

19b. If necessary, please describe any of your responses further.
Long free text.

Part 3. Data sources and tools used in assessments:

One of the general principles of the Agreement of Reforming Research Assessment is to ensure independence and transparency of the data, infrastructure and criteria necessary for research assessment and for determining research impacts; in particular by clear and transparent data collection, algorithms and indicators, by ensuring control and ownership by the research community over critical infrastructures and tools, and by allowing those assessed
to have access to the data, analyses and criteria used.

20a. How are data for research assessments captured at your institution?
Multiple choice (select all that apply)
- Using bibliographic databases (i.e. Web of Science, Scopus, Dimensions, Crossref, OpenAlex, etc.)
- Using altmetrics databases (i.e. PlumX, Altmetric.com, etc.)
- Using ORCID
- Data are submitted/uploaded using local platforms/data sources
- Data are submitted/uploaded in structured formats (i.e. templates are provided, structured web formats are specified, detailed instructions are given, etc.)
- Data are submitted/uploaded in unstructured formats (no templates are provided, no structured web formats are specified, no detailed instructions are given, etc.)
- I don't know
- Not applicable
- Other. Please specify in the comment field:

20b. If necessary, please describe any of your responses further.
Long free text.

21a. Which of the following global data sources are used for research assessment at your institution? *Multiple choice (select all that apply)*
- CORE
- Crossref
- Dimensions
- Google Scholar
- Lens.org
- OpenAIRE
- OpenAlex
- OpenCitations

- ORCID
- Scite
- Scopus
- Web of Science
- I don't know
- Not applicable
- Other global data sources. Please specify in the comment field.

21b. If necessary, please describe any of your responses further.
Long free text.

22a. Which of the following tools are used for research assessment at your institution?
Multiple choice (select all that apply)
- Altmetric.com
- BibExcel
- Bibliometrix/Biblioshiny
- Dimensions Analytics
- Google Big Query
- InCites
- OpenAIRE Graph
- PlumX
- PowerBI
- Publish or Perish
- SciVal
- SQL queries over local data sources
- Tableau
- VOSViewer
- I don't know
- Not applicable
- Other. Please specify in the comment field:

22b. If necessary, please describe any of your responses further.
Long free text.

23a. Which of the following local data sources are used for research assessment at your institution? *Multiple choice (select all that apply)*
- CRIS (a current research information system, i.e. PURE, Converis, an in-house solution, etc)
- Institutional repository (for publications)
- Research data repository
- Software code repository
- Infrastructure sources
- Personnel management systems

- Researcher profile systems or tools to create online CVs and academic profiles (i.e. Symplectic Elements Platform, an in-house solution, etc.)
- I don't know
- Not applicable
- Other local data sources. Please specify in the comment field.

23b. If known, please also indicate the names of local platforms used (i.e. PURE, Converis, Symplectic Elements Platform, CKAN, Dataverse, in-house solutions, etc.).
Long free text.

24. Point out main shortcomings and disadvantages of using the current data sources or tools used for research assessment?
Long free text.

25a. Which type of research entities are preserved in local data sources used for research assessment?
Multiple choice (select all that apply)
- Publications
- Research data
- Persons
- Organisations
- CVs
- Projects
- Infrastructures
- Funding information
- Activities (Participating in or organising an event, peer review and editorial work, presentation, memberships etc.)
- Skills and competencies
- I don't know
- Not applicable
- Other content. Please specify in the comment field. Free text

25b. If necessary, please describe any of your responses further.
Long free text.

26. Which set of metadata is used for description of those types of research entities?
Multiple choice (select all that apply).
- CERIF
- DSpace internal
- Dublin Core

- Institutional specific data model
- VIVO
- I don't know
- Not applicable
- Other. Please specify in the comment field:

27. If you are using institutional specific data model, please provide set of metadata used for description of type of research results for assessment or provide the link to web resource where those information can be found:
Free text.

28. Please describe the cataloguing process, i.e. process of ingestion of research results into your local system as well as actors involved in this process:
Free text.

Part 4. Feedback and comments

Feedback and comments regarding the questionnaire and/or the answers given:

Free text

- # Annex 4. The questionnaire for GraspOS landscape survey for pilots

Landscape questionnaire for pilots

Introduction and purpose of the questionnaire

WP2 will co-develop with the pilot participants (WP5) an Open Science Assessment Framework (OSAF), a framework for assessment of scientific work which enhances Open Science activities. OSAF facilitates contextually-situated research evaluation practices based on a new generation of qualitative and quantitative metrics and indicators.

In the first phase of the project (M1-M8) a landscape analysis report is produced to support the development of the OSAF. The landscape analysis report identifies current Open Science assessment practices, qualitative and quantitative data priorities, and associated implementation obstacles. The landscape analysis will provide an overview of:

A. state of the art assessment frameworks, information, tools, and policies (research assessment in more general)
B. relevant projects (planned, in-progress, completed)

C. relevant community-led curation and annotation practices (Different sources for data, data models and data formats, research data/publication data curation practices etc.)

D. existing open science evaluation practices, tools and platforms

The purpose of this landscape questionnaire is to build early engagement of pilots, to survey current research assessment practices and to monitor to what extent the current situation of the pilot institutions are in relation to the Coalition for Advancing Research Assessment (CoARA).

We invite the representatives of all organisations participating in the pilots to respond to the landscape questionnaire by 24 March 2023:

- Funding agencies and national stakeholders who are operating infrastructure
    - Pilot A: National CRIS, funders, Finland (CSC)
    - Pilot B: National funding monitoring platforms, Romania (UEFISCDI)
- Universities, incl. departments and research groups
    - Pilot C: Institution/research group, Netherlands (UU)
    - Pilot D: National research organisation, Italy (CNR)
    - Pilot E: University, Finland (UEF)
    - Pilot F: University department, Serbia (U. Belgrade)
- Thematic disciplines who can set general assessment criteria based on infrastructure and disciplinary needs
    - Pilot G: Computer Science (INRIA, UniBO, ATHENA)
    - Pilot H: Agricultural and veterinary sciences (INRAE)
    - Pilot I: SSH (Operas)

The information that you provide will be treated confidentially. The data will be anonymised and made openly available in the Zenodo data repository. The results from the survey may be compiled into presentations, reports and publications on an aggregated level (not an individual level).

Definition of basic concepts for the questionnaire

Open Science is defined as an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community. It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities, and it builds on the following key pillars: open scientific knowledge, Open Science infrastructures, science communication, open engagement of societal actors and open dialogue with other knowledge systems. (UNESCO Recommendation on Open Science)

Responsible Research Assessment (RRA) is an umbrella term for approaches to assessment which incentivise, reflect and reward the plural characteristics of high-quality research, in

support of diverse and inclusive research cultures (The changing role of funders in Responsible Research Assessment). Assessment of research, researchers and research organisations recognises the diverse outputs, practices and activities that maximise the quality and impact of research. This requires basing assessment primarily on qualitative judgement, for which peer review is central, supported by responsible use of quantitative indicators (CoARA). Assessment of scientific contribution and career progression rewarding good Open Science practices is needed for operationalisation of Open Science (UNESCO Recommendation on Open Science).

Monitoring of Open Science and research: Monitoring generates data on an intervention's activity and impact over time in a continuous and systematic way. It helps identify and address any implementation problems of an intervention at the same time as it generates factual data for future evaluation and impact assessment. (Horizon Europe KIP indicators report). UNESCO recommends that Member States should, according to their specific conditions, governing structures and constitutional provisions, monitor policies and mechanisms related to open science using a combination of quantitative and qualitative approaches, as appropriate. (UNESCO Recommendation on Open Science).

The landscape questionnaire for pilots

1. Which of the following institutions do you represent?

Please choose **only one** of the following:

Single choice list of GraspOS pilots (dropdown)

- CSC
- UEFISCDI
- UU
- CNR
- UEF
- U. Belgrade
- INRIA
- UniBO
- ATHENA
- INRAE
- Operas

2. Respondent's contact information: (email-address)

Short free text

Please write your answer here:

3. What are your professional responsibilities related to research assessment or monitoring?

Multiple choice

Please choose **all** that apply:

- Creating or collecting data
- Planning or management (what should be assessed or monitored)
- Maintaining/developing the technical systems
- Performing the analysis, assessments or monitoring
- Those who are being assessed or monitored
- Evaluation panel member
- Performing research related to research assessment or monitoring
- Other. Please specify in the comment field:

4. What are the underlying motivations for participating in the GraspOS pilot?

Multiple choice

Please choose **all** that apply:

- Improve recognition of Open Science practices
- Improve rewarding Open Science practices
- Align with responsible research assessment
- Improve local capacity for conducting OS/RAA evaluations
- Experiment with new tools and services
- Participating in the Coalition for Advancing Research Assessment (CoARA)
- Other. Please specify in the comment field:

5. Research evaluation in this pilot context is linked to:

Multiple choice

Please choose **all** that apply:

- Strategic priorities
- Evaluation principles
- Research evaluation policy
- Institutional or unit mission statement
- Hiring and promotion policies
- Collective values
- Other. Please specify in the comment field:

6. What is the intended level of assessment or monitoring in your pilot?

Multiple choice

Please choose **all** that apply:

- Individual researchers or research groups
- Assessment or monitoring of the institution as a whole
- Assessment or monitoring of entire countries or other large geographical areas
- Applications for funding
- Research fields
- I do not know which types of assessment or monitoring is performed
- Not applicable
- Other assessment or monitoring is performed. Please specify in the comment field:

7. Which of the following assessment agreements, policies or recommendations your institution (or relevant stakeholders) is committed to?

Multiple choice

Please choose **all** that apply:

- Coalition for Advancing Research Assessment (CoARA)
- INFORMS SCOPE framework
- San Francisco Declaration on Research Assessment (DORA)
- The Metric tide
- The Leiden Manifesto
- Helsinki Initiative on Multilingualism in scholarly communication
- The Hong Kong Principles for assessing researchers: Fostering research integrity
- European Charter for Researchers and the Code of Conduct for the Recruitment of Researcher
- National recommendation/policy/agreement
- Institutional recommendation/policy/agreement
- I don't know
- Not applicable
- Other. Please specify in the comment field:

Part 2. Advancing Research Assessment

The following questions are formulated based on the four core commitments of the Coalition for Advancing Research Assessment (CoARA).

CoARA core-commitment 1. Recognise the diversity of contributions to, and careers in, research in accordance with the needs and nature of the research.

Purpose: This commitment will broaden recognition of the diverse practices, activities and careers in research, considering the specific nature of research disciplines and other research endeavours.

Scope: Changes in assessment practices should enable recognition of the broad diversity of:

- valuable contributions that researchers make to science and for the benefit of society, including diverse outputs beyond journal publications and irrespective of the language in which they are communicated
- practices that contribute to robustness, openness, transparency, and the inclusiveness of research and the research process including: peer review, teamwork and collaboration
- activities including teaching, leadership, supervision, training and mentoring

8. What types of research outputs are taken into account in research assessment or monitoring at your institution (or relevant stakeholders) at the moment?

Multiple choice

Please choose **all** that apply:

- Journal articles
- Scientific publications beyond journal articles
- Datasets
- Software
- Data models
- Methods
- Theories
- Algorithms
- Protocols
- Workflows
- Exhibitions
- Strategies
- Policy contributions
- I don't know
- Not applicable
- Other. Please specify in the comment field:

9. What practises contributing to robustness, openness, transparency of research and the research process are taken into account in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Multiple choice

Please choose **all** that apply:

- Pre-registration (research plans)
- Early sharing (preprints)
- Data sharing
- Methods sharing
- Software sharing
- Open peer-review
- Open access publishing
- I don't know
- Not applicable
- Other. Please specify in the comment field:

10. What practises contributing to the inclusiveness of research are considered in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Multiple choice

Please choose **all** that apply:

- Research career stages (e.g. early career researchers vs. senior researchers)
- Respect the variety of scientific disciplines
- Respect the variety research types (e.g. basic and frontier research vs. applied research)
- Acknowledge multi-, inter-, and trans-disciplinary approaches
- Acknowledge inter-sectoral approaches
- Include diverse outputs irrespective of the language in which they are communicated
- Gender balance and gender dimension
- EDI dimension (racial or ethnic origin, sexual orientation, socio-economic status, disability)
- I don't know
- Not applicable
- Other. Please specify in the comment field:

11. What diverse research activities, practices and roles are considered in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Multiple choice

Please choose **all** that apply:

- Peer review
- Teaching
- Training, mentoring and supervision of Ph.D candidates
- Leadership roles

- Science communication and interaction with society
- Entrepreneurship
- Knowledge valorisation
- Industry-academia cooperation
- Roles outside of academia
- Skills (including open science skills), competences and merits of individual researchers
- Recognise team science and collaboration
- Recognition of diverse contributor roles (data steward, software engineer and data scientist roles, technical roles, public outreach, science diplomacy, science advice and science communicator etc.)
- I don't know
- Not applicable
- Other. Please specify in the comment field:

CoARA core-commitment 2. Base research assessment primarily on qualitative evaluation for which peer review is central, supported by responsible use of quantitative indicators.

Purpose: This commitment will enable the move towards research assessment criteria that focus primarily on quality, while recognising that responsible use of quantitative indicators can support assessment where meaningful and relevant, which is context dependent.

Scope: Research assessment should rely primarily on qualitative assessment for which peer review is central, supported by responsibly used quantitative indicators where appropriate.

12. What are the preferred methods of assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Radio buttons

Please choose **only one** of the following:

- Expert assessment (peer-review) only
- Metrics only
- Expert assessment (peer-review) informed with metrics
- I don't know what are the preferred methods of assessment
- Not applicable
- Other. Please specify in the comment field:

13. In which of the following ways qualitative input is used in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment?

Multiple choice

Please choose **all** that apply:

- Qualitative input is not used
- Structured CV
- Narrative CV, Competency-based CV or Evidence-based CV
- Impact stories or case narratives
- Other narrative descriptions
- Surveys
- I don't know
- Not applicable
- Other. Please specify in the comment field:

CoARA core-commitment 3. Abandon inappropriate uses in research assessment of journal- and publication-based metrics, in particular inappropriate uses of Journal Impact Factor (JIF) and H-index.

Purpose: This commitment will reduce the dominance of a narrow set of quantitative journal- and publication-based metrics.

Scope: Inappropriate uses of journal- and publication-based metrics in research assessment should be abandoned. In particular, this means moving away from using metrics like the Journal Impact Factor (JIF), Article Influence Score (AIS) and h-index as proxies for quality and impact. 'Inappropriate uses' include:

- **relying exclusively on author-based metrics (e.g. counting papers, patents, citations, grants, etc.) to assess quality and/or impact;**
- **assessing outputs based on metrics relating to publication venue, format or language;**
- **relying on any other metrics that do not properly capture quality and/or impact.**

14. Are the following uses of metrics in research assessment or monitoring employed at your institution (or by relevant stakeholders)? If yes, please describe any of your responses further.

Multiple choice with comments

Comment only when you choose an answer.

Please choose all that apply and provide a comment:

- Author-based metrics (e.g. counting papers, patents, citations, grants, etc.) to assess quality and/or impact (e.g. H-index)?
- Metrics relating to publication venue (e.g. Journal Impact Factor), format or language?
- Other metrics for capturing quality and/or impact?

- I don't know
- Not applicable

CoARA core-commitment 4. Avoid the use of rankings of research organisations in research assessment.

Purpose: This commitment will help avoid that metrics used by international rankings, which are inappropriate for assessing researchers, trickle down to research and researcher assessment.

15. Are university rankings used as a criterion or indicator in research assessment or monitoring at your institution (or by relevant stakeholders) at the moment? If used, briefly describe in what way?

Long free text

Please write your answer here:

16. Which of the following European or global OS monitoring surveys your institution (or relevant stakeholders) participate or consider to participate?

The EOSC Observatory

Monitoring Framework for the UNESCO Recommendation on Open Science (link to working draft)

EUA's Open Science Survey (link to survey 2020 - 2021 results)

OpenAIRE MONITOR (link to dashboards)

Multiple choice

Please choose **all** that apply:

- The EOSC Observatory
- Monitoring Framework for the UNESCO Recommendation on Open Science
- EUA's Open Science Survey
- OpenAIRE MONITOR
- I don't know
- Not applicable
- National OS monitor, please specify which:

17. What are the main barriers and difficulties for your institution (or relevant stakeholders) to revisit and reform its research assessment procedures?

Multiple choice

Please choose **all** that apply:

- Limited awareness of research assessment reform and its potential benefits
- Lack of evidence on potential benefits of research assessment reform
- Resistance to research assessment reform from academic leadership
- Resistance to research assessment reform from researchers
- Concerns over increased costs (e.g. skilled staff, support structures)
- Complexity of research assessment reform (e.g. different national and disciplinary practices)
- Lack of institutional capacity (e.g. skilled staff, support structures)
- Lack of coordination among the relevant actors within the institution
- Absence of incentivising policies or guidelines from external actors (e.g. national/regional governments, research funding organisations)
- Alignment of institutional assessment procedures with nationally and internationally dominant procedures
- Lack of institutional autonomy due to national/regional rules and regulations
- Lack of institutional autonomy due to rules and regulations imposed by research funding Organisation
- Lack of suitable data or metrics
- Implementation problems
- I don't know
- Not applicable
- Other barriers and difficulties. Please specify in the comment field:

Part 3. Data sources and tools used in assessments

18. How are data for research assessments or monitoring captured at your institution?

Multiple choice

Please choose **all** that apply:

- Using global academic databases (i.e. Web of Science, Scopus, ORCID, CrossRef, etc)
- Using altmetrics databases (i.e. PlumX, Altmetric.com, etc.)
- Data are submitted/uploaded using local platforms/data sources
- Data are submitted/uploaded in structured formats (i.e. templates are provided, structured web formats are specified, detailed instructions are given, etc.)
- Data are submitted/uploaded in unstructured formats (no templates are provided, no structured web formats are specified, no detailed instructions are given, etc.)
- I don't know

- Not applicable
- Other. Please specify in the comment field:

19. Which of the following global data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?

Please choose **all** that apply:

- Scopus
- Web of Science
- Google Scholar
- Dimensions
- ORCID
- CrossRef
- Lens.org
- Microsoft Academic Graph
- OpenAIRE
- CORE
- Scite
- I don't know
- Not applicable
- Other. Please specify in the comment field:

20. Which of the following tools are used for research assessment or monitoring at your institution or (or by relevant stakeholders)?

Multiple choice

Please choose **all** that apply:

- InCites
- SciVal
- Google Big Query
- Publish or Perish
- Dimensions Analytics
- PlumX
- Altmetric.com
- OpenAIRE Graph
- VOSViewer
- Tableau
- SQL queries over local data sources
- BibExcel
- Bibliometrix/Biblioshiny
- PowerBI

- I don't know
- Not applicable
- Other. Please specify in the comment field:

21. Which of the following local data sources are used for research assessment or monitoring at your institution (or by relevant stakeholders)?

Multiple choice

Please choose **all** that apply:

- CRIS (a current research information system, i.e. PURE, Converis, an in-house solution, etc)
- Institutional Repository (for publications)
- Research data repository
- Software code repository
- Infrastructure sources
- Personnel management systems
- Researcher profile systems or tools to create online CVs and academic profiles (i.e. Symplectic Elements Platform, an in-house solution, etc.)
- I don't know
- Not applicable
- Other. Please specify in the comment field:

22. If known, please also indicate the names of local platforms used (i.e. PURE, Converis, Symplectic Elements Platform, CKAN, Dataverse, in-house solutions, etc.):

Short free text

Please write your answer here:

23. Point out main shortcomings and disadvantages of using the current data sources or tools used for research assessment or monitoring?

Long free text

Please write your answer here:

24. Which type of research entities are preserved in local data sources used for research assessment or monitoring?

Multiple choice

Please choose **all** that apply:

- Publications

- Research data
- Persons
- Organisations
- CVs
- Projects
- Infrastructures
- Funding information
- Activities (Participating in or organising an event, peer review and editorial work, presentation, memberships etc.)
- Skills and competencies
- I don't know
- Not applicable
- Other content. Please specify in the comment field:

25. Which set of metadata is used for description of those types of research entities?

Multiple choice

Please choose **all** that apply:

- Dublin Core
- CERIF
- VIVO
- DSpace internal
- Institutional specific data model
- I don't know
- Not applicable

26. If you are using institutional specific data model, please provide set of metadata used for description of type of research results for assessment or provide the link to web resource where those information can be found:

Long free text

Please write your answer here:

27. Please describe the cataloguing process, i.e. process of ingestion of research results into your local system as well as actors involved in this process:

Long free text

Please write your answer here:

Feedback and comments

28. Feedback and comments regarding the questionnaire and the answers given

Long free text

Please write your answer here:

Thank you very much for participating in this survey; we appreciate your time and input.

● Annex 5. Declaration of Consent to Participate in Research

What is this study about?

You are being asked to participate in a survey conducted by the Federation of Finnish Learned Societies (TSV) for the GraspOS EU project. Survey is part of the ongoing landscape analysis, the results of which are to be published by the end of August 2023.

The purpose of the survey is to gain overview of the state-of-the-art research assessment practices at the research performing and funding organisations, and other organisations involved with research assessment, who already are, or could become, signatories of the Agreement on Reforming Research Assessment.

GraspOS develops, assesses and puts into operation an Open Science Assessment Framework (OSAF), and an open and trusted federated infrastructure for next generation research metrics and indicators, offering data, tools, services and guidance to support and enable policy reforms for research assessment. The GraspOS project is funded by the European Union's Horizon Europe framework programme under grant agreement No. 101095129.

We invite the representatives of the organisations that are or could become signatories of the Agreement of Reforming Research Assessment to respond to the questionnaire.

What will you do?

If you agree to participate, we will record your responses to the following survey. The survey should take about 20 to 30 minutes to complete. The survey includes general questions about research assessment practises as well as questions formulated based on the four core commitments of the Agreement of Reforming Research Assessment.

What will be done with your answers and how will the data be handled?

Survey data will be collected and handled in accordance with the requirements of the General Data Protection Regulation (GDPR).

The information that you provide will be treated confidentially. The survey results will be fully anonymised and published using appropriate repositories. The results from the survey may be compiled into presentations, reports and publications on an aggregated level (not an individual level).

What are the risks and benefits of participating?

We do not anticipate any personal or professional risks through participating in this survey. You will not directly benefit by participating, although the results of this research will help to support the emerging policy reforms and pave the way towards an Open Science-aware Responsible Research Assessment system.

By filling in this survey, you agree that we will collect your personal information and opinions for the aforementioned purposes. Your participation is voluntary, and you may decline to participate without risk. While it is helpful to be complete in your responses, you are free to withdraw from the survey at any time.

As a participant, you have the right to request information about your personal data that we have archived at any time. All participants have the unrestricted right of deletion, updating and correction of the stored personal data, unless required otherwise by the applicable law.

Who do you contact if you have questions?

The survey is conducted and analysed by a working group including Janne Pölönen, Anna-Kaisa Hyrkkänen, Dragan Ivanović and Marita Kari.

If you have any questions you may contact:

Anna-Kaisa Hyrkkänen

Coordinator, Responsible Assessment & GraspOS

Federation of Finnish Learned Societies

anna-kaisa.hyrkkanen@tsv.fi

Janne Pölönen

Head of Planning of Publication Forum

Federation of Finnish Learned Societies

janne.polonen@tsv.fi

I agree to participate in the survey. (Checkbox – begin survey).

GraspOS co-designs its plans with a broader Community of Practice (CoP) to connect people, promote mutual learning, foster collaboration practices and support the assessment reform by properly capturing the diversity of open science practices, career stages, and disciplines.

If you would like to join the GraspOS Community of Practice, please indicate your:

First name:

Family name:

Email address:

Organisation: