Draft Vision for FAIReR Assessments

This vision draft will be a deliverable of EOSC Co-Creation projects “European overview of career merit systems" and “Vision for Research data in research careers”. Further information on these projects here: https://avointiede.fi/en/networks/eosc-co-creation

This draft is open for public consultation until 15 March 2021. Stakeholders and experts in open science and research assessment are invited to comment on the draft here: https://survey.tsv.fi/index.php/339757?lang=en

Federation of Finnish Learned Societies

EUROPEAN OPEN SCIENCE CLOUD

I. Introduction

Open science, digitalisation, interdisciplinarity and internationalisation change the production, dissemination, impact and accountability of academic work. European institutions face increased global competition for positions and funding; growing numbers of academic personnel and students; as well as underfunding challenges.[1] These changes must be reflected in the future academic assessment practices.

European policy-makers and institutions are strongly committed to encouraging and rewarding open science practices, including the sharing and reuse of research data.[2] Researchers need to be recognised for contributions to teaching and learning, innovation, culture and societal change. Yet the move away from a narrow focus on research, publications and metrics towards a broader range of assessment criteria remains limited.[3]

Europe needs a vision for FAIReR Assessments built on the *FAIR principles for data management* and policies guiding *Responsible assessment* (FAIReR = FAIR + Responsible). The FAIR principles, guidelines for making data *findable* (F)*, accessible* (A)*, interoperable* (I) and *reusable* (R), are key to enabling a shift to open science.[4] In FAIReR Assessments, research data, as well as the criteria, data and metrics informing assessments, are transparent and FAIR.[5]

Diversity is the guiding theme throughout this vision for FAIReR Assessments. Diversity in this context means recognising different outputs, roles and impacts of academic work, and respecting differences between fields. Starting with the DORA declaration (https://sfdora.org/), several international statements outline guiding principles for responsible research assessment methods, criteria and data (see Appendix 1).[6]

FAIReR Assessments build on principles of community ownership, co-creation, co-curation and dialogue. Responsible assessments are also rooted in legislation regarding, for example, equality, anti-discrimination and data protection,[7] and in ethical guidelines for the responsible conduct of research and evaluation.[8] Research communities have played a key role in establishing understanding, trust and commitment in responsible assessment practices at institutional and national levels.[9]

Vision for FAIReR Assessments includes development of an open and FAIR assessment infrastructure. Rewarding researchers for diverse open science practices requires reliable, comprehensive, well-structured and comparable data and metrics to inform assessments. Information produced by researchers, institutions and infrastructures remains scattered and difficult to use and reuse in assessments. An infrastructure for integrating qualitative and quantitative data from, and facilitating interoperability between, international, national and institutional research information systems and infrastructures is needed.[10]

The aim of our EOSC project is to co-create a common vision for FAIReR assessments to make rewarding open science practices possible.[11] The focus of this vision is on assessing individuals for purposes of hiring, promotion, funding, but the vision for FAIReR Assessments is relevant also for research groups and institutions. We recognise that assessments themselves cannot be standardised across Europe, due to diverse institutional needs, strategic goals, and disciplinary standards.

II. Draft Vision for FAIReR assessments

FAIReR assessments are rooted in both the FAIR guidelines for data management and policies for the responsible assessment of research. Specifically, FAIReR assessments foreground *diversity, communities*, and *dialogue*.

In order for FAIReR assessments to be realised:

1. Communities co-create the meaning of diversity in assessments
   Make it responsible. 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. In the case of research data, such practices may include sharing (open) datasets, creating FAIR datasets, reusing data, or cultivating expertise in creating or curating FAIR data.
2. Communities build assessments on infrastructures capturing diversity
   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. In the case of research data, information on creating, publishing and sharing research data needs to be reliable, comprehensive, comparable and structured.
3. Communities reward diverse open science and FAIR practices
   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. In the case of research data, this may include shared or open data, indications of data reuse, or acting as data steward.

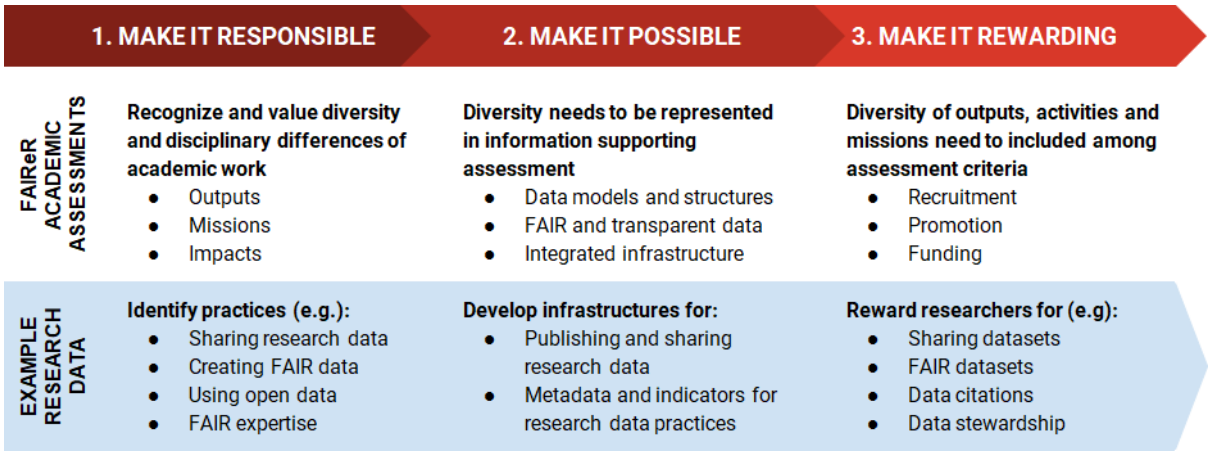

Figure 1. Steps for realising the vision for FAIReR assessments

1. Communities co-create meaning of diversity in assessments

Creating a FAIReR assessment culture requires understanding and accounting for the diversity of both research practices and communities. It also requires co-creating assessment criteria, methods and practices in conjunction with research communities to foster ownership and trust.

Diversity within communities

Disciplinary domains alone do not define research communities. Communities form both within disciplines, across organisational and national boundaries; and within organisations and nations, yet bridging disciplinary boundaries. Co-creation requires engaging in an ongoing dialogue both within and between such communities.

Notions of openness, quality and data are grounded and differently defined within research cultures because:

A. Research is embedded within cultural, linguistic, social, economic, and political contexts.
B. Practices of finding, accessing, integrating and reusing data, as well as practices of data description and sharing, vary both between and within disciplinary fields
C. Research performing and funding organisations have specific strategic priorities, diverse values and missions.
D. Assessments are carried out at a variety of levels (e.g. for institutions, research units and individual researchers) and for a variety of purposes (e.g. funding allocation, organisational rankings, promotion, hiring and awarding academic degrees).

Co-creation as a way to identify diversity and foster community ownership and trust

Co-creation in general is a mutual and reflexive learning experience. Engaging in dialogue with research communities is a way to identify the diversity of practices and norms that need to be considered in FAIReR assessments. These dialogues also provide a way for assessment policies to adjust to changes in research environments and be adapted to local contexts. At the same time, co-creative processes allow communities to develop ownership in the policies and criteria used to assess their work; co-created assessment criteria are owned by the community for the community.

Research communities should not only have ownership of assessment processes and criteria, but they should also own the data used in assessments. This data must be reclaimed from the commercial metrics providers. Community-owned assessment infrastructures support the curation of data for FAIReR assessments, and make data reusable via open infrastructures.

Ownership of assessment criteria, processes, data and infrastructures further enhances trust between evaluators and those being evaluated, ensuring that assessments benefit all parties involved. Trust is also essential for creating the cultural change required for creating FAIReR assessment culture.

2. Communities build assessments on infrastructures capturing diversity

An interlinked infrastructure supporting FAIReR assessments

An interlinked FAIReR assessment infrastructure is created to capture the full diversity of research information. The infrastructure provides ways to record quantitative and qualitative information about the diversity of outputs, activities and roles involved in academic work. Using PIDs and semantic web technologies, this infrastructure connects research information preserved in local and regional research information systems. Linking local systems with each other creates a comprehensive global research information ecosystem. The FAIReR assessment infrastructure builds principally on community-owned, community-curated and openly available data on research.

Automated input and extraction of assessment data

APIs are integrated into existing information systems, technologies and workflows which compose the FAIReR assessment infrastructure. Machine-readable formats define the input of assessment data. This creates a standard, transparent process for collecting and inputting assessment data and minimises manual data entry. The FAIReR assessment infrastructure also facilitates reusing research information produced locally.

Infrastructure supports FAIR criteria, FAIR indicators and community building

The infrastructure enables describing and publishing assessment criteria and indicators in accordance with FAIR principles.

The FAIReR assessment infrastructure also includes web-based communication channels (e.g. forums, open reviews and blogs). This supports information exchange and community building between different professionals, including open science experts, researchers, data stewards and research software engineers. These communications provide one way for gathering information about community practices and uses of, for example, indicators and assessment criteria. Building the FAIReR assessment infrastructure is based on this ongoing dialogue.

The preliminary technical vision for a FAIReR assessment infrastructure is enclosed in Appendix 2.

3. Communities reward diverse open science and FAIR practices

Every organisation has its own FAIReR assessment policy to use in evaluations undertaken in the course of, for example, recruitments, promotions and funding decisions. Such policies are created in collaboration with academic staff and diverse research communities.

FAIReR assessment policies take into account the diversity of outputs, activities and professional roles involved in research and academic work. Researchers and other actors are recognised and rewarded for practicing and encouraging open science, in accordance with the OS-CAM recommendations (Appendix 3).

Examples of the diversity included in FAIReR assessments, specifically related to research data, include:

A. *Outputs* such as data management plans and shared datasets.
B. *Activities* such as teaching or mentoring data management skills, reusing existing data, participating in data management training or the peer-reviewing data.
C. *Professional roles* such as data librarians and stewards, research software engineers, evaluators and researchers.

Organisations commit to using FAIReR assessment infrastructures, with transparent assessment criteria, that support the use of researcher portfolios and qualitative descriptions of research.

FAIReR assessment policies include both quantitative and qualitative approaches to evaluation. Metrics are transparent, both in terms of how they are calculated and in how they are applied in assessments. Appropriate quantitative indicators are accompanied with qualitative assessments. All assessment data is best evaluated using responsible expert review, which helps to counter possible biases or conflicts of interest among evaluators.

III. From Vision to reality

Changes in academic assessment culture shake the research community at its core. Decisions around assessment define what is held important, valuable and where the research community wishes to go from here. Although “what” and “why” are important, nothing will happen without a “how”.

This change is going to take time and requires significant shared effort and investment in order to become reality. As for the vision, in the move from vision to reality we draw on our own research - policy review, survey - as well as co-creation process of bootcamps with experts in the areas of open science, research data and research evaluations.

Barriers for FAIReR assessment culture

If creating a FAIReR assessment culture were easy, it would have been done already. The changes in assessment culture meet challenges, which must be overcome. Awareness of barriers supports developing a roadmap from vision to reality. Barriers to this change include:

A. Cost in developing infrastructure
B. Lack of resources for qualitative assessment
C. Limitations in integrity and expertise in responsible assessment
D. Inconsistencies of assessment policies and cultures between communities

Priorities for Action

1 Policy collaboration

Because research and scholarship are international, there is a need for a global, shared vision for assessment. Shared vision will benefit all stakeholders. Countries and organisations make up the community, but none of them can alone change the culture. The change requires simultaneous international and local policy development.

International policy development creates a space for local innovations to flourish, which again feed and support international policies.

Priorities for policy development:

A. International agreements and/or MoUs on FAIReR assessment vision and policies
B. Co-creation of national and organisational FAIReR assessment policies
C. Support and populate platforms of best practices for FAIReR assessments and policies for mutual learning
D. Harmonisation of terminology in policies regarding FAIReR assessments

2 Investment in assessment data infrastructure

Changes require resources - in time, energy and financial investment. Change in assessment is no different. Policy development above requires investment in time and energy, while infrastructure requires considerable financial investments. To make FAIReR assessments possible, the research communities require new infrastructures for gathering,

storing and sharing assessment data at institutional, national and international level. Key to success is finding a balance between harmonisation and diversity.

Balancing the use of metrics and qualitative assessments is also a question of wise use of resources. The only way to decrease the role metrics in assessments is to increase the experts' time and effort on assessments. The experts' work can also be facilitated by producing good data to support qualitative evaluations, for example by developing infrastructure and services for the production, use, storing and sharing of structured and guided narrative descriptions and case reports. The increased workload in peer review needs to be balanced with merit and rewards for peer review work.

Priorities for FAIReR assessment investments:

A. International funding call by EOSC, or other similar organisation, to begin building the technical solution for shared assessment infrastructure and required data models
B. Building a FAIReR assessment infrastructure with mutually shared architecture supporting quantitative and qualitative assessment information (Appendix 2), which
    i. Has shared data models and PIDs
    ii. Build on existing infrastructures
    iii. Provides different levels of access
    iv. Incorporates consent from researchers
    v. Minimises assessment data re-entry and maximises assessment data re-use
C. Establishing an international forum for dialogue between professionals, including open science and evaluation experts, researchers, data stewards and research software engineers to support development of FAIReR assessment infrastructure.

Appendix 1. Comparison of responsible assessment guidelines: DORA Declaration, the Metric Tide and the Leiden Manifesto

	DORA	METRIC TIDE	LEIDEN MANIFESTO
METHOD	1. Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions."	2. Humility: recognising that quantitative evaluation should support – but not supplant – qualitative, expert assessment	7. Base assessment of individual researchers on a qualitative judgement of their portfolio 1. Quantitative evaluation should support qualitative, expert assessment
CRITERIA	2. Be explicit about the criteria used in evaluating [researchers] and 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.	5. Reflexivity: recognising and anticipating the systemic and potential effects of indicators, and updating them in response.	8. Avoid misplaced concreteness and false precision 9. Recognize the systemic effects of assessment and indicators 10. Scrutinize indicators regularly and update them
DATA	11. Be open and transparent by providing data and methods used to calculate all metrics. 12. Provide the data under a licence that allows unrestricted reuse, and provide computational access to data, where possible.	1. Robustness: basing metrics on the best possible data in terms of accuracy and scope 3. Transparency: keeping data collection and analytical processes open and transparent, so that those being evaluated can test and verify the results	4. Keep data collection and analytical processes open, transparent and simple 5. Allow those evaluated to verify data and analysis
DIVERSITY	3. 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.	4. 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	2. Measure performance against the research missions of the institution, group or researcher 3. Protect excellence in locally relevant research 6. Account for variation by field in publication and citation practices

Sources:

- DORA Declaration: https://sfdora.org/
- Wilsdon, J., Allen, L., & Belfiore, E. (2015). The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management. https://responsiblemetrics.org/wp-content/uploads/2019/02/2015_metrictide.pdf
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Appendix 2. Preliminary vision for technical solution/ architecture for integrated assessment infrastructure

Figure 1 presents a vision for developing eInfrastructures which might simplify changes in the academic assessment process and make this process responsible. Yellow rectangles are used for platforms/services which can be used for building research eInfrastructure ecosystem. Those platforms/services already exist across the world, but should be maintained and further extended in accordance with the Open Science paradigm. Orange cloud in the middle of the diagram represents integration of all those services and platforms under one umbrella. It will improve visibility/discoverability of platforms/services, and on the other side it will enable collecting complete achievement of a researcher or group. Moreover, three more orange rectangles should be developed as a part of this vision with the goal of making a basis for building local Academic assessment platforms (blue rectangles) which will support responsible academic assessment.

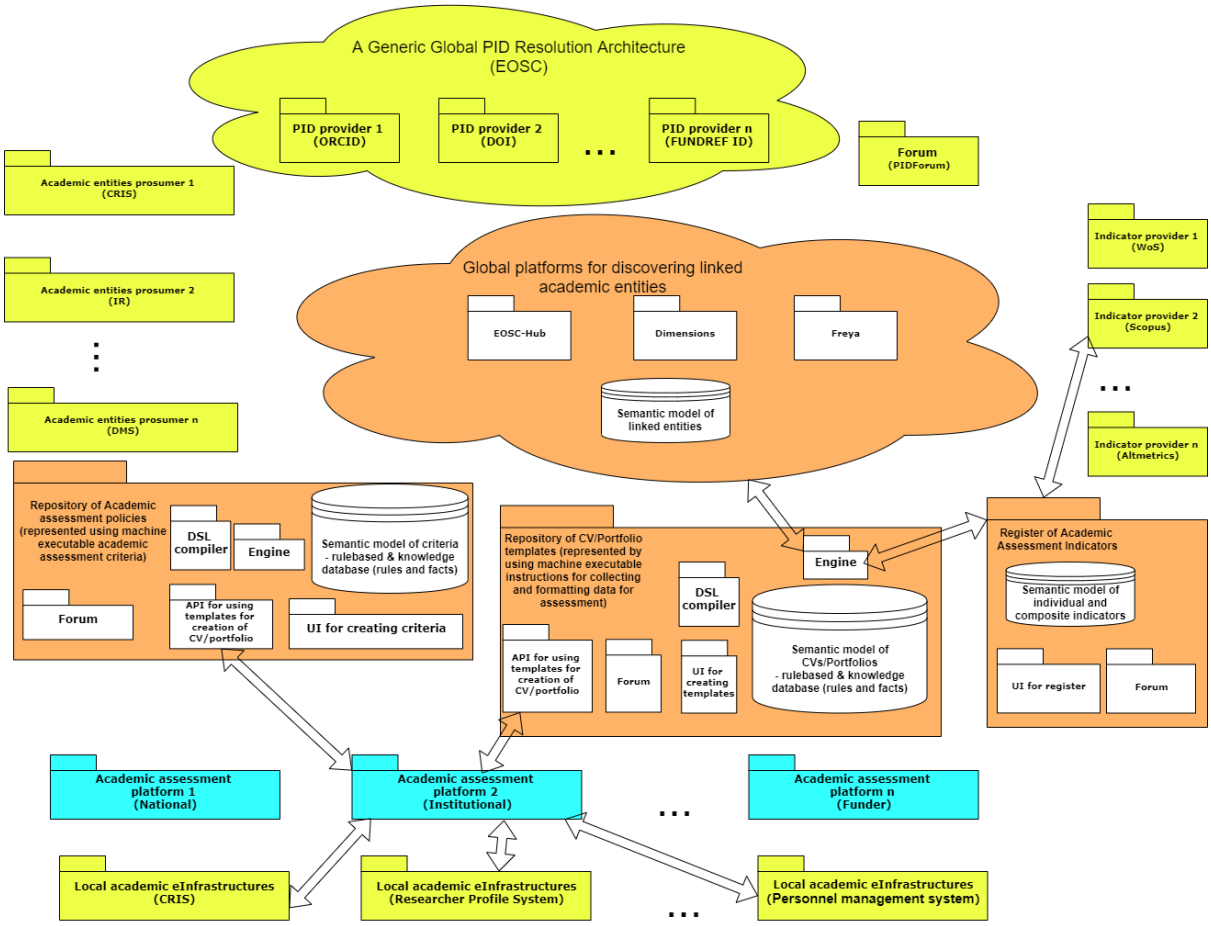

Figure 1. eInfrastructure architecture for responsible academic assessment

Academic entities' prosumers

Academic entities prosumers include platforms which produce and consume records representing information about academic entities such as Projects, Organizations, Researchers, Publications, Datasets, Conferences, etc. Those platforms could be based on different models, include different set of entities, and could be implemented for various

purposes. Some examples are research information systems, publications' repositories, data management systems, researchers' profiles systems, etc.

PID providers

PID (persistent identifier) is a long-lasting reference to a digital object that is accessible over the Internet. PID providers are organizations responsible for handling requests for identifiers and responsible for uniqueness of generated identifiers linked to digital objects. Usually, there is a platform with an API for making a request for generating a new identifier. Moreover, there could be an API for resolving an identifier, meaning returning URL to the object linked with the certain identifier. In the current scholarly communication environment, numerous types of PIDs can be recognized, PIDs for objects (publications, data, software), people, institutions, projects, indicators. PID providers should be part of A Generic Global PID Resolution Architecture prescribed by EOSC (https://doi.org/10.2777/525581)

Global platforms for discovering linked academic entities

Linked information enables large scale integration of, and reasoning on, information on the Internet. Academic ecosystem entities include information about researchers, projects, organizations, publications, data, equipment, etc. Some Semantic web technologies (RDF, OWL, SKOS, SPARQL, etc.), persistent identifiers (ORCID, DOI, ROAR ID, etc.), and standardized vocabularies (CERIF vocabulary, CASRAI, etc.) should be used for linking academic ecosystem entities.

Indicator providers

There are a few types of academic assessment indicators: quantity indicators, which measure the productivity of a particular researcher; quality indicators, which measure the quality (or "performance") of a researcher's output; and structural indicators, which measure connections between publications, authors, and areas of research. Some well-known indicators can be automatically calculated based on the information in some database. An indicator provider should offer an API for calculation of those indicators using available information in a database for the certain academic objects whose identifiers are provided as an input in the API call.

Register of academic assessment indicators

Academic assessment indicators and (alt)metrics include number of citations, number of views, h-index, etc. Register is a platform for making descriptions of those indicators and (alt)metrics FAIR. Description should also include a list of indicators providers, i.e. platforms which might calculate the value of the indicator (WoS, Scopus, Dimension, etc).

Repository of CV/Portfolio templates

CVs/Profiles Templates shape all applications in the same format. Machine readable and data collectable CVs/Profiles Templates can be integrated with other infrastructure elements mentioned above. Repository should store CVs/Profiles Templates represented by using machine executable instructions for collecting and formatting data for assessment. Templates represented in this way enable making researchers' CVs/Portfolios by using those templates and collecting data from linked academic entities' platforms. Besides CVs/Profiles Templates in machine readable format, the repository preserves templates' descriptions in a rich metadata format and makes templates FAIR.

Repository of academic assessment policies

An academic assessment policy prescribed by a pdf document can include a group of academic assessment criteria. Those criteria can be represented in machine executable format. Machine executable academic assessment criteria can automatically produce final classification based on complex rules built on top of input data provided by evaluators, applicants or indicator providers. Repository of academic assessment policies enables storage, discovering and execution of policies and its criteria. Besides academic assessment policies in machine executable format, the repository preserves pdf files and its descriptions in a rich metadata format making policies FAIR.

Local academic eInfrastructures

A local academic eInfrastructure could be academic entities' prosumers for global platforms (see the section "Academic entities' prosumers"). Those eInfrastructures could be developed for local specific needs and could preserve information which are not of interest for the global community or for privacy issues can't be exported to the global platforms, and therefore not exportable in the global platforms. However, those information preserved in local platforms might be useful in the institutional academic assessment process. Therefore, those platforms might be represented two times on the diagram, but offer different sets of functionalities for local users and local platforms for academic assessment compared to the set of public functionalities available for global scientific communities and platforms. Some examples are research information systems, personnel management systems, researchers' profiles systems, etc.

Academic assessment platforms

Academic assessment platforms should implement the academic assessment process. It might be used by applicants and evaluators. An evaluator can be a committee board member or an individual evaluator. Moreover, assigning external reviewers for qualitative evaluation of an output should be supported.

Appendix 3. Open Science Career Assessment Matrix (OS-CAM)

Open Science Career Assessment Matrix (OS-CAM)	
Open Science activities	*Possible evaluation criteria*
RESEARCH OUTPUT	
Research activity	Pushing forward the boundaries of open science as a research topic
Publications	Publishing in open access journals Self-archiving in open access repositories
Datasets and research results	Using the FAIR data principles Adopting quality standards in open data management and open datasets Making use of open data from other researchers
Open source	Using open source software and other open tools Developing new software and tools that are open to other users
Funding	Securing funding for open science activities
RESEARCH PROCESS	
Stakeholder engagement / citizen science	Actively engaging society and research users in the research process Sharing provisional research results with stakeholders through open platforms (e.g. Arxiv, Figshare) Involving stakeholders in peer review processes
Collaboration and Interdisciplinarity	Widening participation in research through open collaborative projects Engaging in team science through diverse cross-disciplinary teams
Research integrity	Being aware of the ethical and legal issues relating to data sharing, confidentiality, attribution and environmental impact of open science activities Fully recognizing the contribution of others in research projects, including collaborators, co-authors, citizens, open data providers
Risk management	Taking account of the risks involved in open science
SERVICE AND LEADERSHIP	
Leadership	Developing a vision and strategy on how to integrate OS practices in the normal practice of doing research Driving policy and practice in open science Being a role model in practicing open science
Academic standing	Developing an international or national profile for open science activities Contributing as editor or advisor for open science journals or bodies
Peer review	Contributing to open peer review processes Examining or assessing open research
Networking	Participating in national and international networks relating to open science
RESEARCH IMPACT	
Communication and Dissemination	Participating in public engagement activities Sharing research results through non-academic dissemination channels Translating research into a language suitable for public understanding
IP (patents, licenses)	Being knowledgeable on the legal and ethical issues relating to IPR Transferring IP to the wider economy
Societal impact	Evidence of use of research by societal groups Recognition from societal groups or for societal activities
Knowledge exchange	Engaging in open innovation with partners beyond academia
TEACHING AND SUPERVISION	
Teaching	Training other researchers in open science principles and methods Developing curricula and programs in open science methods, including open science data management Raising awareness and understanding in open science in undergraduate and masters' programs
Mentoring	Mentoring and encouraging others in developing their open science capabilities
Supervision	Supporting early stage researchers to adopt an open science approach
PROFESSIONAL EXPERIENCE	
Continuing professional development	Investing in own professional development to build open science capabilities
Project management	Successfully delivering open science projects involving diverse research teams
Personal qualities	Demonstrating the personal qualities to engage society and research users with open science Showing the flexibility and perseverance to respond to the challenges of conducting open science

Source: European Commission (2017). *Evaluation of Research Careers fully acknowledging Open Science Practices, Rewards, incentives and/or recognition for researchers practicing Open Science*. Publications Office of the European Union. http://ec.europa.eu/research/openscience/pdf/os_rewards_wgreport.pdf

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