Incentives & Rewards for supporting Open Research Data Management and FAIR

NI4OS Europe

Overcoming the reproducibility crisis

Scholarly communication involves all stages of a researcher's workflow. Still, the most visible part of the research life-cycle are traditional publications, like journals and books, without supporting research data available in Open Access. Major, primarily commercial, publishers are not supporting innovative publishing and usage of the new tools and services by researchers, leading beyond written text and introducing other media, forms, and formats as more efficient and valuable representations of scholarly work. In addition, predominant research assessment criteria push researchers towards selective reporting of positive results only. Consequently, many scholarly studies cannot be reproduced or replicated, proving that findings reported in publications are based on actual data and questioning the research integrity. A scholarly communication system without

available research data is based on the assumption that provided arguments result from best methodological practices. For research to be reproducible, it is necessary to have insight into all phases of the research process, and research data, software and code must be available.

There are several challenges related to the unavailability of the research data:

- **Use and reuse**
  The results of previously conducted research cannot be reused for further research, the findings cannot be confirmed or disproved, new hypotheses cannot be created, and there is an insufficient return on public investment in science

- **Reliability of the peer review process**
  Due to selective reporting, p-values "hacking", and possible researchers' biases, the peer-review process could be unreliable

- **Supporting methodological rigour**
  Methodological and statistical misunderstandings can remain hidden behind ambitious interpretations of research results

- **Evolving programming languages**
  Changes in a computational environment, lack of availability of code necessary to run experiments or errors in code

- **Ethical issues**
  Research integrity could be compromised, and different ethical issues like data fabrication or falsification could arise

- **Trust**
  Over claiming of findings goes beyond the presented data; reproducibility crisis is undermining the trust in science

- **Citizen science**
  The lack of appropriate communication and the gap between the scholarly community and the business sector and society is deepening

- **Research assessment**
  Inadequate research assessment criteria based on the number of publications, number of citations and/or prestige of the publisher

Following EU policies

The Open Science (OS) movement is a direct response to these challenges and an appeal to engage in science properly

Open science means opening all phases of research to the public. The research process should be more transparent, and research outputs findable and available in standardized formats through an interoperable infrastructure. This would allow for the reuse and reproducibility of scientific research.
As far as research data and Open Research Data Management(ORDM) are concerned, these requirements are established through Findable, Accessible, Interoperable, Reusable (FAIR) principles.
The European Commission has already adopted a mandate for OA for Horizon 2020 and Horizon Europe publications and research data. All publications resulting from the H2020 and Euratom projects should be available in Open Access (OA), via publisher websites or OA institutional repositories.

→ **The EU's open science policy**

Benefits of sharing research data

There are countless benefits to sharing research data. Whether they follow an institutional or national OA mandate or their own, self-imposed mission of contributing to the "scholarly community and society as a whole", more researchers are adopting open science

RESEARCHERS
- Increased transparency and trust in their work
- Easier availability of research results for other scientists
- Reproducibility and reuse enabled by verifiable results
- Increased readability, citation and impact
- Long-term archiving and preservation
- New ways of gaining recognition and reputation
- New projects and employment opportunities
- Increased visibility and impact

FUNDERS
- Gaining more value from their investment
- Avoiding duplication in collecting, creating, transferring and reusing scientific content
- Improved quality of research (by building on previous results and avoiding duplication of efforts)
- Increased speed of innovation (faster progress to the market of ideas)
- More accurate verification of scientific results
- Stepped up scientific enquiry and discovery for the benefit of society
- Increased innovation potential

INSTITUTIONS
- Transparent liability to taxpayers, justification of existing funding
- Greater chances to compete and obtain new funding for scientific research
- Encourage and attract cooperation (academic and commercial)
- Particularly (multi and interdisciplinary), ability to attract high-quality researchers
- High-quality research presented to the global community
- Maintaining the quality of project applications
- Improved knowledge and engagement of researchers
- Greater impact on society
- Increased citations
- Improved research integrity (transparency allows validation of research results)
- Reduced risk of publishing in appropriate or sensitive data through an improved quality assurance process
- Maximized the potential of open data assets through reuse
- Increased productivity in times of limited budgets

Who's involved?

- researchers
- institutions
- policymakers
- publishers
- libraries
- funders

5

How to regulate

The ORDM and FAIR principles cannot be promoted, regulated, and implemented without policies, especially the ones setting the rules for career advancement or funders' project evaluation.
These policies are there to shape researchers' behaviour and to motivate them to make OS and pertaining activities as part of their every day work. Current research evaluation systems are mostly based on quantitative metrics, such as the number of publications and citations, which is the easiest but not the optimal way to evaluate and compare researchers' work.

- Develop and implement certification schemes (e.g., OS infrastructures, OS policies, and DMPs, FAIR compliance of the data infrastructure, DMPs and policies harmonization across stakeholders)

- Implement Open Science aware policies (e.g., mandating DMPs, OA publishing including dataset and software)

- Amend the current evaluation and assessment rules considering ORDM and FAIR practices (e.g., in promotion of researchers, recruitment procedures, project proposal assessment, institutions' evaluation, funding allocation systems)

- Enable and mandate fully transparent editorial policies addressing research data, publication/availability of datasets alongside research papers in OA (transparent peer review process, licenses, ethical issues, data availability and data citation)

What counts

- Creating and publishing a Data management plan (DMP)

- Publishing a dataset

- FAIRness of published data (e.g., dataset metadata and documentation completeness and quality)

- Dataset peer-review and curation activities

- Published dataset citation (including altmetrics)

- Projects overall ORDM activities (e.g., DMP, data curation, archiving and publishing)

How to acknowledge

- Award a priority in equipment/ service provision

- Award extra points according to the official research assessment system (e.g., project proposal evaluation, career advancements, allocation of funds)

- Award a conference fee

- Award a membership fee

- Award funds for APCs

Where to intervene

The incentives and rewards for ORDM and FAIR can be summarized through the following ten topics and associated activities which needs to be adopted by all stakeholders

Enforcement of ORDM and FAIR through policies – mandating OA publishing, including datasets and software, mandating DMPs, setting up policies for FAIR data publishing and archiving.

Assessment and promotion criteria on all levels – integration of ORDM and FAIR activities into research assessment and evaluation at various levels: promotion of researchers, recruitment procedures, project proposal assessment, institution evaluation, funding allocation systems, research awards.

Support for data infrastructure – organizational and financial support for OS infrastructure development and maintenance, for personnel costs, for training activities.

Increasing skills, capacity and awareness – education and training of researchers, students and support staff, provide discipline - specific and stakeholder - specific guidelines and training.

Enforcement of ethics and research integrity – adopting research integrity policy at all levels and enforcing research integrity policy.

Providing support and fostering collaboration – infrastructure support, helpdesk, data stewards, collection and sharing information about best practices, collaboration with national and international partners.

Proper dataset attribution, citing and metrics – fostering a culture of sharing and using open research data, facilitating and standardising dataset attribution and citation, development of new and innovative research data metrics.

Use of certification schemes – certification of OS infrastructures, OS policies and DMPs, FAIR compliance of the data infrastructure, DMPs and policies harmonisation across stakeholders.

Use of research infrastructures – foster ORDM and FAIR through the rules for the use of common research infrastructure.

Improving publishers' practices – enabling and mandating fully transparent editorial policies, publication/availability of datasets alongside research papers in OA, developing interoperability with other OS infrastructures, implementing more transparent peer review processes and high ethical standards into publishing practices, enabling text and data mining.

How to support

There are various types of ORDM activities, including data management planning, acquisition and managing research data during the project, data curation, data archiving and publishing. These activities need sustained and sufficient organizational and financial support

Adopting OS policies, developing related infrastructure and integrating ORDM- and FAIR-related criteria into research assessment and evaluation can be achieved only by raising the awareness of all stakeholders. To adopt OS practices everyday work, a researcher needs to acquire new knowledge and skills through continuous discipline-specific training and support and best practices in the field. In addition, higher education institutions should also include OS, ORDM and FAIR-related topics into their curricula.

- **Organizing ORDM and FAIR data training (education and training of researchers, students and staff, provide discipline and stakeholder specific guidelines and training)**
- **Establishing data curation services and support (infrastructure support, helpdesk, data stewards, collection and sharing information about best practices)**
- **Funding the development and maintenance of OS research infrastructures**
- **Funding the personnel cost**
- **Funding training activities**
- **Subsidizing national publishers, journals and platforms**

How to advance and promote

Given the varied stages of OS implementation on national/community level, not all ORDM and FAIR reward and incentive mechanisms identified and described in this document are equally mature and immediately applicable in every national context. Their simultaneous installation by policymakers, funders, research organizations and higher education institutions could be less effective than the gradual implementation in synergetic and successive clusters – a perfect match from the onset is unlikely, while the discussion on incentives for OS activities is still a work in progress on a global level (e.g., rewards for opening data, infrastructural support to open peer-review, developing reliable alternative and open metrics, etc.). NI4OS-Europe will back the core reward and incentive mechanisms by supporting the related activities and ensuring their alignment across the reconciled regional ecosystem. At the same time, NI4OS-Europe will keep track of all relevant developments in Europe, seeking to assess their applicability in individual local contexts.

- **Raising awareness about the benefits of ORDM and FAIR**
- **Annual awards for ORDM and FAIR champions on national/institutional/community level**
- **OS badges implementation in data repositories/catalogues**

NI4OS

Europe

https://ni4os.eu/