Supporting Open Research (Open Science)

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A short guide explaining how libraries can get started in supporting Open Research (Open Science).

Introduction

Open Research - used interchangeably with Open Science - is an umbrella term that sets values and practises to make research easily discoverable, transparent, equitable, available and re-usable across all disciplines and across the entire research lifecycle. It aims to remove barriers to knowledge and make access as inclusive as possible.

The aim of Open Research is:

- To promote a collaborative, sustainable and inclusive research culture
- To incentivise innovation and creativity
- To support reproducibility of research outputs (where relevant)

How does this benefit society?

Universities and researchers are recognising that Open Research has benefits extending far beyond each individual institution. The Open Research Group at University of Cambridge articulates this nicely in their guidance to researchers:

- The general public has free access to quality information that matters in their lives
- Practitioners and policy makers can put the findings of research into practice more quickly and easily
- Public funds result in knowledge that can be shared as a public good
- Economic benefits derive from reducing attrition between research and commercial applications
- Students in a variety of context face no barriers to accessing materials that help them
- Access to knowledge is more equitably distributed around the world
- Findings from research are more transparent and trustworthy

How does this benefit researchers?

The Open Research Group at University of Cambridge note that individual researchers also benefit from sharing their research:

- More visibility as outputs are not restricted by paywalls and other barriers
- Greater impact as more people read and apply their work
- More credibility through making the process of research more transparent
- Compliance with funders' requirements and career opportunities

Open Research is more than just making research findings public. It's a philosophy that encourages transparency, accessibility, and collaboration throughout the entire research process.

Are there any challenges to Open Research?

Funders, institutions, research groups and individual researchers from around the world are actively working to overcome technical, cultural, ethical, legal and financial challenges to make open research the norm. This includes developing robust infrastructure, fostering a culture that values openness, ensuring ethical practices, clarifying legal frameworks, and establishing sustainable funding models.

Relevance to the Library Sector (Case Studies/Use Cases)

The role of libraries on Open Research has been discussed for a while and endorsed publicly by international organisations and stakeholders such as the European commission (European Commission, 2012) and OECD (OECD, 2015).

OECD defines libraries as enablers "*Libraries have adapted their role and are now active in the preservation, curation, publication and dissemination of digital scientific materials, in the form of publications, data and other research-related content. Libraries and repositories constitute the physical infrastructure that allows scientists to share use and reuse the outcome of their work, and they have been essential in the creation of the Open Science movement*"

Library staff have an important role in encouraging their institution to make open research a priority, and deliver practical support to their researchers.

LIBER's Open Science Roadmap produced by the LIBER Open Access Working Group is an exceptional resource and outlines the "specific actions libraries can take to champion Open Science, both within and beyond their own institutions". It provides specific recommendations on how libraries can (and *must*) work across many different areas to fully advocate, raise awareness of and support Open Science such as:

- Scholarly Publishing
- FAIR Data

- Research Infrastructure & the EOSC
- Open Science Skills

The Roadmap also provides a number of helpful case studies, well worth a read, of champions in the Open Research space:

- Karlsruhe Institute of Technology
- National Library of Finland
- Ruder Bošković Institute Library
- Spanish National Research Council
- Svetozar Markovic University Library
- University of Barcelona
- University College London
- University Library of Southern Denmark

These can be a good source of inspiration and are concrete examples to help your institution practically support Open Research.

One of the most important ways librarians can and do support Open Research is through adopting, promoting and supporting Fair Data Principles.

- **Findable**: Research data, software and publications should be easy to discover using clear and consistent identification methods.
- **Accessible**: Data, software and publications should be readily available to anyone with minimal barriers, often through open access repositories.
- **Interoperable**: Data should be presented in a standardised format that allows for seamless integration and analysis with other datasets.
- **Reusable**: Data, software and publications should be accompanied by clear documentation and licensing, allowing others to understand and build upon them.

LIBER's Research Data Management Working Group produced a helpful factsheet, Implementing FAIR Data Principles: The Role of Libraries, specifically to help libraries understand how to get started incorporating the FAIR Data Principles in their work:

- Promote the FAIR principles to local research and IT staff;
- Incorporate the FAIR principles in your Data Management Plans and your digital preservation practices and policies;
- Seek opportunities to curate, enrich, capture and preserve research data that will aid in making data findable, accessible, interoperable and reusable. Good starting points are collections of individual researchers, or a data collection of a research group;
- Train subject and data librarians on disciplinary metadata, vocabularies and tools to make data FAIR;
- Encourage researchers to deposit data with archives that embody the FAIR principles;
- Evaluate the data collections and data management practices at your institution against the FAIR principles.

Here are a few more practical suggestions for ways in which librarians can support the adoption of Open Research principals at their insitutions:

1. Make it easier for staff and researchers to find all the info they need about Open Research

Your institution should have a central place for providing information to staff and researchers about embarking on open research, and where to seek practical support. If it doesn't your library website can be a natural home for such information!

2. *Provide practical support for researchers*

Researchers may be keen to adopt open research principals, but without a lack of institutional support and practical training they may be more easily deterred. Librarians have an important role in encouraging their institution to make open research a priority, and deliver practical support to their researchers.

Providing advice and training to support researchers across the research life cycle is a key way for librarians to support open research.

Planning a Research Project

- Exploring pre-registered studies and protocols
- Using existing open datasets to inspire new research questions and applications.
- Open Peer Review practices
- Choosing the right data repository
- Develop a Research Data Management plan and outlining data management plans for during and after the project

During the Research Project

- Developing a pre-registration document
- Exploring the use of Open Code and Software
- How best to document data collection process (The Turing Way: A handbook for reproducible, ethical and collaborative research: open notebooks)
- How to share preliminary results through the use of Preprints
- Help researchers to manage their personal identifiers (ORCID

After the end of the Project

- How to share results in an open and suitable long-term format (e.g. UK Data Service: Recommended File Formats & Library of Congress Recommended Formats)
- How to upload (anonymised if appropriate) research data to a trusted open access data repository
- How to Publish research findings in open access journals and/or deposit them in open access repositories with a permissive reuse licence

3. Work to understand the barriers The blogpost "How can librarians support open research?" recommends librarians work closely with researchers to understand their specific barriers to publishing openly and share data more easily, and collaborate with other faculties to understand if their researchers are facing the same challenges. This collaborative communication could help find the right solutions for your researchers' needs.

4. Make use of bibliometrics Another way to help encourage the adoption of Open Research practices is to use bibliometrics to incentivise open practices. The authors of "How can librarians support open research?" notes that colleagues who work with bibliometrics/citation analysis can help develop their institution's understanding of the impact of their research and shared data, especially if more outputs across the research lifecycle are being openly published. Library can help institutions to recognise, showcase, and reward high impact data sets which have been shared openly and reused by other researchers.

5. Contribute to and/or create an institution platform Library staff are often responsible for maintaining and enhancing the records deposited on the institutional or national repository, so having a full understanding of open research principals will be essential in some roles.

Some institutions may find that creating institutional platforms, such as a repository capable of hosting (and making open) data sets and other useful resources to share across faculties can drive open research at your institution. It is important though to be aware though that such repositories may often come with some limitations which means they should only be considered as part of a wider plan for supporting open research.

Hands-on activity and other self-guided tutorial(s)

Skills4EOSC is an EU funded project that started in 2022 and offers "a comprehensive training program designed to equip researchers, data stewards, and other stakeholders with essential skills for navigating the evolving landscape of Open Science and the European Open Science Cloud (EOSC)" ". Some training is asynchronous and you can enroll yourself at any time such as Learning path for (data) librarians: Technical skills are the bridge to reproducible research.

The Foster Open Science Project produced a number of training materials which are helpful for librarians wanting to get started in supporting open research.

Though aimed at researchers in biological and biomedical sciences, this Beta Data Carpentries lesson provides a really accessible introduction for anyone interested in FAIR (Findable, Accessible, Interoperable, Reusable) principles for data re-use, and how to practically apply then throughout a projects' life cycle.

Recommended Reading/Viewing

Again, we can't recommend enough LIBER's Open Science Roadmap produced by the LIBER Open Access Working Group as an all around guide for libraries getting started in Open Research.

UKRN Open Research Resources is also an excellent resource for getting to grips with supporting open research. They provide helpful animations, primers, videos and training materials as well as discipline specific case studies of open research including Library and Information Science related examples.

UNESCO Recommendation on Open Science (2021)

The Community Sourced Open Research glossary is a good place to start to find out more about the terminology connected to Open Research, which can be sometimes overwhelming and confusing

If you prefer podcasts, we can recommend:

- Everything Hertz (in particular podcast 57 & 176) & Orion Open Science will give you a perspective or Open research from different fields
- The first few episodes of ReproducibilitiTea are an excellent introduction to Open research

Finding Communities of Practice

Learning about Open Research can be overwhelming at first especially if you are new to it! LIBER's Open Access Working Group is a great community to join as they are playing an important role in the Open Research Europe (ORE) Project - LIBER Europe and have many members well versed in this topic!