

Open Research and Innovation for Early Career Researchers

Today's researchers are leveraging web technologies to broaden the impact of their research and make their work more efficient. Early career researchers (ECRs) face unique challenges as they move to embrace the latest tools while working within established research groups. You can navigate this balance by connecting with regional, national, and global organizations doing similar work, and these communities can help you make connections and link to resources that can make your work more reproducible.

What is Open Research?

Open Research is an umbrella term that encompasses the following:

- **Open Access:** Scholarly research that is freely available to the public, i.e., not behind a paywall or accessed by subscription only.
- **Open Data:** Sharing of data, code, and other research objects the underlying published work to enhance reproducibility.
- **Open Education:** Sharing of curriculum, texts, and other resources to reduce barriers to education.
- **Open Source:** Source code is freely shared (no agreement required for use) and contributions to the code are welcomed.

Examples of Open Research practices today:

You can adopt tools and practices to make your work more impactful and efficient - open practices are now widespread.

- Posting preprint publications to repositories like [arXiv](#) and [biorXiv](#)
- Publishing in open access journals like [PLOS](#) and [eLife](#)
- Sharing code on platforms like [GitHub](#) and [GitLab](#)
- Publishing citable datasets with data repositories like [Dryad](#)

Organizations supporting ECRs and Open Research

- [SPARC](#) and [OpenCon](#)
- [Mozilla Foundation](#)
- [NumFOCUS](#) and their sponsored projects including [rOpenSci](#)
- [Future of Research](#)
- [Force11](#)
- [ASAP Bio](#)
- [Open Source Alliance for Open Scholarship](#)

Enabling researchers to share data, publish data, use open data, and collaborate on data-driven research benefits both researchers and institutions:

1. Speed discovery and avoid duplicated effort

Open data enables researchers working in parallel on similar problems to collaborate easily and transparently, rather than work independently and potentially wasting time and resources.

2. Increase scholarly impact

Allowing other researchers to create, access, and reuse citable datasets benefits researchers. Open data leads to increased citations and clear recognition of contributions both of which [positively impact](#) a researcher's scholarly profile. Open data actually protects researchers from their research being 'scooped' because it provides provenance for their research outputs through clear, dated digital records associated with intermediate research products.

3. Save time preparing for funder and publisher open data requirements

Funders and publisher increasingly require data to be deposited alongside publications (example: [NSF](#)). When researchers plan for open data early in the research process, they save time, and avoid mistakes or information loss.

4. Protect your investment - ensure that data are preserved.

At many universities, research outputs like data are the intellectual property of the university. However, research data management processes vary between research groups and there is often little oversight of data stewardship. We have [read the horror stories](#) of data lost due to poor storage decisions. Working with archivists and librarians can prevent this. When data are made openly available in a data repository -- such as an institutional data repository or a nonprofit repository like [Dryad](#) -- the responsibility of archival preservation is handled by digital archiving professionals. This ensures that datasets remain accessible and relieves the researcher of the burden of managing long term data preservation infrastructure.

5. Encourage collaboration across disciplines

Open data facilitates researchers can more easily find those outside their subject area doing related or relevant work; these connections and collaborations may lead to [new ways of approaching and solving problems](#).

6. Maintain accountability and increase public trust

When data are made openly available, the publications or conclusions resulting from those data can be easily verified, [increasing public trust in researchers](#) and data producing entities.

7. Facilitate citizen science and encourage public engagement with research

When data is open and the findings are shared in a clear and accessible way, it increases public understanding, [creates opportunities for public participation](#), and bolsters public support of research initiatives.