FAIR data for reproducible research

Lunch&Learn Open Science, September 23

Rachel Heyard, Center for Reproducible Science, University of Zurich

Goals of the Center for Reproducible Science (CRS)

1. Teaching and training to improve the overall reproducibility and quality of empirical research

- **Good Research Practice** (GRP) courses
- **Primers** in Good Research Practice
- **ReproducibiliTea** journal club
- **Reproducibility Lab Pitches**

2. Promote, support and conduct original research in reproducibility and methodology

- Design and analysis of **replication studies**
- **Meta-research**

more infos, see
www.crs.uzh.ch

What is Research Data?

Definition from the **Concordat on Open Research Data** (by HEFECE, UKRI, Universities UK and the Wellcome Trust)

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+ code, software, protocols and methods

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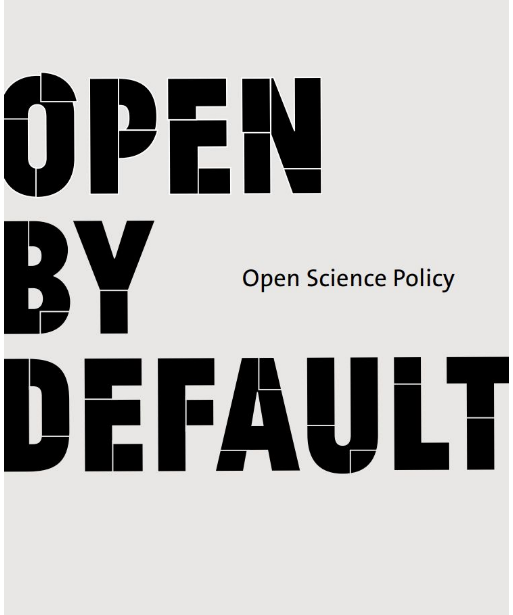
University requirement

UZH Open Science Policy

UZH expects that all publicly funded scholarly output – including, e.g. publications, research data and code – is made openly available.

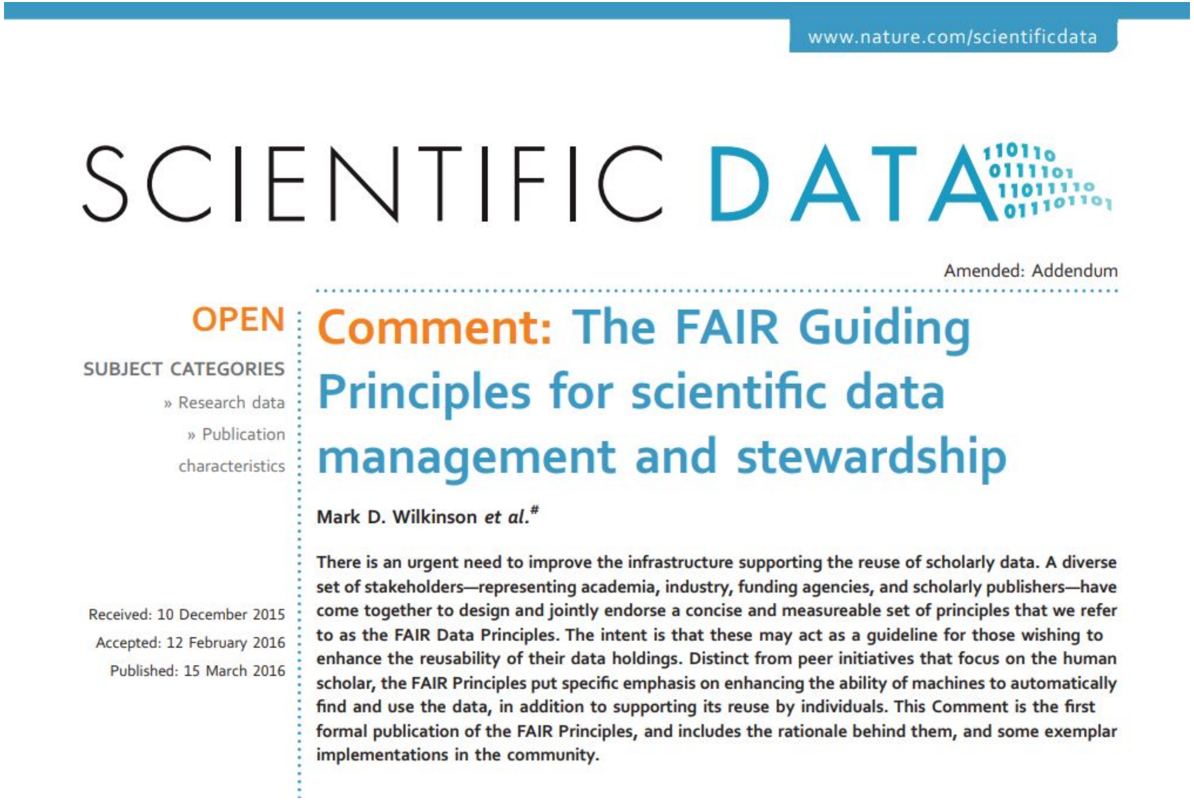
UZH expects output of all publicly funded research to be made FAIR (Findable, Accessible, Interoperable and Reusable). The FAIR principles apply to data and metadata as well as to software, code, algorithms, and workflows/protocols that lead to that data.



OPEN BY DEFAULT

Open Science Policy

The FAIR principles



www.nature.com/scientificdata

SCIENTIFIC DATA

Amended: Addendum

OPEN

SUBJECT CATEGORIES

» Research data

» Publication characteristics

Comment: The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson *et al.*#

There is an urgent need to improve the infrastructure supporting the reuse of scholarly data. A diverse set of stakeholders—representing academia, industry, funding agencies, and scholarly publishers—have come together to design and jointly endorse a concise and measureable set of principles that we refer to as the FAIR Data Principles. The intent is that these may act as a guideline for those wishing to enhance the reusability of their data holdings. Distinct from peer initiatives that focus on the human scholar, the FAIR Principles put specific emphasis on enhancing the ability of machines to automatically find and use the data, in addition to supporting its reuse by individuals. This Comment is the first formal publication of the FAIR Principles, and includes the rationale behind them, and some exemplar implementations in the community.

Received: 10 December 2015

Accepted: 12 February 2016

Published: 15 March 2016

The FAIR principles

Findable

Accessible

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- ➔ (meta)data should have a globally unique and persistent identifier (DOI)
- ➔ well described metadata
- ➔ (meta)data should be registered (Zenodo, Open Science Framework, …)

Can I find it, also in a year from now?

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- ➔ (meta)data and protocols should be retrievable, open and free
- ➔ metadata should stay accessible, even when data not available

Can my colleague access it, without paywall, or other obstacles?

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Can my colleague interact with the data, do they understand and find all relevant information?

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Reusable

➔ (meta)data with clear and accessible usage license and detailed provenance

Will a potential future collaborator be able to re-use my data, without contacting me?

Open and FAIR data sharing does not come without obstacles

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2. Recognition, being acknowledged for data sharing
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3. Long-term data maintenance
   - Training and data stewardships
4. Open and FAIR data sharing *is not enough*
   - Additionally share code, software, and all research material

What is Metadata?

Metadata is **data about data**, that

is machine readable.

makes data FAIR - *findable, accessible, interoperable, and reusable*.

facilitates data reuse and discovery.

contains a data-dictionary or codebook defining and explaining variable in the data.

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Data management plans (DMPs) are more and more required (funders, publishers, …).

UZH Library provides lots of support.

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From researcher to researcher - this will save you lots of trouble along the way!

Data management planning

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- Strategy for sharing? Where? What?
- Strategy for quality control?
- Ethical considerations and data privacy?

Data management planning - My suggestion

Start with defining data, and list the types of data you generate and reuse.

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I *generate*

- R scripts
- research protocols
- papers and preprints
- teaching material

I *reuse*

- R code and packages
- openly accessible data

Data management planning - My suggestion

Quality control?

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- research protocols
- papers and preprints
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- openly accessible data

Data management planning - My suggestion

Quality control?

I *generate*

- R scripts: code review and version control
- research protocols: follow reporting guidelines and templates
- papers and preprints: reporting guidelines, use community approved vocabulary, engage with pre-/post-publication peer review
- teaching material: option for feedback / test material

I *reuse*

- R code and packages
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Data management planning - My suggestion

Strategy for sharing?

I *generate*

- R scripts: via git, with snapshot on Zenodo for DOI
- research protocols: preregistration on the Open Science Framework (with DOI)
- papers and preprints: post preprint before submission, prefer OA journals
- teaching material: upload to the OSF (with DOI)

I *reuse*

- R code and packages: *properly cite all packages and sources*
- openly accessible data: *ensure data has a license*

Data management planning - My suggestion

Metadata? Documentation?

I *generate*

- R scripts: comments in code, add examples for usage, add README and license
- research protocols: is documentation + minimal metadata via OSF + license
- papers and preprints: …
- teaching material: description of learning objectives, add license

I *reuse*

- R code and packages
- openly accessible data

Thank you.

Question?

Comments?