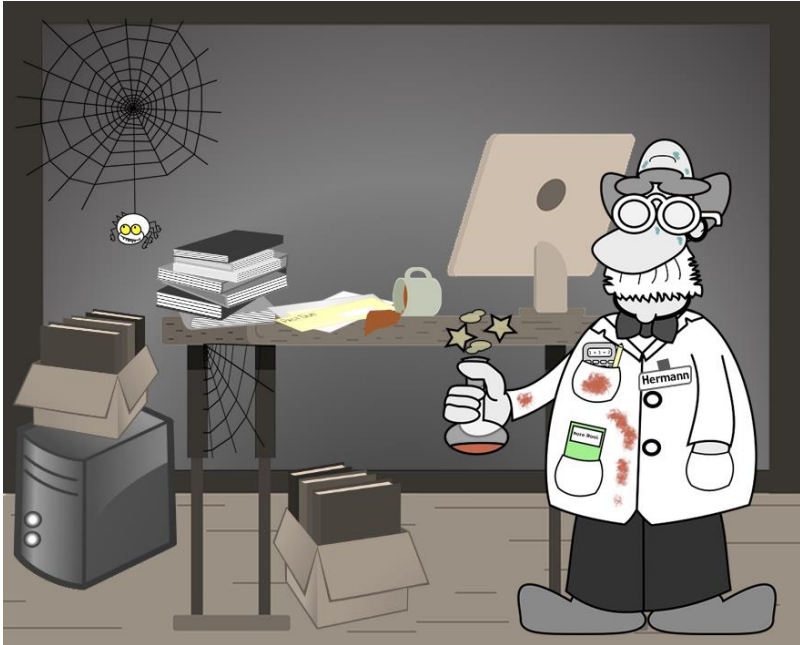


My research data and me: How it can work!

Research Data Management - Basics

Find the differences?

Former practices



FAIR practices



Find the differences, by RDM Team TU Graz, [CC by 4.0](#)

Content

- Research Cycle & Good Scientific Practice
- Publications & Open Access
- FAIR Principles
- File organization basics

Research circuit

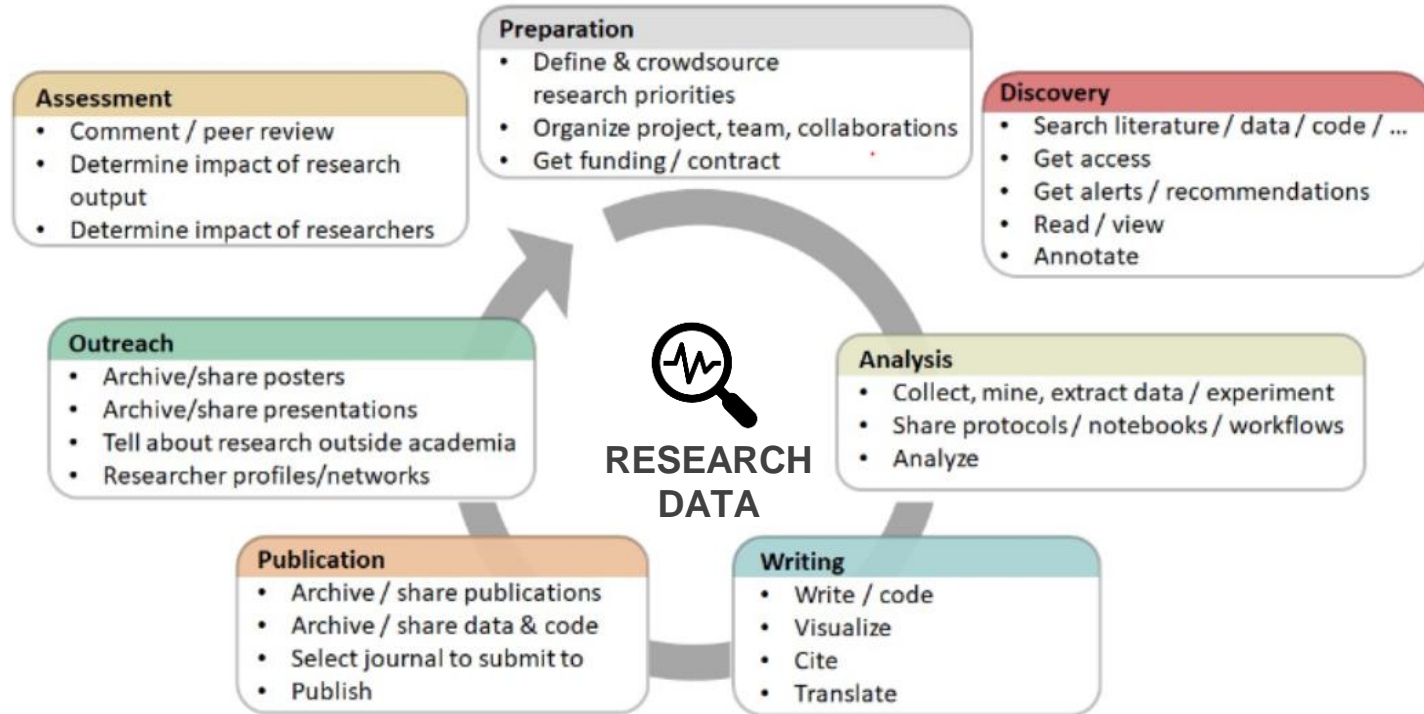
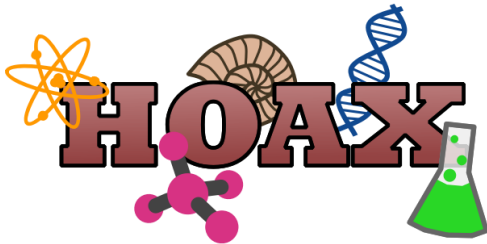


Image from <https://open-science-training-handbook.github.io/>, CC0

Good scientific practice

- Work in accordance with legal regulations & ethical standards
- Clear and traceable documentation of results
- Subject results to critical review
- Public nature of basic research



Guidelines on Safeguarding Good Scientific Practice

RL 92000 SGWP 050E-04

CC0, by j4p4n at <https://freesvg.org/science-hoax>

Source: TU4U TU Graz 2017

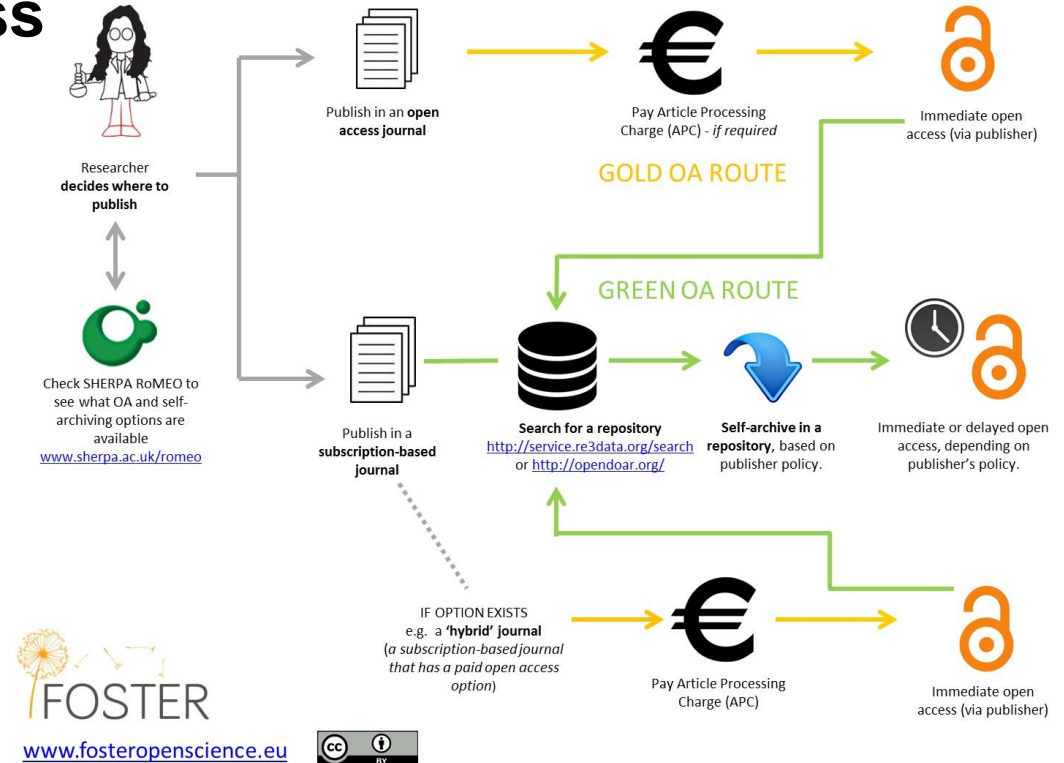
Challenges with publications



Solution: Open Access

Open Access stands for **online**, and **free access** to peer-reviewed publications with **open licences for reuse**.

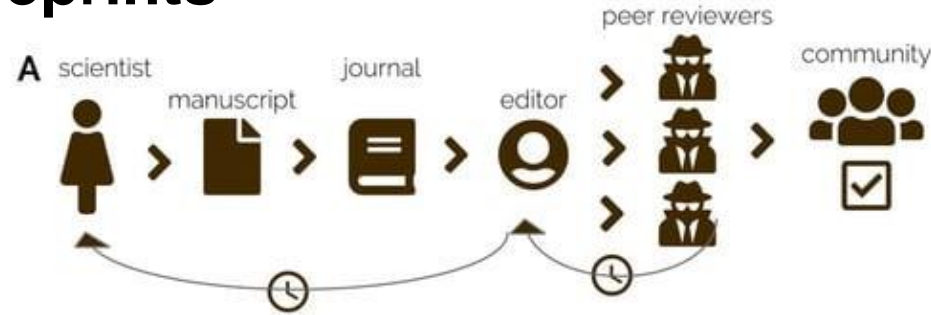
Contact: TU Graz Library



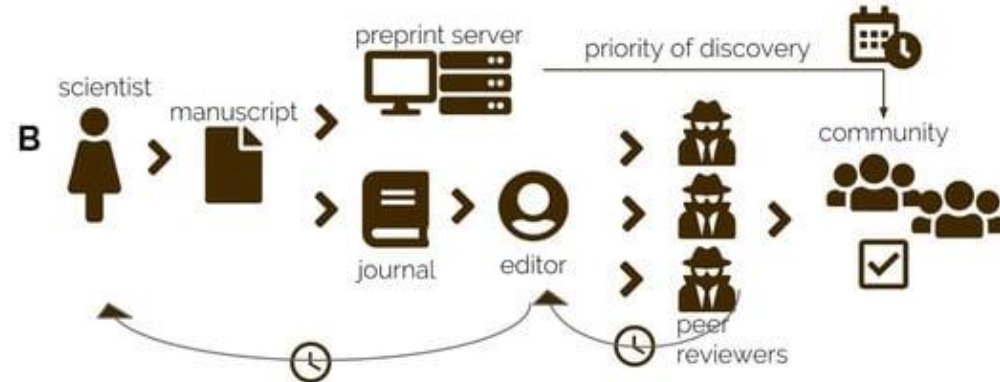
„OA-routes“, by Digital curation Center, from dcc.ac.uk/blog/fostering-open-science, CC by 4.0

Solution: Preprints

Traditional submission



Preprint submission



Ten Hot Topics around Scholarly Publishing, Tennant et al. 2019, MDPI, [CC by 4.0](#)

Solution: Registered Reports

Peer review before results are known
to align scientific values and practices



The registered report workflow, from Promoting reproducibility with registered reports. Nat Hum Behav 1, 0034 (2017). <https://doi.org/10.1038/s41562-016-0034>

Scientific publication of data

- **Scientific data**
(<https://www.nature.com/sdata/>)
- **Data in Brief**
(<https://www.journals.elsevier.com/data-in-brief>)
- **MDPI Data**
(<https://www.mdpi.com/journal/data>)
- **Data Science Journal**
(<https://datascience.codata.org>)



Repository, RDM Team TU Graz, [CC by 4.0](#)

Data publication

As an independent information object in a research data repository

- Discipline-specific repositories, e.g.
- Cross-disciplinary repositories, e.g.
- Institutional repositories, e.g.



**TU GRAZ
REPOSITORY**
Bibliothek und
Archiv

Find repositories:

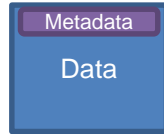
on **re3data.org**
REGISTRY OF RESEARCH DATA REPOSITORIES

you can find repositories for your discipline.

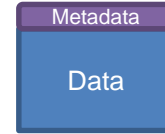
Metadata

- **Description** and **context**
- Discipline-/topic-specific schemata: <https://fairsharing.org/>
- Generic: Data cite,
<https://schema.org>,
<https://guidelines.openaire.eu/>
- Code: <https://github.com/codemeta/codemeta>,
<http://datacite.org/schema/kernel-4>

Metadata



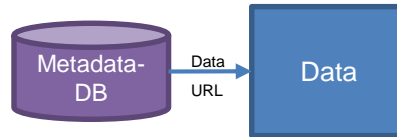
Metadata in data
(part of header of data-formats, e.g. HDF5)



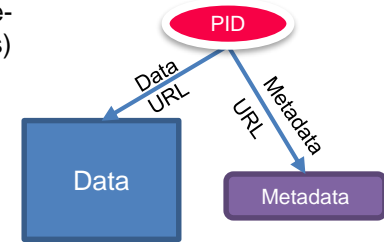
Metadata on data
(e.g. object-storage, file-and folder-designations)



Metadata with data
(e.g. readme-file, metadata)



Metadata-DB
Link to data
(e.g. search index, repository)



Persistent Identifier
linked to metadata and data
(e.g. DOI, EPIC-PID, URN)

Content from: TU9-FDM. (2019, May 3). Metadaten. Zenodo. <https://doi.org/10.5281/zenodo.2660187> - CC by 4.0

FAIR Principles

Findable - Accessible - Interoperable - Reusable

FAIR DATA PRINCIPLES

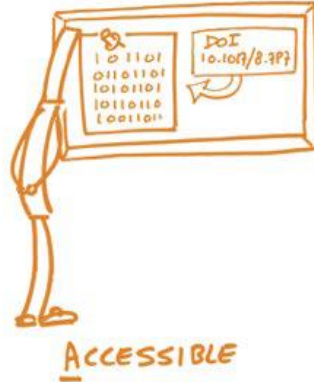


Image from <https://open-science-training-handbook.github.io/>, CC0

FAIR Principles

Findable - Accessible - Interoperable - Reusable

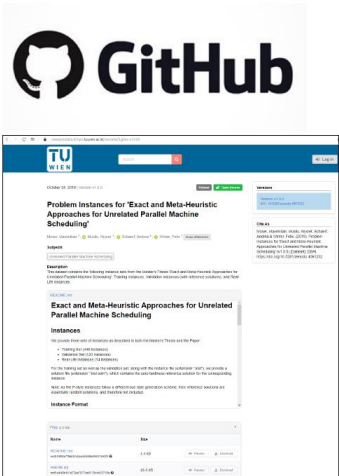


Image from “Resources for making your data fair”, Australian Research Data Commons, [CC By 3.0](#)

FAIR Principles


Example for FINDABLE:

Yes



Data repository

No



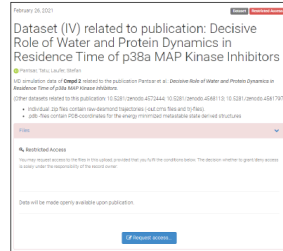
Personal website

Let's make our data FAIR, by Tomasz Miksa. DOI: 10.25365/phaidra.306. [CC-BY 4.0](#)

FAIR Principles

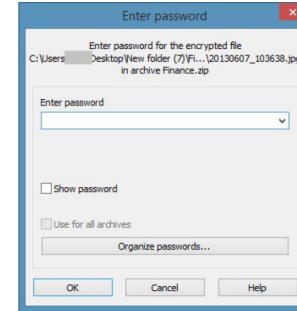
Example for ACCESSIBLE:

Yes



Restricted access,
but a clear way to
request access

No



Let's make our data FAIR, by Tomasz Miksa. DOI: 10.25365/phaidra.306. [CC-BY 4.0](#)

FAIR Principles

Example for INTEROPERABLE:

Yes

- XML following known XSD Schema
- MP3 for audio recordings

No

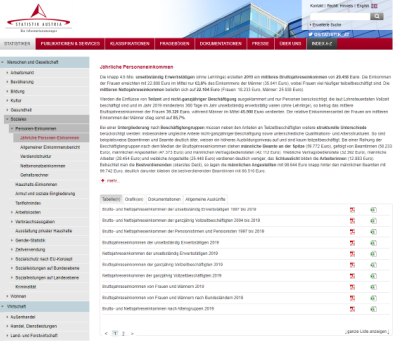
- Custom XML without any documentation
- M4P (Apple) for audio recordings

Let's make our data FAIR, by Tomasz Miksa. DOI: [10.25365/phaidra.306](https://doi.org/10.25365/phaidra.306). [CC-BY 4.0](#)

FAIR Principles


Example for REUSABLE:

Yes



Trusted source, permission to reuse, well defined meaning of terms used

No



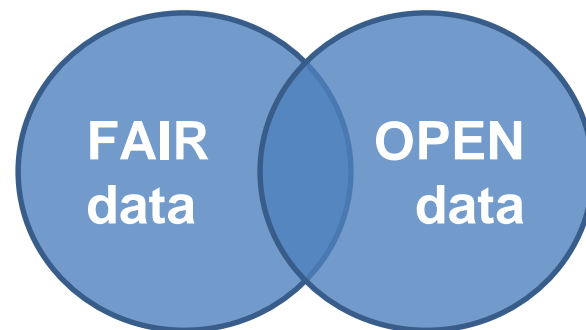
Provenance and permissions not clear

Let's make our data FAIR, by Tomasz Miksa. DOI: 10.25365/phaidra.306. [CC-BY 4.0](#)

FAIR Principles

Towards "as **FAIR** as possible" and "as **open** as possible"

- **FAIR** principles \neq **open** data sharing
- FAIR = **best practices** for data exchange
- Data not shared, still **metadata** defined

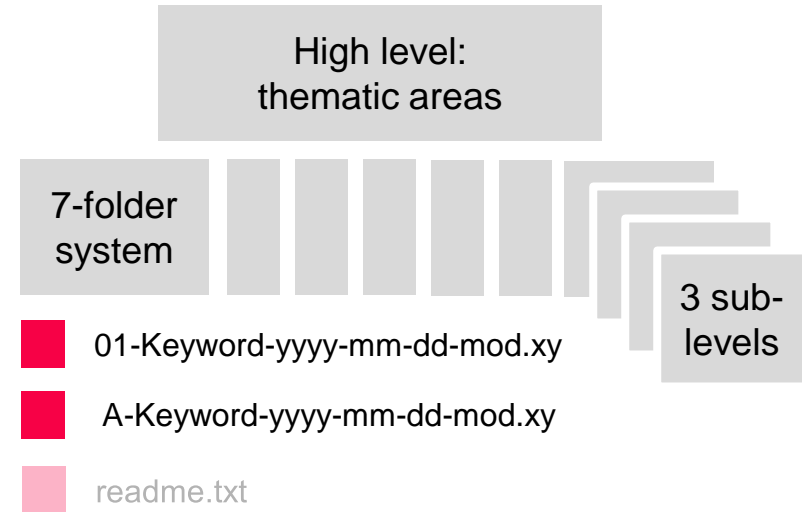


Basic Data Management – Toolless File Organization

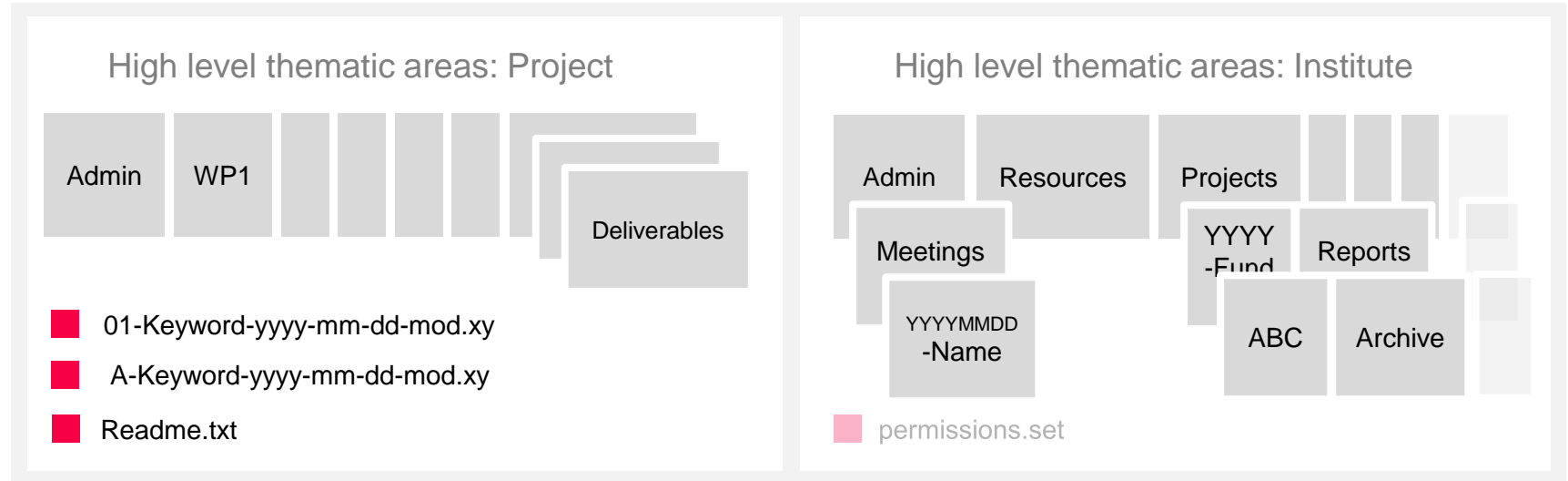
AVOID: How did I name the file, where did I put it?
What is what?

Basic Data Management – Toolless File Organization

- Clear hierarchical folder structure
 - similar subfolders
- Separate sensitive structure
- Files/records at bottom level
- Document consistency



Basic Data Management – Toolless File Organization



Toolless File Organization - Summary

(1) Define **naming rules** and options

- document rules, e.g. readme.txt in root/main folders!
- consistency, e.g. keyword, date, modification
- hierarchy structure (levels with similar subfolders, max 5)
- avoid special characters and spaces (– only hyphens _or underscores)
- metadata? Content & Provenance (author, changes, date)

(2) **Group**, e.g. projects/topics/resources - group working data together!

- set permissions

(3) Avoid duplicates/redundance! - keep necessary **versions** only!

- keep track

(4) **Numbering** & Order

- year/month/day in similar format
- number in front: importance

(5) **Revise** regularly!



Basic Data Management – Further Materials

Knowledge clip:

Keeping research data organized

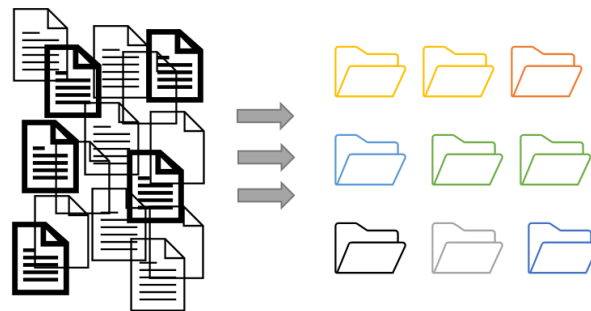
CC By 3.0 Ugent Data Stewards



Disciplinary In-depth Exercise:

Working with files – FAIR in (biological) practice
(carpentries-incubator.github.io)

CC-BY 4.0 2023 by Zieliński T, Romanowski A, et al.



messy/unstructured

organised folder structure

Research Data Management @ TU Graz

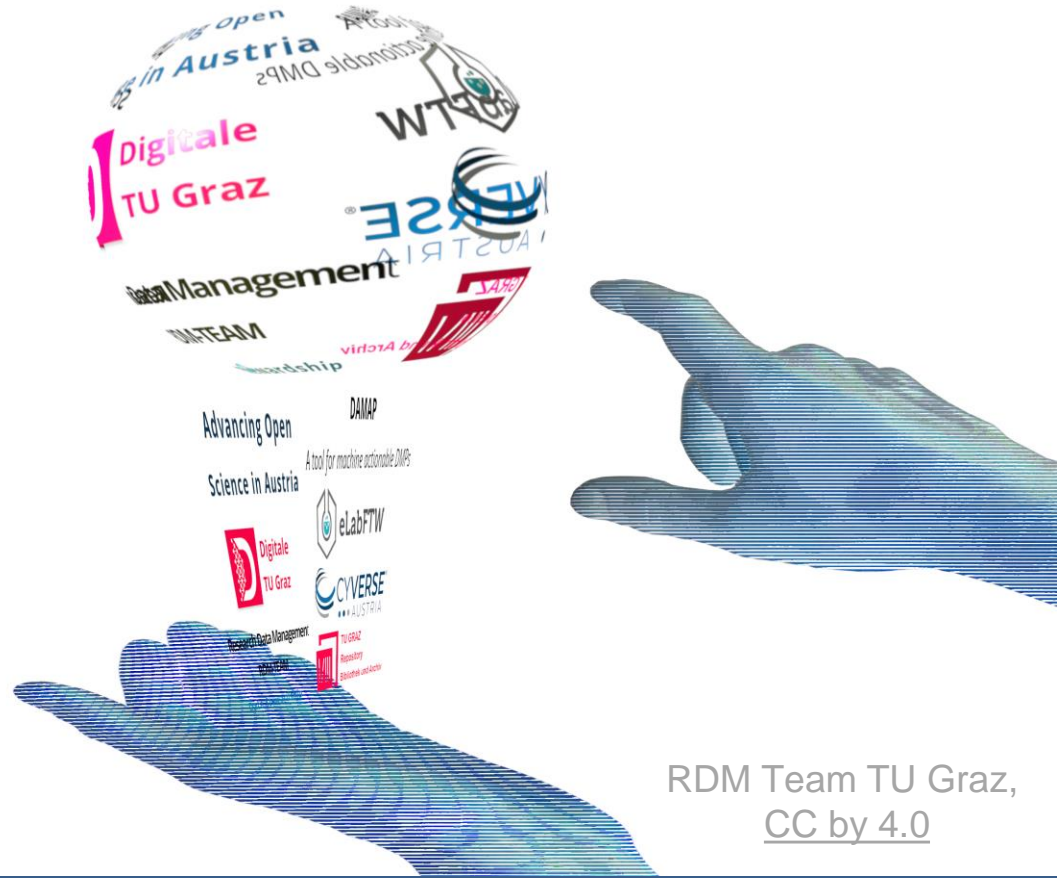
- DMP Support
- RDM Optimization Institute/Group: Workflows/Pipelines, Infrastructure
- RDM Individual support & support in Research Projects (Collaborations)
- RDM guidelines & policies
- Tool-dependent support
(workshops, introduction, training, assistance, development)

Supporting reproducible research

rdmteam@tugraz.at



<https://rdm.tugraz.at>



RDM Team TU Graz,
CC by 4.0