Research Data Management (RDM)

Q1 Q2 Q3

Best Practices Roadmap

Leibniz IOER - RDM Seminar   20.05.2022

Stefano Della Chiesa

Leibniz Association

DRESDEN concept

Leibniz Institute of Ecological Urban and Regional Development

Outline – Today`s RDM Recipe

| 4 Modules and 1 group exercise	
Short Presentation:	(9:00-9:15)
Module 1: Introduction to RDM	(9:15-10:00)
Coffee break:	*(10:00-10:15)*
Module 2: High-Level Policies	(10:15-11:00)
Module 3: Knowledge Bricks	(11:00-12:30)
Lunch break:	*(12:30-13:30)*
Module 4: Data Management Plans	(13:30-14:15)
DMP Exercise (*World coffee style*): in 3-4 groups Outlining a DMP	(14:15-16:00)

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Brief Presentation

Short participant's presentation

- Briefly on your Project/PhD

- Which data you use, methods and which are the expected research outputs?
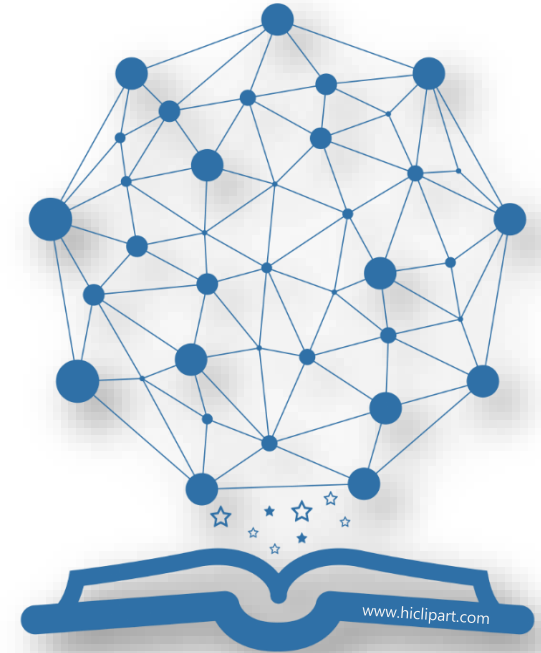
Knowledge network

Before starting

RDM is like a multidisciplinary knowledge network

- You´ll be introduced on several concepts

linked with another (be patient, feel free to ask)

- The training material contains several hyperlinks

to other sources

www.hiclipart.com

Knowledge network

Module 1 - Introduction

This first module introduces RDM, giving its context in the Research Data Governance

- Research Data Management (RDM)
- RDM Top Down & Bottom Up
- Linked Research Outputs
- Research Assessment

Research Data Management - What?

A Puzzle of knowledge bricks

RDM is a mosaic of multidisciplinary knowledge and competencies. Hence, RDM know-how serves as a reference toolkit to address policy compliance and data management best practices throughout the project lifecycle.

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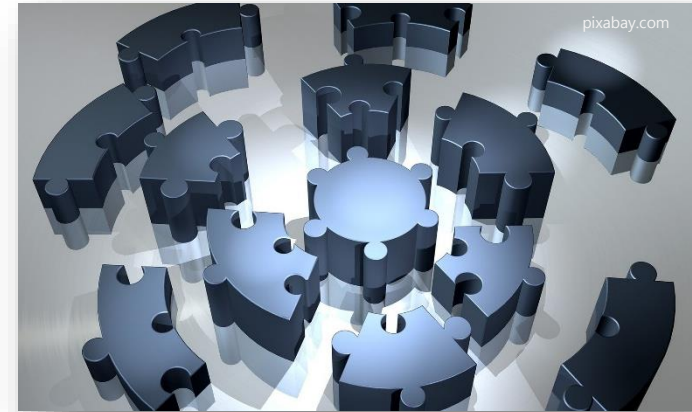
What is Research Data?

- No standard definition available.

- Research data is the fundament of any scientific work documenting its results.

- DFG specifies: "Research data includes **measurements, audio-visual information, texts, documentation, samples, questionnaires, algorithms**, **software, simulations**, etc..

- Research data is highly heterogeneous, with subject area having a wide variety of data type and formats.

- Hence: Research Data → Research Input/Outputs
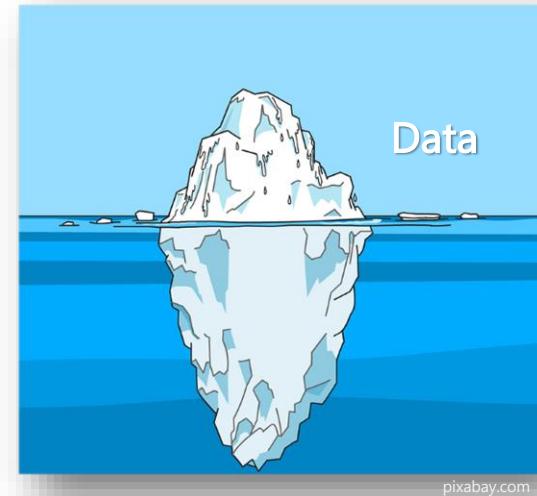
Data

pixabay.com

What is Metadata (MD)?

Metadata (MD) is **data about data**.

In research Metadata represents all the **information that describe and document** in a structured way the research data.

Structured? It means there are several MD elements that can describe the data: Title, Creator, Abstract, Keywords, Format, Subject, PID, License, Provenance/Lineage, etc.

Metadata

pixabay.com
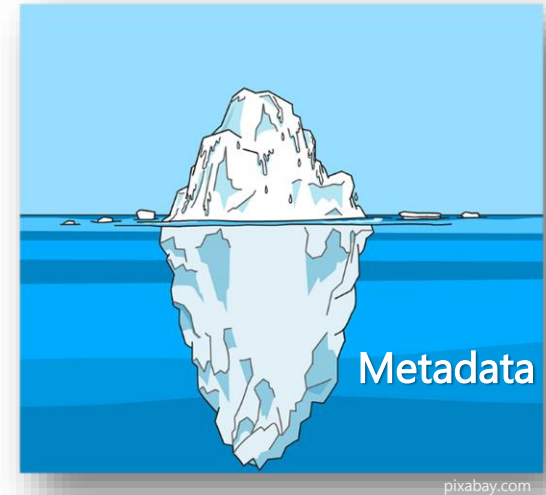
Research Data Management Lifecycle

Research idea and design planning

Data retrieval (existing or new)

Data processing and analysis

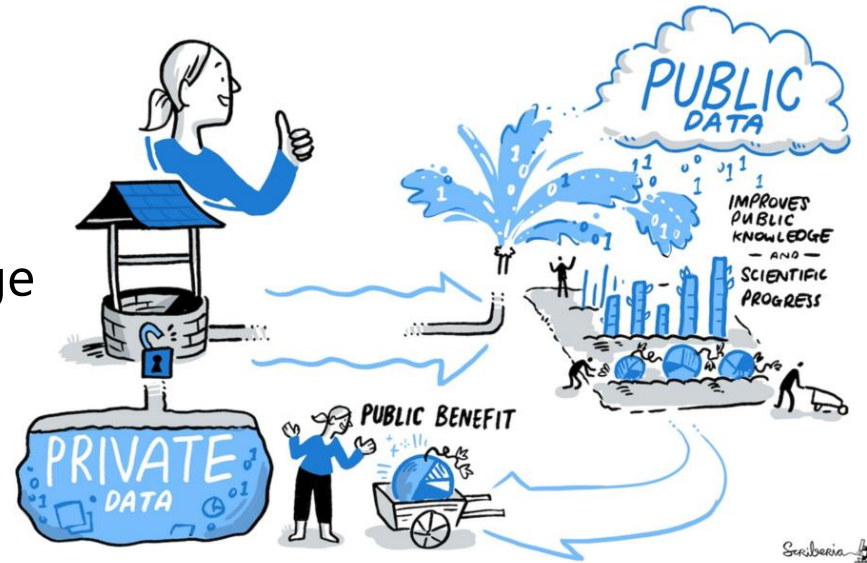Publishing and re-use

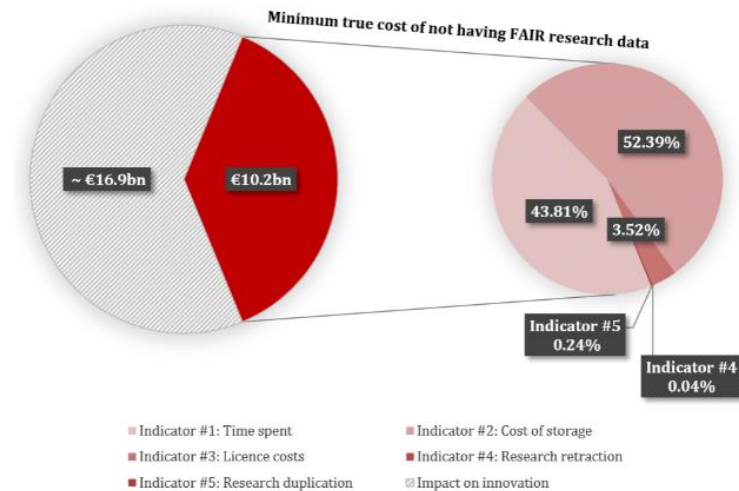

https://doi.org/10.5281/zenodo.6482340

Research Data Management - Why?

- Assure return of investment

- Efficient spending

- Increases publicly available knowledge

- Network

- Provides new unexplored benefits

Lack of RDM best practices has a price!

- RDM practices still too "patchy and not optimal"

- Huge cost for not having "open/FAIR" data

- Minimum cost ~ €10bn^{-y} (likely cost → almost three-fold)

- Into perspective (Horizon 2020 ~ €12bn^{-y})

Minimum true cost of not having FAIR research data

~ €16.9bn   €10.2bn

52.39%
43.81%   3.52%
Indicator #5
0.24%
Indicator #4
0.04%

- Indicator #1: Time spent
- Indicator #2: Cost of storage
- Indicator #3: Licence costs
- Indicator #4: Research retraction
- Indicator #5: Research duplication
- Impact on innovation

EU Cost-benefit analysis for FAIR research data - https://data.europa.eu/doi/10.2777/02999

Research Data Management - How?

Top Down Requirements

Bottom up needs!

Top Down

Stakeholder Requirements & High level policies

- DMP Funder requirements
(e.g. DFG, Horizon Europe)
- Open Science
- Good Scientific Practice
- Guidelines Handling Research Data
- Open Access
- FAIR Principles

EVOLVING TOWARDS AN ERA OF OPEN RESEARCH

Bottom up

Researcher and community needs!

- Save time in the long-term
- Find again your data
- Good practices & Data Culture
- Partnership & Collaboration
- Share, re-use and get credits
- Data/Method/Software Paper
- Grey Literature

pixabay.com

Digital & Linked Research Outputs

Research is digital

Several research outputs associated with the formal Journal publication are stored & shared online. (e.g. datasets, software/code/algorithms, protocols, preprints, posters, documentation, etc.)

Crossref Blog: "Linking publications to associated research outputs"

CC-BY 4.0 10.5281/zenodo.5706310

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Linked Research Outputs

Research Outputs

Peer review

Non-Peer review
Workflow
(Free)

Peer review publication

Algorithms

Software

Workflows

Peer review Data Paper

Research Outputs

Data*

* General, Institutional, Disciplinary Repositories

Peer review Software Paper

White papers

Posters

Documentation

Designs Artworks

Icons:
*pixbay.com
Freeicons.io*

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Research Outputs and Evaluation metrics

Scientific publication

Peer review Software/Method Paper

Peer review Data Paper
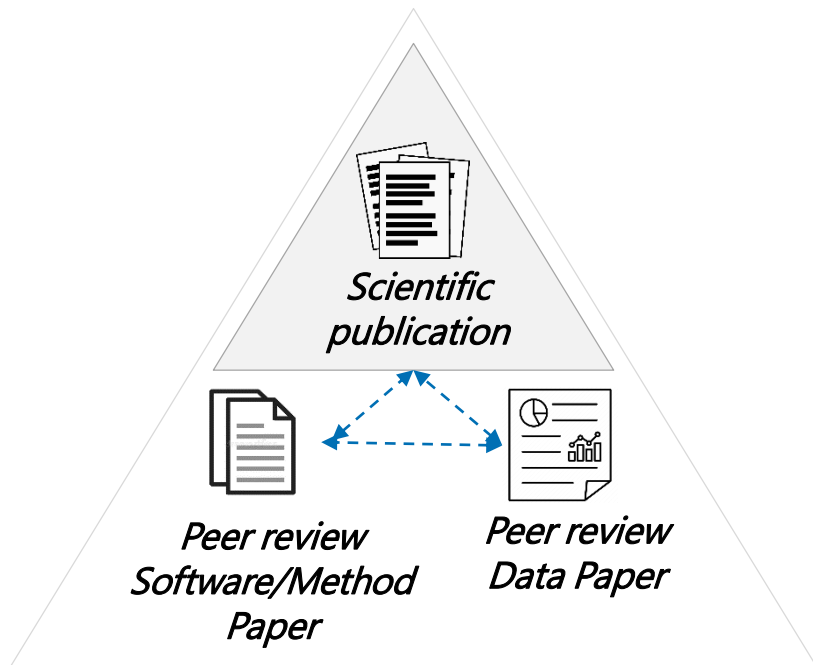
Traditional
ISI- indexed Research Outputs

Algorithms

Software

Workflows

White papers

Data

Posters

Documentation

Designs Artworks

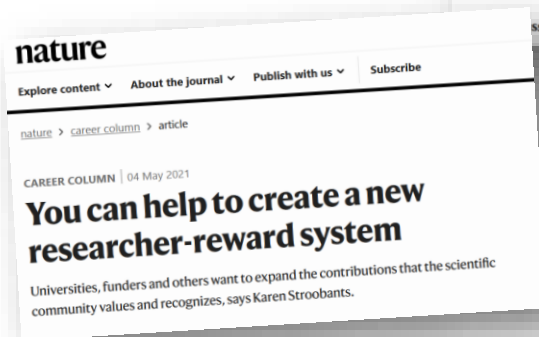Emerging
Non-ISI Open Research Outputs

Research evaluation

...in addition to research quality and impact factor...

"...so far career-advancement criteria **don't reward** open practices but it is changing..."

The Impact Factor Game
It is time to find a better way to assess the scientific literature

The PLoS Medicine Editors

Not-so-deep impact

Nature 435, 1003–1004 (2005)

...assessment rests too heavily on the inflated status of the impact factor.

You can help to create a new researcher-reward system

Universities, funders and others want to expand the contributions that the scientific community values and recognizes, says Karen Stroobants.
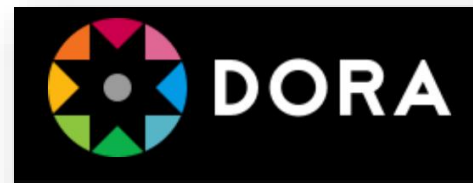
The Declaration on Research Assessment (DORA)

Scientific Community Initiatives to Improve the ways in which researchers and the outputs of scholarly research are evaluated!

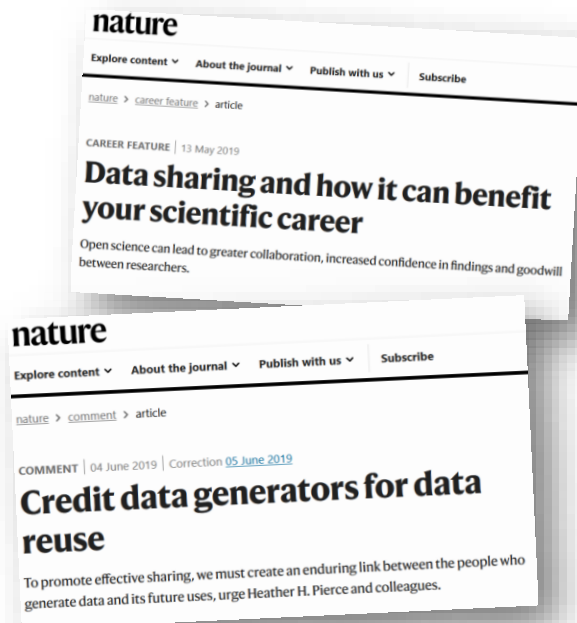"Research assessment criteria should reward **ethics**, **reputation**, **teamwork and diversity of outputs**"

Research evaluation needs to change with the times.
Nature 601, 166 (2022). https://doi.org/10.1038/d41586-022-00056-z
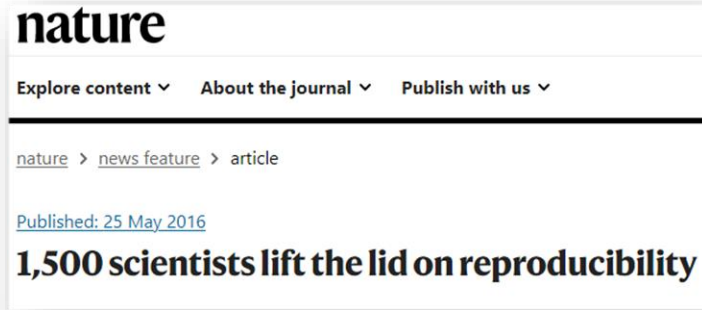

nature

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Research evaluation needs to change with the times

Growing momentum toward Open Science

Why RDM does it matter? **The reproducibility challenge**

nature

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Published: 25 May 2016

1,500 scientists lift the lid on reproducibility

*"More than 70% of researchers have tried and **failed to reproduce** another scientist's experiments, and more than 50% have failed to reproduce their own experiments"*

7%
Don't know

3%
No, there is no crisis

IS THERE A
**REPRODUCIBILITY
CRISIS?**

A *Nature* survey lifts the lid on
how researchers view the 'crisis'
rocking science and what they
think will help.

BY MONYA BAKER

52%
Yes, a significant crisis

38%
Yes, a slight crisis

1,576
RESEARCHERS SURVEYED
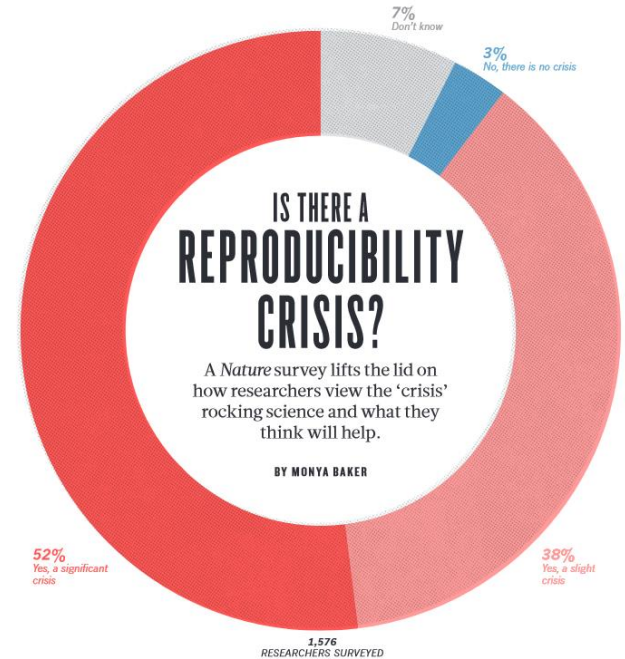
Baker, M. 1,500 scientists lift the lid on reproducibility. *Nature* **533,** 452–454 (2016).

Good RDM → Reproducibility is doable

Ensuring that your work is reproducible
is not as daunting or complicated

nature

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CAREER COLUMN | 21 October 2021

How to make your research reproducible

Ensuring that your work is reproducible is not as daunting or complicated as you might think. Experts share their tips.

Jeffrey M. Perkel

Research Data – A Valuable Asset!

Research Data = Research Asset
Beside scientist competences and skills, data is to be considered as a valuable research asset.

Open Research outputs = Scientific Reputation
Open and Linking all the Research Outputs is key to build up your Scientific Reputation

The Economist

Crunch time in France
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South Korea's unfinished revolution
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The world's most valuable resource

Data and the new rules of competition

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