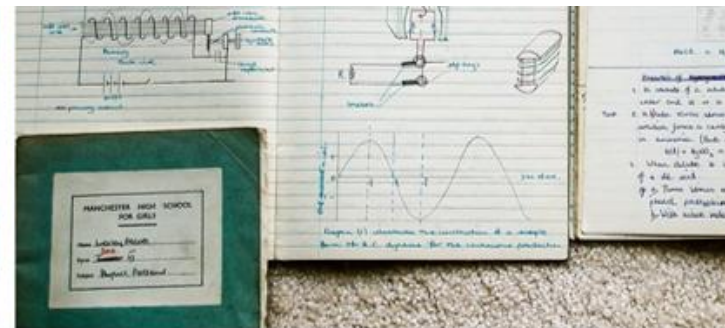




RESEARCH DATA MANAGEMENT AT FZ JÜLICH USING JÜLICH DATA

OPEN ACCESS WEEK 2021 | CENTRAL LIBRARY

RESEARCH DATA MANAGEMENT

What is research data?



samples



code

**everything, what is a result and/or
object of scientific research**



items from collections



measurement data



RESEARCH DATA MANAGEMENT

What is research data?

Research data can be classified according to:

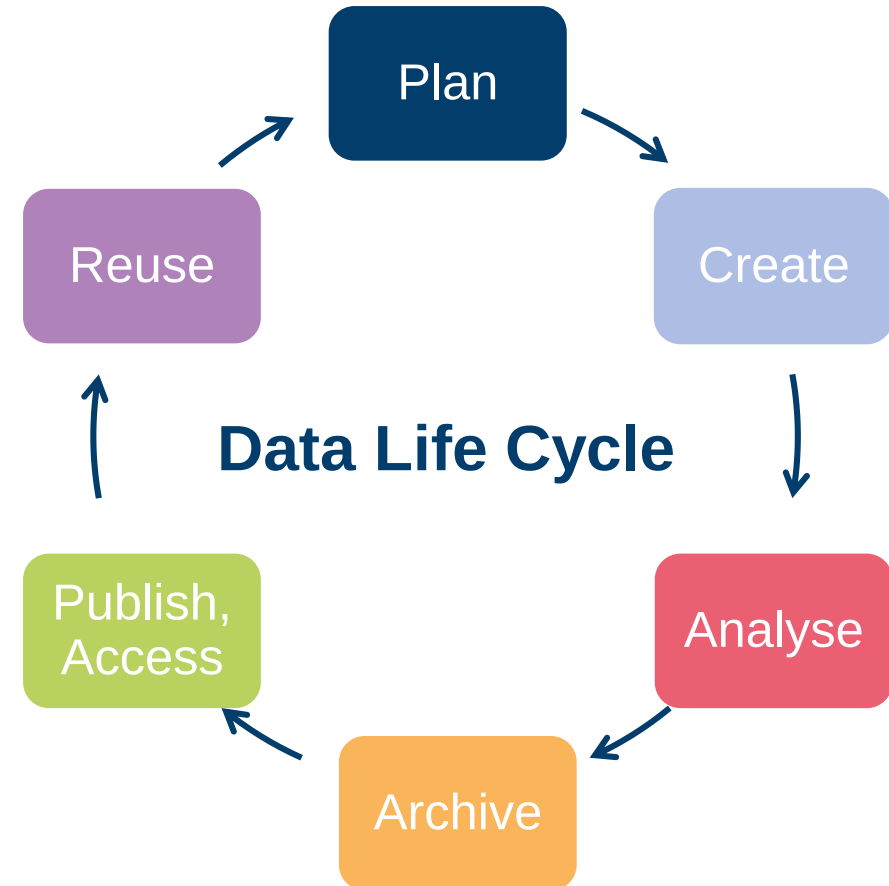
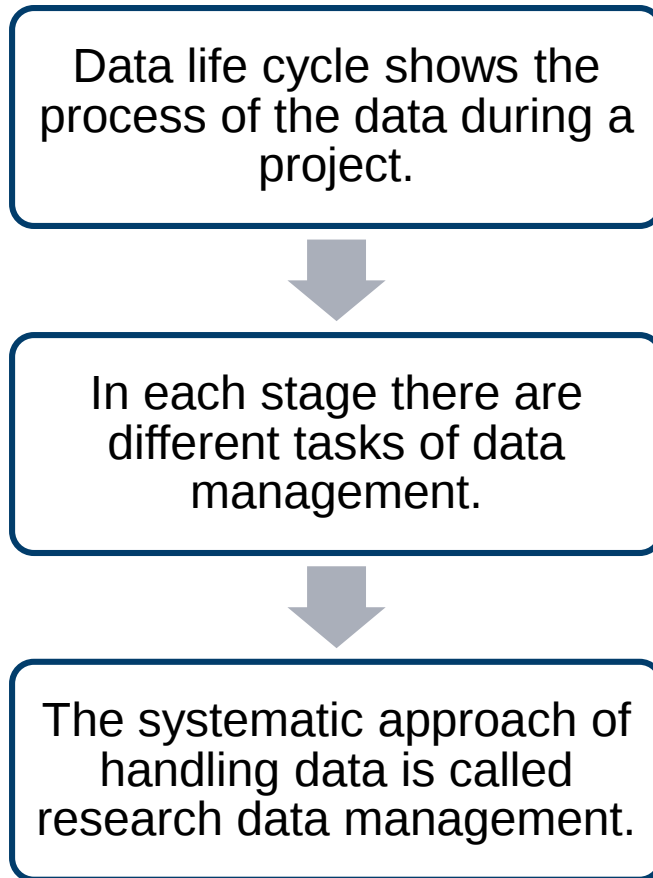


```
graph TD; A[Research data can be classified according to:] --> B[processing status]; A --> C[data generation]; A --> D[data type];
```

processing status	data generation	data type
primary data		spreadsheets
secondary data	simulations	images
	surveys	databases

RESEARCH DATA MANAGEMENT?

Data Life Cycle

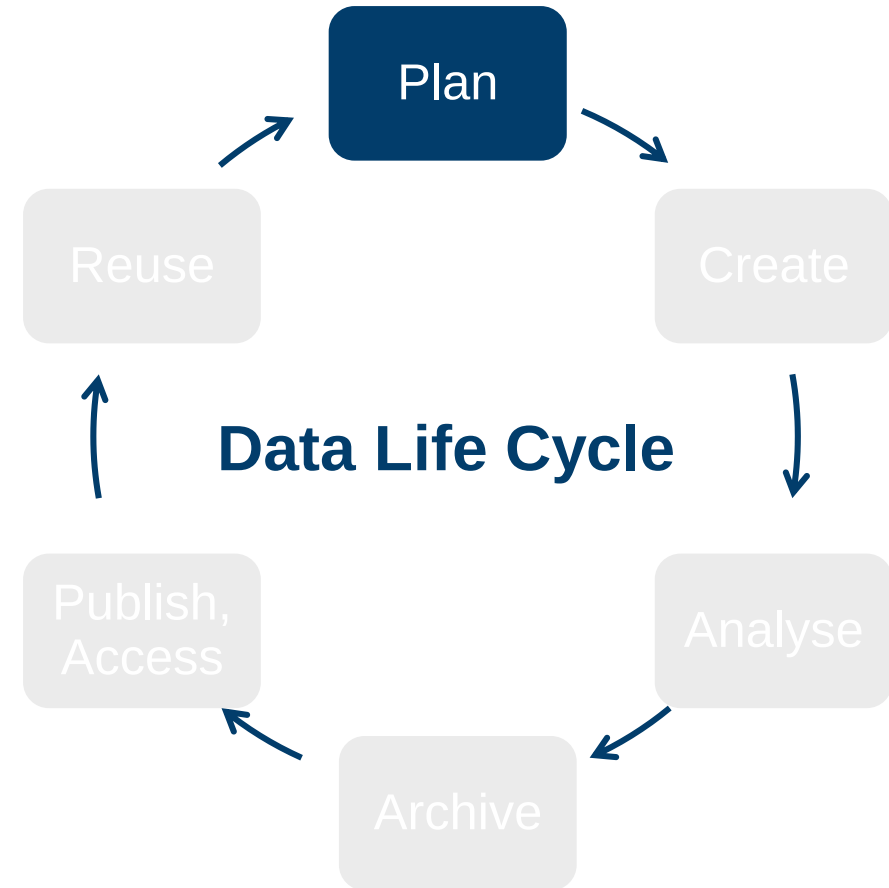


RESEARCH DATA MANAGEMENT

Data Life Cycle

Plan data management like:

- Clarify legal issues like privacy.
- Defines who is responsible for the different tasks.
- Document it in a data management plan.

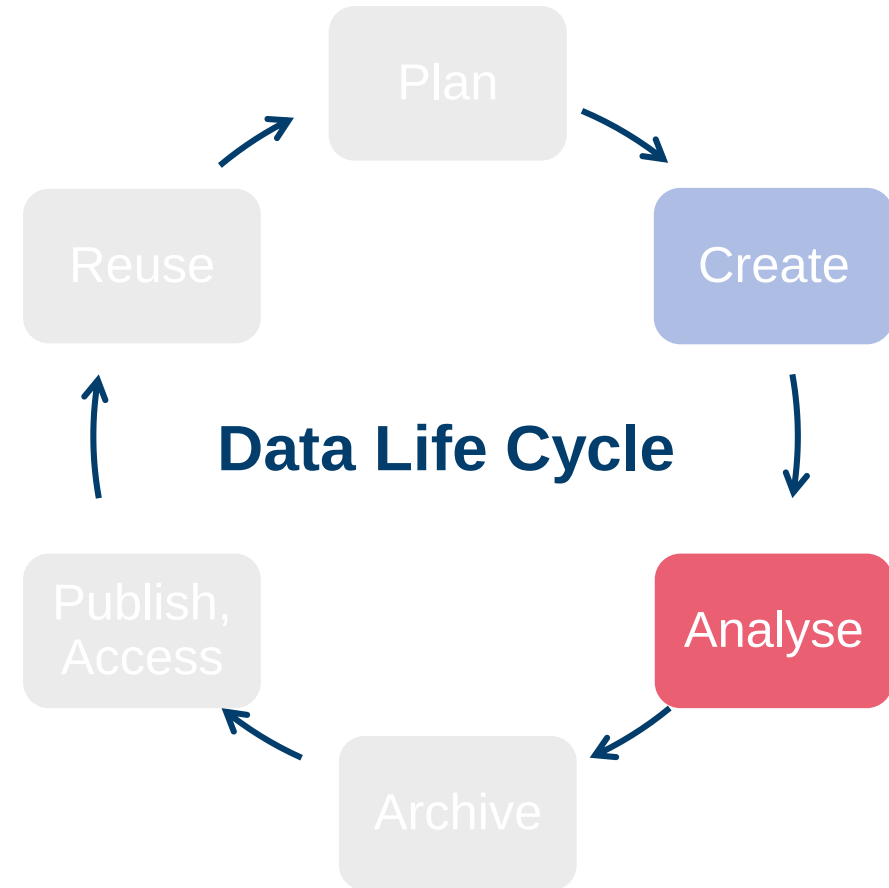


RESEARCH DATA MANAGEMENT

Data Life Cycle

Organise and describe data:

- Create file and folder structure.
- Collect metadata.
- Document data.
- Check, validate and clean up data.

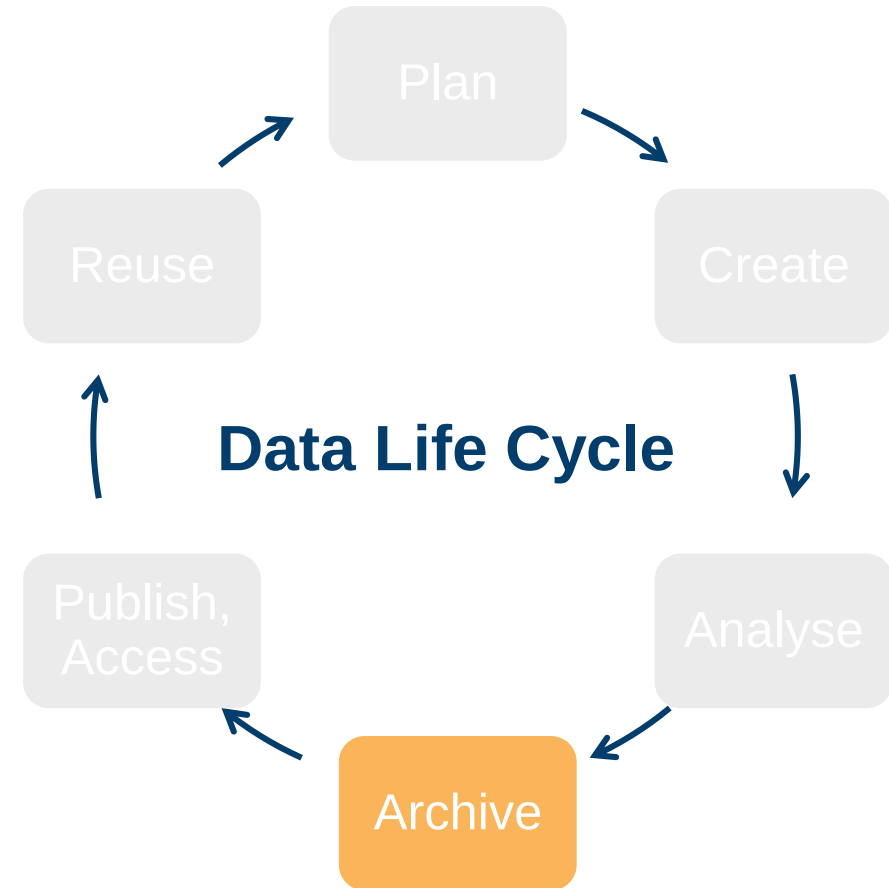


RESEARCH DATA MANAGEMENT

Data Life Cycle

Prepare data for archiving:

- Select data.
- Check data and related materials.
- Convert data in open file formats.

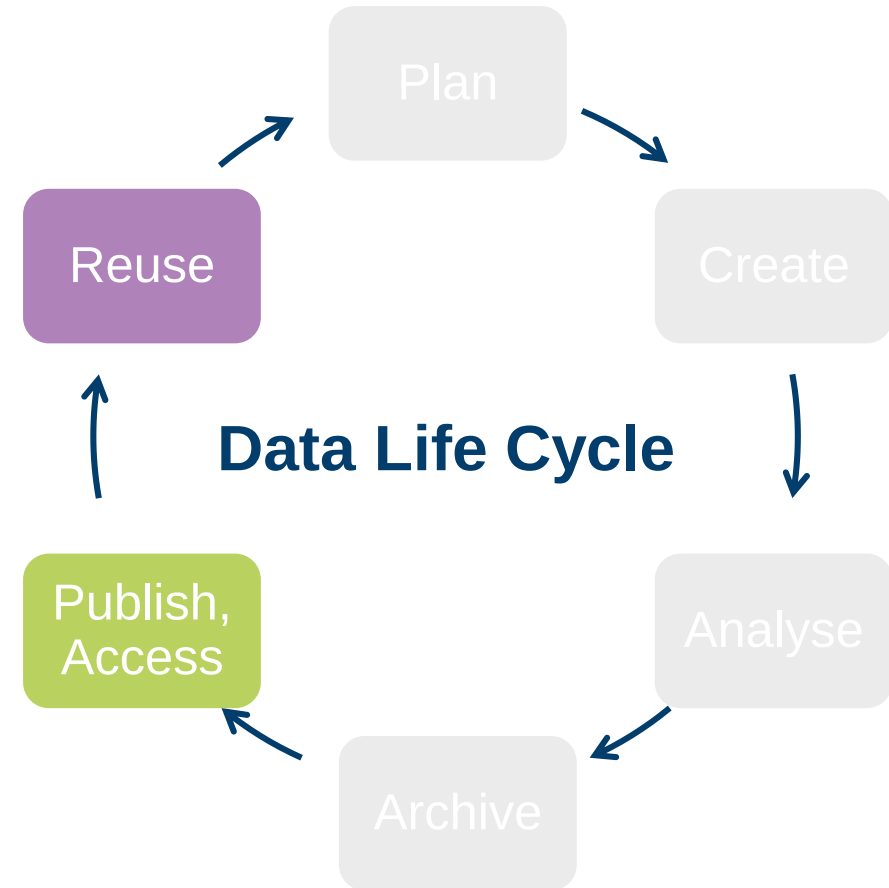


RESEARCH DATA MANAGEMENT

Data Life Cycle

Publish and reuse data:

- Configure access options:
 - publish data and metadata
 - publish only the metadata
- Grant license.
- Label dataset with a persistent identifier.



RESEARCH DATA MANAGEMENT

What are metadata?

keywords

creator

method

subject

date

**Metadata are
data about data.**

file format

version

description of the data format
like column captions

RESEARCH DATA MANAGEMENT

Metadata schema

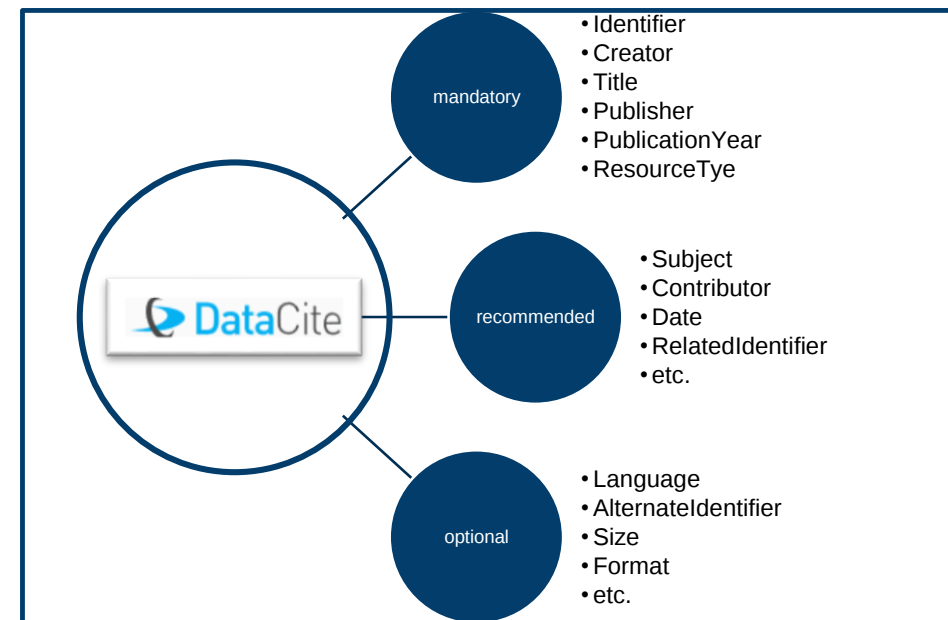
Metadata schema:

- structures metadata as elements in a schema
- describes content of the elements

ID	DataCite-Property	Occ	Definition	Allowed values, examples, other constraints
1	Identifier	1	The Identifier is a unique string that identifies a resource. For software, determine whether the identifier is for a specific version of a piece of software, (per the Force11 Software Citation Principles ¹¹), or for all versions.	DOI (Digital Object Identifier) registered by a DataCite member. Format should be "10.1234/foo"

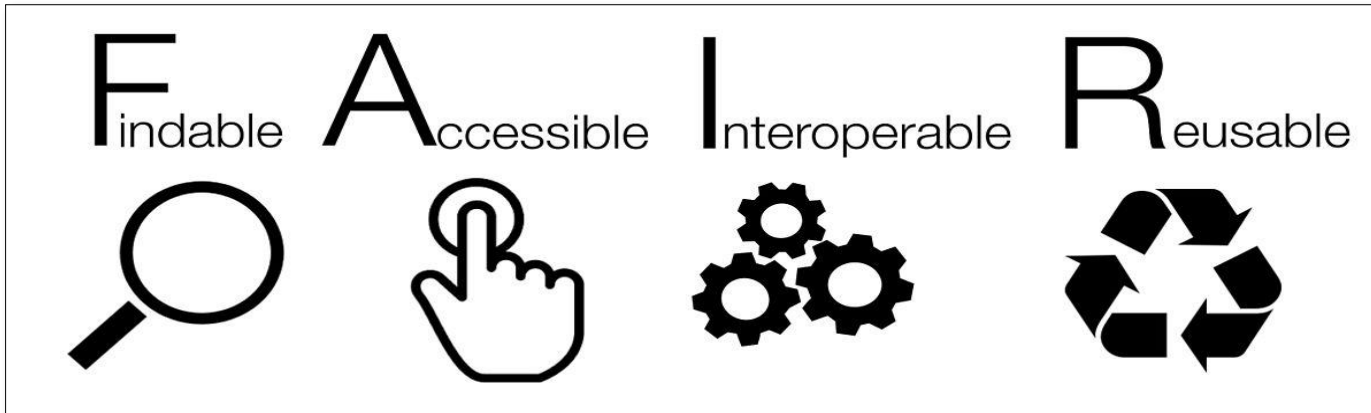
Note:
Occ = Occurrence
1 = required

DataCite:
generic schema for
research data



RESEARCH DATA MANAGEMENT

FAIR Principles



- published 2016 by Mark D. Wilkinson et al.
- **Aim:** Ensure that shared data is reusable for humans and machines

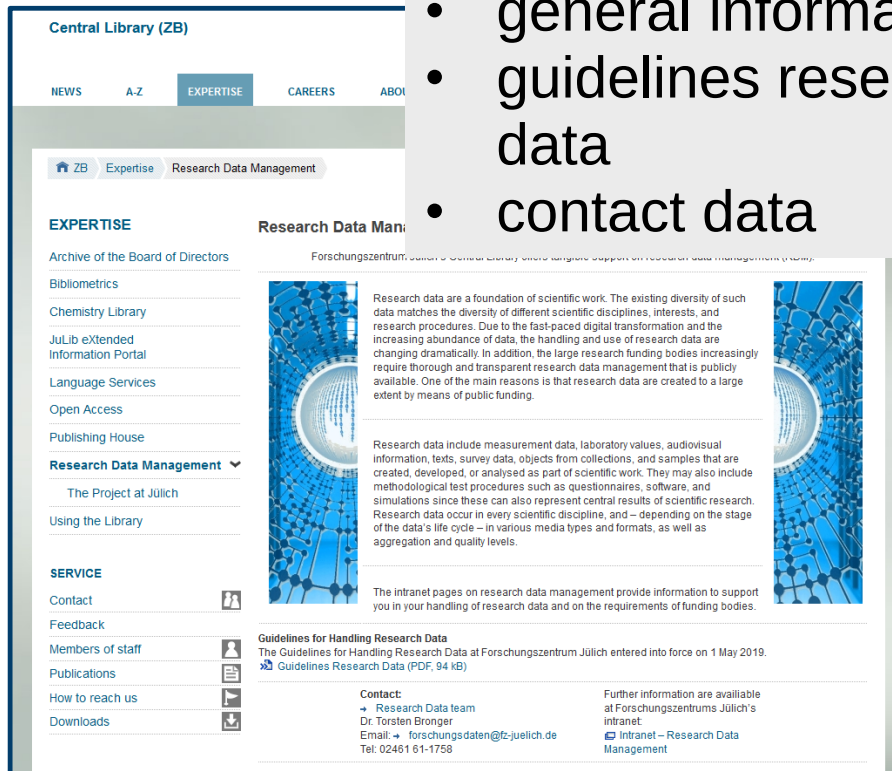
Findable	Accessible	Interoperable	Reusable
✓ Use persistent identifier (PID) like a DOI.	✓ Make metadata retrievable.	✓ Use standard metadata schemes. ✓ Use common (open) file formats like CSV.	✓ Choose license. ✓ Document data.

SERVICES TEAM RDM

Information service

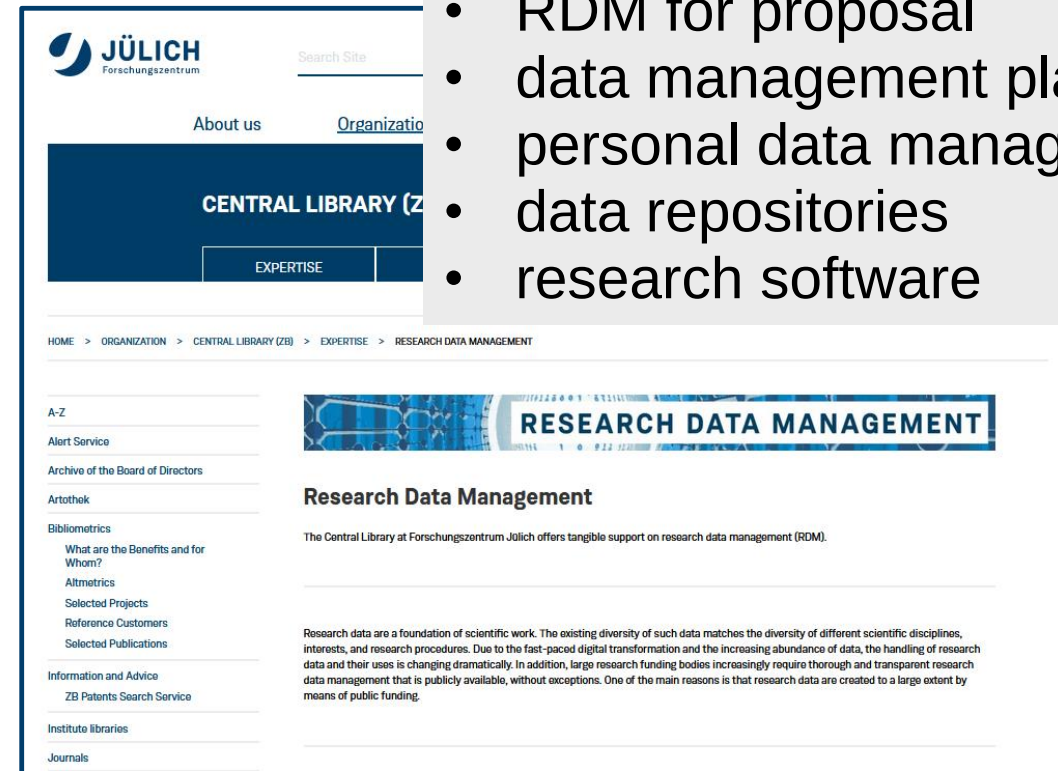
Internet:

- general information
- guidelines research data
- contact data



Intranet:

- RDM for proposal
- data management plans
- personal data management
- data repositories
- research software



SERVICES TEAM RDM

Consulting service

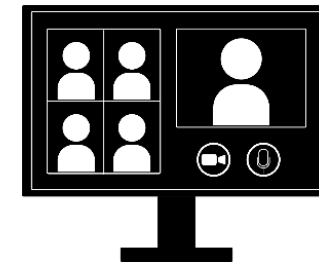
Advice on all relevant RDM aspects, like:

- Requirements of research funding agencies
- How to create a data management plan?
- Tips for Best-Practices and tools
- How to publish data and software?



You can contact us:

- via mail or telephone
- arrange an appointment

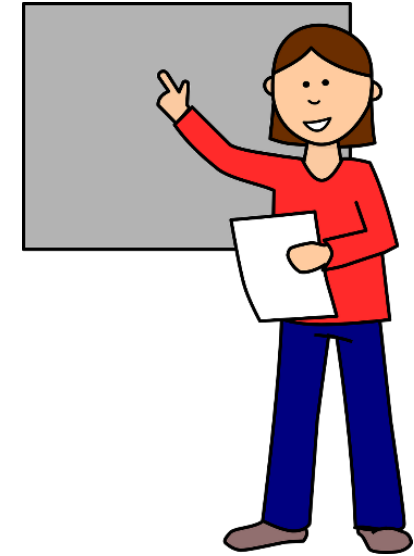


SERVICES TEAM RDM

Training service

Trainings:

- Research Data Management – An Overview
- Creation of Data Management Plans – An Introduction
- Online training course on [JuLearn](#)



New:

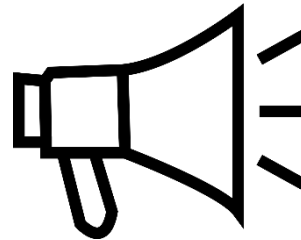
- Introduction in Jülich DATA (from 2021)

Upon request:
individual trainings for institutes, research groups, etc.

SERVICES TEAM RDM

IT service

- [DMP-Tool](#) for creating data management plans
- Central institutional repository [Jülich DATA](#)
- Implementation of tools and workflows for RDM upon request



DATA PUBLICATION

Motivation

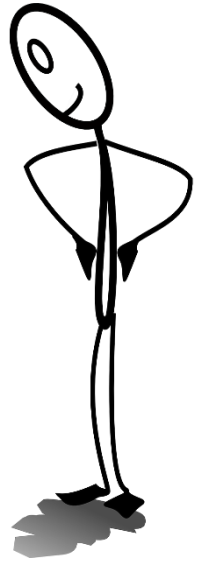
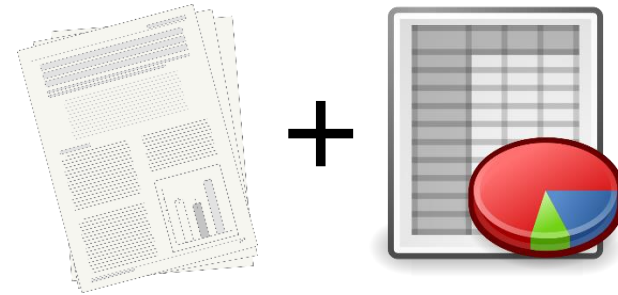
Start research project:



Search for information
about your research topic



What about finding the
data to the paper?



DATA PUBLICATION

Motivation

Data publications have many benefits.

increases visibility

allows verification

eases networking

for researchers



improves reproducibility
of the results

honors the effort of data
generation and analysis

DATA PUBLICATION

Motivation

Data publications have many benefits.

enables reanalysis of the same data with a different research question

for science



saves time and money because data can be reused

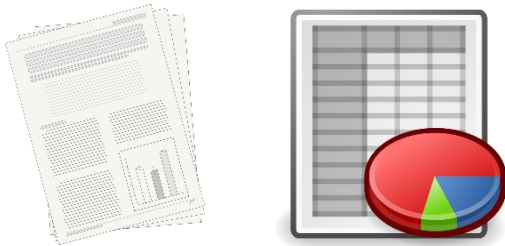
allows combination of data from different sources

science opens for society

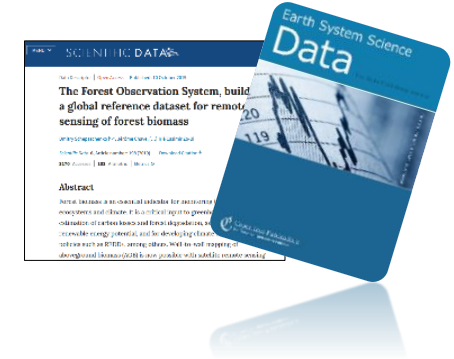
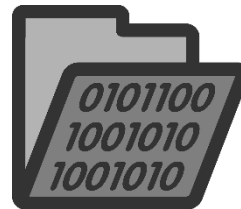
DATA PUBLICATIONS

How to publish data?

As a supplement:
Data belongs to the paper.



In a data repository:
Data is published
separately from the paper.



In a data journal:
Data documentation is
published as an own paper.

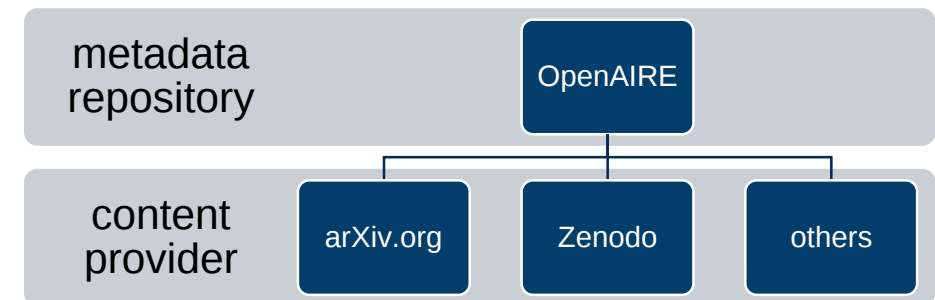
DATA PUBLICATIONS

Data repository

Database in which data can be:

- archived and published together with related materials like
 - metadata
 - documentation
- Note: There are also metadata repositories.
- Example: [OpenAIRE](#)

For example:



DATA PUBLICATIONS

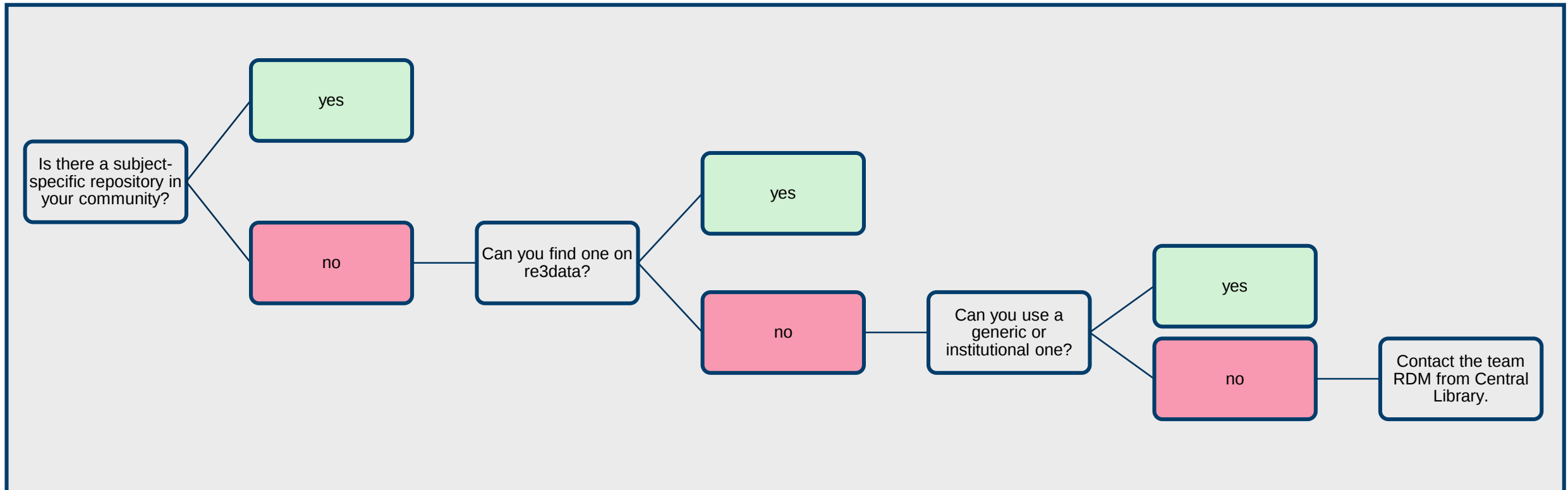
re3data

- global registry of research data repositories
- funded by German Research Foundation (DFG)
- re3data checks new repository before registration
- features like
 - numerous filter functions
 - browse by subject, content type, country



DATA PUBLICATION

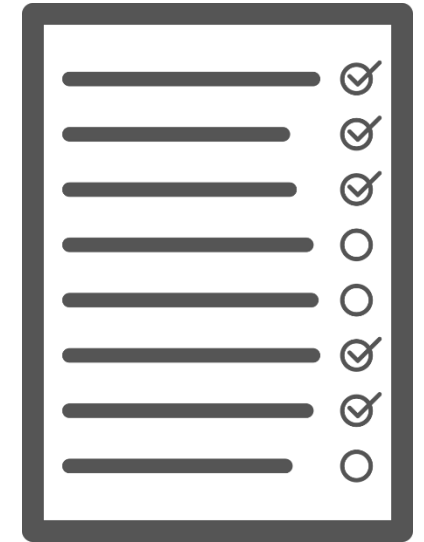
How to find a suitable repository?



DATA PUBLICATION

Check the repository

- Does the repository supports the **FAIR Principles**?
- Are there **curators** to check the data before publishing?
- Are there **requirements** regarding costs, format, metadata or license?
- Is there a **certification** like [CoreTrustSeal](#)?



DATA PUBLICATION

Guidance for publication

Step 1: Clarify legal aspects

- Are there specifications from the research funder?

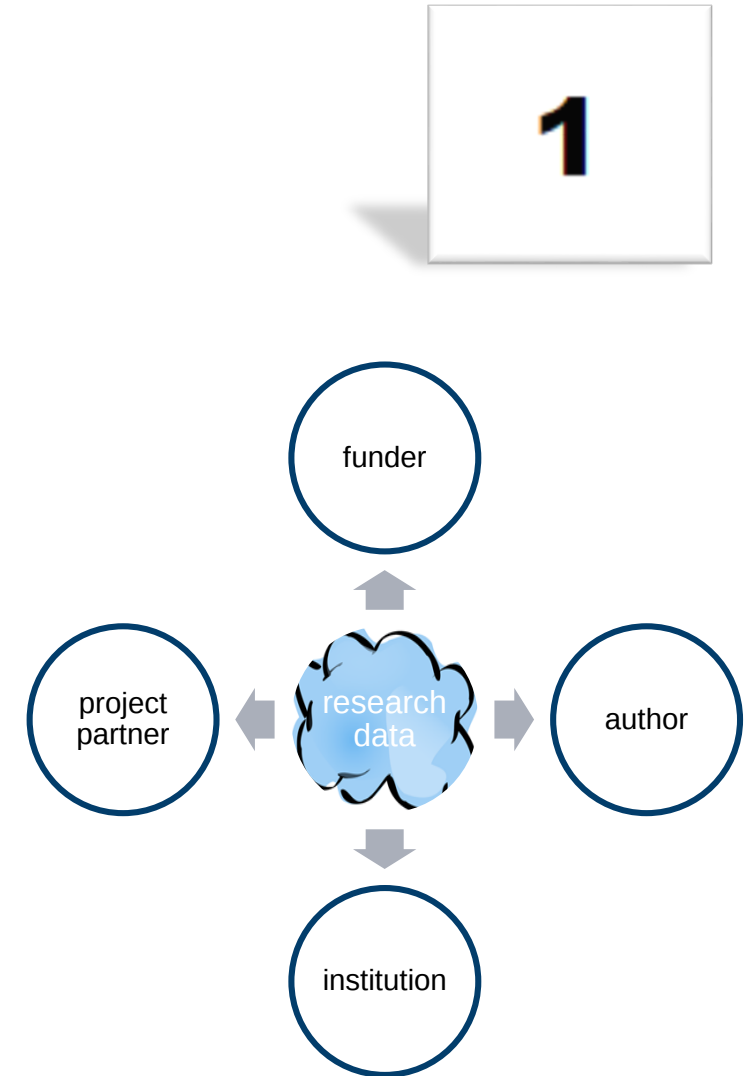
- Who is the data creator or collector?

Note:

authors of the dataset $\neq$ authors of the paper

- Who has the right of use like employer or project partner?

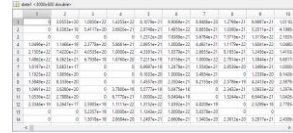
➤ **Request early for an agreement.**



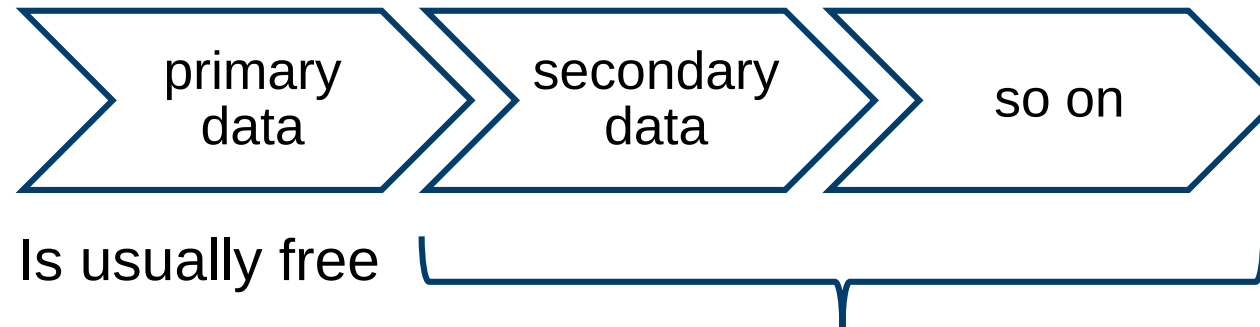
DATA PUBLICATION

Guidance for publication

By law in Germany:



	A	B	C	D	E	F	G	H	I
1	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
20	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
28	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
32	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
33	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
34	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
35	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
36	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
37	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
39	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
40	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
41	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
42	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
43	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
44	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
45	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
46	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
47	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
48	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
49	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
50	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000



When does copyright apply?

Is this free, too?

- To avoid legal uncertainties → Grant your dataset with a license.
- Recommended are Creative Commons (CC0 or CC-BY)

DATA PUBLICATION

Guidance for publication

2

Step 2: Prepare data

- Data should be as raw as necessary to recreate analysis.
- Convert data in open file formats.
- If you use data from external resources:
 - Describe:
 - From where?
 - Who is the author?
 - Under which license?
 - Was the data preprocessed in your project?



DATA PUBLICATION

Guidance for publication

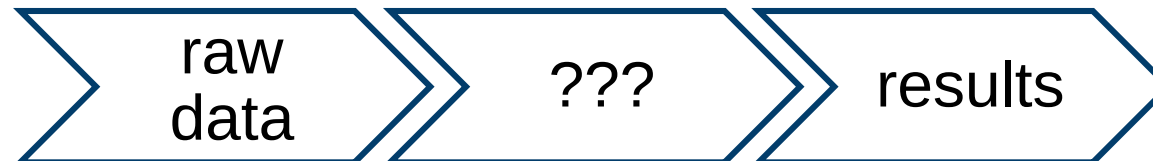
2

Provide information for reproduction:

- description of the data like



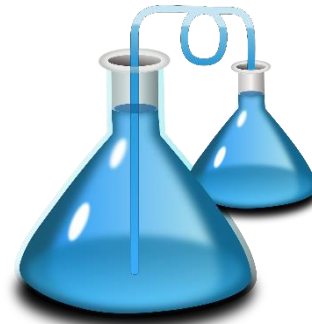
1. data type and format
2. purpose of data generating/collecting
3. file naming and folder structure



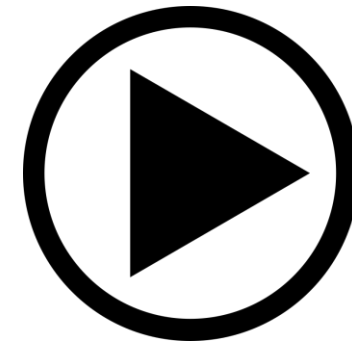
DATA PUBLICATION

Guidance for publication

- methods of
 - data generating/collecting
 - data analysing
- for simulation data
 - code and version
- self-developed code for data analysing
 - publish code and refer to it



2



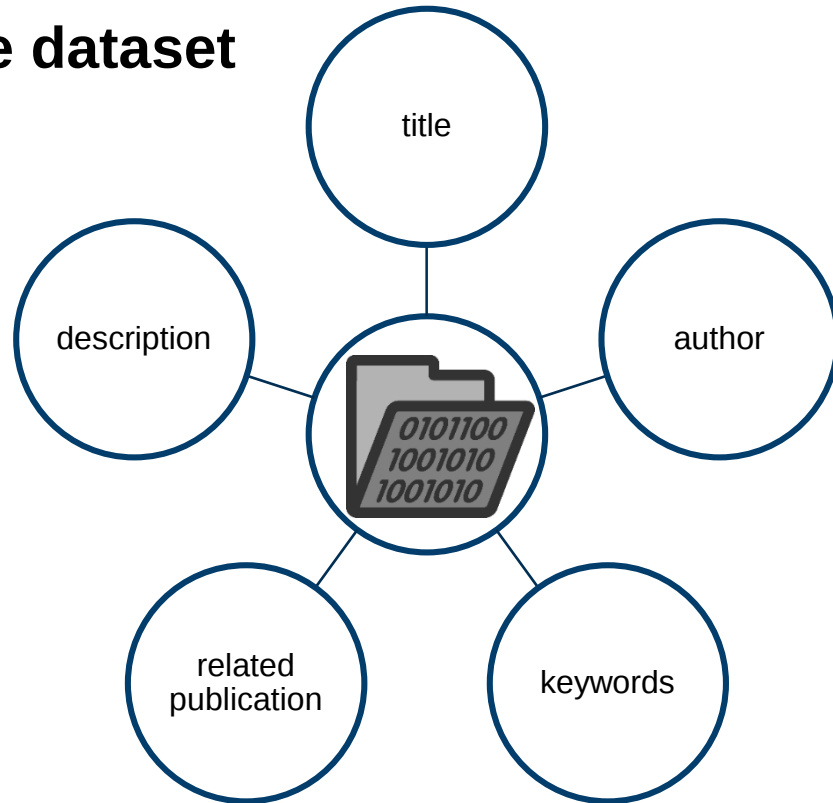
```
4  #include "utilities.h"
5
6  Game game;
7
8  int main(int argc, char **argv) {
9
10     game = Game();
11
12     game.initialize();
13 }
```

DATA PUBLICATION

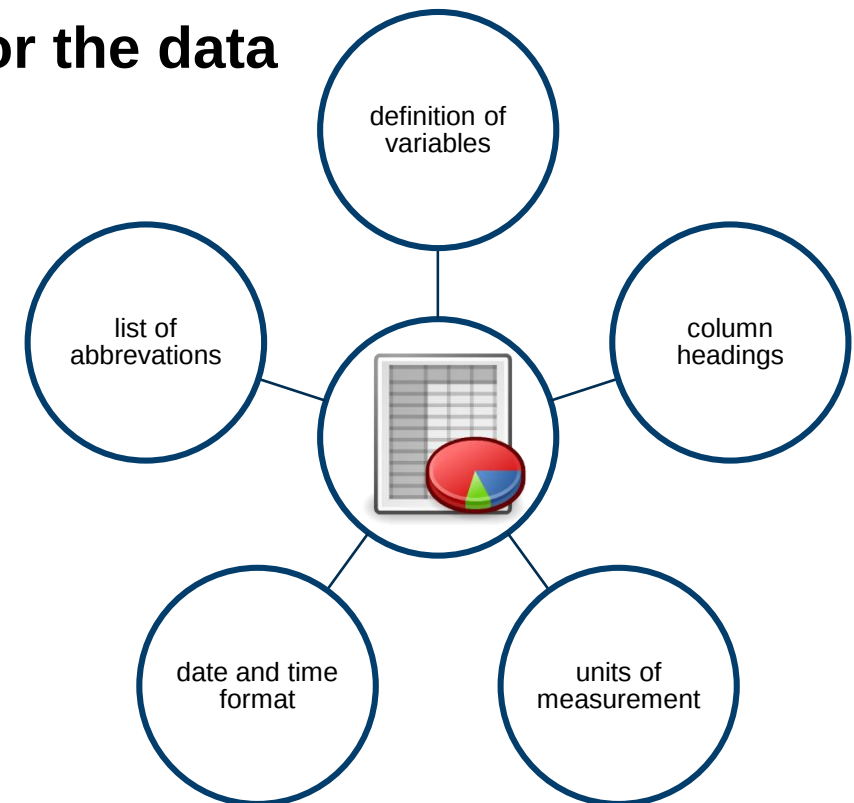
Guidance for publication

Step 3: Prepare metadata

For the dataset



For the data



3

DATA PUBLICATION

Guidance for publication

- Choose subject-specific metadata standard.
 - If none is available, at least choose a generic one.

DataCite: 
generic schema for
research data

- Make metadata machine-readable by using formats like

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<resource xmlns:schemaLocation="http://datacite.org/schema/kernel-4 http://schema.datacite.org/meta/kernel-4/metadata.xsd"
  <identifier identifierType="DOI">10.26165/JÜLICH-DATA/WLC/FX</identifier>
  <creators>
    <creator>
      <creatorName>Barber, Irene</creatorName>
      <nameIdentifier schemaURI="https://orcid.org/" nameIdentifierScheme="ORCID">0000-0003-2011-7444</nameIdentifier>
      <affiliation>Forschungszentrum Jülich, Zentralbibliothek</affiliation>
    </creator>
    <creator>
      <creatorName>Rosenberger, Sonja</creatorName>
      <nameIdentifier schemaURI="https://orcid.org/" nameIdentifierScheme="ORCID">0000-0002-7519-1476</nameIdentifier>
      <affiliation>Forschungszentrum Jülich, Zentralbibliothek</affiliation>
    </creator>
    <creator>
      <creatorName>Mittermeier, Bernhard</creatorName>
      <nameIdentifier schemaURI="https://orcid.org/" nameIdentifierScheme="ORCID">0000-0002-3412-6168</nameIdentifier>
      <affiliation>Forschungszentrum Jülich, Zentralbibliothek</affiliation>
    </creator>
  </creators>
  <titles>
```

or

JSON

```
{
  "id": "10.26165/JÜLICH-DATA/WLC/FX",
  "persistentId": "https://doi.org/10.26165/JÜLICH-DATA/WLC/FX",
  "protocol": "doi",
  "author": "Barber, Irene",
  "publisher": "Jülich Data",
  "publicationDate": "2020-06-05",
  "storageIdentifier": "10.26165/JÜLICH-DATA/WLC/FX",
  "datasetVersion": 1,
  "dataset": {
    "id": "10.26165/JÜLICH-DATA/WLC/FX",
    "datasetPersistentId": "https://doi.org/10.26165/JÜLICH-DATA/WLC/FX",
    "storageIdentifier": "10.26165/JÜLICH-DATA/WLC/FX",
    "versionNumber": 1,
    "versionIdentifier": "10.26165/JÜLICH-DATA/WLC/FX",
    "lastUpdate": "2020-06-05T11:43:22Z",
    "releaseTime": "2020-06-05T11:43:22Z",
    "createTime": "2020-06-05T11:43:22Z",
    "license": "CC-BY",
    "termsOfUse": "CC-BY",
    "fileAccessRequest": false,
    "metadataLocks": {
      "dataset": {
        "displayName": "Citation Metadata"
      }
    }
  }
}
```

DATA PUBLICATION

Guidance for publication

Step 4: Deposit data in repository

Advantages:



provide PID (persistent identifier) for dataset like DOI

- This helps to make the data findable, even if the location of the data changes.

By creating dataset metadata must be given

- exportable in machine readable formats like json or xml



The screenshot shows a 'Citation Metadata' form with the following sections:

- Title ***: A text input field with a placeholder 'Enter title...' and a button 'Add "Depositor Data" to Title'.
- Author ***: Fields for 'Name' (Schmidt, Lisa), 'Affiliation' (Forschungszentrum Jülich), 'Identifier Scheme' (DataCite), and 'Identifier'.
- Contact ***: Fields for 'Name' (Schmidt, Lisa), 'Affiliation' (Forschungszentrum Jülich), 'Email' (l.schmidt@fz-juelich.de), and a '+' button.
- Description ***: A text input field with a placeholder 'This field supports only certain HTML tags' and a '+' button.

DATA PUBLICATION

Guidance for publication

Allows versioning of the dataset

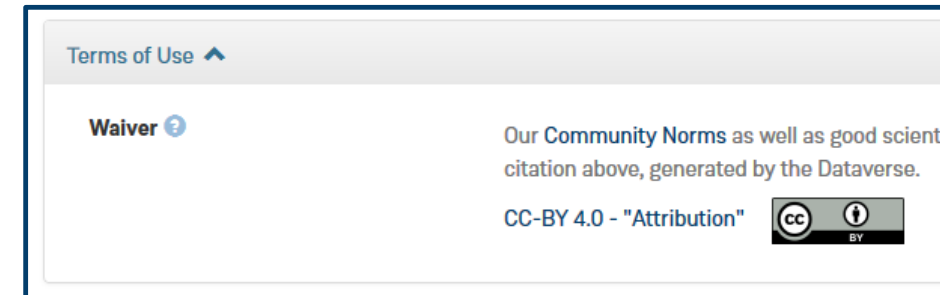
➤ for example by embargo

	Dataset	Summary
☐	4.1	Citation Metadata: Related Publication (1 Added); View Details
☐	4.0	Files (Added: 2); View Details
☐	3.0	Files (Added: 1); View Details
☐	2.0	Files (Added: 1); View Details
☐	1.0	This is the first published version.

4

License can be granted to dataset

➤ independently of the license of the paper



Choose access option

➤ open or closed



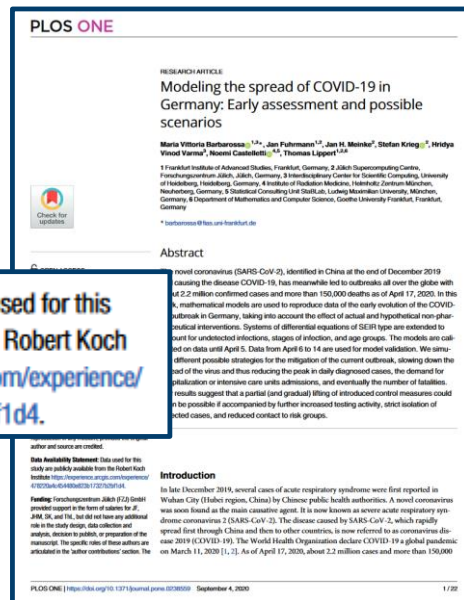
DATA PUBLICATION

Guidance for publication

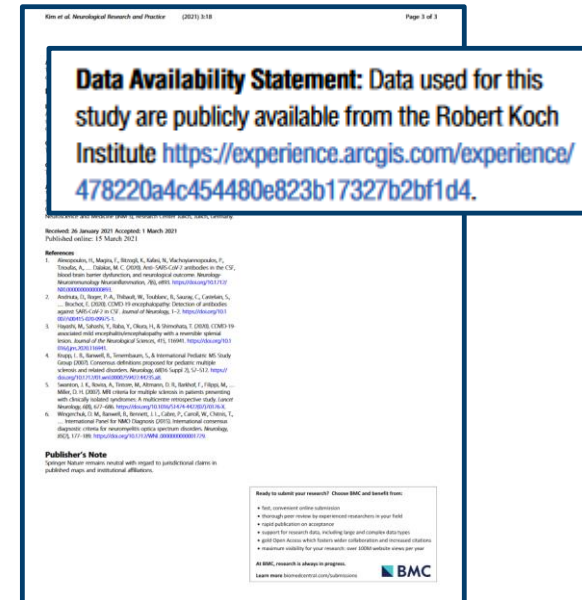
Step 5: Refer to data publication in paper

Data availability statement

title page



or end of paper



5

DATA PUBLICATION

Guidance for publication

5

Cite dataset in the methods section of your paper.

2. Methods

The initial versions of this dataset [14,21] only included data collected from the publicly available Twitter Stream API with a collection process that gathered any available tweets within the daily restrictions from Twitter from

Give full citation in references.

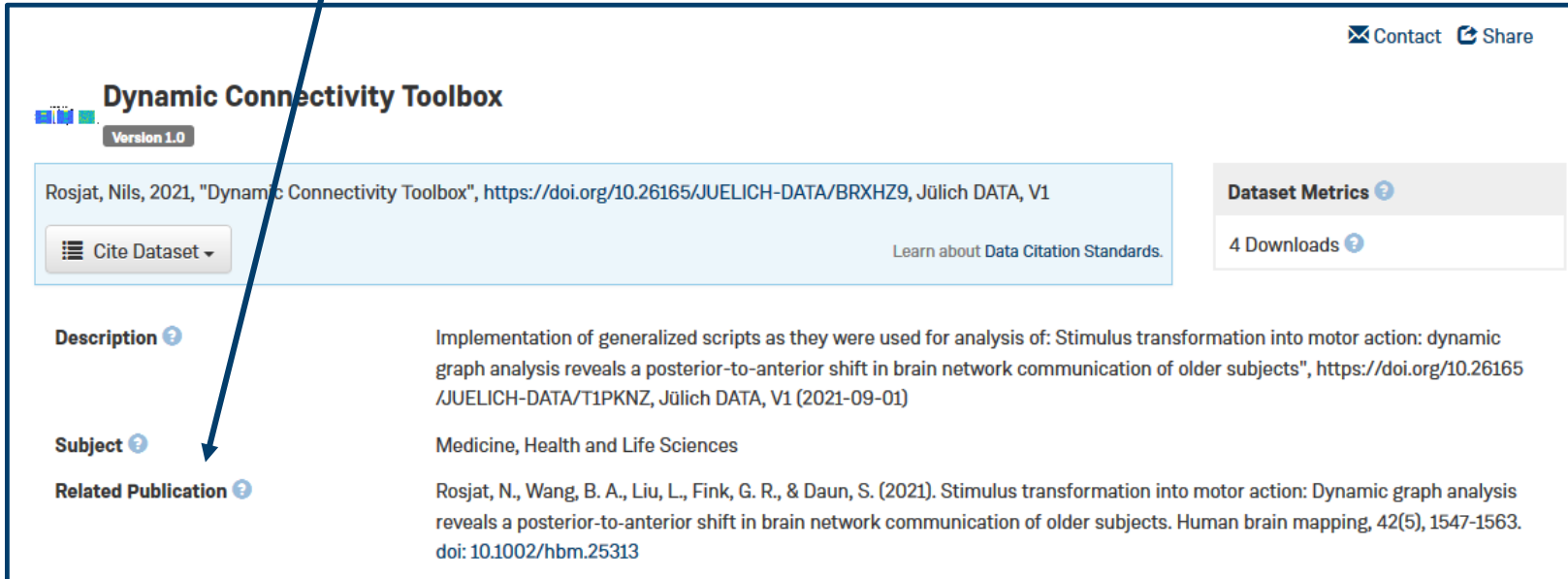
14. Banda JM, Tekumalla R. A Twitter Dataset of 40+ million tweets related to COVID-19. 2020.
doi:10.5281/zenodo.3723940

DATA PUBLICATION

Guidance for publication

Additionally refer to the paper in your data publication.

5



Dynamic Connectivity Toolbox
Version 1.0

Rosjat, Nils, 2021, "Dynamic Connectivity Toolbox", <https://doi.org/10.26165/JUELICH-DATA/BRXHZ9>, Jülich DATA, V1

[Cite Dataset](#) [Learn about Data Citation Standards.](#)

Dataset Metrics
4 Downloads

Description
Implementation of generalized scripts as they were used for analysis of: Stimulus transformation into motor action: dynamic graph analysis reveals a posterior-to-anterior shift in brain network communication of older subjects", <https://doi.org/10.26165/JUELICH-DATA/T1PKNZ>, Jülich DATA, V1 (2021-09-01)

Subject
Medicine, Health and Life Sciences

Related Publication
Rosjat, N., Wang, B. A., Liu, L., Fink, G. R., & Daun, S. (2021). Stimulus transformation into motor action: Dynamic graph analysis reveals a posterior-to-anterior shift in brain network communication of older subjects. Human brain mapping, 42(5), 1547-1563. doi: 10.1002/hbm.25313

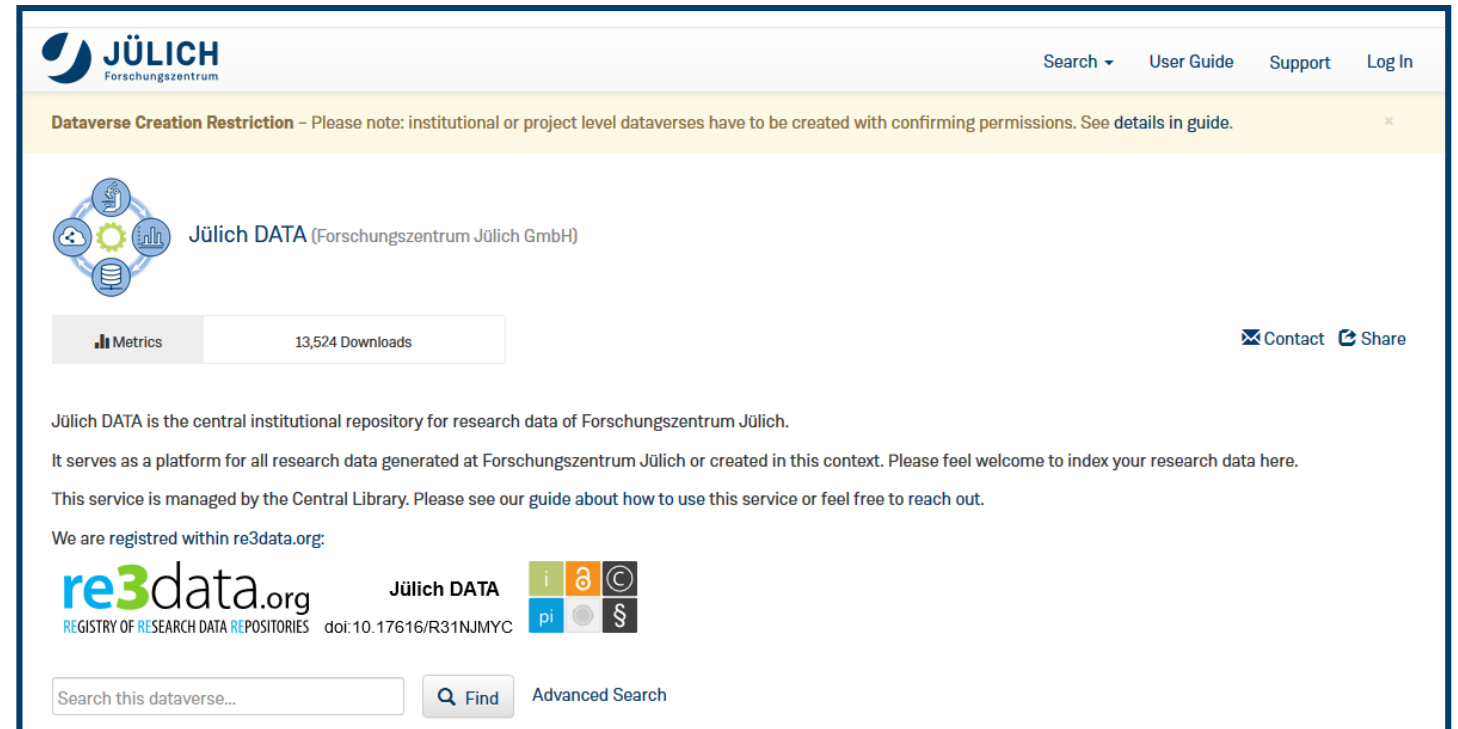
JÜLICH DATA

Purpose

**Jülich DATA is the
institutional
data repository
of the FZ Jülich**

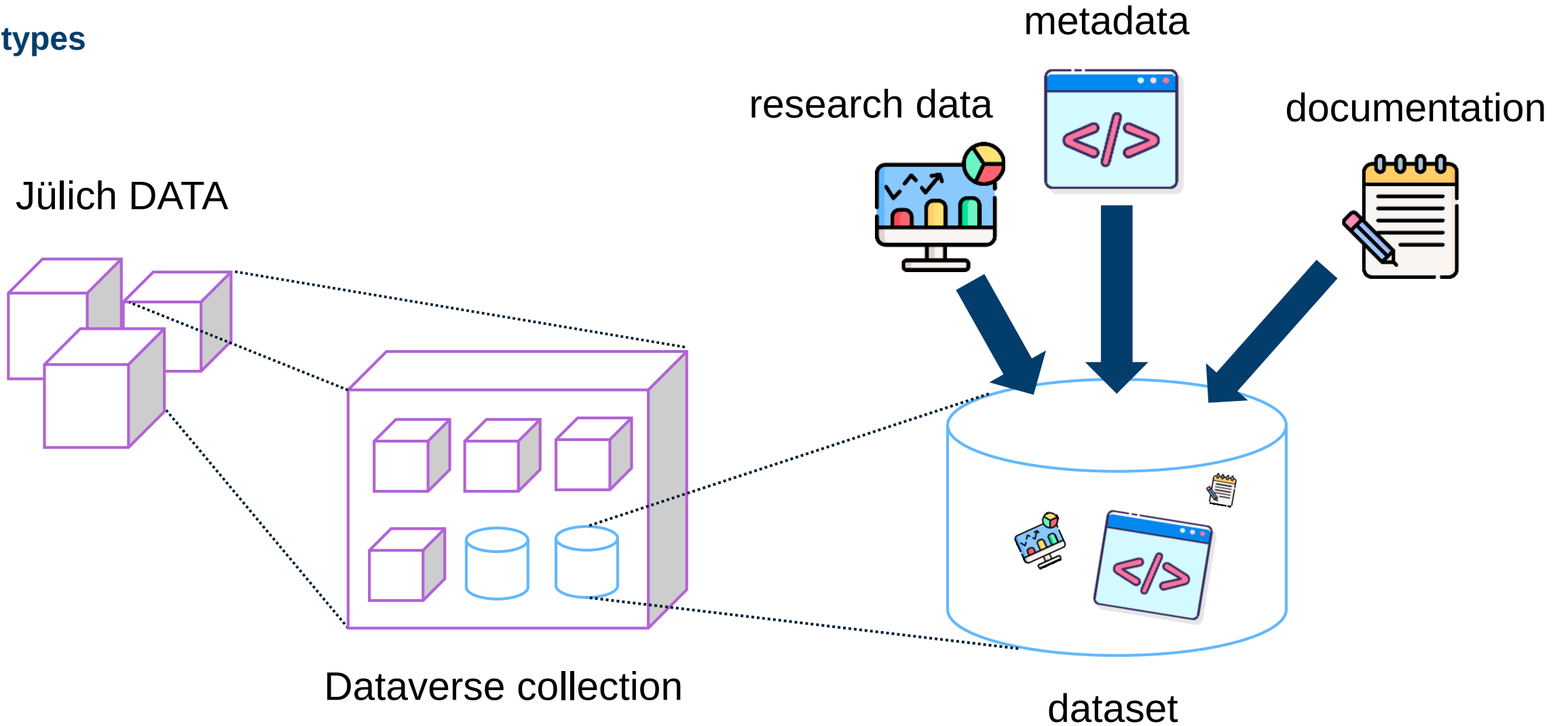


1. Index of the data output of the FZ Jülich (see [guidelines research data](#), 5.2)
2. Archiving and publishing of research data



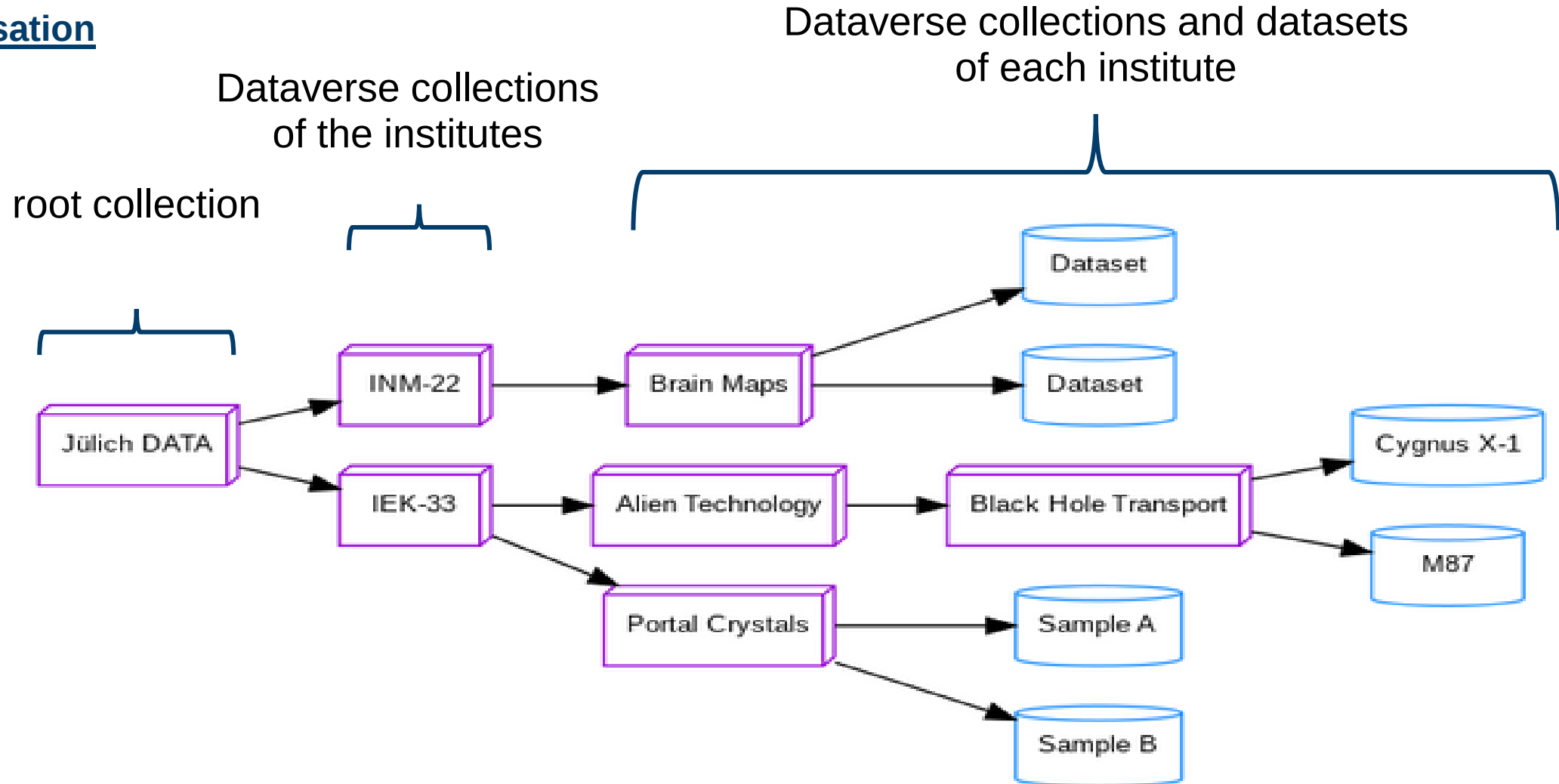
JÜLICH DATA

Data types



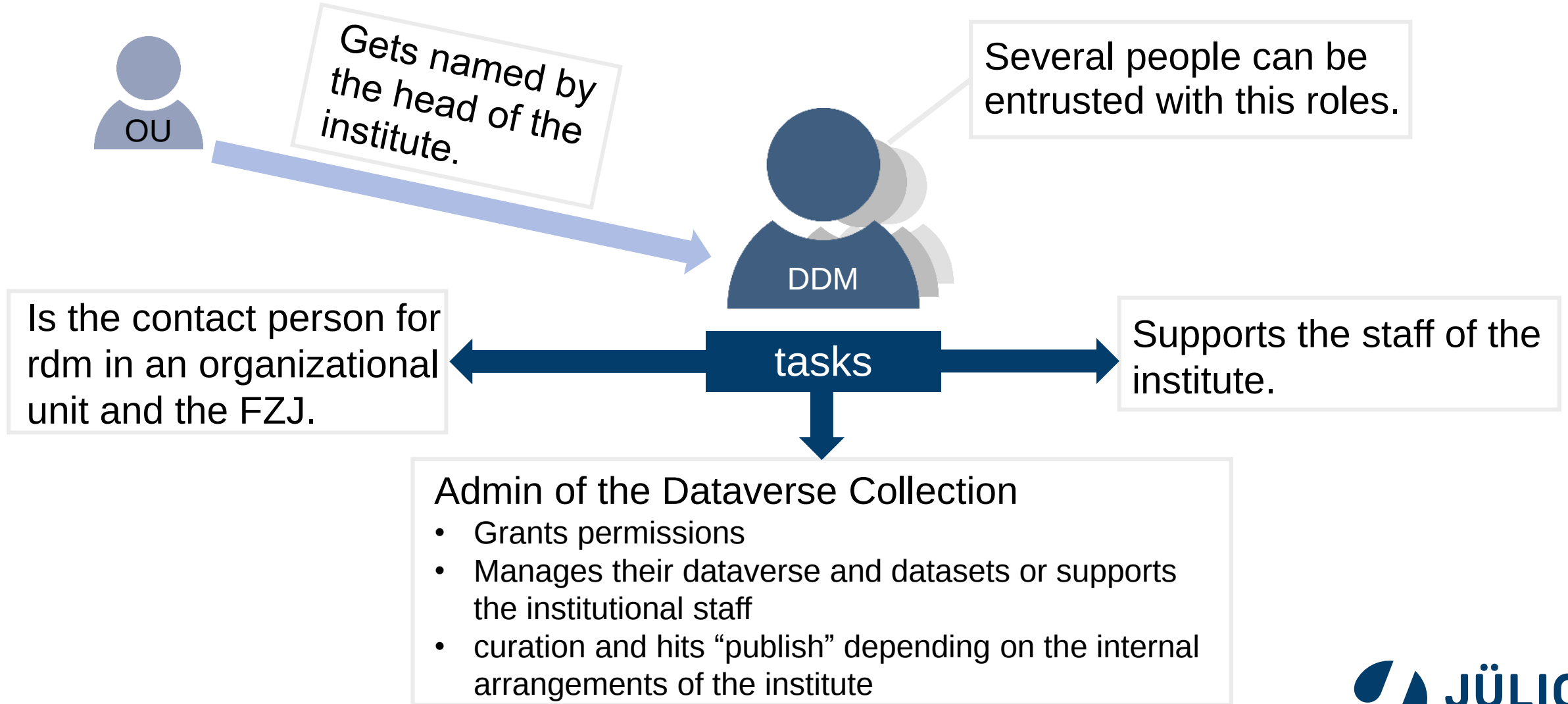
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Organisation

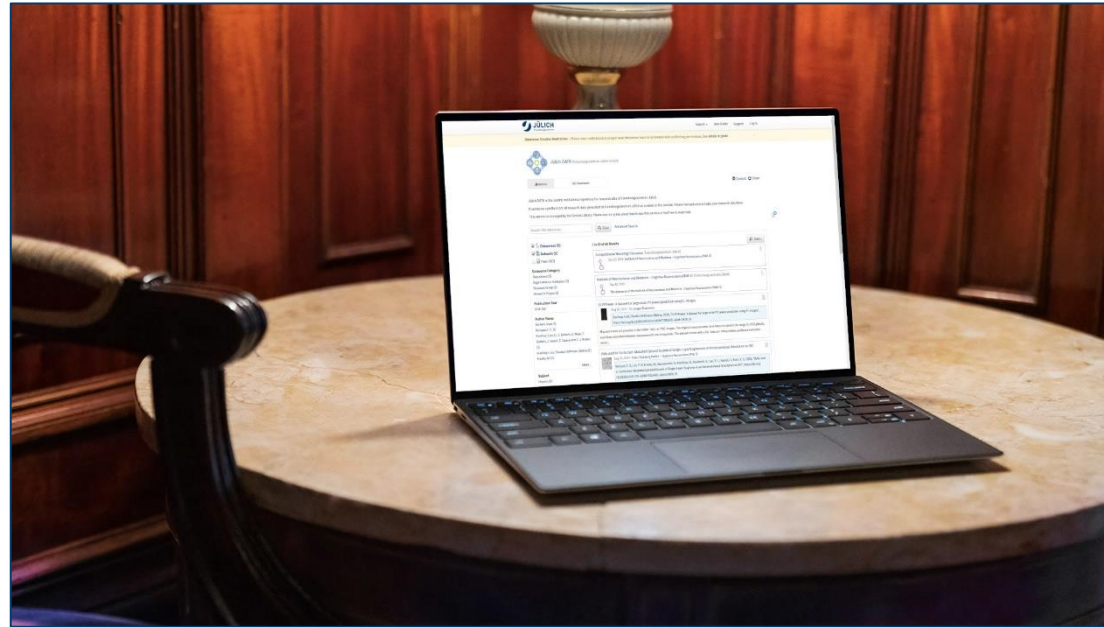


JÜLICH DATA

The role of the decentralised data manager (DDM)



live presentation



TEAM RDM OF THE CENTRAL LIBRARY

Contact



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Project head, strategy and development



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Software architecture and development



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Software architecture and development



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Website (intranet):

[Research Data Management](#)

RocketChat channels:

[#fdm](#) and [#fdm-announce](#)

THANK YOU!

forschungsdaten@fz-juelich.de



LITERATURE

- forschungsdaten.info (overview): <https://www.forschungsdaten.info/praxis-kompakt/english-pages/>
- Open Science in the Helmholtz Association: <https://os.helmholtz.de/en/open-science-in-the-helmholtz-association/>
- Handling of Research Data by DFG:
https://www.dfg.de/en/research_funding/principles_dfg_funding/research_data/index.html
- DataCite - Homepage: <https://datacite.org/>
- DataCite Best Practice Guide: <https://zenodo.org/record/3559800>
- DataCite Metadata Generator - Kernel 4.3: <https://dhvlab.gwi.uni-muenchen.de/datacite-generator/>
- GO FAIR Initiative: <https://www.go-fair.org/go-fair-initiative/>
- The FAIR Guiding Principles for scientific data management and stewardship by Mark D. Wilkinson et al. :
doi.org/10.1038/sdata.2016.18
- Quick Guide to Creative Commons: <https://smartcopying.edu.au/quick-guide-to-creative-commons/>
- Soranno, P. A. (2019). Six simple steps to share your data when publishing research articles. Limnology and Oceanography Bulletin, 28(2), 41-44. doi:10.1002/lob.10303

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