Berlin Mathematics Research Center
MATH+

Research Data Management

Introduction and three take home messages

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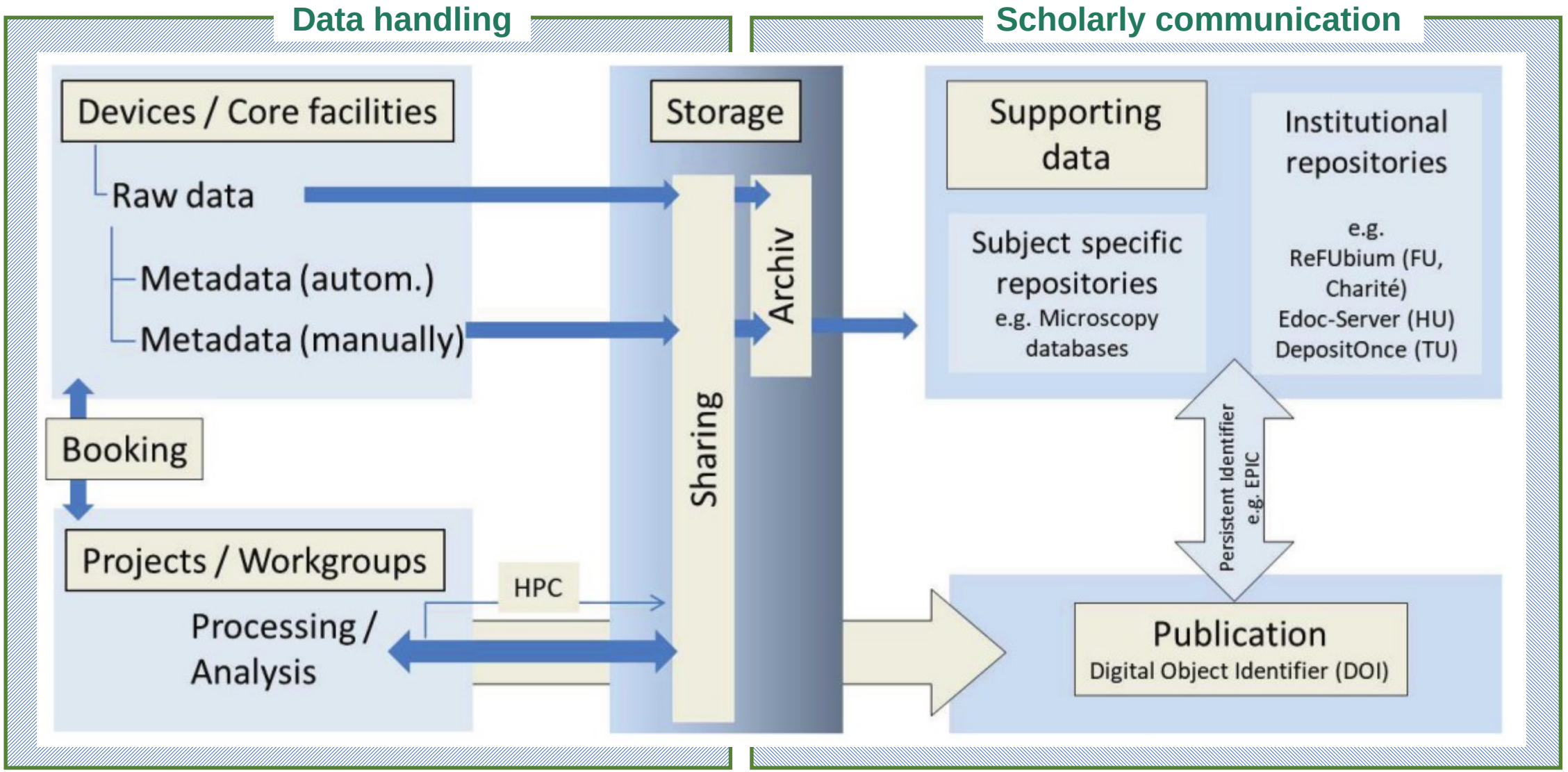
Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany´s Excellence Strategy – The Berlin Mathematics Research Center MATH+ (EXC-2046/1, project ID: 390685689).

The two aspects of RDM



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RDM is not a new invention - Hermann von Helmholtz:

"Jeder einzelne Forscher arbeitet an seinem Theile; [...] Jeder Einzelne muss aber wissen, dass er nur im Zusammenhange mit den Anderen das grosse Werk weiter zu fördern im Stande ist, und dass er deshalb verpflichtet ist, die Ergebnisse seiner Arbeit den Uebrigen möglichst vollständig und leicht zugänglich zu machen."

„Each individual researcher works on his own part; [...] However, each individual must know that he is only able to further the great work in cooperation with the others, and that he is therefore obliged to make the results of his work as complete and easily accessible as possible to the others.“

At the University Heidelberg **1862**

https://www.projekt-gutenberg.org/helmholt/natwiss/natwiss.html

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Takehome message 1:

Data has a lifecycle

Source: KU Leuven RDM portal, http://www.kuleuven.be/rdm

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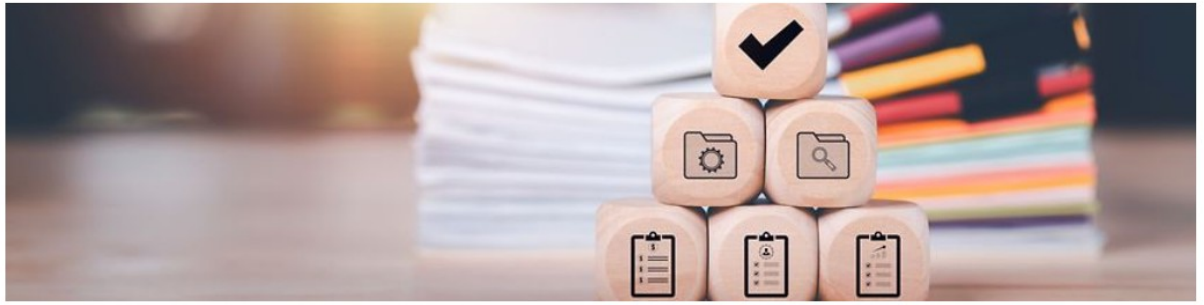

Handling of Research Data

One essential component of quality-oriented, compatible research is that the data a research project is based on or generates is handled in a way that is appropriate to the subject-specific discipline. For this reason, the handling of research data and the objects on which the data is based have to be carefully planned, documented and described. Wherever possible it is important to enable subsequent use of the research data and potentially also the objects by other users. Subject-specific recommendations regarding standards, methods and infrastructures should be taken into account.

News

DFG supports plans for legislation on research data. more →

Checklist for the appropriate handling of research data in connection with DFG projects

This questionnaire will help you plan and describe the handling of research data in connection with your project.

https://www.dfg.de/en/research-funding/funding-initiative/research-data

RDM in the DFG Kodex (aka Good Scientific Conduct)

RDM got a prominent place in the revised Code of Conduct:

Guideline 7: Cross-phase quality assurance
Guideline 10: Legal and ethical frameworks, usage rights
Guideline 11: Methods and standards
Guideline 12: Documentation
Guideline 13: Providing public access to research results
Guideline 14: Authorship
Guideline 15: Publication medium
Guideline 17: Archiving

Take home message 2: **RDM is important to your sponsor!**

Publication guidelines (paper & data)
Take Home Message 2a

Since your work in the MATH+ context is funded by the DFG (Deutsche Forschungsgemeinschaft) it is mandatory that you mark your output accordingly:

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For publications in German please use:
Gefördert durch die Deutsche Forschungsgemeinschaft (DFG) im Rahmen der Exzellenzstrategie des Bundes und der Länder – Das Forschungszentrum der Berliner Mathematik MATH+ (EXC-2046/1, Projektnummer: 390685689).

https://mathplus.de/research-2/research-services/open-access/

What is considered research data?

Citing the DFG:
„Research data includes measurement data, laboratory values, audiovisual information, **texts**, survey or observation data, **methodological test procedures** and **questionnaires**. Compilations and **simulations** can likewise constitute a key outcome of academic research and are therefore also included under the term research data.

Research data in some subject areas is based on the analysis of objects [...] so it must be handled just as carefully and consideration must be given to a technically adequate option for subsequent reuse whenever appropriate and possible. The same applies if **software** is required for the creation or processing of research data.“

https://www.dfg.de/en/research_funding/principles_dfg_funding/research_data/index.html

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What are mathematical research data?

Symbolic data: Formulae, Theorems, Proofs, Functions

Numeric data: (Integer) number sequences, Matrices, Tensors, Finite lattices

Geometric data: Curves, Surfaces, High-dimensional objects, Polytopes

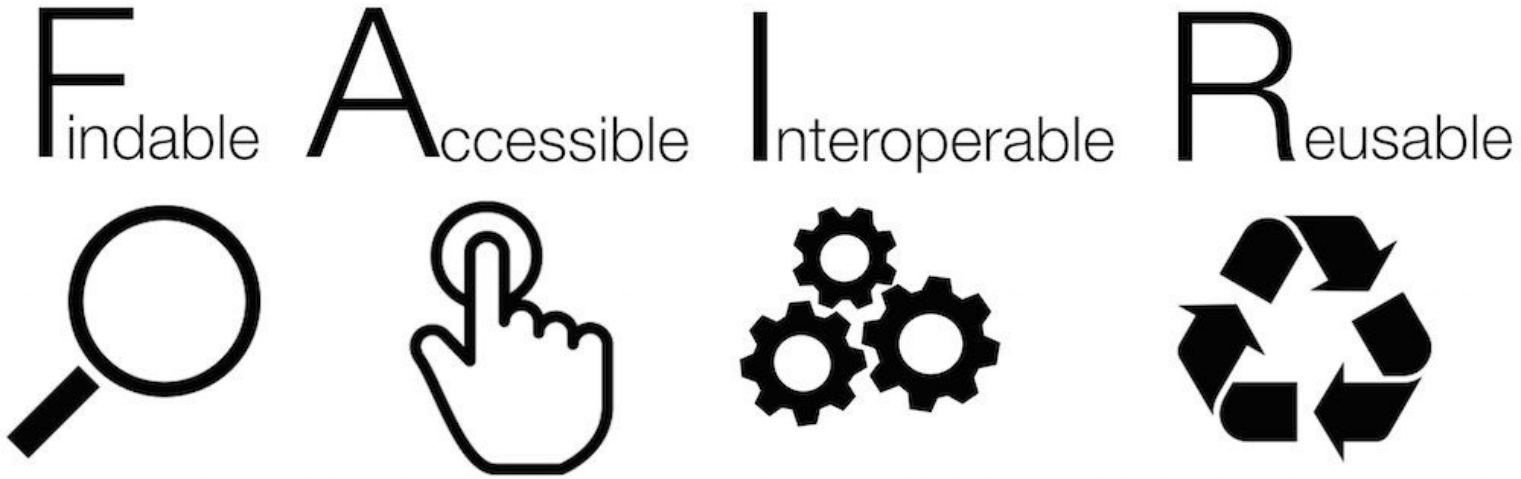
Models: Math models, BioModels

Observational data: Simulations, Experiments, Observations

Text data: arXiv.org, EuDML, Encyclopedia of Math

Cited from „Making Mathematical Research Data FAIR: A Technology Overview“
Tim Conrad, et al. (2023)

https://doi.org/10.48550/arXiv.2309.11829



FAIR Principles
©panosc

Take home message 3:

Data should implement the FAIR principles

The FAIR support tool: RDMO

The **R**esearch **D**ata **M**anagement **O**rganizer is a tool to conveniently manage your research data in a structured way. It does **not store the actual data**, but provides context for re-use.

Managing research data is usually an integral part of the research process, so you are already doing it.

https://rdmo.mathplus.de is aiming at a structured approach to achieve the most ***consistency*** possible with ***reasonable effort***. AND it is saving you time!

Remember: Each project is required to have a Data Management Plan.

RDMO in the scientific community

Developed in DFG Project from 2015 - 2020

Since 2020 RDMO Working Group

Most widely used Research Data Management Software in Germany

RDMO is used (or planned to be used) by 2/3 of NFDI consortia

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RESEARCH DATA MANAGEMENT ORGANIZER

HOME MANAGEMENT ADMIN ROOT

My Projects

Name	Role	Last changed

My Projects

Here you will find all your self-created projects, as well as projects to which you have been added. At first, this overview will be empty. The specified role (owner, manager, author, guest) defines your access restriction to the project. You can edit or delete the projects with the help of the symbols on the right in the respective line.

Dismiss Next tip

Options

Create new project

View all projects on rdmo.mathplus.de

Search projects

Search project title

Import existing project

Select file

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AA 7-3 Date Trees and Mushrooms

Description	Apparently it is possible for date trees to communicat via associat This project aims on discovering the ways information is transmitte the world could save a lot of energy if it was covered in ... brrr, shud
Catalog	**DFG**

Tasks

Tasks are generated automatically from the answers given in the project. On the page of each task you can see which of your answers lead to the activation of the task.

No active tasks found.

Answer questions

Click "Answer questions" at this point to go to the interview for the selected questionnaire. Your answers will be used to create individual tasks for you, which you will find in the task overview, as well as to fill in ready-made templates that you can export for further use.

Dismiss Next tip

Options

Answer questions

View answers

Update project information
Update project catalog
Update parent project
Update project tasks
Update project views
Delete project

Add member

Questionnaire

Data usage / Data sharing and re-use

Please fill in the form for each dataset. The different datasets will be referred to in following questions. You can add a new dataset using the green button. Once created, you can edit or delete datasets using the buttons in the top right corner.

Distribution of date trees | Add dataset

Will this dataset be published or shared?

- ○ Yes, internally with everyone, as long as they don't pass on the data
- ○ Yes, externally limited with individual approval
- ◉ Yes, externally for everyone
- ○ No

Where will your data be published?

Do you already have a place for your data? This could be one of the institutional repositories, like DepositOnce or ReFuBium. If you are looking for a discipline specific repository please give Re3Data a try. If you don't find a suitable repository, there are always the generic repos like Dryad oder Zenodo.

- ☐ Re|fub|ium FU
- ☑ Deposit Once TU
- ☐ ZIB OPUS ZIB
- ☐ Data Dryad
- ☐ Zenodo
- ☐ Other:

Overview

Project: AA 7-3 Date Trees and Mushrooms
Catalog: DFG

Back to my projects

Progress

Back | Skip

Navigation

Using the navigation will save your input.

Institutional contacts regarding publication (incl. money related questions)

TU
https://www.tu.berlin/en/ub/research-publishing/advisory-services-for-publications/open-access

FU
https://www.fu-berlin.de/en/sites/open_access/index.html

HU
https://www.ub.hu-berlin.de/en/researching-and-publishing/open-access?set_language=en

WIAS
https://www.wias-berlin.de/services/library/index.jsp?lang=1

Short deviation into rights and licenses

You as the creator of the data are the **rights**holder unless your contract says otherwise.

If you publish your data your should assign a **license** to it, to enable people to legally use it.

The license of choice for research data is the **Creative Commons attribution 4.0**:

This license allows reusers to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to the creator. The license allows for commercial use.

The household name is CC BY 4.0 with this logo:

https://creativecommons.org/licenses/by/4.0/

MATH+ Zenodo Community

The MATH+ Zenodo Community bundles its Research Output:
https://zenodo.org/communities/mathplus

For **testing and experimenting** please use:
https://sandbox.zenodo.org/communities/math-test

How to **submit** a published record **to a Community**:
https://help.zenodo.org/docs/share/submit-to-community/

How to **link** a **GitHub** Repository **to a Community:**
https://github.com/OpenScienceMOOC/Module-5-Open-Research-Software-and-Open-Source/blob/master/content_development/Task_2.md
and
https://coderefinery.github.io/github-without-command-line/doi/

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DOIs for things

DOIs are Identifier for Digital Objects. Or are they Digital Identifier for Objects? Why should a large important piece of hardware not get a DOI?

DOIs are mostly used to reference papers.

So far so good. But DOIs also have a **rich set of metadata**.

Aufbau einer ZIB-DOI

Muster	10.12752	/	123.	456
Beschreibung	ZIB-Prefix		Identifikator für DOI-vergebene Arbeitsgruppe (ZIB-intern) (s. nachfolgende Aufstellung)	Identifikator für ein zu referenzierendes Dokument
Erläuterung	immer identisch		einzelne Arbeitsgruppen sollen über Zahlen identifiziert werden	wird von der jeweiligen Arbeitsgruppe frei vergeben
Beispiel ("Element steht für")	ZIB		digiS	Bezeichner für Digitalisat XY

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DOIs can provide relations

12	RelatedIdentifier	Identifiers of related resources.		0-n	The format is open. Use this property to indicate subsets of properties, as appropriate.
12.1	relatedIdentifierType	The type of the RelatedIdentifier.	A	Req	Controlled List. Allowed values: ARK DOI EAN13 EISSN Handle ISBN ISSN ISTC LISSN LSID PURL UPC URL URN
12.2	relationType	Description of the relationship of the resource being registered (A) and the related resource (B).	A	Req	Controlled List. Allowed values: • IsCitedBy (indicates that B includes A in a citation) • Cites (indicates that A includes B in a citation) • IsSupplementTo (indicates that A is a supplement to B) • IsSupplementedBy (indicates that B is a supplement to A) • IsContinuedBy (indicates A is continued by the work B) • Continues (indicates A is a continuation of the work B) • IsNewVersionOf (indicates A is a new edition of B, where the new edition has been modified or updated) • IsPreviousVersionOf (indicates A is a previous edition of B) • IsPartOf (indicates A is a portion of B; may be used for elements of a series) • HasPart (indicates A includes the part B) • IsReferencedBy (indicates A is used as a source of information by B) • References (indicates B is used as a source of information for A) • IsDocumentedBy (indicates B is documentation about/explaining A) • Documents (indicates A is documentation about/explaining B) • isCompiledBy (indicates B is used to compile or create A) • Compiles (indicates B is the result of a compile or creation event using A) • IsVariantFormOf (indicates A is a variant or different form of B, e.g. calculated or calibrated form or different packaging) IsOriginalFormOf (indicates A is the original form of B)

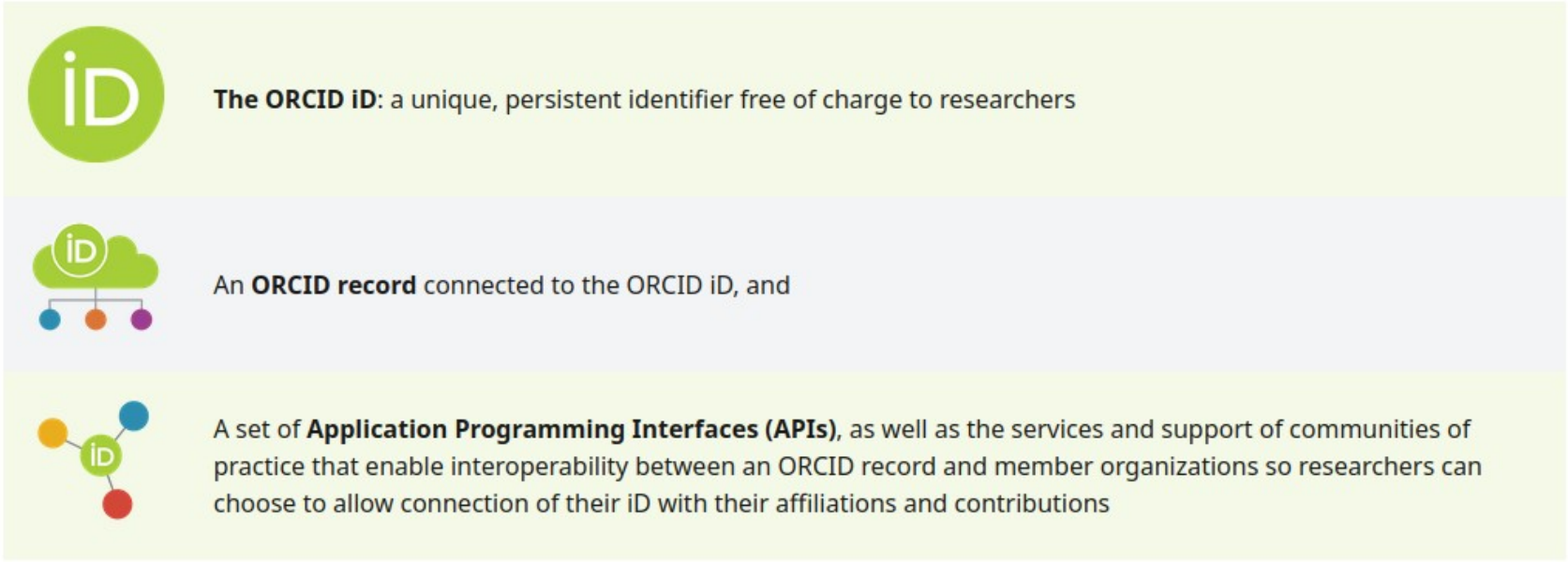
ORCID for People

Andrea Müller, Jeff Miller, Takeshi Honda, José Silva, …

Disambiguation is nearly impossible without a lot of contextual information.

ORCID (**O**pen **R**esearcher and **C**ontributor **ID**) to the rescue. https://orcid.org

We do this by providing three interrelated services:



ORCID
Connecting research and researchers

Tim Hasler | English

Search the ORCID registry...

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Printable version

https://orcid.org/
0000-0001-9164-3500

Preview public record

Emails & domains

Email addresses

hasler@zib.de

hasler@tu-berlin.de

Verified email domains

zib.de

tu-berlin.de

Websites & social links

Keywords

Research Data Management, Long Term Preservation, Open Access,

Countries

Germany

Names

Name
Tim Hasler

Biography — Everyone

Activities — Collapse all

Employment (2) — Add | Sort

Technische Universität Berlin: Berlin, Berlin, DE — Everyone

2021-01-11 to present | Chief Data Officer (Excellence Cluster MATH+)
Employment

Show more detail

Source: Tim Hasler

Zuse Institute Berlin: Berlin, DE — Everyone

2012-05-01 to present (Scientific Information)
Employment

Show more detail

Source: Tim Hasler

Education and qualifications (0) — Add | Sort

Add details about where you have studied and educational or professional qualifications you have been awarded.
Learn more about adding education or qualifications to your ORCID record

Professional activities (0) — Add | Sort

Add the invited positions or memberships you have held, awards or prizes you have received, and donations of time and resources given

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