


# FAIR on the First Try

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2025-12-03



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# About Me

- Leader of EOSC CZ open working group Core Services.
  - <https://www.eosc.cz/en/working-groups/core-services>
- Leader of end-user-services oriented work packages in the NRP project.
  - <https://www.eosc.cz/en/projects/national-repository-platform-for-research-data-os-i-nrp/national-repository-platform>
- Open Science support team member at CERIT-SC | ICS MU
  - Focus on data management and FAIR data support.
  - Including sensitive data (SensitiveCloud).
- Good coffee and tea lover.

2025-12-03

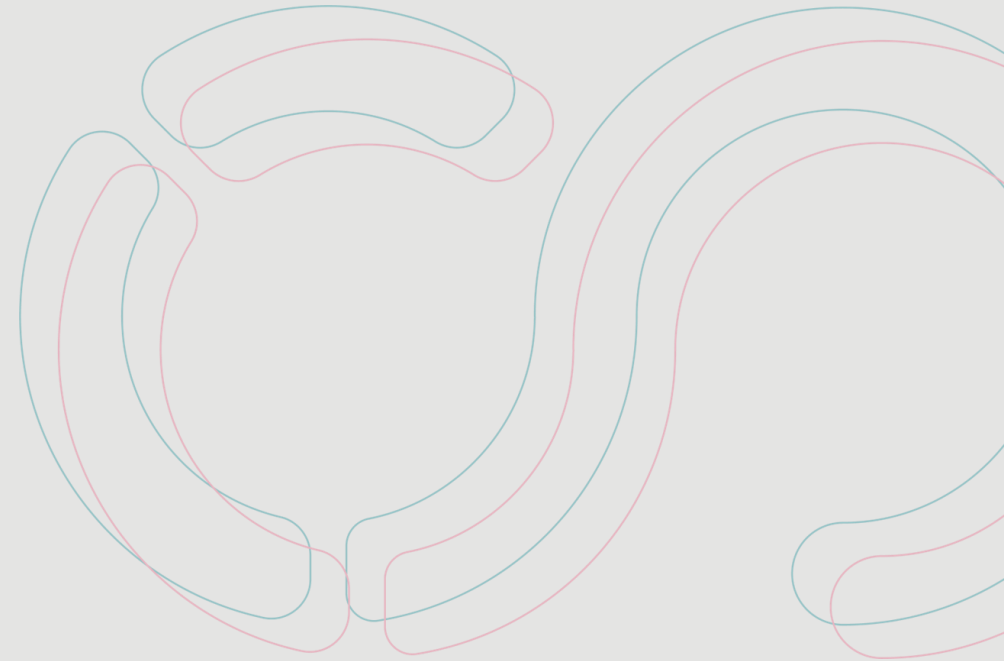
FAIR on the First Try



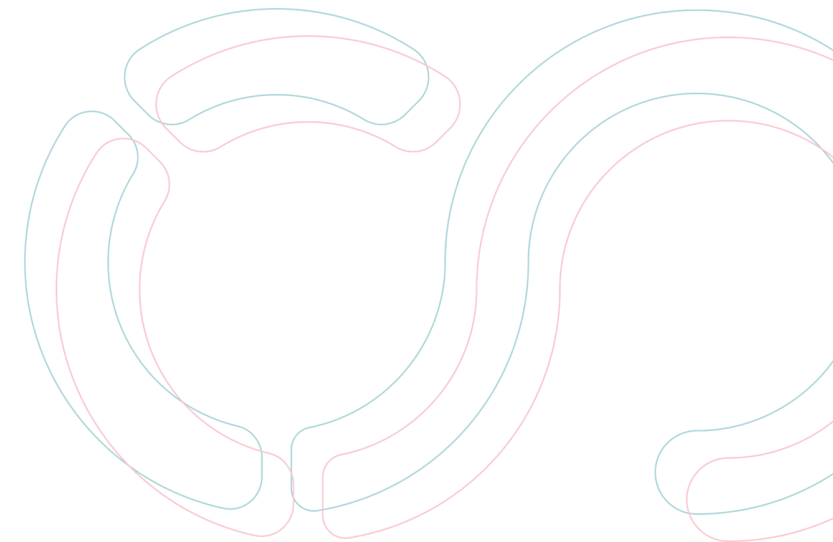
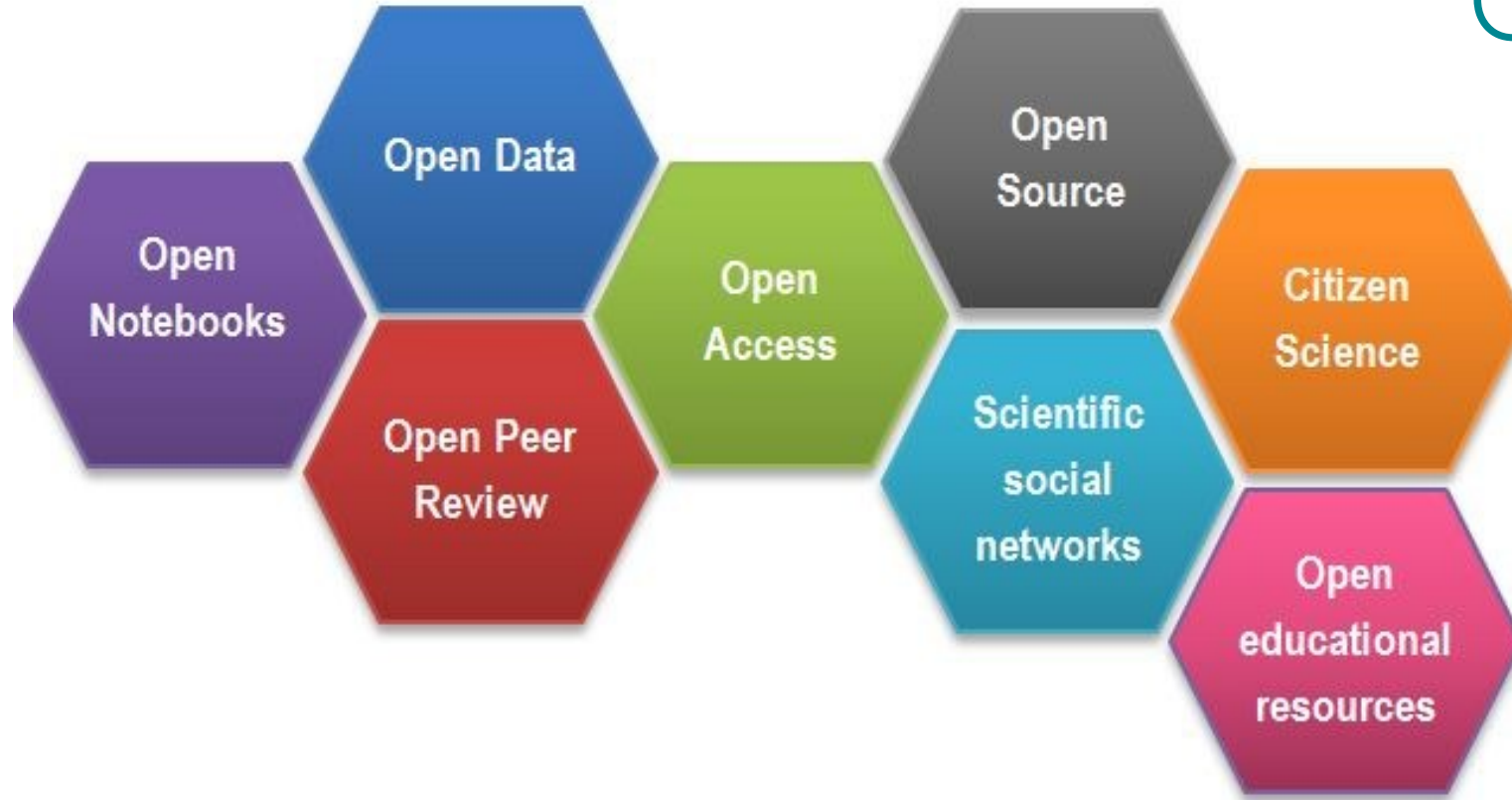
# Outline

1. Context
2. Research **Data Life-Cycle**
3. **Data**, Managed Data, FAIR Data, Open Data...
4. Data Management Plan (**DMP**) in Research Project Calls
5. **Create New or Reuse Existing Data**
6. **Tools and Resources** to Support FAIR Principles
7. **Where to Store** Research Data
8. Persistent Identifiers (**PIDs**)
9. European Open Science Cloud (**EOSC**)

# Context



# Open Science



Source: <https://www.fosteropenscience.eu/node/1420>

# Research Data Life-Cycle



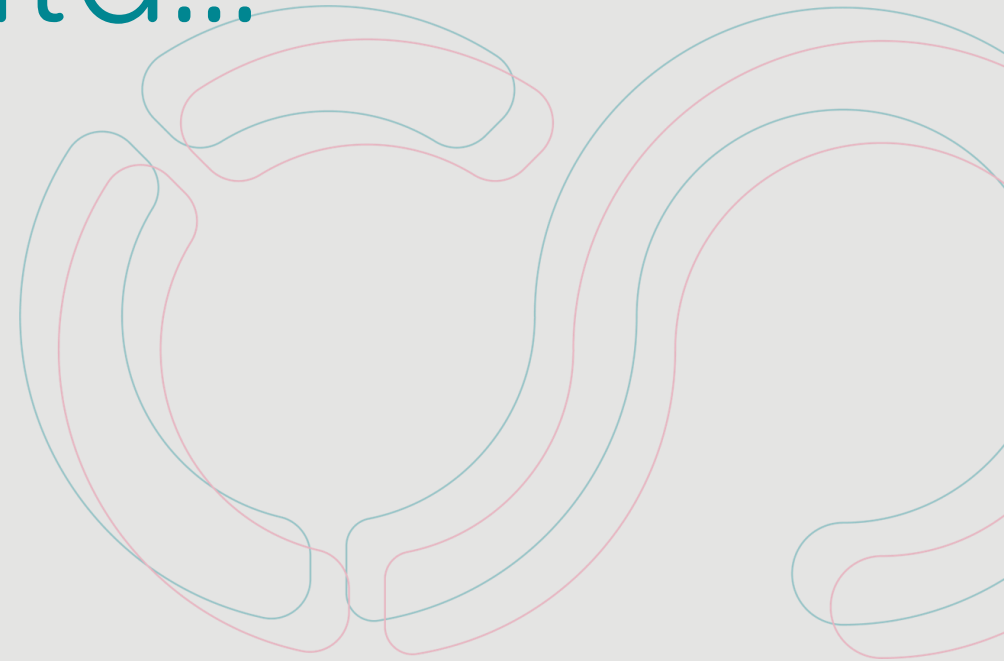
# Research Data Life-Cycle



Source: ELIXIR RDMkit, <https://rdmkit.elixir-europe.org/>

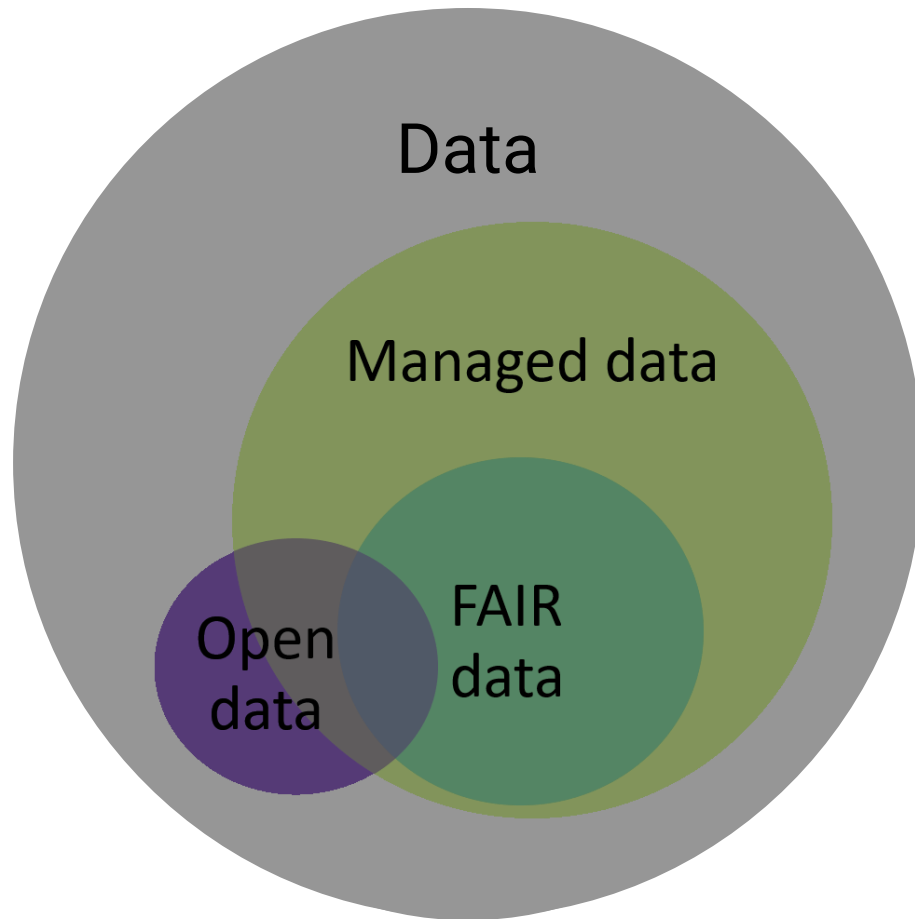
- What **data do you (re)use**?
  - Including **licenses** that allow you to do so.
- What **data do you generate** and how?
- **Where do you store, backup, and long-term archive data?**
- How do you **permanently and uniquely identify** it?
- How do you **process** it?
- How do you **analyze** it?
- Where do you **publish and share** it?
- Who **pays** for all of this?
- **What are the data really about?**
- **What are the data suitable (or unsuitable) for?**
- **Who can reuse** the data?
- What specific data support your results?
- How can they be used to **repeat your experiments, etc.?**

# Data, Managed Data, FAIR Data, Open Data...





# Research Data Levels



Source: FAIR příručka pro data steward komunitu v ČR, <https://doi.org/10.71495/hxfc-6f57>

- FAIR principles:
  - Findable
  - Accessible
  - Interoperable
  - Reusable

# 5-Stars Deployment Scheme for Open Data

★ Make your stuff available on the Web (**whatever format**) under an **open license**.

★★ Make it available as **structured data** (e.g., Excel instead of image scan of a table).

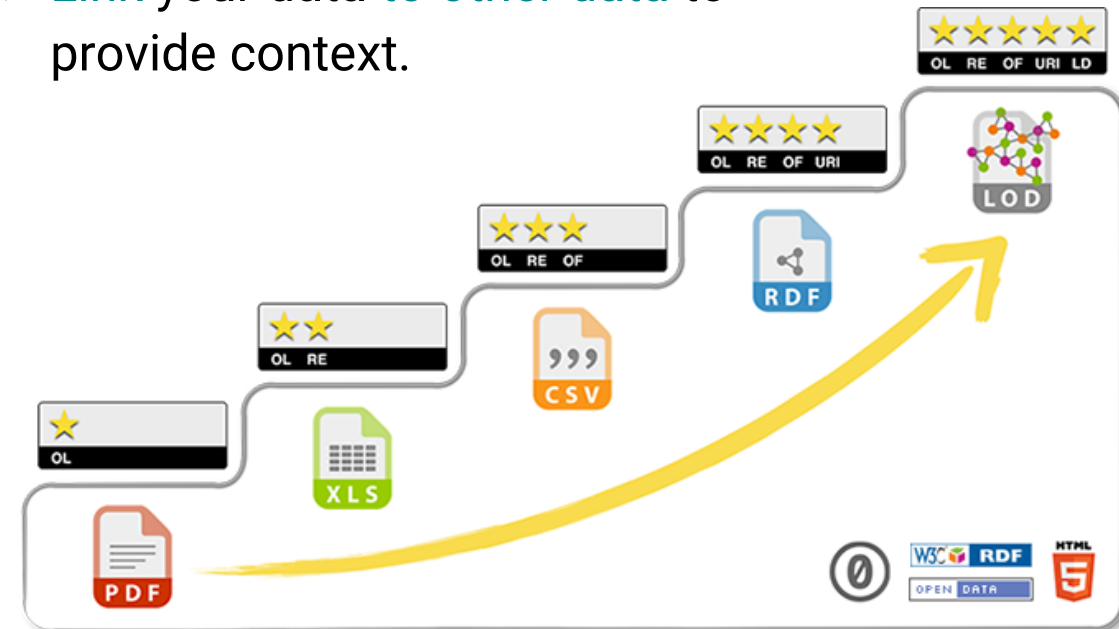
The dataset is provided in a **machine-readable format** that allows **automated machine processing**.

★★★ Make it available in a **non-proprietary open format** (e.g., CSV instead of Excel).

★★★★ Use **URIs** to denote things, so that people can point at your stuff.

★★★★★ **Link your data to other data** to provide context.

In 2010, Tim Berners-Lee published a system for assessing the openness of linked data, the so-called [5-Star Linked Open Data](#).



Source: FAIR příručka pro data steward komunitu v ČR, <https://doi.org/10.71495/hxfc-6f57>

# FAIR Principles

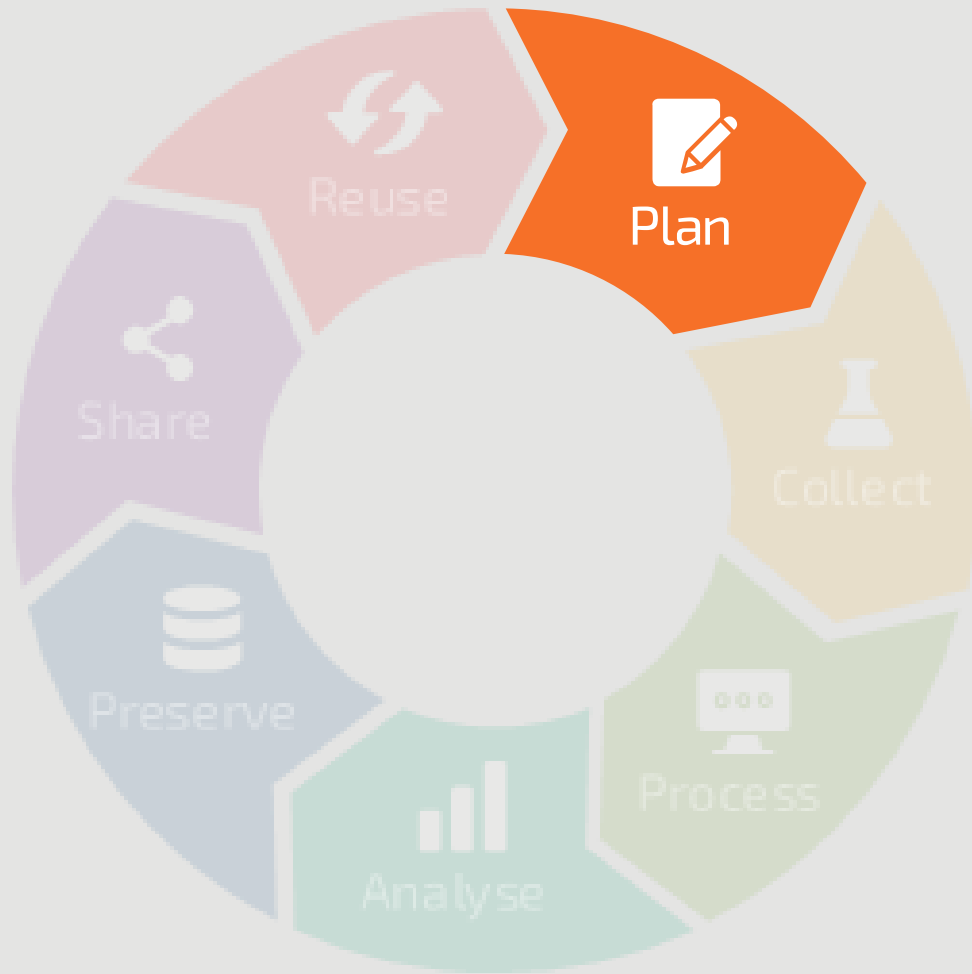
<https://www.go-fair.org/fair-principles/>

- FAIR is an abbreviation of the four English adjectives denoting these principles.
- **Findable**
  - For **people and machines**.
  - We need (**machine-readable**) **metadata** that is available to **search engines/users**.
  - We need **unique persistent identifiers** (PIDs).
- **Accessible**
  - Technical solution for **access to data and metadata** – use **standard open protocols** (e.g. **https://**) common in the field.
  - The data does not have to be freely accessible – then the **authentication mechanisms** should be **common and standard** (e.g. **OpenID Connect**) in the field.
  - If the data itself is inaccessible (not public or has been deleted), **at least the metadata should be freely available** (for Findable and audit-record of the deleted data).
- **Interoperable**
  - **Similar to Accessible**, but not about access protocols, **but about the data itself**.
  - Data and metadata in **machine-readable open formats** common in the field.
  - **Other** data/metadata should be **referenced** using standard persistent identifiers.
- **Reusable**
  - Rather the goal we are aiming at in the previous points, rather than a separate principle.
  - **Clear declaration of license**, use of open licenses (e.g. CC0, CC-BY).
  - Data and metadata in **industry-standard and usable formats**.
  - **Provenance metadata** – a relatively new area dealing with the metadata record of all operations with data from their inception to the present.

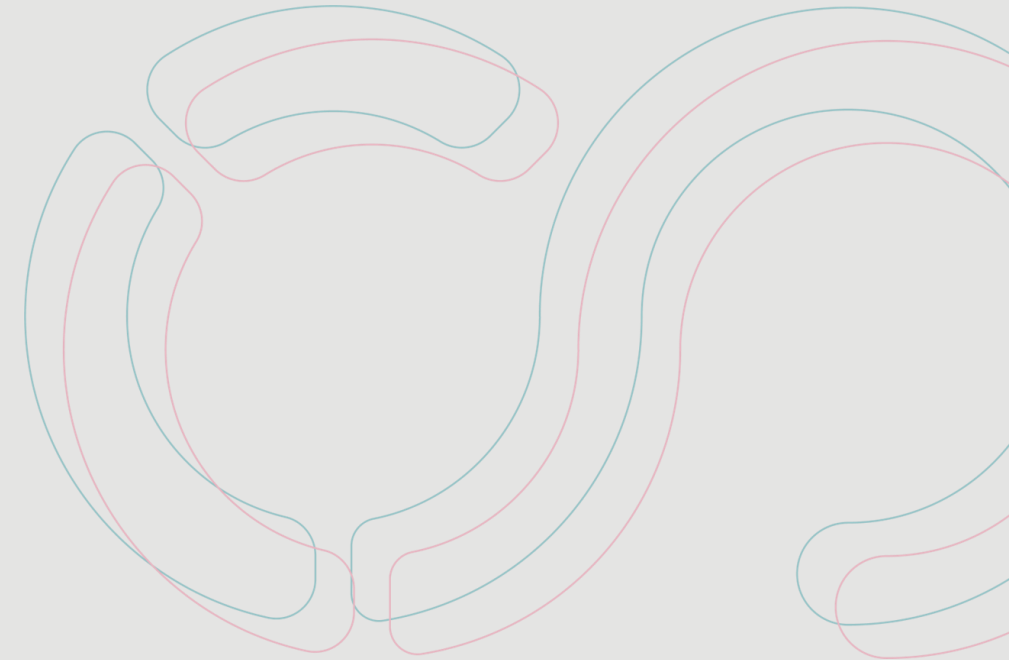
## Building your FAIR implementation profile.

Community description	
Name of Community	e.g. ENVRI
Description of Community	
Supporting Links	
Research Domain	e.g. Environmental Sciences
Data Steward	e.g. ORCID #
Date of FIP creation	

FAIR principle	Question	FAIR enabling resource types	Your answers
F1	What globally unique, persistent, resolvable identifiers do you use for metadata records?	Identifier type	e.g. PURL, DOI
F1	What globally unique, persistent, resolvable identifiers do you use for datasets?	Identifier type	
F2	Which metadata schemas do you use for findability?	Metadata schema	
F3	What is the technology that links the persistent identifiers of your data to the metadata description?	Metadata-Data linking mechanism	
F4	In which search engines are your metadata records indexed?	Search engines	
F4	In which search engines are your datasets indexed?	Search engines	
A1.1	Which standardized communication protocol do you use for metadata records?	Communication protocol	
A1.1	Which standardized communication protocol do you use for datasets?	Communication protocol	
A1.2	Which authentication & authorisation technique do you use for metadata records?	Authentication & authorisation technique	
A1.2	Which authentication & authorisation technique do you use for datasets?	Authentication & authorisation technique	
A2	Which metadata longevity plan do you use?	Metadata longevity	
I1	Which knowledge representation languages (allowing machine interoperation) do you use for metadata records?	Knowledge representation language	
I1	Which knowledge representation languages (allowing machine interoperation) do you use for datasets?	Knowledge representation language	
I2	Which structured vocabularies do you use to annotate your metadata records?	Structured vocabularies	
I2	Which structured vocabularies do you use to encode your datasets?	Structured vocabularies	
I3	Which models, schema(s) do you use for your metadata records?	Metadata schema	
I3	Which models, schema(s) do you use for your datasets?	Data schema	
R1.1	Which usage license do you use for your metadata records?	Data usage license	
R1.1	Which usage license do you use for your datasets?	Data usage license	
R1.2	Which metadata schemas do you use for describing the provenance of your metadata records?	Provenance model	
R1.2	Which metadata schemas do you use for describing the provenance of your datasets?	Provenance model	



## Data Management Plan (DMP) in Research Project Calls



# Open Science and Projects

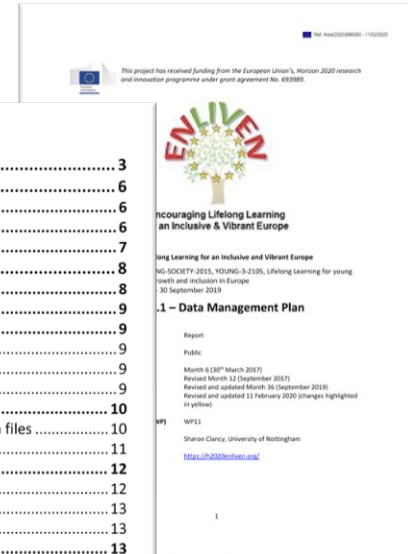
- Requirements for **compliance with Open Science principles** have already been **established as a standard** part of **research project calls**.
- Often mandatory and optional principles:
  - **Mandatory**: Open Access, Data Management (DMP)
  - **Optional**: Citizen Science, Open Source, Preprints, ...
- **DMP** is a **living** document: Regular **updates** are expected.

# ENLIVEN ('Encouraging Lifelong Learning for an Inclusive and Vibrant Europe') Data Management Plan

- <https://hdl.handle.net/11353/10.1139743>
- DMP from the area of **Social Sciences**.
  - Audio and video data, transcription of **interviews**.
  - **Restricted access** to the data.
- Use of **existing** data + collection of **own** data.
- **Continuous updating** of the DMP.
  - Changes are summarized in a table.
  - Migration of some of the data to the UK.
  - Data saved encrypted in MS 0365 Teams.
- **Ethic** aspects are described in a **standalone document** referenced from the DMP.
- Joined project of multiple institutions → explicit **definition of responsibilities**.
- Nice **description of data protection**.
  - Information on anonymization procedures in the DMP appendix.
- Documentation and produced **publications** (including project website) are **covered in the DMP**.
- Description of the used hardware and software could be more detailed.
  - Nevertheless, the backup process and strategy are described.
- Described **intellectual properties** and **QA process**.

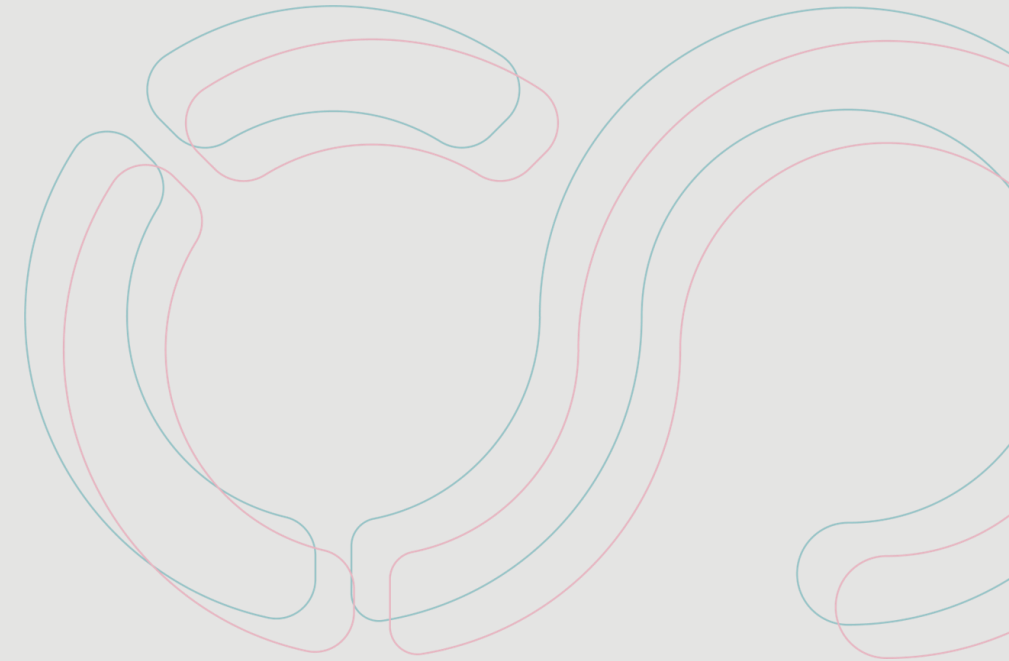
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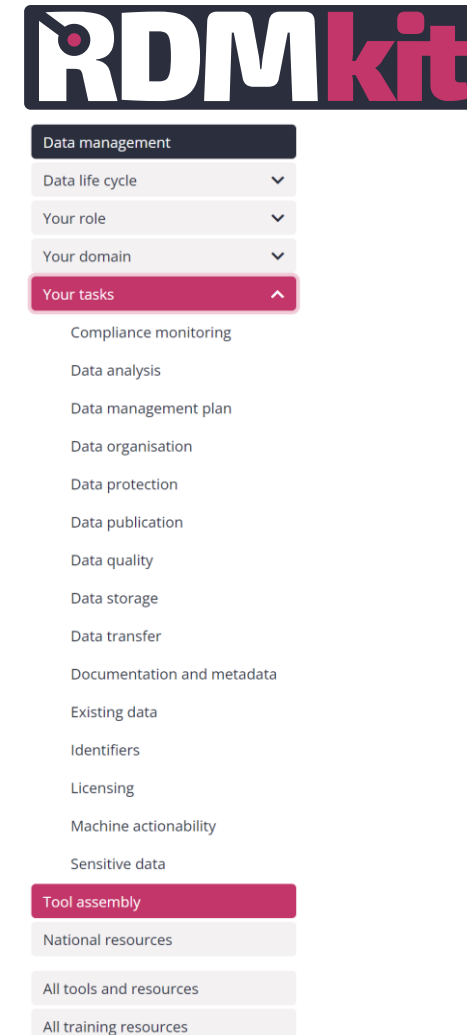
Create New or Reuse  
Existing Data





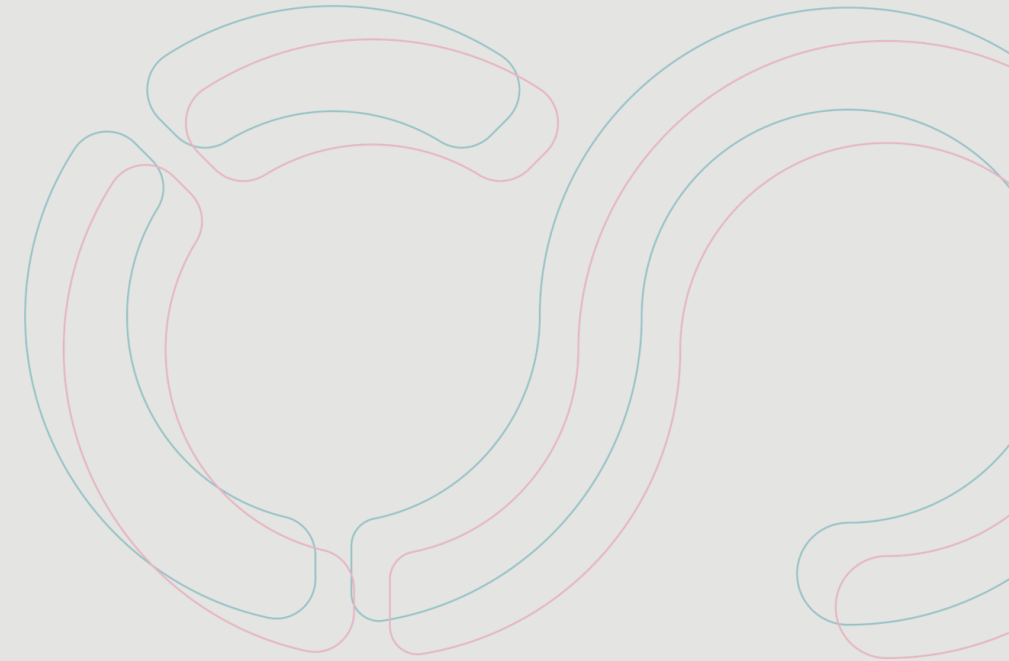
# Create New or Reuse Existing Data

- **Check the licence** if you are going to reuse an existing data/software!
- The ELIXIR Research Data Management Kit (**RDMkit**)
  - <https://rdmkit.elixir-europe.org/>
  - Online guide to data management in the life sciences.
  - **Links to several external sources.**





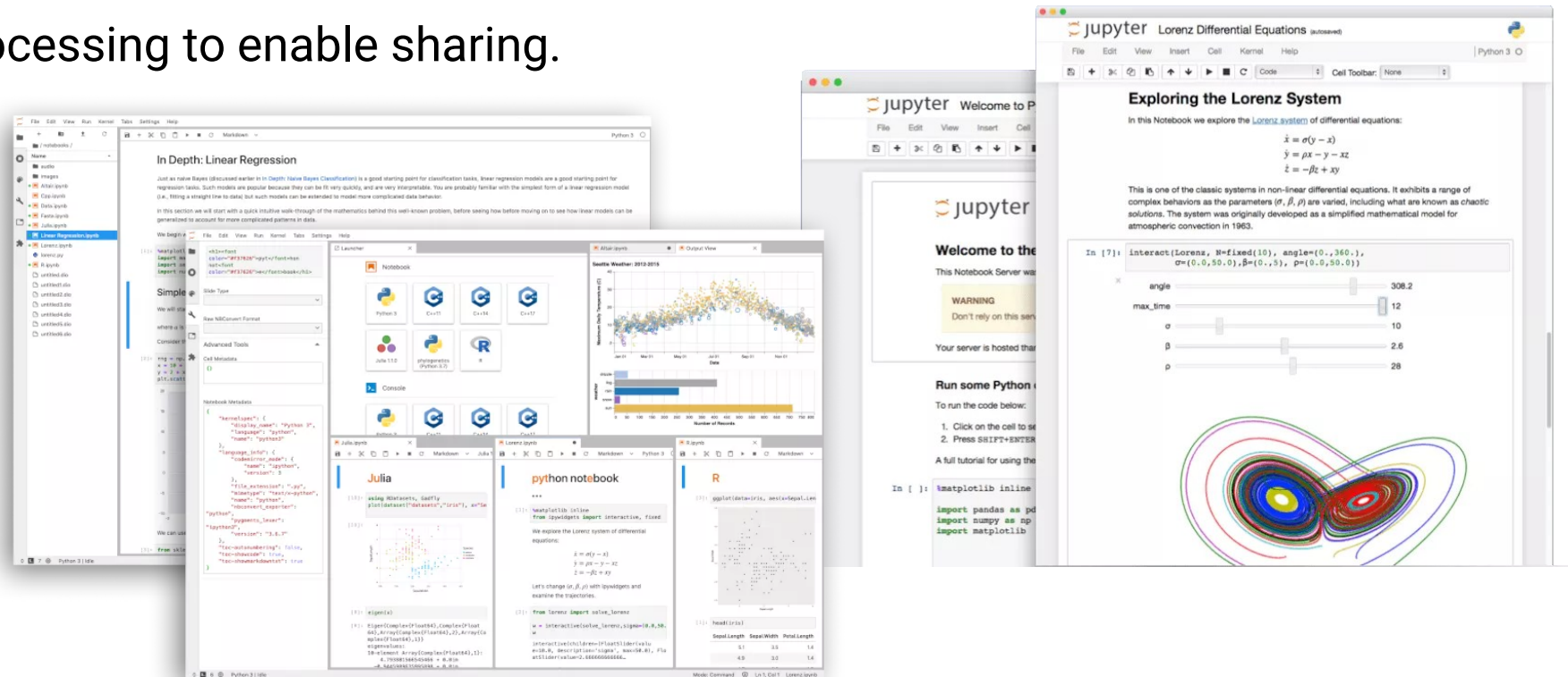
## Tools and Resources to Support FAIR Principles



# Tools and Resources to Support FAIR Principles

## JupyterLab

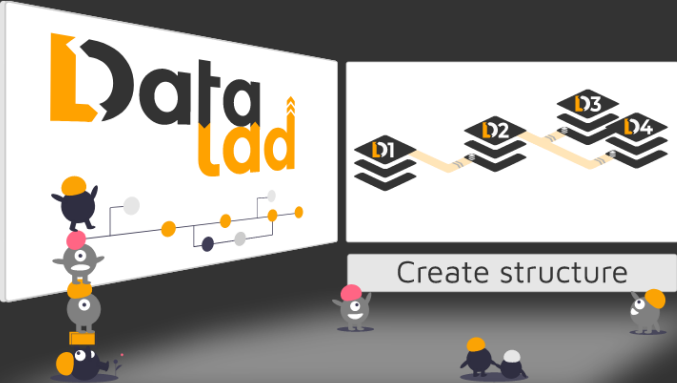
- <https://jupyter.org/>
- Documented data processing to enable sharing.



# Tools and Resources to Support FAIR Principles

## DataLad

- <https://www.datalad.org/>
- *DataLad is a free and open-source distributed **data management** system that **keeps track** of your data, creates structure, **ensures reproducibility**, supports collaboration, and integrates with widely used data infrastructure.*



The image shows a promotional graphic for DataLad. On the left, the DataLad logo is displayed on a screen, with a stack of colorful characters below it. In the center, a diagram illustrates the 'Create structure' process, showing four data blocks labeled D1, D2, D3, and D4 connected by arrows. On the right, the text 'distributed data management' and 'free and open source' is shown. Below this, there is a 'Get DataLad' button with a rocket icon and a 'Star 398' button.

distributed data  
management

free and open  
source

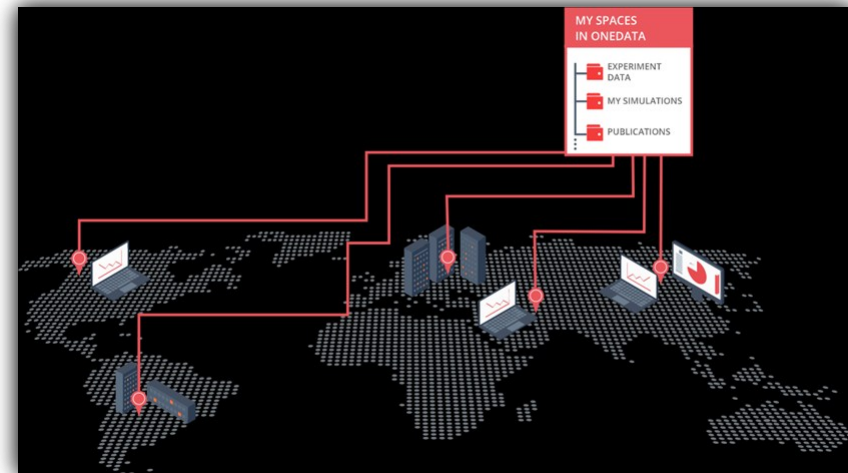
Get DataLad

Star 398

# Tools and Resources to Support FAIR Principles

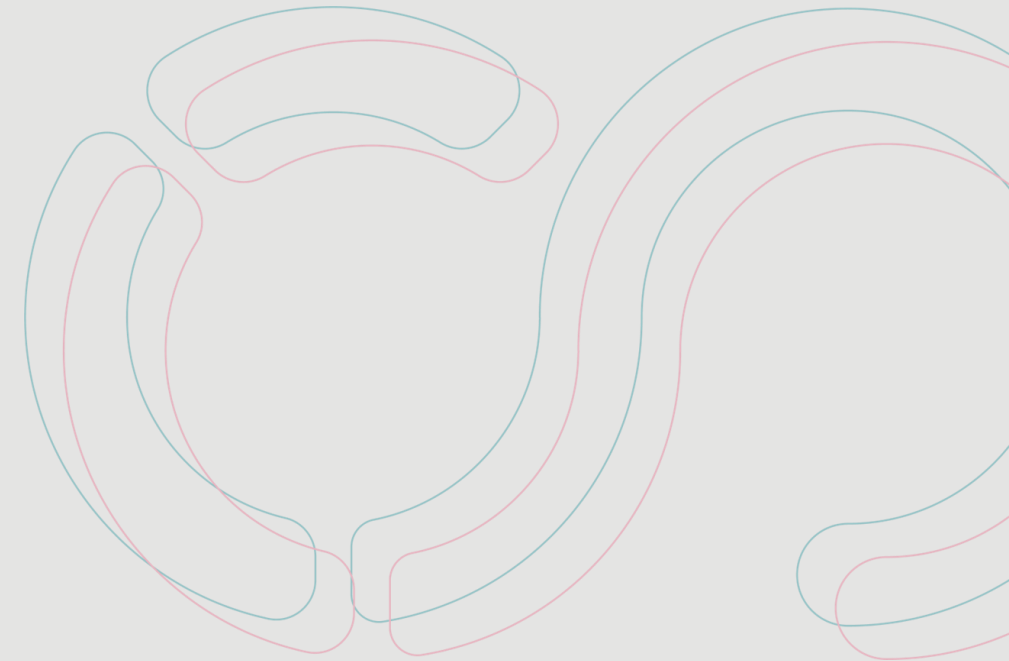
## OneData

- <https://onedata.org/>
- *Perform heavy computations on huge datasets. Access your data in a dropbox-like fashion regardless of its location. Publish and share your results with public or closed communities.*





## Where to Store Research Data



# Example: Storages at MU and Recommendations for their Use

- Centrally managed by Institute of Computer Science
  - <https://it.muni.cz/en/categories/data-storage>
- Recommendations their use:
  - Data type categorization.
  - Storage technology categorization.
  - Matrix of suitability of different storages for different types of data.

# Example: Storages at MU – Suitability of storage for different types of data

STORAGE TYPE	USAGE			
	GREEN: PUBLIC DATA	BLUE: INTERNAL DATA	ORANGE: DISCRETE DATA	RED: SENSITIVE DATA
PORTABLE MEDIA (FLASH DRIVES, EXTERNAL HDD, CD, DVD, ...)	Appropriate	Possible Encryption recommended	Inappropriate Possible when using encryption	Inappropriate
LOCAL STORAGE				
IN COMPUTERS (DESKTOP, LAPTOPS)	Appropriate	Appropriate	Appropriate Encryption recommended	Inappropriate possible in well-justified cases, when performing an individual analysis, using encryption and applying other security measures resulting from the analysis
IN MOBILE DEVICES (MOBILE PHONES, TABLETS, ...)	Appropriate	Appropriate Screen lock required (pattern, fingerprint reader, PIN, password)	Possible Encryption required Strong screen lock required (fingerprint reader, PIN, password)	Inappropriate possible in well-justified cases, when performing an individual analysis, using encryption and applying other security measures resulting from the analysis
ICS NETWORK AND CLOUD STORAGE (SO-CALLED STANDARD AND MEDIUM NETWORK STORAGE, SEE IT CATALOGUE, CERIT-SC STORAGE)	Appropriate	Appropriate	Appropriate	Appropriate It is recommended to perform an individual analysis, use encryption and apply other security measures that result from the analysis



# Example: Storages at MU – Suitability of storage for different types of data

STORAGE TYPE	USAGE			
	GREEN: PUBLIC DATA	BLUE: INTERNAL DATA	ORANGE: DISCRETE DATA	RED: SENSITIVE DATA
IS MUNI REPOSITORY (E.G. DOCUMENT SERVER, FILE DEPOSITORY, ETC.)	Appropriate	Appropriate	Appropriate	Appropriate It is recommended to perform an individual analysis, use encryption and apply other security measures that result from the analysis
CESNET STORAGE (E.G. CESNET ARCHIVE STORAGE, OWNCLOUD, FILESENDER, ..., SEE CESNET DATA STORAGE DEPARTMENT)	Appropriate	Appropriate	Appropriate	Appropriate It is recommended to perform an individual analysis, use encryption and apply other security measures that result from the analysis
EXTERNAL STORAGE				
WITH A CONTRACT WITH MUNI				
MUNI MICROSOFT O365 (MUNI O365 ONEDRIVE, SHAREPOINT, ..., VIZ MUNI O365)	Appropriate	Appropriate	Appropriate Encryption recommended	Possible only with adequate procedural coverage of the situation based on an individual analysis and the application of security measures that result from the analysis
MUNI GOOGLE G SUITE FOR EDUCATION (SEE MUNI GOOGLE APPS)	Appropriate	Appropriate	Inappropriate Possible when using encryption	Inappropriate
GRAMMARLY	Appropriate	Appropriate	Inappropriate	Inappropriate
WITHOUT A CONTRACT WITH MUNI				
PUBLIC GOOGLE, MICROSOFT, DROPBOX, ... STORAGES	Appropriate	Inappropriate	Inappropriate	Inappropriate

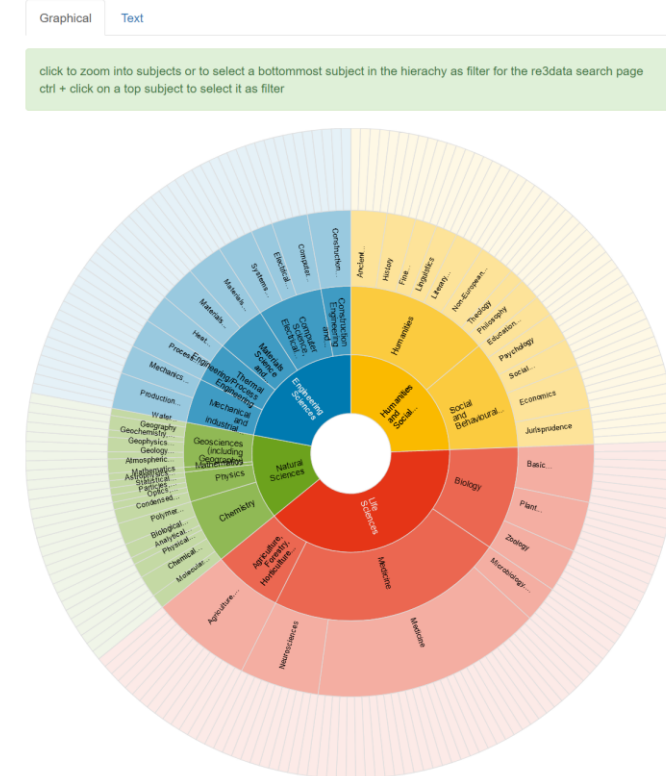
# Repositories for Research Data: Types

- Topical, national, institutional, catch-the-all, ...
- A common procedure for working with research data is to divide it by disciplines, not by country or institution.
  - We do not consider national/institutional/... specifics, but research topic specifics.
- If we are dealing with a project/institutional/national standard, we must be compatible with international industry practices.
  - Industry standards are addressed by, for example, EOSC Task Forces:  
<https://www.eosc.eu/task-force-faq>

# How to Find/Select a Data Repository

- Repository directories:
  - Open Access Repositories: [OpenDOAR](#)
  - Data repositories: [re3data.org](#)
- OpenAIRE: [How to find a trustworthy repository for your data](#)
  - Trusted certified repositories are preferred.
  - [CoreTrustSeal](#) (list of certified repositories).
  - [Nestor Seal](#) (verification according to DIN 31644).
  - [ISO 16363](#).
  - For example, the well-known [Zenodo](#) has no certification...
- The most used general repositories include
  - [Zenodo](#),
  - [Figshare](#), or
  - [Dryad](#).

## Browse by subject



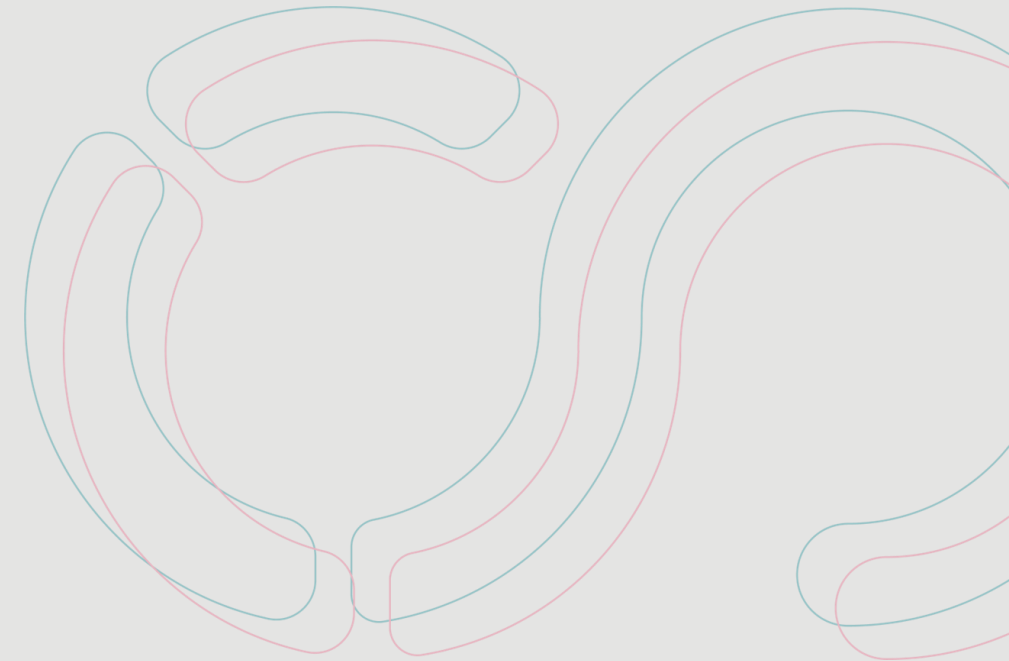
Source: <https://www.re3data.org/browse/by-subject/>

# What to Look Out for when Choosing a Repository

- Will the repository assign a **persistent identifier** (e.g. DOI) to your data?  
Persistent identifiers make your data easier to find and cite.
- Is the repository **trustworthy/certified**?  
With certified repositories, you can be more sure that your data is well taken care of.
- Does the selected repository provide **open access to the stored data**?  
If you want to share your data openly, then this is the key information.
- Will the repository **license** your data? Does it state clear conditions under which the data stored in the repository can be used?  
It's important that users of your data know how they can handle it.
- Will the repository provide a **landing page** for your data?  
Metadata will help others find the data, find out what the data is, and also how to cite it.
- Does the repository allow **versioning**?  
If you update your dataset, you can upload the updated version as a new version to the original dataset. The new dataset is assigned its own persistent identifier and users can easily find out what the latest version is or which version was used in the original study.



## Persistent Identifiers (PIDs)



# Persistent Identifiers (PIDs)

- They are supposed to ensure the separation of the identification of the object as such,
  - person,
  - institution,
  - publication,
  - dataset,
- from its current physical location.
- Example – dataset *https-set*
  - Dataset identifier: <https://doi.org/10.48791/4mxxp-r725>
  - Current physical location: <https://ucnmuni.sharepoint.com/teams/mu-UVT-https-set/Shared%20Documents/Forms/AllItems.aspx?id=%2Fteams%2Fmu%2DUVT%2Dhttps%2Dset%2FShared%20Documents%2Fhttps%2Dset%2Dv1%2E0%2E0&p=true&ga=1>
  - The physical location is likely to change in the future – a move to the National catch-all data repository, is being considered.
  - Changes don't matter – users are *always* presented with a link to the data being [DOI 10.48791/4mxxp-r725](https://doi.org/10.48791/4mxxp-r725), which always takes them to the current location.

# Persistent Identifiers (PIDs)

- They are intended to ensure **clarity**.
- **Example** – names of natural persons:
  - **Multiple forms of writing** the name of **one physical person**.
  - **Multiple different individuals** with **the same name**.
- They are intended to ensure **persistence**.
  - **Metadata** physically located **with a third party**, independent of the physical location of the referenced entity.
- The **identifier's owner** takes **care** of updating the metadata and **updating the route** to the current location.
- The **third party** is responsible for **preserving** the latest version and history of the **metadata** and the **existence** of the **identifier itself**, even if the owner of the identifier stops caring for it. And even if the identified entity is not retained as such.

<input type="checkbox"/>	<a href="#">NovakD (1)</a>	Novák, David (1)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>
<input type="checkbox"/>	<a href="#">NovakE (5)</a>	Nováková, Eva (5) Nováková, E. (0)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>
<input type="checkbox"/>	<a href="#">NovakJ (52)</a>	Novák, Josef (38) Novák, Jos. (1) Novák, J. (13)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>
<input type="checkbox"/>	<a href="#">NovakJ2 (7)</a>	Novák, Jiří (7) Novak, Jiri (0)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>
<input type="checkbox"/>	<a href="#">NovakJ7 (19)</a>	Novák, Josef (16) Novák, J. (3)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>
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<input type="checkbox"/>	<a href="#">NovakM (2)</a>	Novák, Mirko (2) Novak, Miroslav M. (0) Novak, M. M. (0) Novák, M. (0)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>
<input type="checkbox"/>	<a href="#">NovakM2 (2)</a>	Nováková, Markéta (2)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>
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<input type="checkbox"/>	<a href="#">NovakZ (1)</a>	Novák, Zdeněk (1)	<input type="button" value="Join"/>	<input type="button" value="Delete"/>

Source: Authors' database of the project [DML-CZ](#)

# Popular PIDs

- People

- **ORCID:** <https://orcid.org/>
  - Example: [0000-0001-6399-5453](https://orcid.org/0000-0001-6399-5453)

- Institutions

- **ROR:** <https://ror.org/>
  - Example: [02j46qs45](https://ror.org/02j46qs45)

- Publications

- **DOI:** <https://www.crossref.org/>
  - Example: [10.5817/CP2022-3-1](https://doi.org/10.5817/CP2022-3-1)

- Datasets

- **DOI:** <https://datacite.org/>
  - Example: [10.48791/4mxp-r725](https://doi.org/10.48791/4mxp-r725)
- **Handle:** <https://handle.net/>
  - Example: [11222.digilib/130328](https://handle.net/11222.digilib/130328)

- Books

- **ISBN:** <https://www.isbn-international.org/>
  - Example: [978-3-16-148410-0](https://www.isbn-international.org/978-3-16-148410-0)

- Journals

- **ISSN:** <http://portal.issn.org/>
  - Example: [0378-5955](http://portal.issn.org/0378-5955)

- Business articles

- **EAN13:** <https://www.gs1.org/standards/barcodes/ean-upc>
  - Example: [5901234123457](https://www.gs1.org/standards/barcodes/ean-upc/5901234123457)



Source: VaGa, CC BY-SA 3.0 -<<http://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

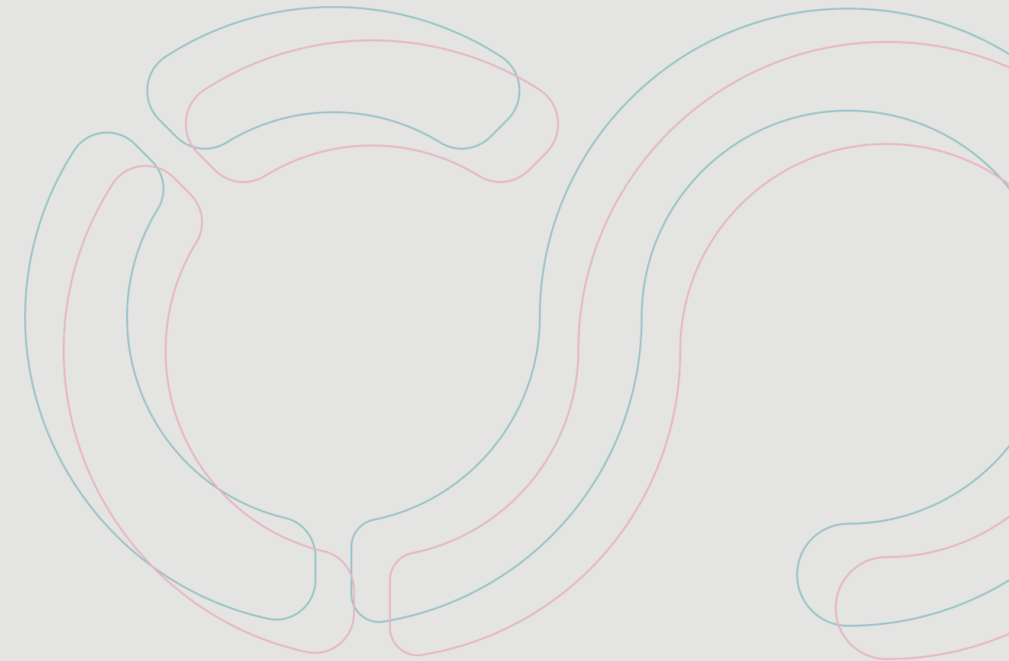
- Inhabitants of the Czech Republic

- **Birth Number** (~Social Security Number): <https://www.zakonyprolidi.cz/cs/2004-302/>
  - Example: [736028/5163](https://www.zakonyprolidi.cz/cs/2004-302/736028/5163)

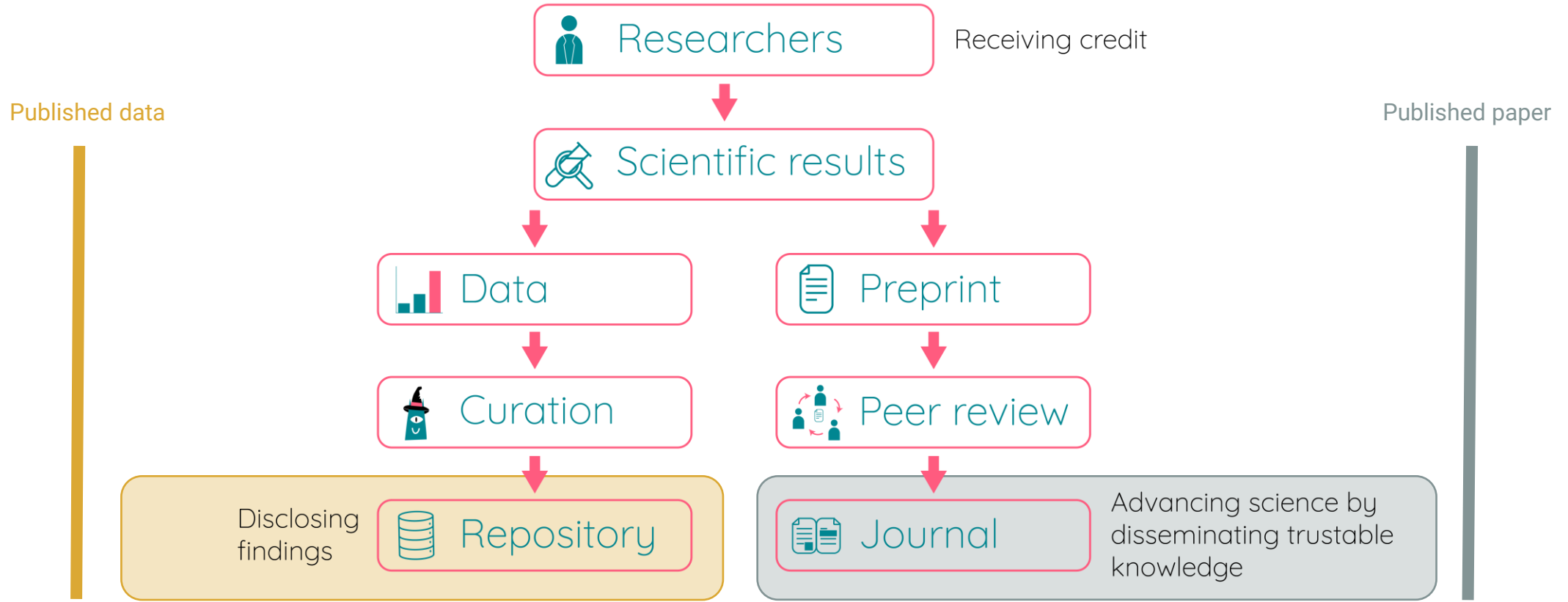




# European Open Science Cloud (EOSC)



# Peer reviewed research



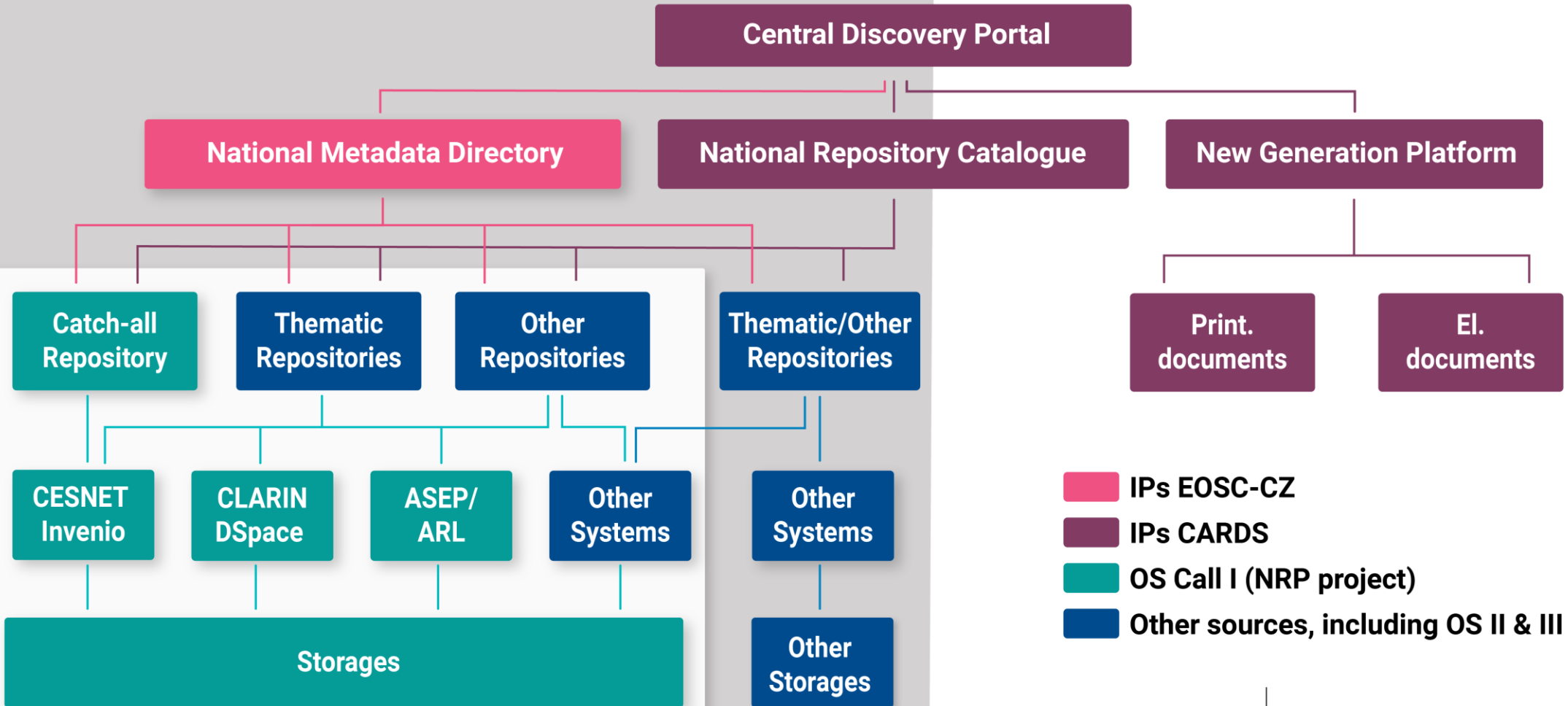
This **ALSO** is a figurative checkmark in your career

This is a figurative checkmark in your career

# National Data Infrastructure (NDI)

NDI

NRP



# NDI Outputs: Storage Capacities

## Repositories

- [Catch-all repository](#) (2025)
- **Thematic (domain-specific) repositories**  
4 pilots: Molecular Biophysics Database\*, National Repository for Biodiversity Data, Repository for Biological Imaging Data, ArchaeoVault (end of 2025)
  - Others from 2025/2026
- [National Metadata Directory](#)

## Repository systems

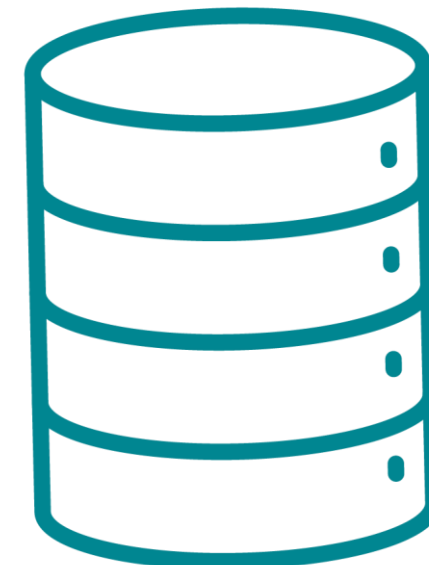
- CESNET Invenio, CLARIN-DSpace, ASEP-ARL

## Hardware

- Physical, distributed storage infrastructure
- Total of 50+ PB of user data storage capacity



<https://mbdb-data.org/>



\* in production mode already

# AI-ready (Valuable) Data

← BACK TO COLLECTION

## Polycaprolactone nanofibers for construction of the alveolar-capillary interface model: Detailed data

**License:**

**Attachments:**

- Dataset Cell co-culture scaffolds production.zip
- Dataset Cell culture and co-culture analysis.zip
- Dataset Nanofibers production and characterization.zip

**Object identifier:** DOI 10.48700/datst.wmbbb-xhc25

**Record status:** Published

**In community:** General community

**Subtitle:** Nanofibers production and characterization | Cell co-culture scaffolds production | Cell culture and co-culture analysis

**Creators:** Capandova, Michaela | Sedlakova, Veronika | Vorac, Zbynek | Kotasova, Hana | Antol, Matej | Moran, Lukas | Tomáš Bárta | Dasa Bohaciakova | Ales Hampel

**Date available:** 2024-11-04

**Dataset creation date:** 2024/2024

**Data collection date:** 2014/2024

**Language:** English

**Publisher:** Masaryk University

**Keywords:** nanofibers | electrospinning | polycaprolactone | tissue engineering | scaffold | alveolar-capillary interface

**Subject categories:** Engineering and technology | Nano-technology | Medical and health sciences | Medical biotechnology | Nano-materials (production and properties) | Technologies involving the manipulation of cells, tissues, organs or the whole organism (assisted reproduction) | Biomaterials (as related to medical implants, devices, sensors)

**Abstract:** English

This data collection contains the datasets showing the preparation and characterization of polycaprolactone nanofibers for the proof-of-concept construction of the alveolar-capillary interface. We include parameters of nanofibers manufacturing as well as their characterization. We prepared nanofibers from polycaprolactone, poly(lactic acid) and polyamide. We used polycaprolactone nanofibers to model the alveolar-capillary interface of human lung: We electrospun the nanofibers onto supporting mesh and incorporated the whole structure into 3D-printed insert to create the nanofibrous cell co-culture scaffold. For reproducing the 3D-printing of 24-well plate co-culture insert, see also the GitHub repository <https://github.com/Grindyd/Nanofiber-holder-insert/>. We seeded the scaffold with capillary endothelial cells (HUVEC) and alveolar epithelial cells (ELEP) to mimic the alveolar-capillary interface. For reproducing our protocol for differentiation of ELEP (Expandable lung epithelium) from hESCs (Human embryonic stem cells) see our protocol in the publication, DOI: 10.1007/s13770-022-00458-0. Importantly, we include detailed data from cell culture and co-culture experiments leading to construction of the in vitro alveolar-capillary interface proof-of-concept model. Some conclusions based on these data have been summarized in this publication: <https://doi.org/10.1002/jbm.a.37824>.

**Methods:** English

Nanofibers production and characterization: We produced nanofibers by electrospinning method, using Nanospider technology. The nanofibers were electrospun onto supporting polyamide mesh. The characterization of nanofibrous structures provided in this dataset is based on advanced microscopic techniques (SEM). Cell co-culture scaffolds production: The nanofibrous structures electrospun onto supporting polyamide mesh were mounted into 3D-printed polyamide insert and used for cell culture and co-culture. We provide detailed description of this arrangement and the methodology used to get it. Cell culture and co-culture analysis: The analysis of cell culture and co-culture provided in this dataset is based on standard microscopic techniques (brightfield microscopy), advanced microscopic techniques (SEM), biochemical methods (MTT and CV assay).

Your (author)

Citable (DOI) + Findable

Accessible + Interoperable

Reusable (licence)

Machine actionable (metadata)

= AI-ready record (dataset)

**VALUABLE SCIENTIFIC RESULT**

ARTS 	AGROFOOD 	AI 	CORPUS 	GENESIS 	OMICS 	ZOOLOGY 	SIMULATIONS 	SENSORS 			
DUNE 	ARCHAEOLOGY 	BIOIMAGING 	<h1>CZECH DATA REPOSITORIES</h1>			SOLAR 	PLANTS 	MAPS AND DATA 			
LINGUISTICS 	ISOARCH 	SOCIAL 				FUNGI 	SENSITIVE SOCIAL DATA 	MOLECULAR BIOPHYSICS 			
BIO/CHEM 	OBSERVATORY 	ARCHAEOVAULT 				IMAGING 	ARCHAEO-MAPS 	BIODIVERSITY 	CRYSTALOGRAPHY 	PLASMA 	PHENOTYPE 
LASER PHYSICS 	LAUEDB 	MATERIALS 				EXPOSOME 	TELESCOPE 	BIBLIOGRAPHY 	BIOPHYSICS 	BIOMONITORING 	REPO CZ 

# NDI Outputs: Tools and Services

- Support for data management planning (DMP).
- Metadata profile management.
- Support for license handling.
- Support for working with persistent identifiers.
- Support for FAIRification of research data.
- Automation of data collection.
- Electronic laboratory notebooks.
- Overall cybersecurity and system compliance.



# Data Access Control

- FAIR Data, “As open as possible, as closed as necessary”.
  - We need precise access control to data, metadata, services.
- Federative system – use your institutional identity, your well-known authentication web page.
  - Effective collaboration across institutions, individuals, ...

Log in with

Masar



Masaryk Memorial Cancer Institute (MMCI)



Masaryk Public Library



Masaryk University



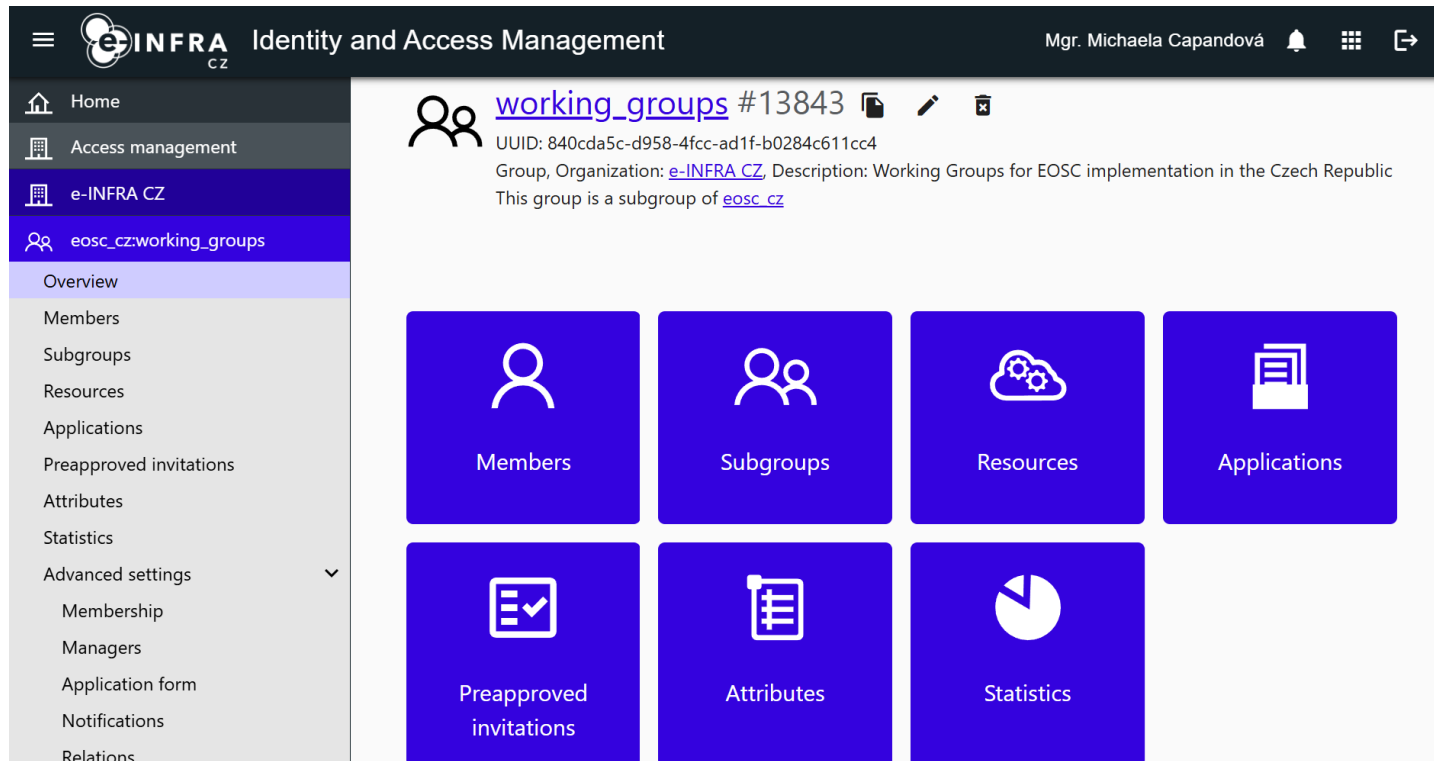
Municipal library T.G. Masaryk Sumperk



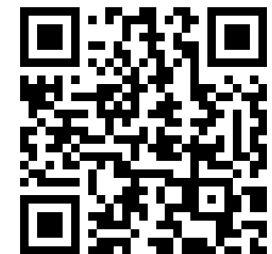


# Authentication and Authorization Infrastructure

Enabling users from different institutions to easily access data and services.



- Access and identity management
- Group and role management
- Permission assignment



<https://perun-aa1.org/>

# SensitiveCloud

Secure environment for storing, sharing  
and processing sensitive data.

- Primarily designed for work with **your own sensitive data**.
- Gradually extended to support **controlled data sharing**.
  - Main technical component for handling sensitive data within NDI.
- Includes **storage, computing** resources and support for ready-to-use web applications.



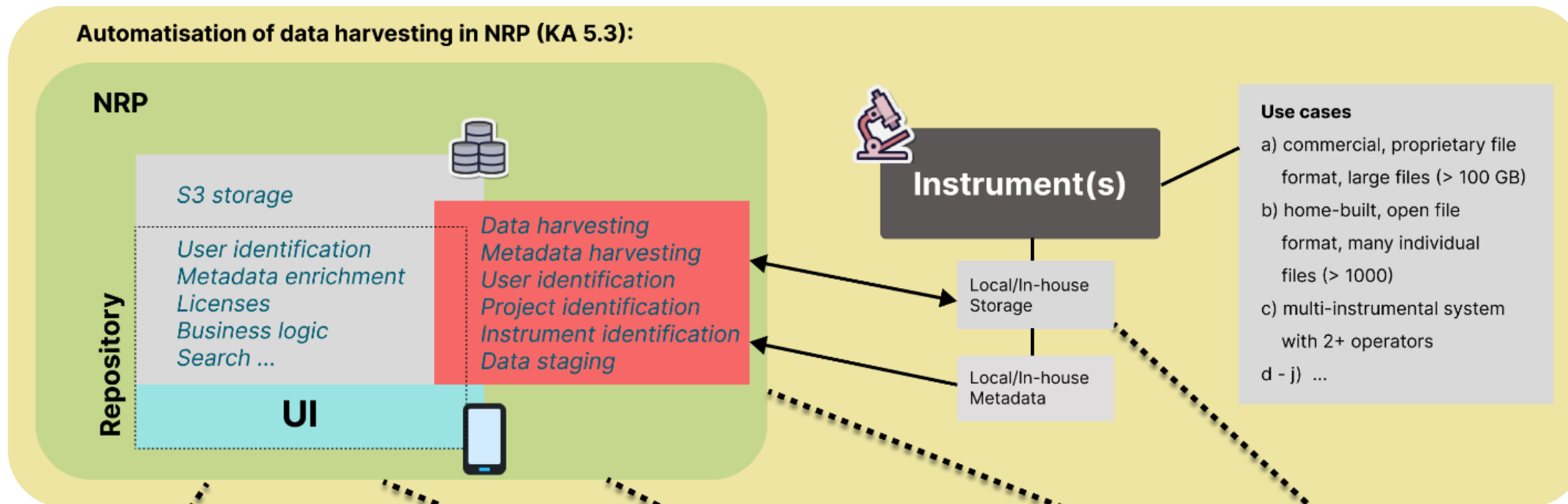
[SensitiveCloud](#)



# eosc Automation of Data and Metadata Collection

**FAIR:** Accessible, Interoperable, Reusable

## Automatisation of data harvesting in NRP (KA 5.3):



- Use cases**
- a) commercial, proprietary file format, large files (> 100 GB)
  - b) home-built, open file format, many individual files (> 1000)
  - c) multi-instrumental system with 2+ operators
  - d - j) ...

**Workflows (KA 5.4):**  
HPC, cloud computing (e.g., Galaxy), ML/AI ... APIs

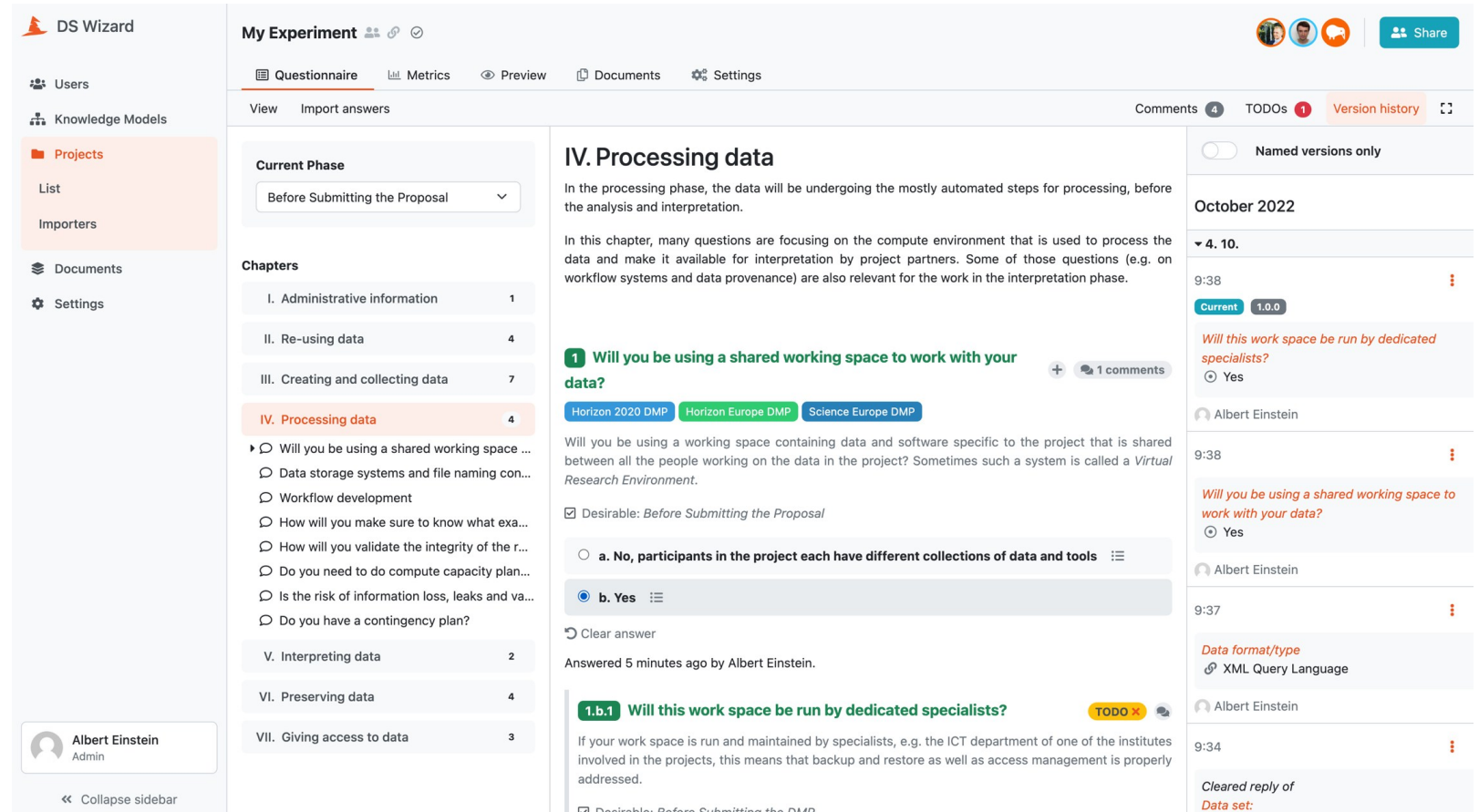
**PIDs (IPs EPSC CZ, CARDS):**  
Ecosystem of PIDs within NDI

**FAIRification (KA 5.1):**  
User checks of data FAIRness

**AAI and licenses (KA 4.2 and 4.3):**  
NRP access control settings  
Licensing

# Support for Data Management Planning

- We expect integration of tools like Data Stewardship Wizard (DSW) directly to the platform.
  - <https://dmp.eosc.cz/>
- Integration allows effective re-use of available (meta)data.



The screenshot displays the DS Wizard interface for a 'My Experiment'. The left sidebar shows navigation options: Users, Knowledge Models, Projects (List, Importers), Documents, and Settings. The main content area is titled 'My Experiment' and includes tabs for Questionnaire, Metrics, Preview, Documents, and Settings. The 'Questionnaire' tab is active, showing a 'Current Phase' dropdown set to 'Before Submitting the Proposal' and a list of 'Chapters' including Administrative information, Re-using data, Creating and collecting data, Processing data (highlighted), Interpreting data, Preserving data, and Giving access to data.

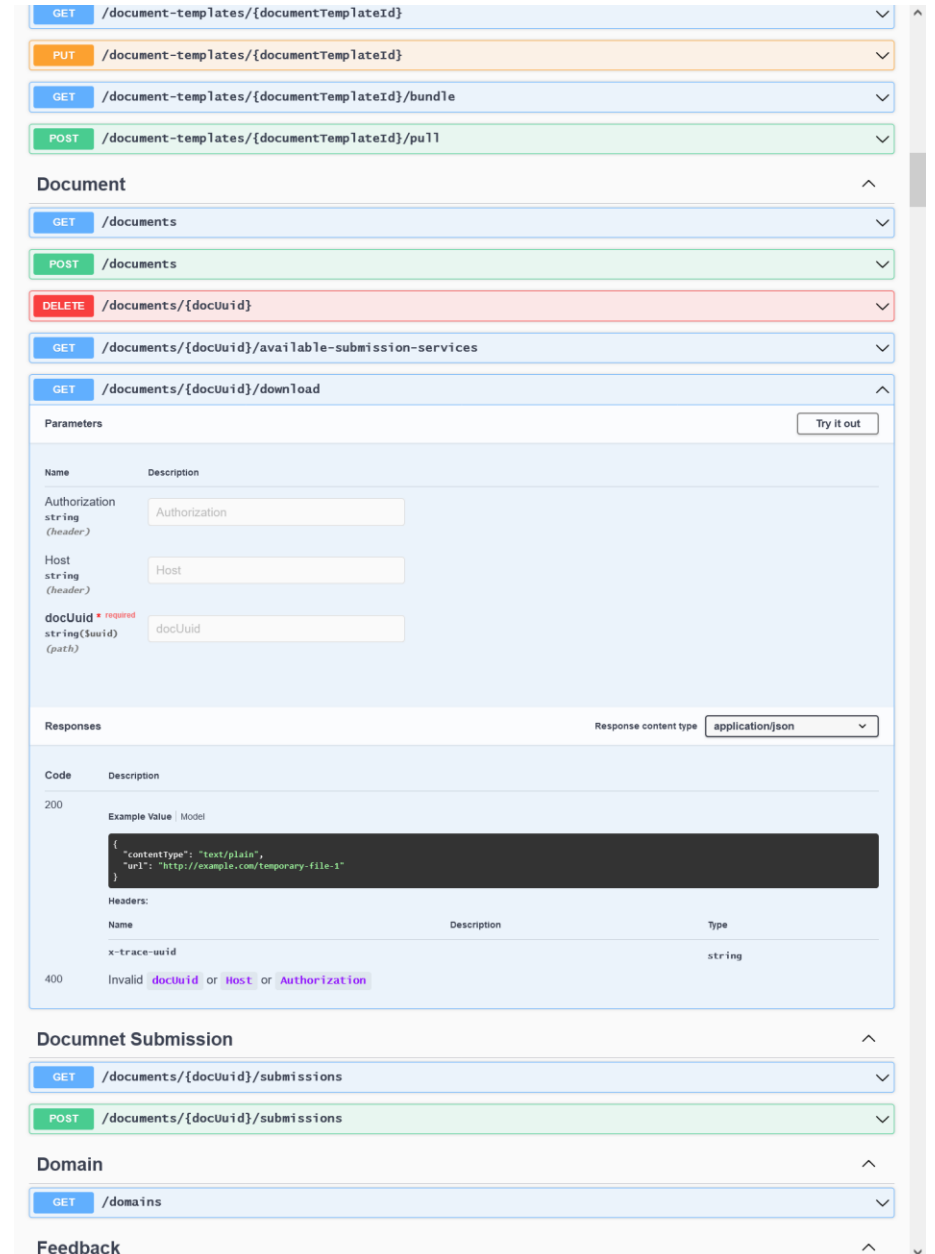
The 'Processing data' chapter is expanded, showing a question: '1 Will you be using a shared working space to work with your data?'. The question text states: 'In the processing phase, the data will be undergoing the mostly automated steps for processing, before the analysis and interpretation. In this chapter, many questions are focusing on the compute environment that is used to process the data and make it available for interpretation by project partners. Some of those questions (e.g. on workflow systems and data provenance) are also relevant for the work in the interpretation phase.' The question has three tags: 'Horizon 2020 DMP', 'Horizon Europe DMP', and 'Science Europe DMP'. The answer options are 'a. No, participants in the project each have different collections of data and tools' and 'b. Yes'. The 'b. Yes' option is selected. A 'Clear answer' button and a 'Desirable: Before Submitting the Proposal' label are also visible.

On the right side of the interface, there is a 'Comments' section for the question, showing a comment from Albert Einstein: 'Will this work space be run by dedicated specialists?' with a 'Yes' response. Below this, there is a 'Version history' section showing a 'Current' version (1.0.0) and a 'Cleared reply of Data set:'.

# Machine-Actionable

FAIR: Findable,  
Accessible,  
Interoperable

- Automate as much as possible.
  - API and machine-readability for data and metadata.
- As much as possible read from metadata of the datasets, from infrastructure configuration, ...

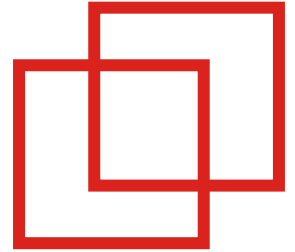


The screenshot displays an API documentation interface with the following sections:

- document-templates/{documentTemplateId}**: GET, PUT, GET (bundle), POST (pull)
- Document**: GET (/documents), POST (/documents), DELETE (/documents/{docUuid}), GET (/documents/{docUuid}/available-submission-services), GET (/documents/{docUuid}/download)
- Parameters**: A table with columns 'Name' and 'Description'.

Name	Description
Authorization string (header)	Authorization
Host string (header)	Host
docUuid * required string (\$uid) (path)	docUuid
- Responses**: Response content type: application/json. A table with columns 'Code' and 'Description'.

Code	Description
200	Example Value   Model <pre>{  "contentType": "text/plain",  "url": "http://example.com/temporary-file-1"}</pre>
400	Invalid docUuid or Host or Authorization
- Documnet Submission**: GET (/documents/{docUuid}/submissions), POST (/documents/{docUuid}/submissions)
- Domain**: GET (/domains)
- Feedback**



# Persistent Identifiers

 **identifikatory.cz**

Persistent Identifiers

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## Persistent Identifiers

Learn more about each persistent identifier (PID). Persistent identifiers are tools that are used to uniquely identify people, organisations, and other objects (e.g., books, articles, datasets) in a scholarly communication system.

**ORCID iD for  
researchers**

**DOI for objects**

**ISBN for books**

**ISSN for periodicals**

**ISMN for notated  
music**

**ROR for  
organizations**

**IGSN for samples**

**Other PIDs**

**NTK**

50°14.083'N, 14°23.26.365'E  
Mánesův technická knihovna  
National Library of Technology



Persistent Identifiers

ORCID iD for researchers  
DOI for objects

Services

National ORCID Centre  
FAQs – ORCID

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<https://identifikatory.cz/en/>

# Support Work with Licenses

- Templates of **deposition licenses** governing the rules for upload of datasets to repositories.
- **License chooser** for users' datasets on upload.
- Framework for dataset's **license-based access control** to dataset with limited access.
- **Integration and machine actionability**.
  - Connection to data management, access control, ...

### Choose a License

Answer the questions or use the search to find the license you want

↻ Start again ← | | →

Is your data within the scope of copyright and related rights?




Yes No

Search for a license...

---

#### Public Domain Dedication (CC Zero)




CC Zero enables scientists, educators, artists and other creators and owners of copyright- or database-protected content to waive those interests in their works and thereby place them as completely as possible in the public domain, so that others may freely build upon, enhance and reuse the works for any purposes without restriction under copyright or database law.

Publicly Available   

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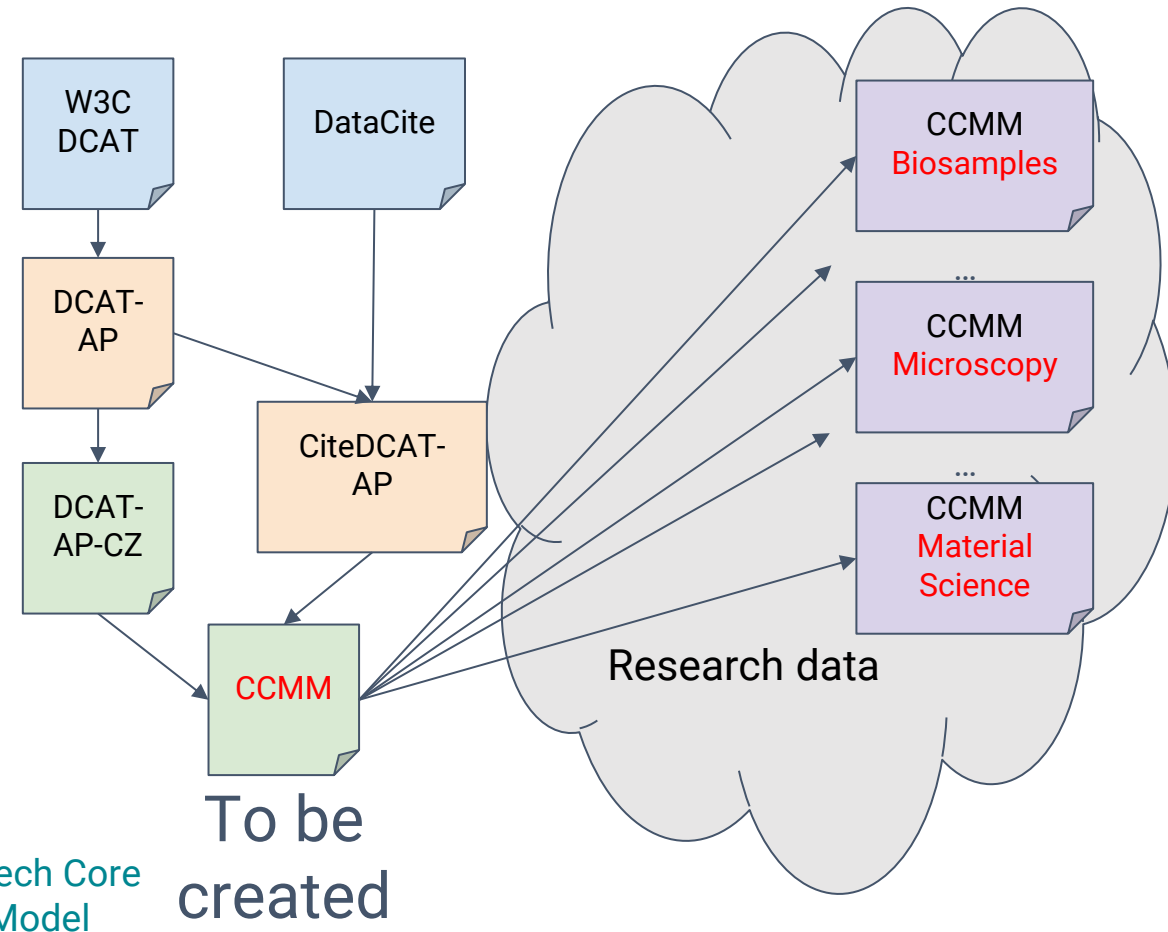
#### Creative Commons Attribution (CC-BY)

This is the standard creative commons license that gives others maximum freedom to do what they want with your work.

Publicly Available   

# Managing Metadata Profiles in NRP

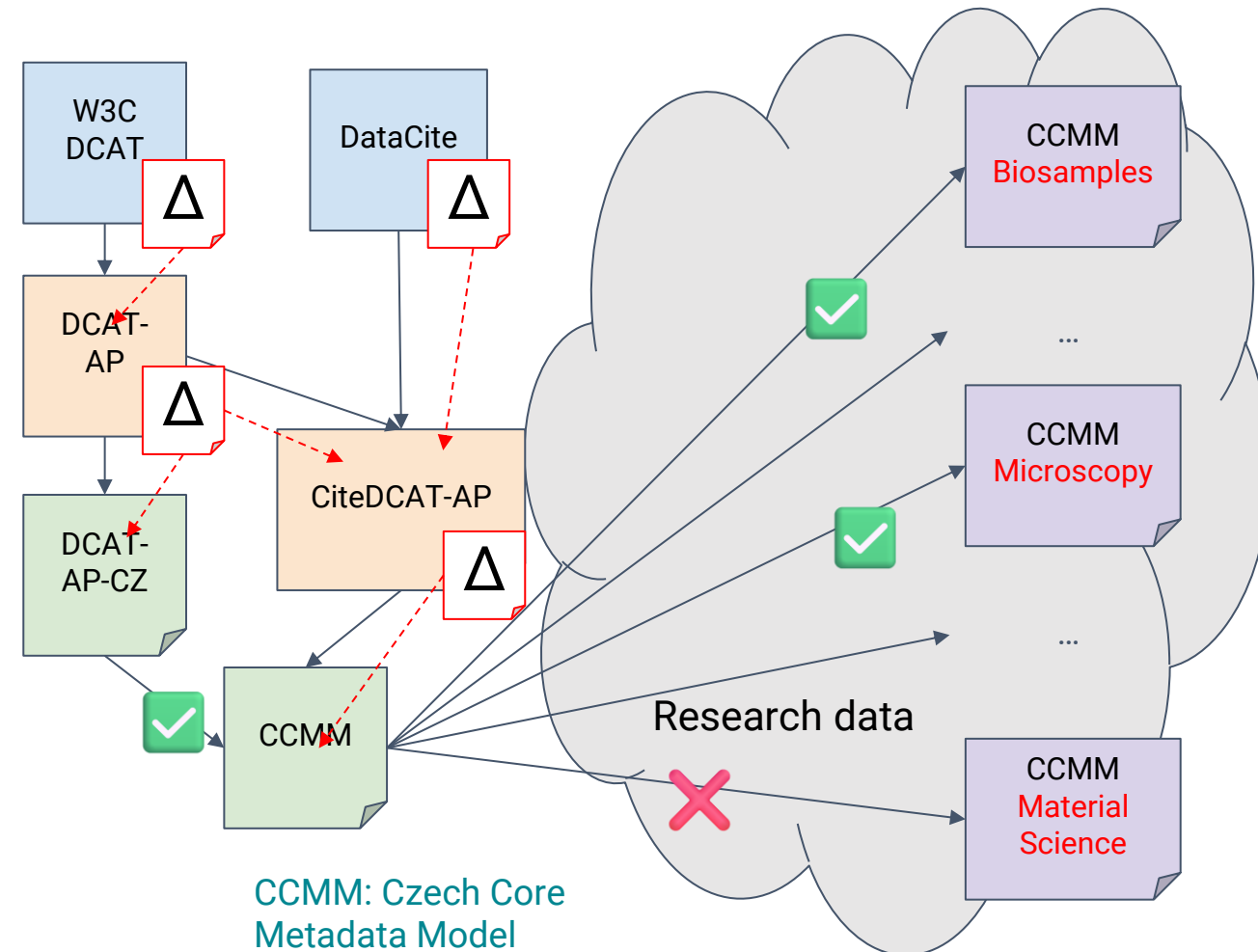
- <https://dataspecer.com/>
- Research data metadata profiles:
  - What happens, when
    - DCAT v2 → DCAT v3?
    - DCAT-AP v2.1.1 → DCAT-AP 3.0.1?
    - DataCite 4.4 → DataCite 4.5?
- We want changes to be propagated automatically.



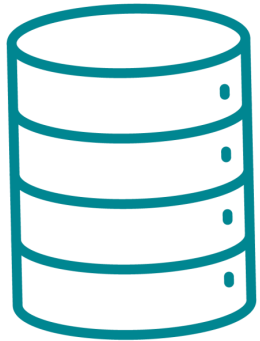


# Managing Metadata Profiles in NRP

- <https://dataspecer.com/>
- But also
  - profile compliance validation (✓ ✗),
  - description of changes in specifications (Δ),
  - change propagation mechanism (----->),
  - implementation in tools.



# NDI Outputs: Summary



**Storage capacities**



**Tools and services**



**Computing capacities**

# Useful Links and Contacts

[EOSC CZ Website](#)



[EOSC CZ Newsletter](#)



- Any questions?
  - [info@eosc.cz](mailto:info@eosc.cz)
- Ideas for a lecture or a training?
  - [events@eosc.cz](mailto:events@eosc.cz)
- Get in touch with our PR
  - [pr@eosc.cz](mailto:pr@eosc.cz)



@EOSC Czech Republic

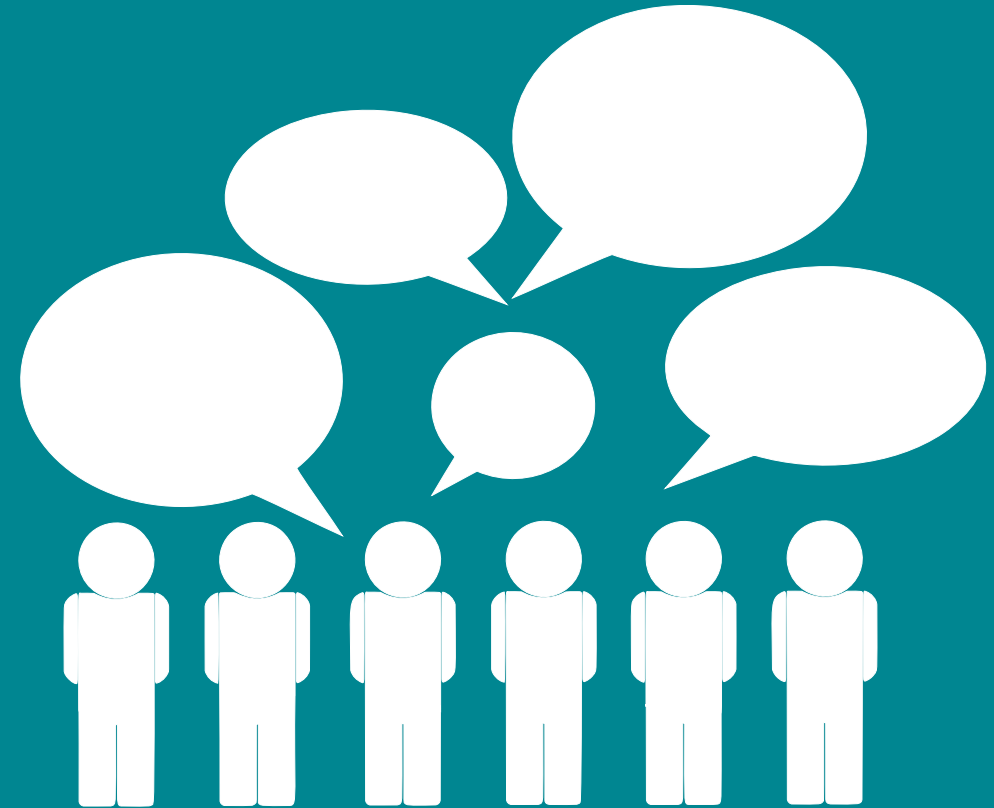


@eosccz.bsky.social

# Thank you for your attention

E: [ruzicka@ics.muni.cz](mailto:ruzicka@ics.muni.cz)

E: [info@eosc.cz](mailto:info@eosc.cz)      W: [www.eosc.cz/en](http://www.eosc.cz/en)



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Evropskou unií



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MLÁDEŽE A TĚLOVÝCHOVY

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