

UNIVERSITY OF BERGEN LIBRARY

# Sharing research data and software - FAIR & FAIR4RS

**Collaborative Software Development Summer School  
Day 7, 27.06.2023**

University of Bergen Library  
Digital Lab  
Jenny Ostrop

UNIVERSITY OF BERGEN



This presentation is available under:

[https://doi.org/  
10.5281/zenodo.8086413](https://doi.org/10.5281/zenodo.8086413)



# The library provides guidance



UNIVERSITY OF BERGEN

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# UiB Library Research Data Team



## Courses and guidance:

- Open Science
- Open Data: why, how and where?
- Data Management Plans
- Finding & reusing research data
- UiB Open Research Data

## More information on our web pages:

Open Access to Research data  
Data Management Plans

**Contact us:** [research-data@uib.no](mailto:research-data@uib.no)

# The library provides guidance



[NTNU - Guidelines for policy for Open Science](#)  
[NTNU - Publish with Open Access](#)  
[Research Data @NTNU](#)



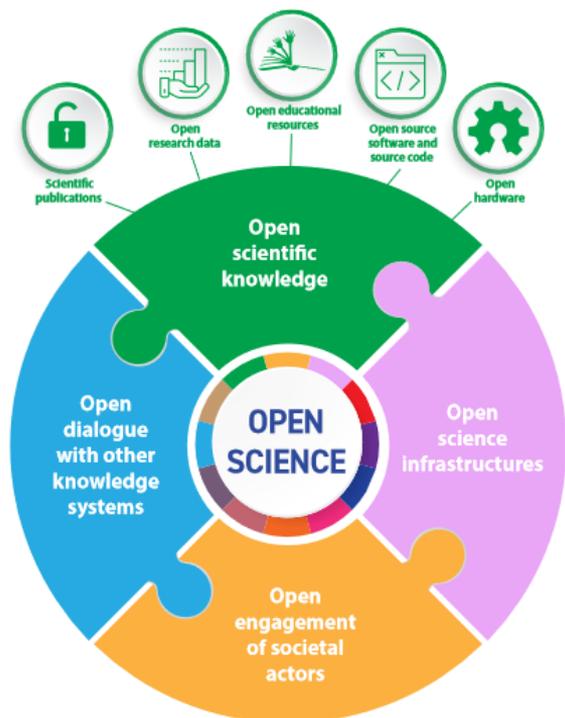
UiO

[UiO - Digital Scholarship Centre](#)



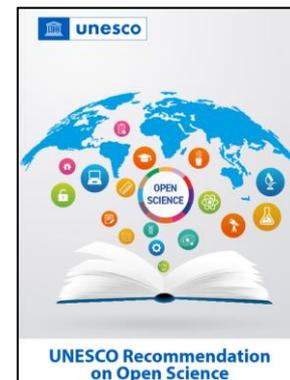
[UiT - Portal for publishing and Open Access](#)  
[UiT – Research Data Portal](#)

# Opening the processes of scientific knowledge creation



*Open scientific knowledge refers to open access to scientific publications, research data, metadata, open educational resources, software, and source code and hardware [...]*

UNESCO Recommendation on Open Science (2021)  
CC BY SA 3.0



# Open Science

Please go to [menti.com](https://menti.com) and use code **3729 3848**



# Open Science Benefits

- Reproducibility
- Efficiency
- New avenues of research



- Faster response to societal challenges
- Trust in science
- Citizen engagement

- Value creation based on open research results
- Open Innovation

# Open Science on the agenda



Norwegian Ministry  
of Education and Research

2017

National goals and guidelines  
for open access to research articles

National strategy on  
access to and sharing  
of research data

2018

The Research Council Policy  
for Open Science

In effect from 2020



EN English

Home > Research and innovation > Strategy > Goals of research and innovation policy > Open Science

## Open Science

An approach to the scientific process that focuses on spreading knowledge as soon as it is available using digital and collaborative technology. Expert groups, publications, news and events.

Horizon Europe 2021



2018

UNESCO Recommendation  
on Open Science

2021

# Open Science – funder requirements



## Horizon Europe:

- Mandatory: Open access to research articles & rights retention.
- Mandatory: FAIR & open research data by default. Data Management Plan.
- Recommended: Early & open sharing of research, Open peer review, Output management beyond research data, Including citizens



## Norwegian Research Council:

- Full and immediate open access to all articles in accordance with Plan S.
- Data are to be shared in keeping with the FAIR principles. Data Management Plan required.



# **Selfish reasons for Open Science Practices**

# Open Science benefits

- Reproducibility enhances trust in science
- Increased visibility & wider audience (inside & outside academia)
- More citations (publications & data sets)
- Collaborations, others can build on your work and credit you
- Early feedback (on pre-registration, preprints etc.)



# Further reading: Open Science Benefits

POINT OF VIEW

## How open science helps researchers succeed

**Abstract** Open access, open data, open source and other open scholarship practices are growing in popularity and necessity. However, widespread adoption of these practices has not yet been achieved. One reason is that researchers are uncertain about how sharing their work will affect their careers. We review literature demonstrating that open research is associated with increases in citations, media attention, potential collaborators, job opportunities and funding opportunities. These findings are evidence that open research practices bring significant benefits to researchers relative to more traditional closed practices.

DOI: [10.7554/eLife.16800](https://doi.org/10.7554/eLife.16800)

ERIN C. MCKIERNAN<sup>1</sup>, PHILIP E. BOURNE, C. TITUS BROWN, STUART BUCK, AMYE KENALL, JENNIFER LIN, DAMON MCDUGALL, BRIAN A. NOSEK, KARTHIK RAM, COURTNEY K. SODERBERG, JEFFREY R. SPIES, KAITLIN THANAY, ANDREW UPDEGROVE, KARA H. WOO AND TAL YARKONI

PERSPECTIVE

## Open science challenges, benefits and tips in early career and beyond

Christopher Allen<sup>1</sup>\*, David M. A. Mehler<sup>1,2</sup>\*

<sup>1</sup> Cardiff University Brain Research Imaging Centre (CUBRIC), Wales, United Kingdom, <sup>2</sup> Department of Psychiatry, University of Muenster, Germany

CAREER FEATURE | 13 May 2019

## Data sharing and how it can benefit your scientific career

Open science can lead to greater collaboration, increased confidence in findings and goodwill between researchers.

PERSPECTIVE

## On the value of preprints: An early career researcher perspective

Sarvenaz Sarabipour<sup>1\*</sup>, Humberto J. Debat<sup>2</sup>, Edward Emmott<sup>3</sup>, Steven J. Burgess<sup>4</sup>, Benjamin Schwessinger<sup>5</sup>, Zach Hensel<sup>6</sup>

<sup>1</sup> Institute for Computational Medicine, Department of Biomedical Engineering, Johns Hopkins University, Baltimore, Maryland, United States of America, <sup>2</sup> Center of Agronomic Research, National Institute of Agricultural Technology (IPAVE-CIAP-INTA), Córdoba, Argentina, <sup>3</sup> Department of Bioengineering, Northeastern University, Boston, Massachusetts, United States of America, <sup>4</sup> Carl R. Woese Institute for Genomic Biology, University of Illinois at Urbana-Champaign, Urbana, Illinois, United States of America, <sup>5</sup> Research School of Biology, The Australian National University, Acton, Australian Capital Territory, Australia, <sup>6</sup> Instituto de Tecnologia Química e Biológica António Xavier, Universidade Nova de Lisboa, Oeiras, Portugal

## A Beginner's Guide to Conducting Reproducible Research

Jesse M. Alston<sup>1,2</sup> and Jessica A. Rick<sup>1,3</sup>

<sup>1</sup>Program in Ecology, University of Wyoming, 1000 East University Avenue, Laramie, Wyoming 82071 USA

<sup>2</sup>Department of Zoology and Physiology, University of Wyoming, 1000 East University Avenue, Laramie, Wyoming 82071 USA

<sup>3</sup>Department of Botany, University of Wyoming, 1000 East University Avenue, Laramie, Wyoming 82071 USA

McKiernan et al. 2016: [10.7554/eLife.16800](https://doi.org/10.7554/eLife.16800)

Allen et al. 2019: <https://doi.org/10.1371/journal.pbio.3000246>

Sarabipour et al. 2019: <https://doi.org/10.1371/journal.pbio.3000151>

Popkin 2019: <https://doi.org/10.1038/d41586-019-01506-x>

Alston et al. 2021: <https://doi.org/10.1002/bes2.1801>

# Agenda

- Open Science – a paradigm shift
- Sharing data: Open & FAIR research data
- Sharing software/code: FAIR for Research Software
- How to make your code citable



# The research data life cycle



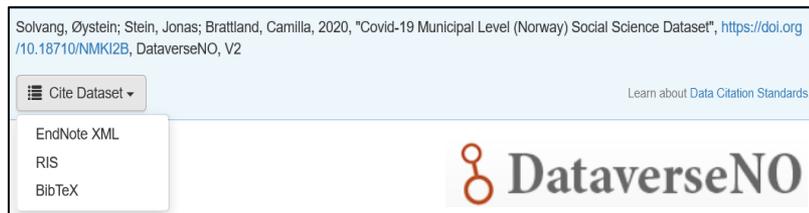
Research projects can:

1. Generate novel data
2. Reuse existing datasets (secondary data)

# Data citation

- Principles: Attribution & Access
  - Joint Declaration of Data Citation Principles (JDDCP)
  - Creative Commons: TASL – Title, Author, Source, License

- Many archives contain information how a dataset should be cited



Solvang, Øystein; Stein, Jonas; Brattland, Camilla, 2020, "Covid-19 Municipal Level (Norway) Social Science Dataset", <https://doi.org/10.18710/NMKI2B>, DataverseNO, V2

Cite Dataset ▾

- EndNote XML
- RIS
- BibTeX

Learn about Data Citation Standards

 **DataverseNO**

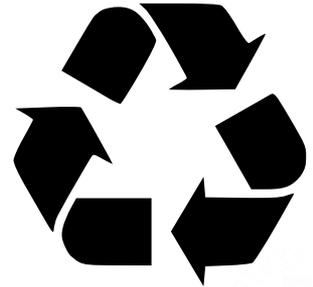
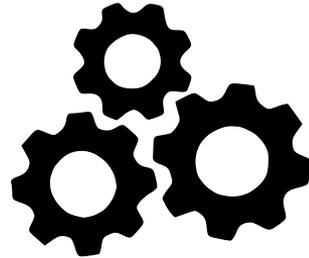
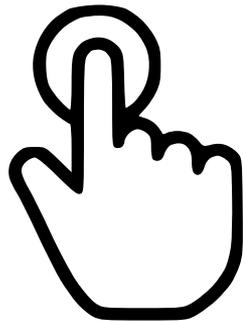
<https://dataverse.no/dataset.xhtml?persistentId=doi:10.18710/NMKI2B>

# Data reuse requirements

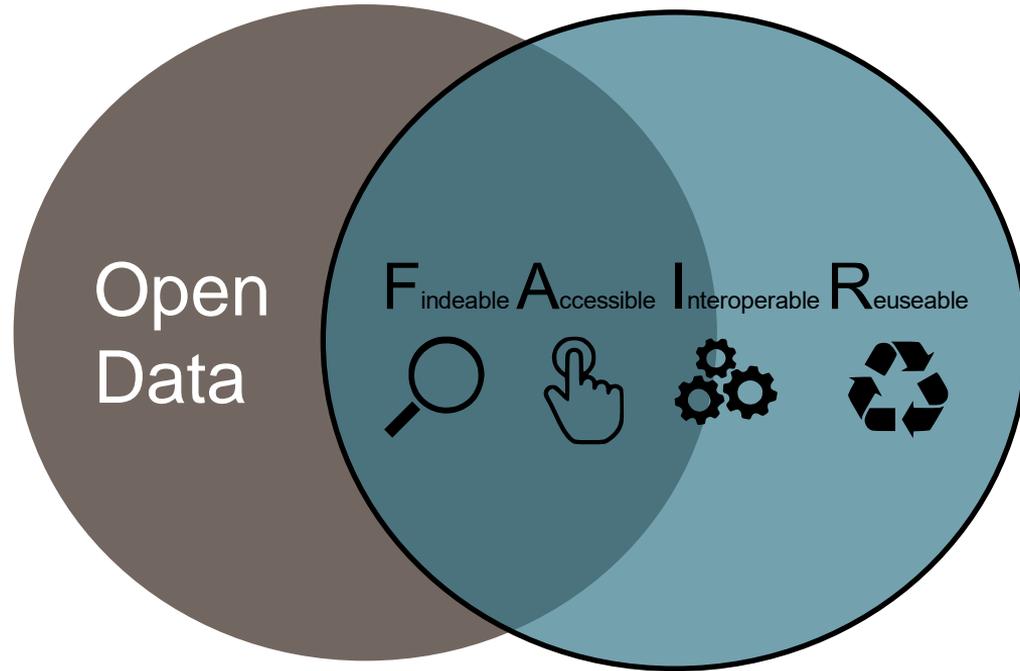
1. Discovering suitable datasets
2. Retrieving the data
  - Scale? Manual, automated, or API-retrieval?
3. Understanding the data
  - Human-readable vs. machine-readable (metadata, data files)
4. Permission to build upon the data

# FAIR: prerequisites for reuse

**F** Findable **A** Accessible **I** Interoperable **R** Reusable



# Open data and FAIR data



**“As open as possible – as closed as necessary”**

# FAIR principles: Findable

**F**indable

- Permanent, unique identifiers (PID) avoid ambiguity



<https://identifiers.org/>

ORCID

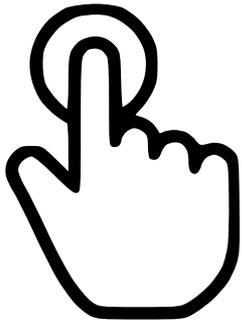


- Rich metadata accompany dataset



# FAIR principles: Accessible

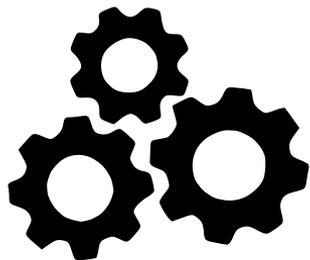
**A**ccessible ➤ Available in “approved” repository/archive



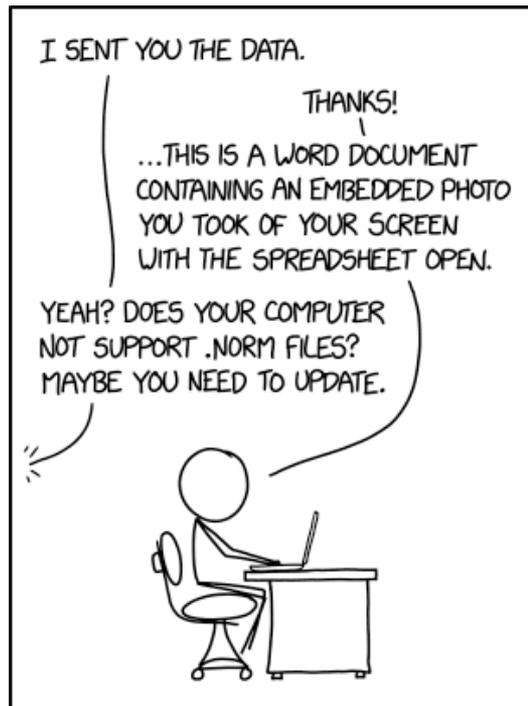
- Methods/tools for access is described and available
- Metadata remain available, even if dataset is deleted

# FAIR principles: Interoperable

## I nteroperable



- Standardized metadata
- Standardized (open) file formats
- Controlled vocabularies
- Cross-referencing





# Agenda

- Open Science – a paradigm shift
- Sharing data: Open & FAIR research data
- Sharing software/code: FAIR for Research Software
- How to make your code citable



# Defining Research Software

*Research software can be anything from a few lines of code written by yourself, to a professionally developed software package.*

UK Research Software Survey 2014



# Defining Research Software

*Software components (e.g. operating systems, libraries, dependencies, packages, scripts etc.) that are used for research but were not created during or with a clear research intent should be considered software in research and not Research Software. This differentiation may vary between disciplines.*

Defining Research Software: a controversial discussion

# Computational reproducibility

*The minimal requirement for achieving computational reproducibility is that all the computational components (Research Software, software used in research, documentation and hardware) used during the research are identified, described, and made accessible to the extent that is possible.*

Defining Research Software: a controversial discussion

# Software is not data

- Software is the result of a creative process that provides a tool for doing something, for example with data.
- Software is executable, while data is not.
- All software applications that are not written completely from scratch are of a composite nature that easily leads to complex dependencies.
- Lifetime of software is generally shorter than that of data, as versioning is applied more frequently and regularly leads to changes in behavior and/or interfaces.

# FAIR for research software

Data Science 3 (2020) 37–59  
DOI 10.3233/DS-190026  
IOS Press

37

## Towards FAIR principles for research software

Anna-Lena Lamprecht <sup>a,\*</sup>, Leyla Garcia <sup>b</sup>, Mateusz Kuzak <sup>c,d</sup>, Carlos Martinez <sup>e</sup>,  
Ricardo Arcila <sup>f</sup>, Eva Martin Del Pico <sup>g</sup>, Victoria Dominguez Del Angel <sup>h</sup>,  
Stephanie van de Sandt <sup>i</sup>, Jon Ison <sup>j</sup>, Paula Andrea Martinez <sup>k</sup>, Peter McQuilton <sup>l</sup>,  
Alfonso Valencia <sup>m,n</sup>, Jennifer Harrow <sup>o</sup>, Fotis Psomopoulos <sup>p</sup>, Josep Ll. Gelpi <sup>q,r</sup>,  
Neil Chue Hong <sup>s,t</sup>, Carole Goble <sup>u</sup> and Salvador Capella-Gutierrez <sup>v,\*\*</sup>

# FAIR4RS principles (2021)

## FAIR Principles for Research Software (FAIR4RS Principles)

FAIR Guiding Principles (2016)	Towards FAIR Principles for research software (2020)	Taking a fresh look at FAIR for research software (2021)	FAIR4RS Principles (2021)
<b>F. Findable</b>			
<p>The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the FAIRification process.</p>	<p>The main concern of findability for research software is to ensure software can be identified unambiguously when looking for it using common search strategies.</p>	<p>The first step in (re)using software is to find it. Metadata and software should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of software, so this is an essential component of the FAIRification process.</p>	<p>The software, and its associated metadata, should be easy to find for both humans and machines.</p>

# FAIR4RS principles (2021)

FAIR Guiding Principles (2016)	Towards FAIR Principles for research software (2020)	Taking a fresh look at FAIR for research software (2021)	FAIR4RS Principles (2021)
<p>F1. (Meta)data are assigned a globally unique and persistent identifier</p>	<p>F1. Software and its associated metadata have a global, unique and persistent identifier for each released version.</p>	<p>F1. Software is assigned a globally unique and persistent identifier</p>	<p>F1. Software is assigned a globally unique and persistent identifier.</p>
			<p>F1.1. Different components of the software must be assigned distinct identifiers representing different levels of granularity.</p>
			<p>F1.2. Different versions of the same software must be assigned distinct identifiers.</p>

# FAIR4RS version 1.0 (2022)

scientific **data**

Date	Version Number	Description	Editor(s)
15/3/2022	1.0	First release of principles <sup>o</sup>	Neil Chue Hong
9/6/2021	0.3	Draft for formal RDA community review	Neil Chue Hong
7/6/2021	0.2.1	Amended abstract and text of F1, F1.1, F1.2, F4 and R1 for review by drafting group	Neil Chue Hong
1/6/2021	0.2	Second draft for review by FAIR4RS Steering Committee	Neil Chue Hong
17/5/2021	0.1	First draft for review by FAIR4RS WG	Neil Chue Hong, Michelle Barker

*o: The pre-1.0 drafts of the FAIR4RS Principles included sections describing the drafting process - these are now published separately.*



OPEN

ARTICLE

## Introducing the FAIR Principles for research software

Michelle Barker<sup>1,2</sup>, Neil P. Chue Hong<sup>2</sup>, Daniel S. Katz<sup>3</sup>, Anna-Lena Lamprecht<sup>4</sup>, Carlos Martinez-Ortiz<sup>5</sup>, Fotis Psomopoulos<sup>6</sup>, Jennifer Harrow<sup>7</sup>, Leyla Jael Castro<sup>8</sup>, Morane Gruenpeter<sup>9</sup>, Paula Andrea Martinez<sup>10</sup> & Tom Honeyman<sup>11</sup>

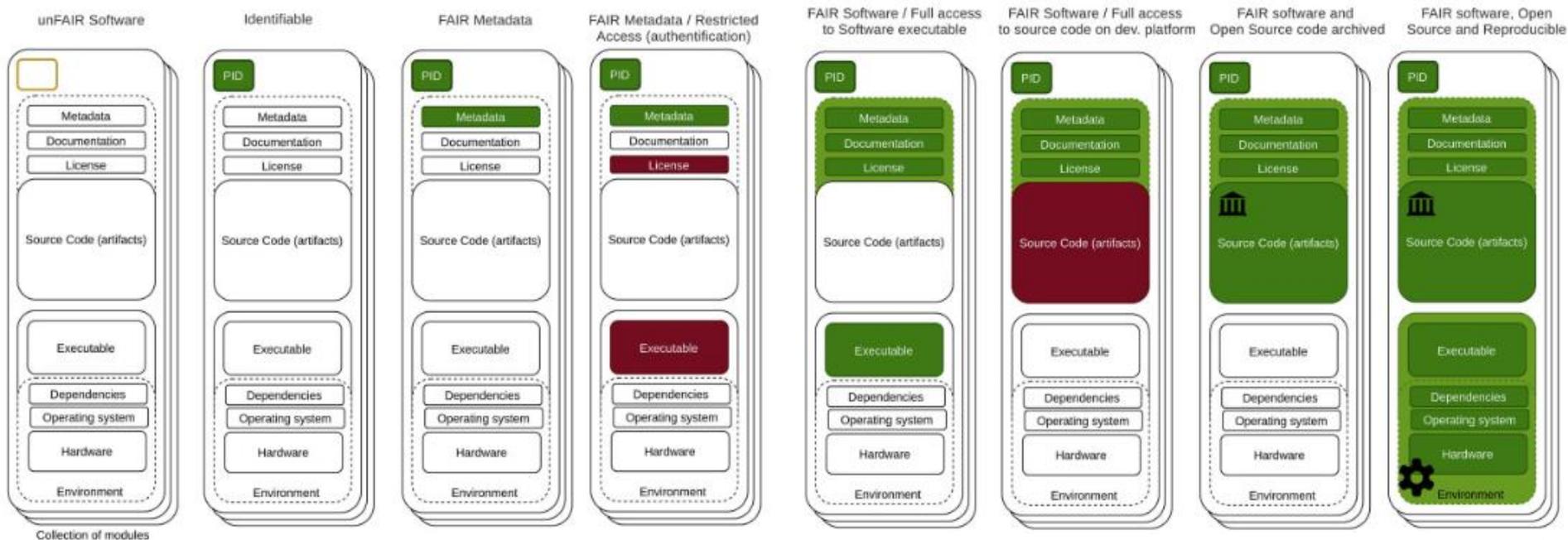
Barker et al. October 2022

<https://doi.org/10.1038/s41597-022-01710-x>



# Software as FAIR research objects

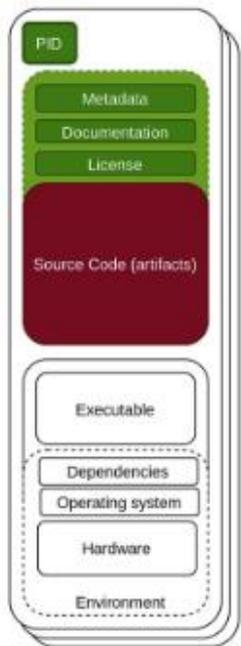
## FAIRness



# Required steps

e.g.  GitHub

FAIR Software / Full access  
to source code on dev. platform



Public repository with version control



Software license: [choosealicense.com](https://choosealicense.com)



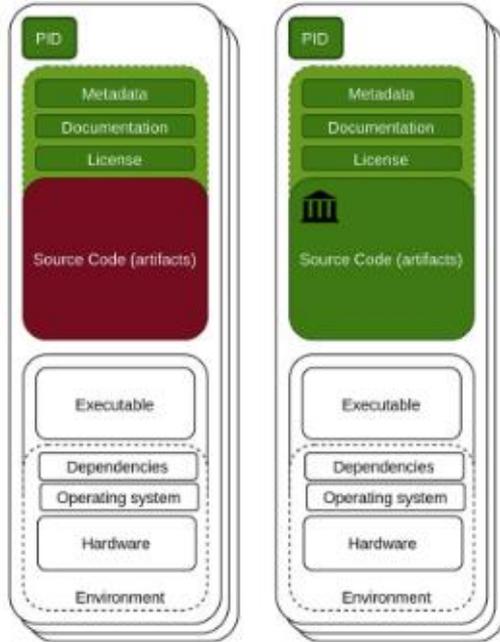
# Required steps

e.g.  GitHub



FAIR Software / Full access  
to source code on dev. platform

FAIR software and  
Open Source code archived



Public repository with version control



Software license: [choosealicense.com](https://choosealicense.com)



Archive code & enable citation  
**next on the agenda**



# Required steps

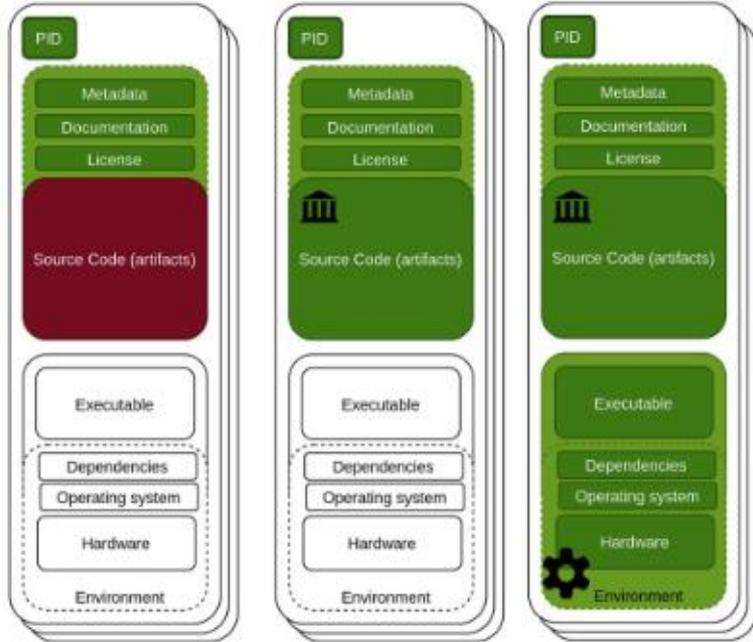
e.g.  GitHub



FAIR Software / Full access  
to source code on dev. platform

FAIR software and  
Open Source code archived

FAIR software, Open  
Source and Reproducible



Public repository with version control



Software license: [choosealicense.com](https://choosealicense.com)



Archive code & enable citation  
**next on the agenda**



Recording of dependencies and  
environments



Software quality measures

# Agenda

- Open Science – a paradigm shift
- Sharing data: Open & FAIR research data
- Sharing software/code: FAIR for research software
- How to make your code citable



# Make your code citable

- Your code will be archived and get a Digital Object Identifier (DOI)
  - Makes it easy to use your code and give you **credit**
  - Improves findability of your code
  - Encourages others to build on your work
  - Allows reproducibility and transparency



# Archives for research software



Software Heritage

Category Archives

## Zenodo

Global multidisciplinary repository

**Type**  
Public

**Legal status**  
Service in organisation

**Geographical scope**  
International

**Content scope**  
Global

**Year of creation**  
2013

**Software projects handled**  
44,086  
(more than 101K versions)

**Source code archival**  
Own storage

**Supported identifiers**

**Estimated resources**  
FTE:4

**Software infrastructure**  
Licence: open source (MIT)  
Data access: open API

**Policy support (optional)**  
International endorsement

**Website**  
zenodo.org

Category Archives

## Software Heritage

Universal software archive

**Type**  
Private not for profit

**Legal status**  
Hosted organisation

**Geographical scope**  
International

**Content scope**  
Global

**Year of creation**  
2015

**Software projects handled**  
140 Million

**Source code archival**  
Own storage plus mirror network

**Supported identifiers**

**Estimated resources**  
Current: 14 FTE,  
1,600,000€/year  
Target: 50 FTE,  
10,000,000€/year

**Software infrastructure**  
Licence: open source  
Data access: open API

**Policy support (optional)**  
National Plan for Open Science (France)  
Agreement with UNESCO

**Website**  
softwareheritage.org

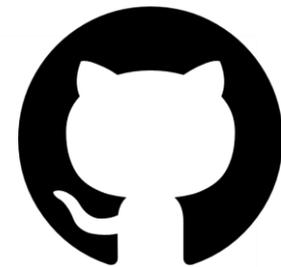
**Demo Video** <https://www.youtube.com/watch?v=8nISvYh7Vpl>

**Reference Publications**  
(Di Cosmo, 2020) doi:10.1007/978-3-030-52200-1\_36  
(Abramatic et al., 2018b) doi:10.1145/3183558

# Release on Zenodo step-by-step

- *Based on the CERN infrastructure.*
- *“Built and developed by researchers, to ensure that everyone can join in Open Science.”*





# The convenient way: Start with a GitHub repository

- To transfer an external repository to GitHub: use dialogue new repository >> import project

## Import your project to GitHub

Import all the files, including revision history, from another version control system.

Required fields are marked with an asterisk (\*).

Support for importing Mercurial, Subversion and Team Foundation Version Control (TFVC) repositories will end on October 17, 2023. For more details, see the [changelog](#).

### Your old repository's clone URL \*

Learn more about the types of [supported VCS](#).

### Your new repository details

Owner \*

Repository name \*

✔ awesome\_example is available.

 **Public**

Anyone on the internet can see this repository. You choose who can commit.

 **Private**

You choose who can see and commit to this repository.

 You are creating a public repository in your personal account.

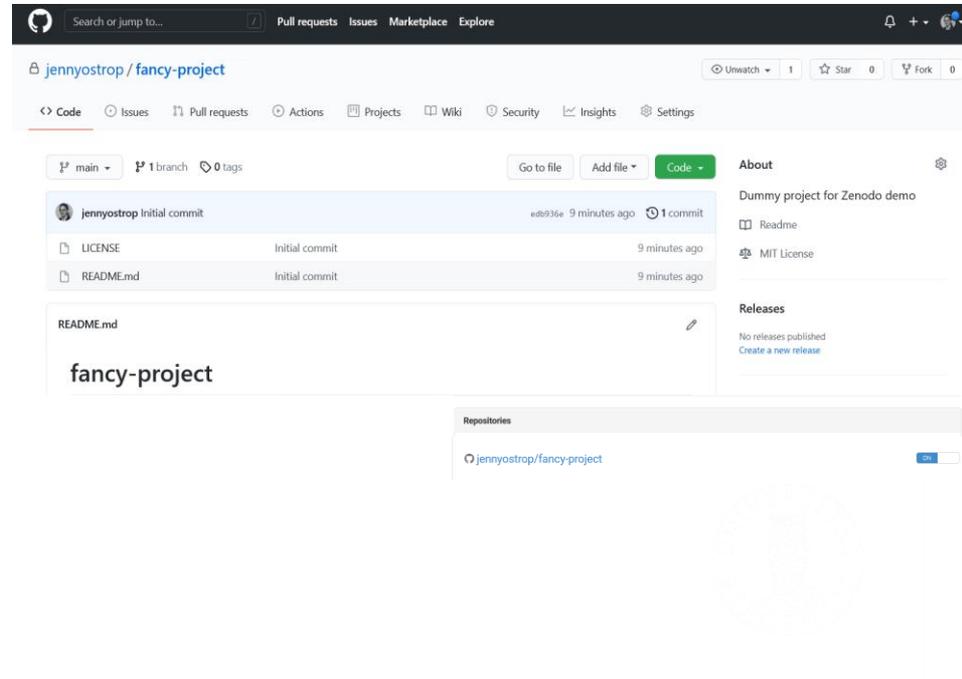
[Cancel](#)

[Begin import](#)

# GitHub release on Zenodo step-by-step

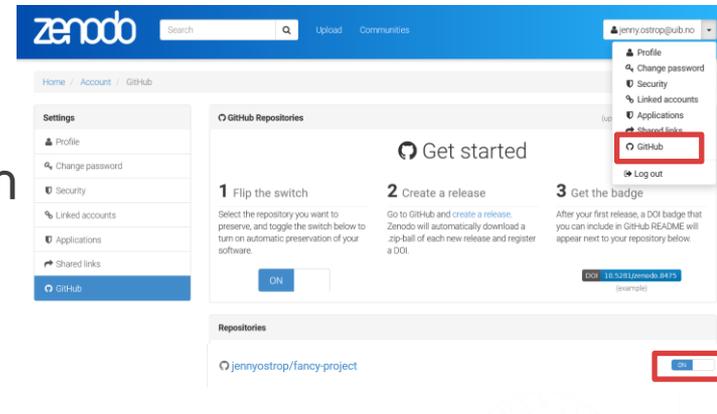


1. Create GitHub project  
(must be public)



# GitHub release on Zenodo step-by-step

1. Create GitHub project
2. Login to Zenodo (first time: authorize GitHub), choose GitHub in dropdown, select project to release & toggle switch

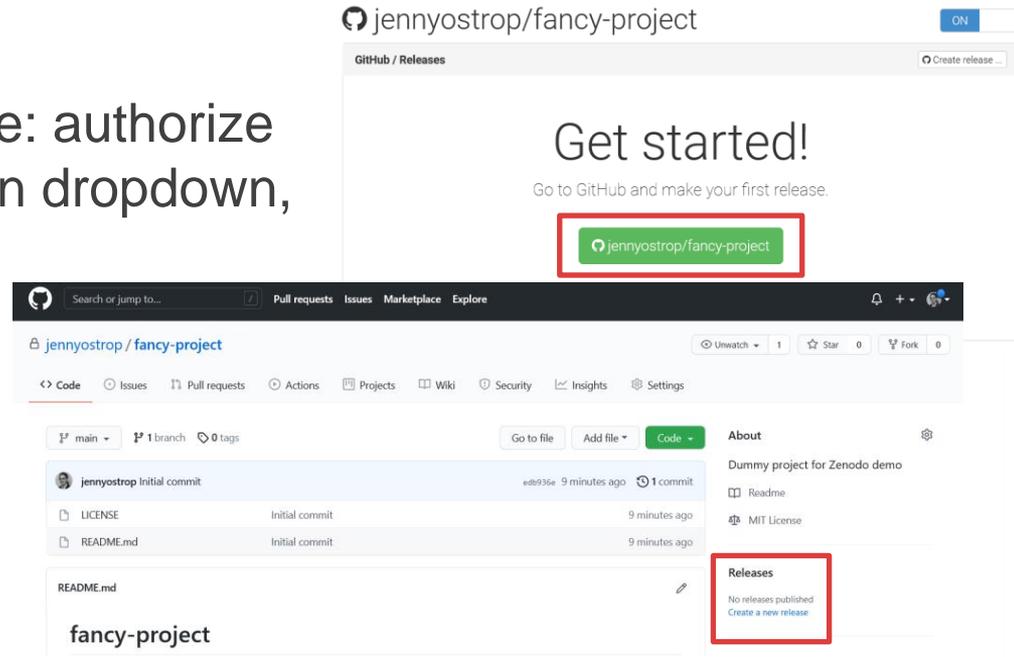


For testing:

<https://sandbox.zenodo.org>

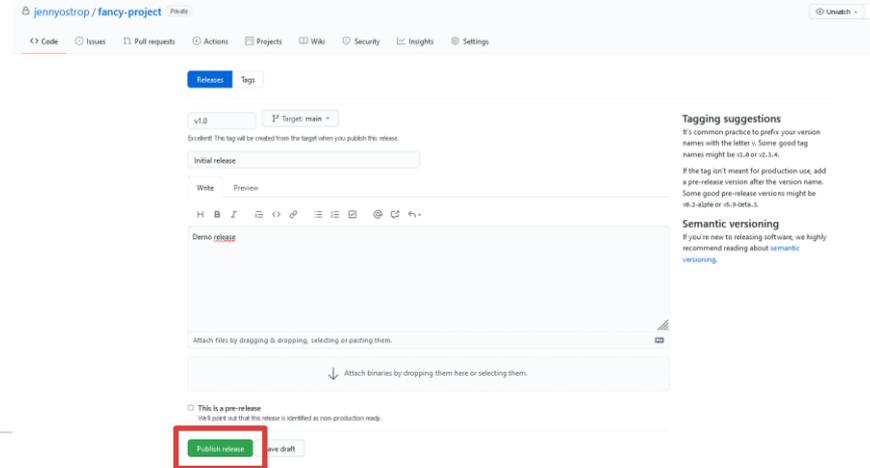
# GitHub release on Zenodo step-by-step

1. Create GitHub project
2. Login to Zenodo (first time: authorize GitHub), choose GitHub in dropdown, select project to release
3. In Github, create release



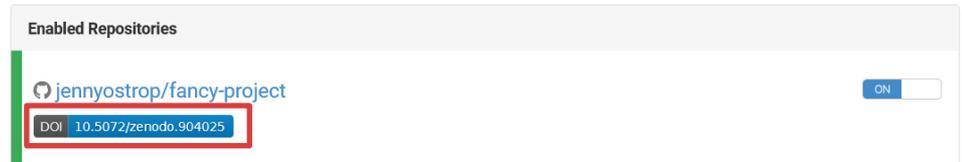
# GitHub release on Zenodo step-by-step

1. Create GitHub project
2. Login to Zenodo (first time: authorize GitHub), choose GitHub in dropdown, select project to release
3. In Github, create release
4. In Github, publish release



# GitHub release on Zenodo step-by-step

1. Create GitHub project
2. Login to Zenodo (first time: authorize GitHub), choose GitHub in dropdown, select project to release
3. In Github, create release
4. In Github, publish release  
>> release on zenodo  
will get doi



# GitLab: gitlab2zenodo

- UiB GitLab Community Edition:  
[https://git.app.uib.no/users/sign\\_in](https://git.app.uib.no/users/sign_in)



- ESCAPE OSSR library:  
[https://escape2020.pages.in2p3.fr/wp3/eosr/gitlab\\_to\\_zenodo.html](https://escape2020.pages.in2p3.fr/wp3/eosr/gitlab_to_zenodo.html)



- gitlab2zenodo (beta):  
<https://pypi.org/project/gitlab2zenodo/>

gitlab2zenodo 0.0b2

```
pip install gitlab2zenodo
```





# **Adding metadata and other relevant information**

- *Accompanying information in a structured, standardized format*

# If you are citing software

- Minimal requirement: Creator(s), Title, Publication venue, Date, Identifier
- Recommended: Version, Type

Developer, A. A., Developer, B. B., & Developer, C. C. (yyyy)<sup>1</sup>. *Title of the software: Subtitle (Version #.#)*<sup>2</sup> [Computer software]<sup>3</sup>. Publisher<sup>4</sup>, <https://URL><sup>5</sup>

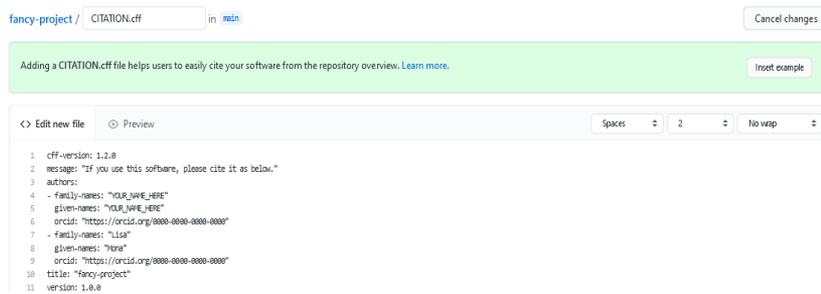
Developer, A. A., Developer, B. B., & Developer, C. C. (yyyy). *Title of the software: Subtitle* [Computer software].  
Archive Name. Retrieved Month dd, yyyy, from <https://URL>

# Citation information visibility

## 1. Add & fill out GitHub CITATION.cff template

>> import in Zenodo (add pre-release!)

>> supported by Zotero



```
fancy-project / CITATION.cff in main Cancel changes
Adding a CITATION.cff file helps users to easily cite your software from the repository overview. Learn more. Inset example
<> Edit new file Preview Spaces 2 No wrap
1 cff-version: 1.2.0
2 message: "If you use this software, please cite it as below."
3 authors:
4 - family-names: "YOUR_NAME_HERE"
5   given-names: "YOUR_NAME_HERE"
6   orcid: "https://orcid.org/0000-0000-0000-0000"
7 - family-names: "Lisa"
8   given-names: "Ivana"
9   orcid: "https://orcid.org/0000-0000-0000-0000"
10 title: "fancy-project"
11 version: 1.0.0
```

## 2. Add doi-button to GitHub README (copy & paste from Zenodo)



DOI Badge

This badge points to the latest released version of your repository. If you want a DOI badge for a specific release, please follow the DOI link for one of the specific releases and grab badge from the archived record.

Markdown

```
[! [DOI] (https://sandbox.zenodo.org/badge/399225621.svg)](https://sandbox.zenodo.org/badge/399225621.svg)
```

reStructuredText

```
.. image:: https://sandbox.zenodo.org/badge/399225621.svg
   :target: https://sandbox.zenodo.org/badge/latestdoi/399225621
```

HTML

3

# CITATION.cff

## What is a CITATION.cff file?

`CITATION.cff` files are plain text files with human- and machine-readable citation information for software (and datasets). Code developers can include them in their repositories to let others know how to correctly cite their software.

This is an example of a simple `CITATION.cff` file:

```
cff-version: 1.2.0
message: "If you use this software, please cite it as below."
authors:
  - family-names: Druskat
    given-names: Stephan
    orcid: https://orcid.org/0000-0003-4925-7248
title: "My Research Software"
version: 2.0.4
doi: 10.5281/zenodo.1234
date-released: 2021-08-11
```



# CFFinit – CITATION.cff generator

CFFINIT

[REPORT AN ISSUE](#) [DOCUMENTATION](#)

Basic Information  
required

## Basic information

Indicate whether your work is a software or a dataset, give it a title, and optionally change the default message.

Authors  
required

Identifiers  
optional

Related Resources  
optional

Abstract  
optional

Keywords  
optional

License  
optional

Version Specific  
optional

Extra Cff Fields  
optional

Finish

Type of the work ⓘ

Software  Dataset

Title of the software (required)  
awesome\_example ⓘ

Personalized message. Leave blank to use default ⓘ

Finish

Next

CITATION.cff preview

```
# This CITATION.cff file was generated with cffinit.  
# Visit https://bit.ly/cffinit to generate yours today!
```

```
cff-version: 1.2.0  
title: awesome_example  
message: >
```

```
If you use this software, please cite it using the  
metadata from this file.
```

```
type: software
```

```
authors:
```

```
- given-names: Ostrop  
  family-names: Jenny  
  email: jenny.ostrop@uib.no  
  affiliation: University of Bergen  
  orcid: 'https://orcid.org/0000-0003-2752-8377'
```

✓ Your CITATION.cff is valid

Download

# CodeMeta: metadata for software

*What metadata you want from software is determined by your use case. [...]*

*Different software repositories, software languages and scientific domains denote this information in different ways, which makes it difficult or impossible for tools to work across these different sources without losing valuable information along the way.*

# CodeMeta: metadata for software

## CodeMeta

---

[gitter](#) [join chat](#) [build](#) [passing](#) [doi: 10.5063/SCHEMA/CODEMETA-2.0](#)

[CodeMeta contributors](#) are creating a minimal metadata schema for science software and code, in JSON and XML. The goal of CodeMeta is to create a concept vocabulary that can be used to standardize the exchange of software metadata across repositories and organizations. CodeMeta started by comparing the software metadata used across multiple repositories, which resulted in the [CodeMeta Metadata Crosswalk](#). That crosswalk was then used to generate a set of software metadata concepts, which were arranged into a JSON-LD context for serialization.



# CodeMeta generator

## CodeMeta generator

Most fields are optional. Mandatory fields will be highlighted when generating Codemeta.

<b>The software itself</b>	<b>Discoverability and citation</b>	<b>Development community / tools</b>
<b>Name</b> <input type="text" value="My Software"/> the software title	<b>Unique identifier</b> <input type="text" value="10.151.00000"/> such as ISBNs, GTIN codes, UUIDs etc. <a href="http://schema.org/identifier">http://schema.org/identifier</a>	<b>Code repository</b> <input type="text" value="git+https://github.com/You/RepoName.git"/>
<b>Description</b> <input type="text" value="My Software computes ephemerides and orbit propagation. It has been developed from early '80."/>	<b>Application category</b> <input type="text" value="Astronomy"/>	<b>Continuous integration</b> <input type="text" value="https://travis-ci.org/You/RepoName"/>
	<b>Keywords</b> <input type="text" value="ephemerides, orbit, astronomy"/>	<b>Issue tracker</b> <input type="text" value="https://github.com/You/RepoName/issues"/>
		<b>Related links</b>

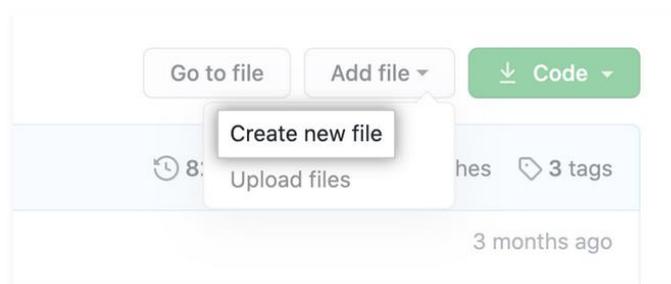
- CodeMeta2zenodo: [https://escape2020.pages.in2p3.fr/wp3/ossr-pages/page/contribute/publish\\_overview/](https://escape2020.pages.in2p3.fr/wp3/ossr-pages/page/contribute/publish_overview/)

# Code of conduct

## Contributor guidelines

- [CODE\\_OF\\_CONDUCT.md](#): define community standards, signal a welcoming and inclusive project, and outline procedures for handling abuse
- [CONTRIBUTING.md](#): create guidelines to communicate how people should contribute to your project

- 1 On GitHub.com, navigate to the main page of the repository.
- 2 Above the list of files, using the **Add file** drop-down, click **Create new file**.



# Further resources – sharing data & code



[openscience.no](https://openscience.no)  
incl. event calendar



[CESSDA Data Management  
Expert Guide](#)



[The Turing Way - Guide  
for Reproducible Research](#)



[PhD on Track -  
Open Science](#)



[ELIXIR RDMkit](#)



[The Carpentries](#)

# Further resources – sharing code

- [RDA - FAIR for Research Software \(FAIR4RS\) WG](#)
- [Hettrick et al. 2014, UK Research Software Survey 2014](#)
- [Gruenpeter et al. 2021, Defining Research Software: a controversial discussion](#)
- [Lamprecht et al. 2019, Towards FAIR principles for research software](#)
- [Katz et al. 2021, Taking a fresh look at FAIR research software](#)
- [Chue Hong et al. 2021, FAIR principles for Research Software](#)
- [Chue Hong et al. 2022, FAIR principles for Research Software \(FAIR4RS Principles\) \(1.0\)](#)
- [Barker et al. 2022, Introducing the FAIR principles for research software](#)
- [4OSS recommendations: Recommendations to encourage best practices in research software](#)
- [Five recommendations for FAIR software](#)
- [Katz et al. 2021, Recognizing the value of software: a software citation guide](#)
- [Chue Hong et al. 2019, Software Citation Checklist for Developers](#)
- [EOSC Executive Board Working Group - Scholarly infrastructures for research software](#)
- [Software Sustainability Institute – FAIR Software](#)
- [Library Carpentry: FAIR Data and Software – Software](#)
- [LibraryCarpentry - Research Software](#)
- [SoftwareCarpentry – Open Science](#)
- [CodeRefinery - Reproducible Research: Sharing code and data](#)



# Optional task(s) before lunch

- When should a repository be released? Which license will you apply? Discuss in your groups.
  - Create a CITATION.cff and/or CodeMeta file for your group project
  - Release a repository on [sandbox.zenodo.org](https://sandbox.zenodo.org)
  - Discuss whether you would like to add CODE\_OF\_CONDUCT.md or CONTRIBUTING.md guidelines for your project
-



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@DLabUiB

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