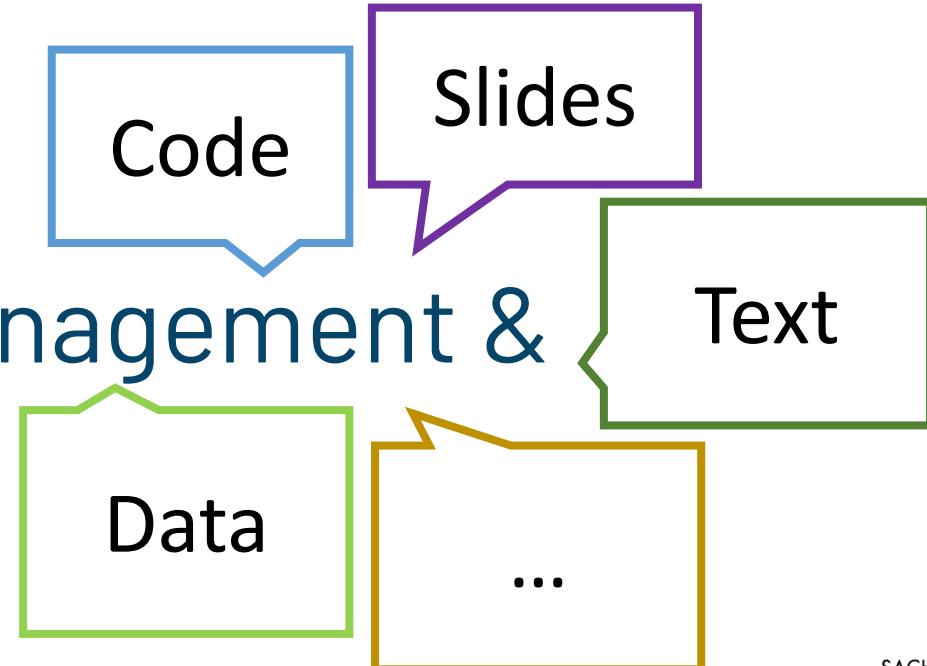


# Research Data Management & Open Science

## Robert Haase



GEFÖRDERT VOM



Bundesministerium  
für Bildung  
und Forschung



Diese Maßnahme wird gefördert durch die Bundesregierung  
aufgrund eines Beschlusses des Deutschen Bundestages.  
Diese Maßnahme wird mitfinanziert durch Steuermittel auf  
der Grundlage des von den Abgeordneten des Sächsischen  
Landtags beschlossenen Haushaltes.

# Quiz

- When you shared materials over the internet, which *platform* did you use?

Onedrive/Google  
cloud/Dropbox/etc.

Zenodo/Figshare/  
arxiv/F1000

Email

Other



# Quiz

- When you shared materials over the internet, which *license* did you use?

None



Public  
Domain



Creative  
Commons



BSD/GPL/  
MIT/...



# Closed science

Why are some science-related materials/data/code not shared?

- Risk of being scooped
- Fear of blaming oneself (imposter syndrome)
- Lack of awareness (who is allowed to publish *my work*?)
- Assumption: it's not worth the effort.



# Open Science

- Research related  
**(hot topics)**
- Often tailored towards  
**general audience**  
(science communication)
- Earliest at the time a  
manuscript is published  
(e.g. as preprint)

# Open Training

- Routine tasks  
**(colder topics)**
- Transfer of  
**domain-specific**  
knowledge



Image AI-generated using Dall-E

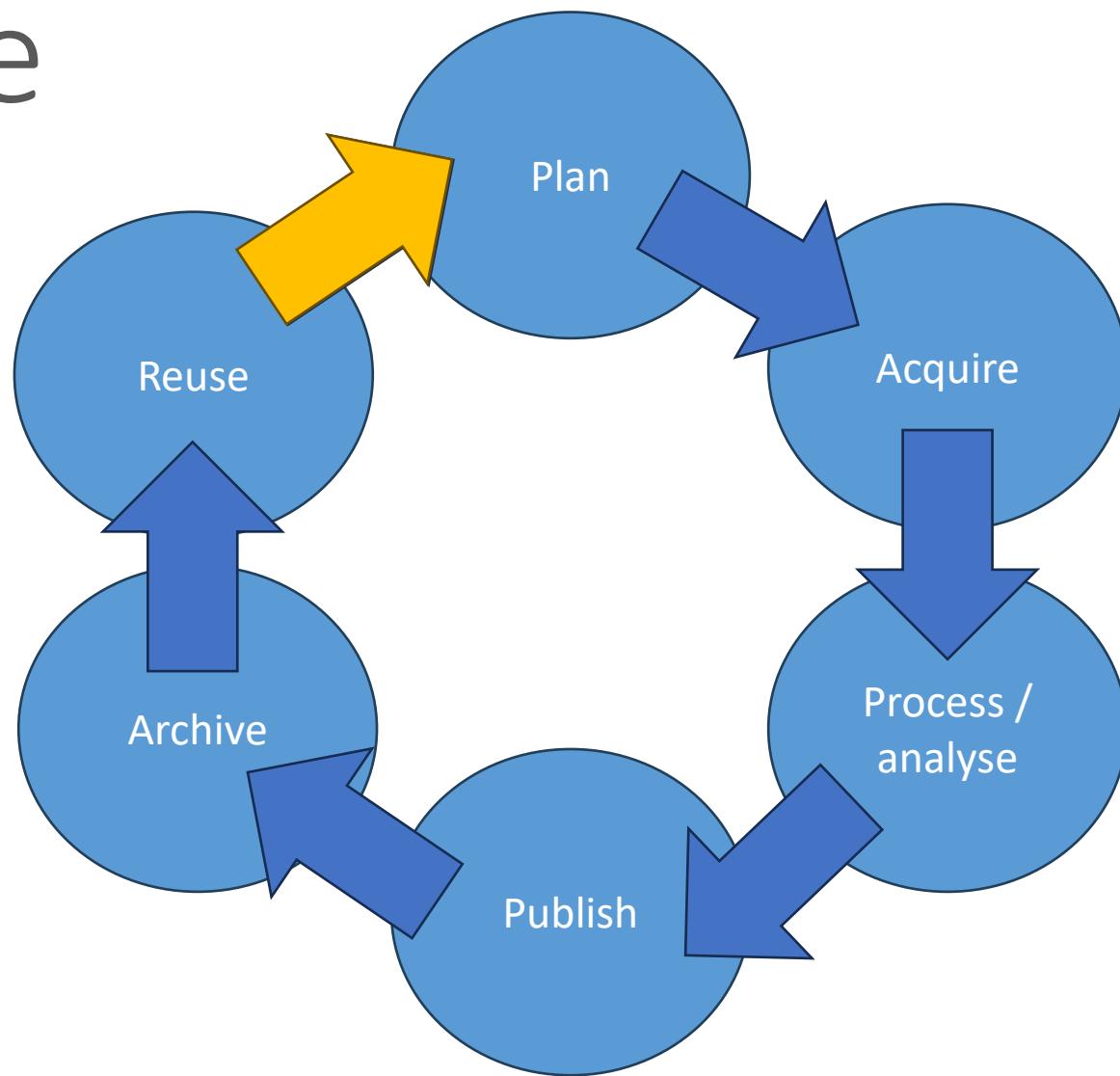
# [Research] Data Management (RDM)

- All activities, processes, terms, persons which have relationships with data
  - Processing
  - Storage
  - Organization
  - Publication
  - ...
- In routine: working with data



# RDM Life Cycle

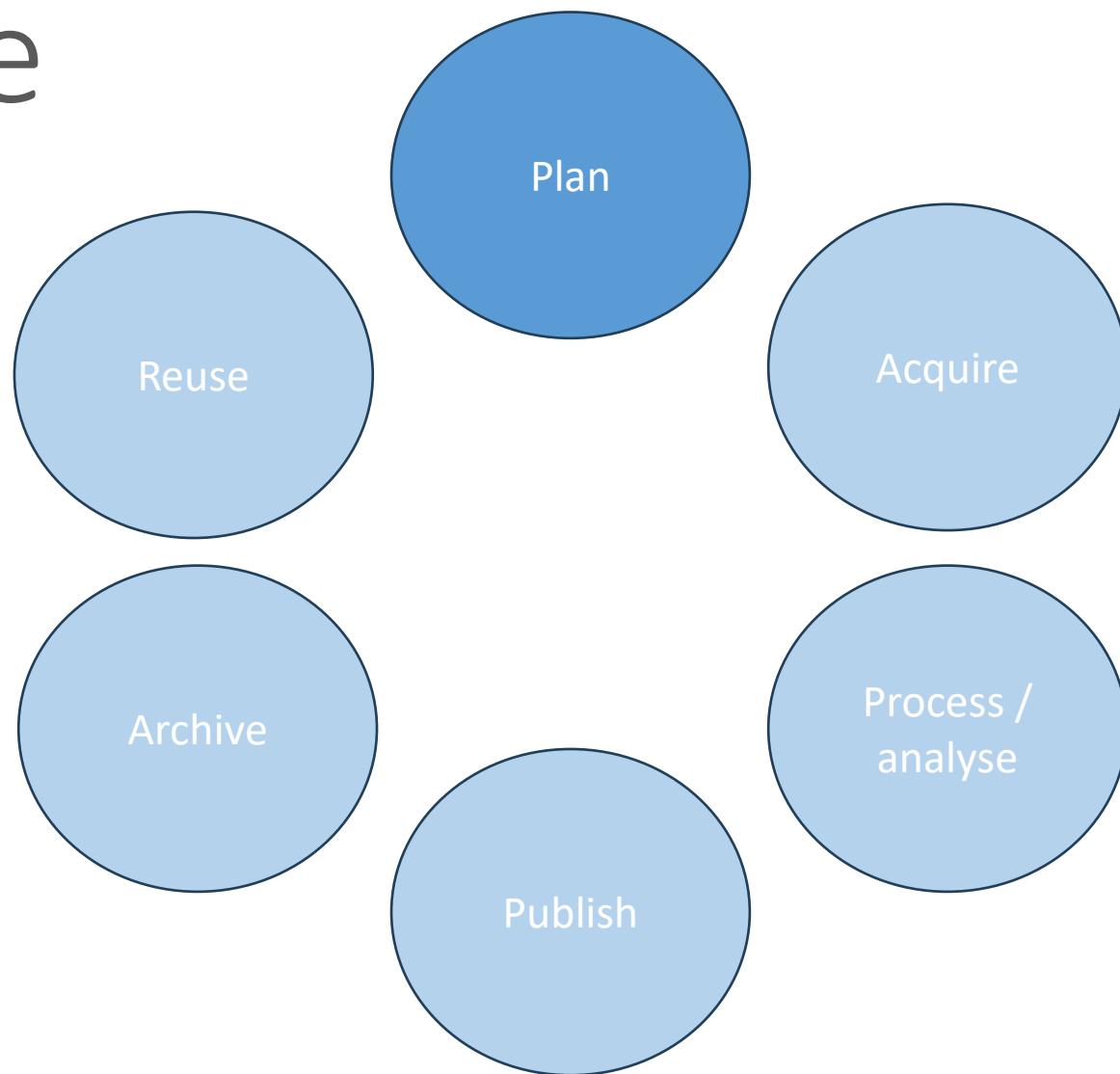
- Processes are ideally cyclic



# RDM Life Cycle

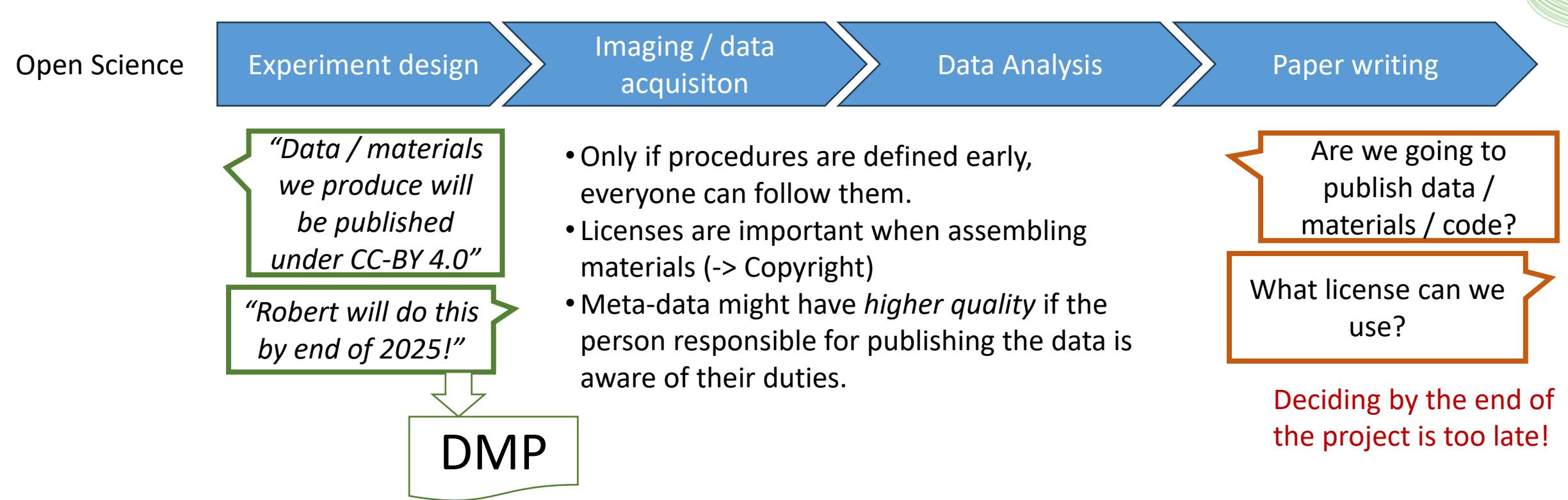
## Plan

- Cost
- Benefit
- Quality
- Strategic decisions



# Data Management Plans (DMPs)

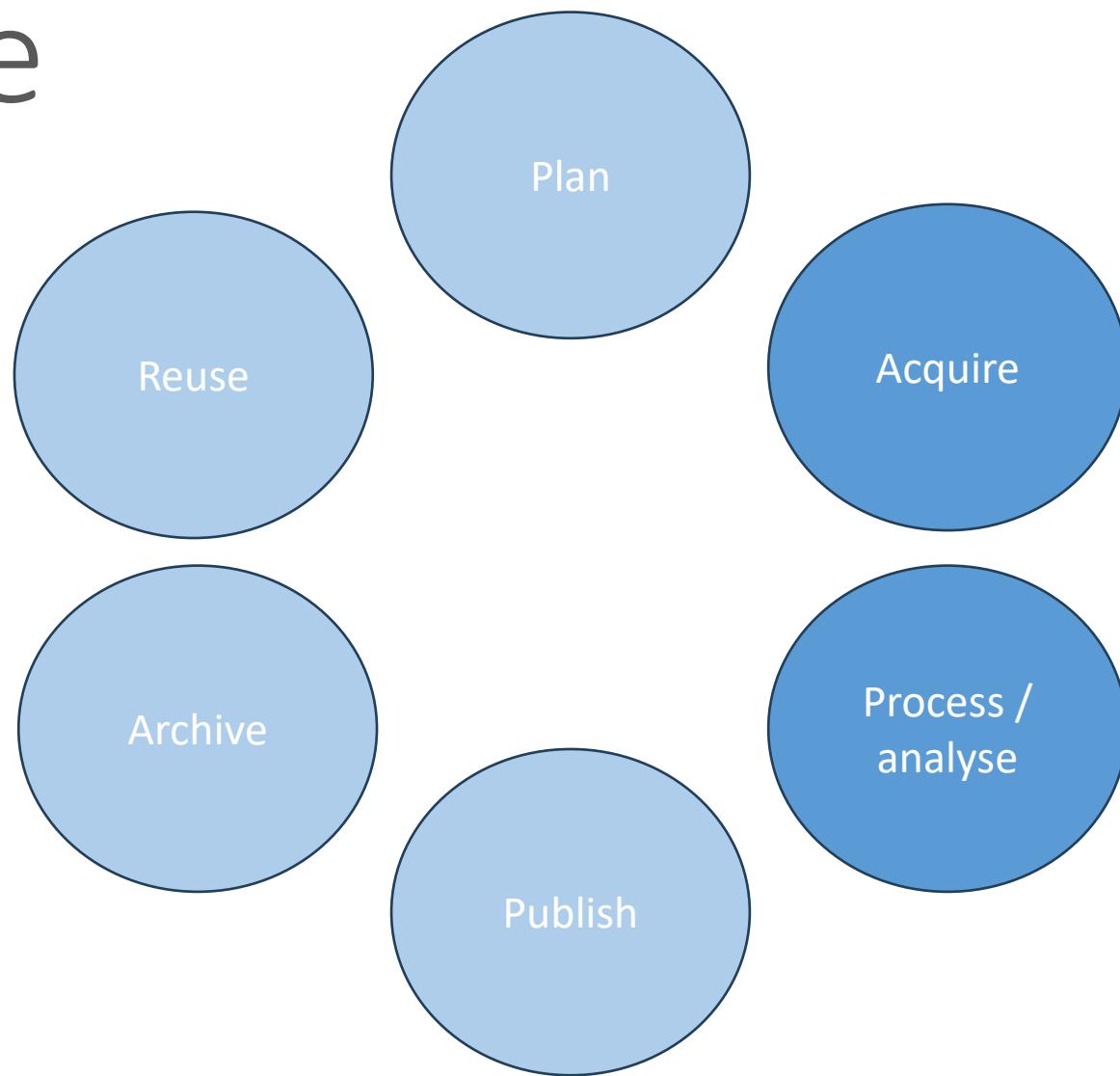
- Define responsibilities and procedures early!



# RDM Life Cycle

## Acquisition + Processing

- Types of data
- Terms and conditions
  - Usage rights
  - Copyright
- IT infrastructure
  - HPC
  - USB-Drives
- Backup



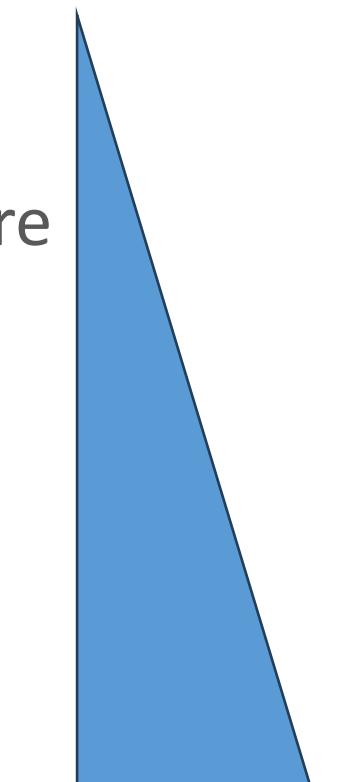
# Types of data

- Structured data
  - Tables, databases
- Unstructured data
  - Texte, emails, videos, pictures
- Semi-structured data
  - Fragebögen
  - Scientific images



# Types of data

- Openly accessible data
  - „open data“
  - „open source“ software
- Business data
- Research data
  - Hot / cold
- Personal data
- Secret data

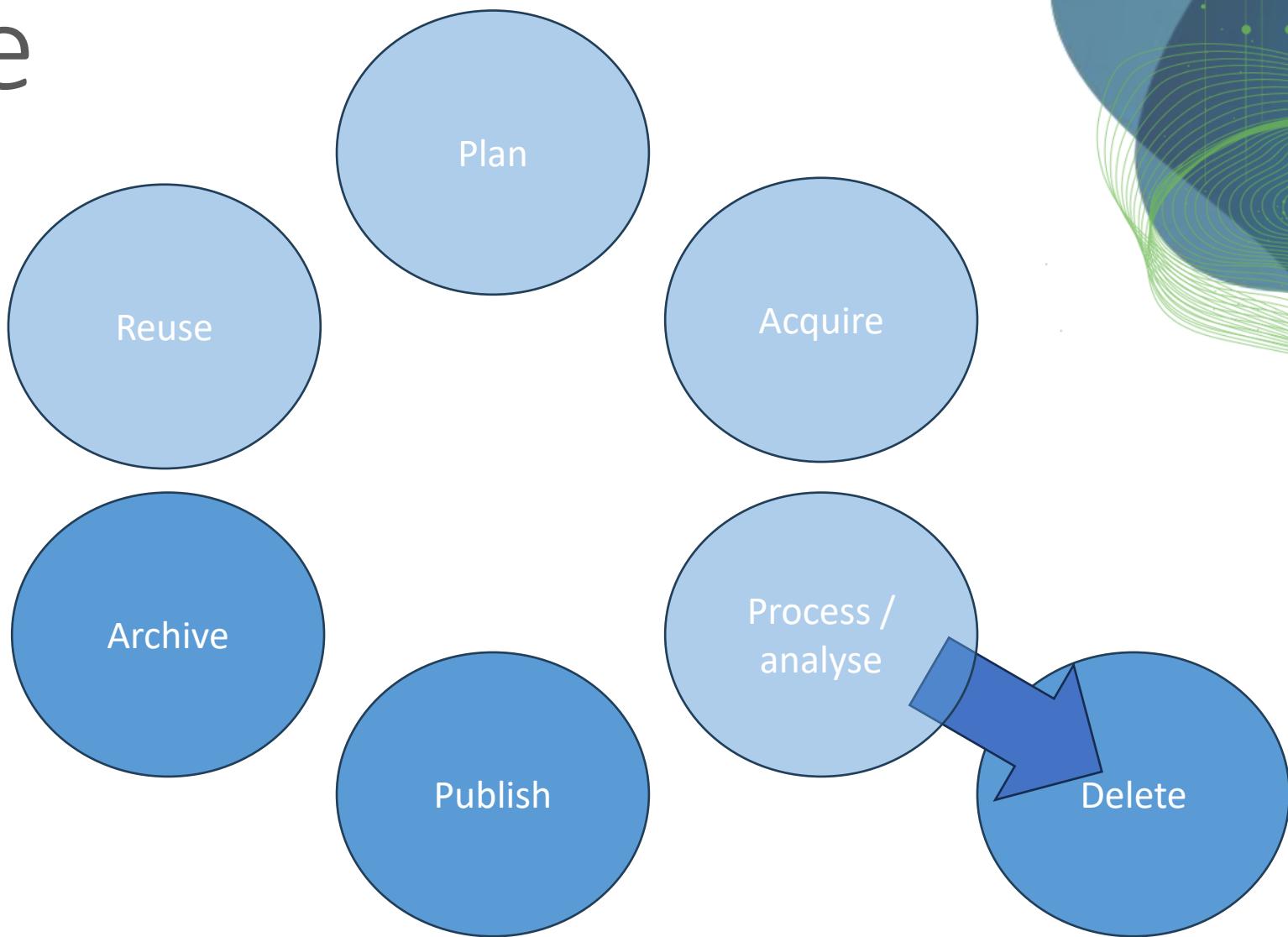


In need of  
protection  
(schutzbedürftig)



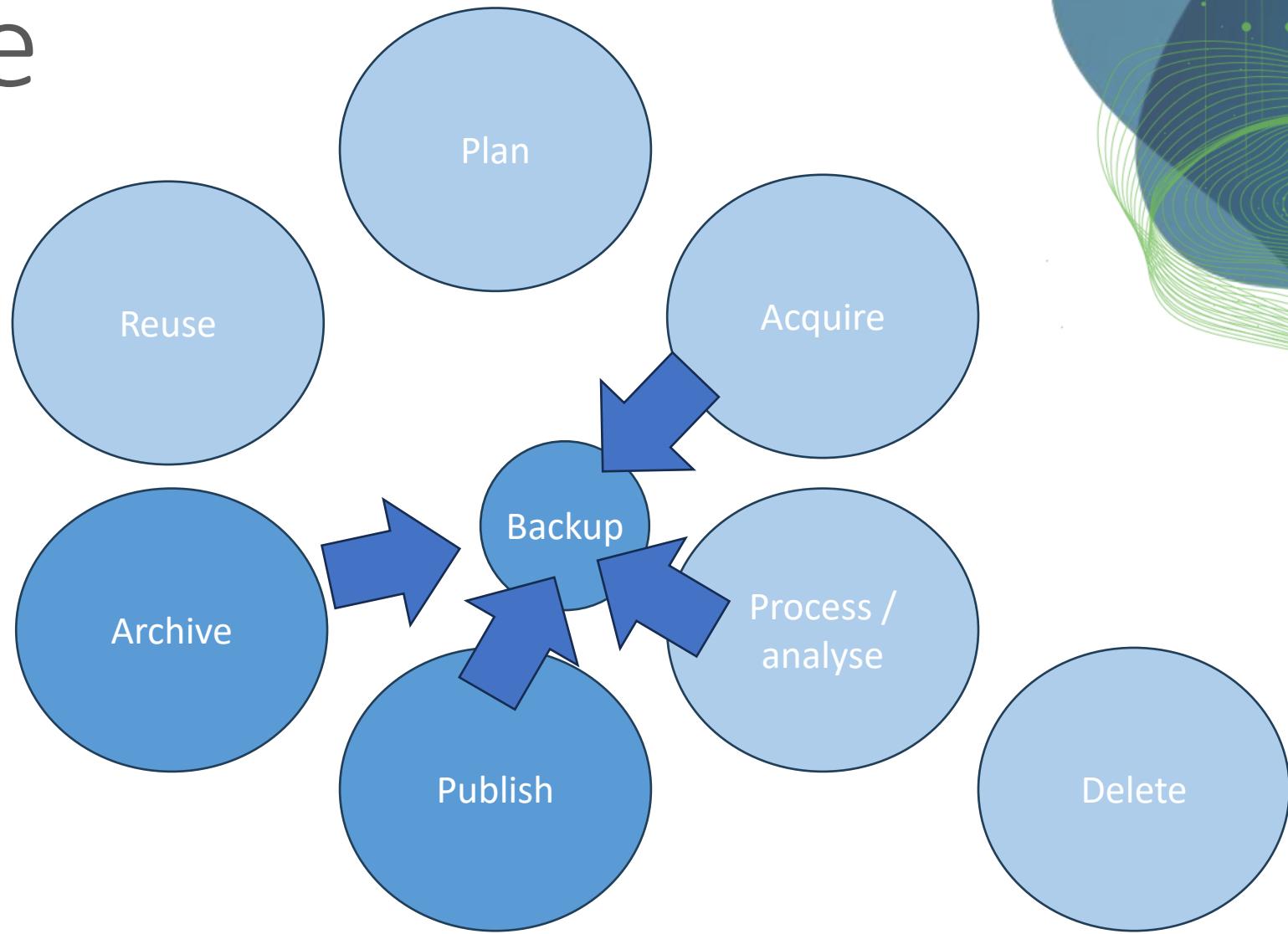
# RDM Life Cycle

- Right to publish
- Regulatory aspects
  - Research data: archive 15 years
- Authorship
- Registration (-> Findable)



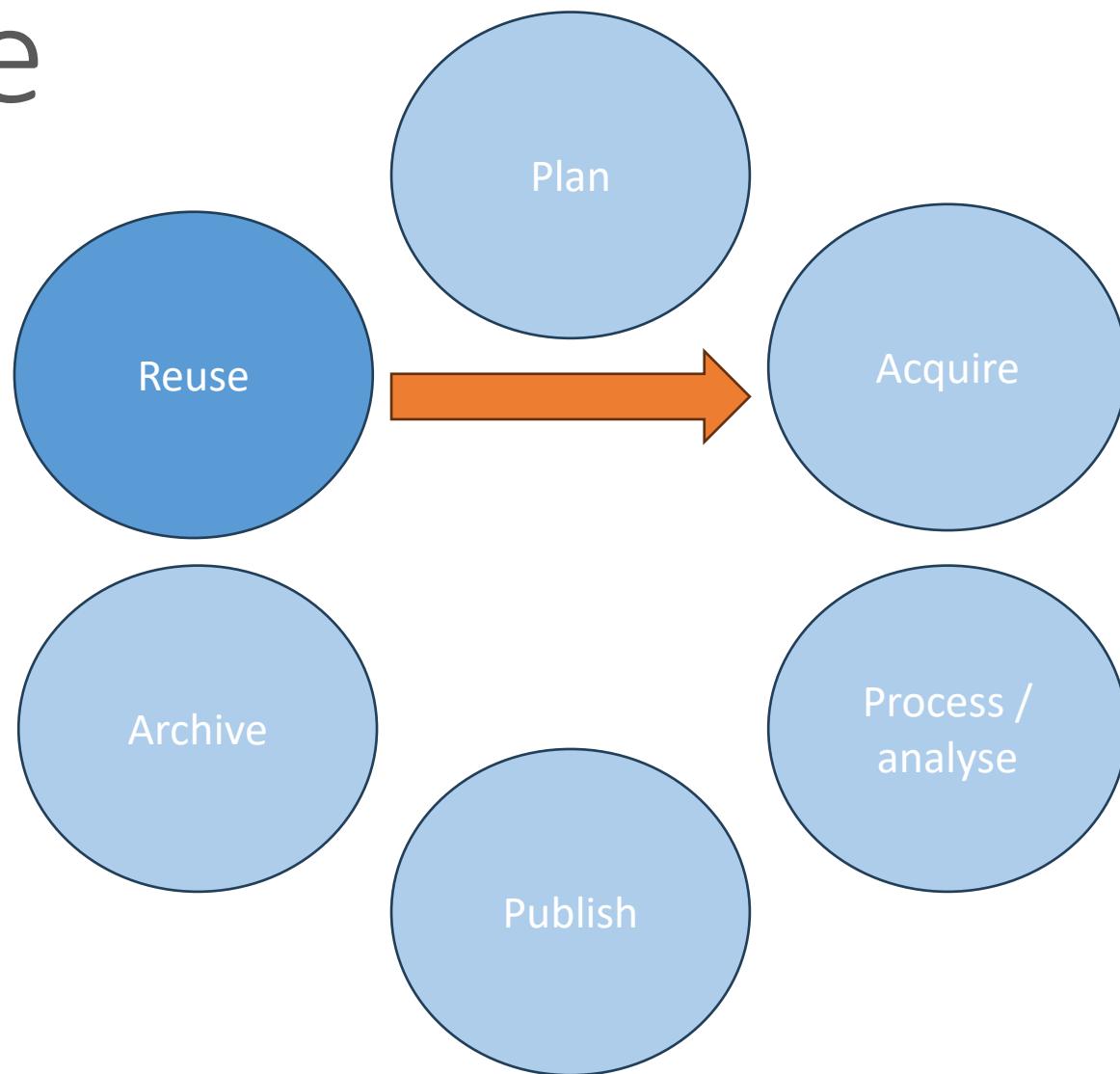
# RDM Life Cycle

- Backup: Regular copy of (all) files
  - Conflict: Some personal data needs to be deleted, should not go into backup
- Publication: Selection of curated files for external use
- Archive: Selection of curated files for later use (not necessarily public)



# RDM Life Cycle

- Potential future benefit
- Sustainability
- Important: **Licensing**
  - Has impact on next cycle / acquisition



# Scientific culture

Public access to research results -> Reusability



“Codex”

## Guideline 13: Providing public access to research results

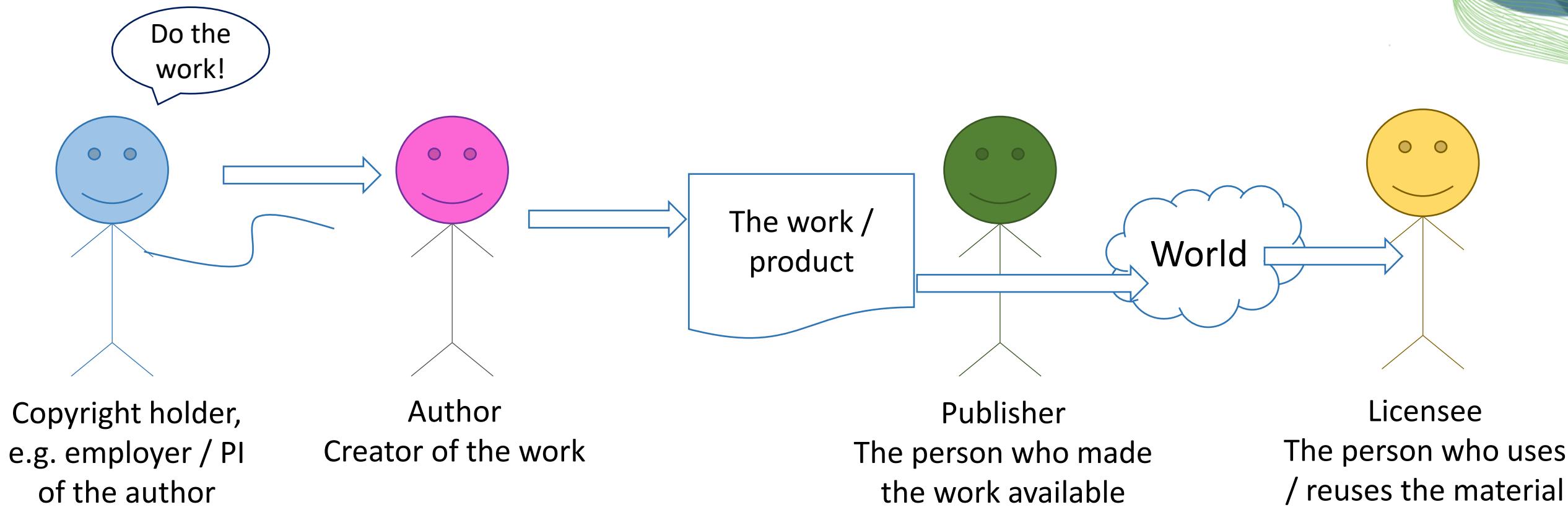
► As a rule, researchers make all results available as part of scientific/academic discourse. In specific cases, however, there may be reasons not to make results publicly available (in the narrower sense of publication, but also in a broader sense through other communication channels); this decision must not depend on third parties. Researchers decide autonomously – with due regard for the conventions of the relevant subject area – whether, how and where to disseminate their results. If it has been decided to make results available in the public domain, researchers describe them clearly and in full. Where possible and reasonable, this includes making the research data, materials and information on which the results are based, as well as the methods and software used, available and fully explaining the work processes. Software programmed by researchers themselves is made publicly available along with the source code. Researchers provide full and correct information about their own preliminary work and that of others.

### Explanations:

In the interest of transparency and to enable research to be referred to and reused by others, whenever possible researchers make the research data and principal materials on which a publication is based available in recognised archives and repositories in accordance with the FAIR principles (Findable, Accessible, Interoperable, Reusable). Restrictions may apply to public availability in the case of patent applications. If self-developed

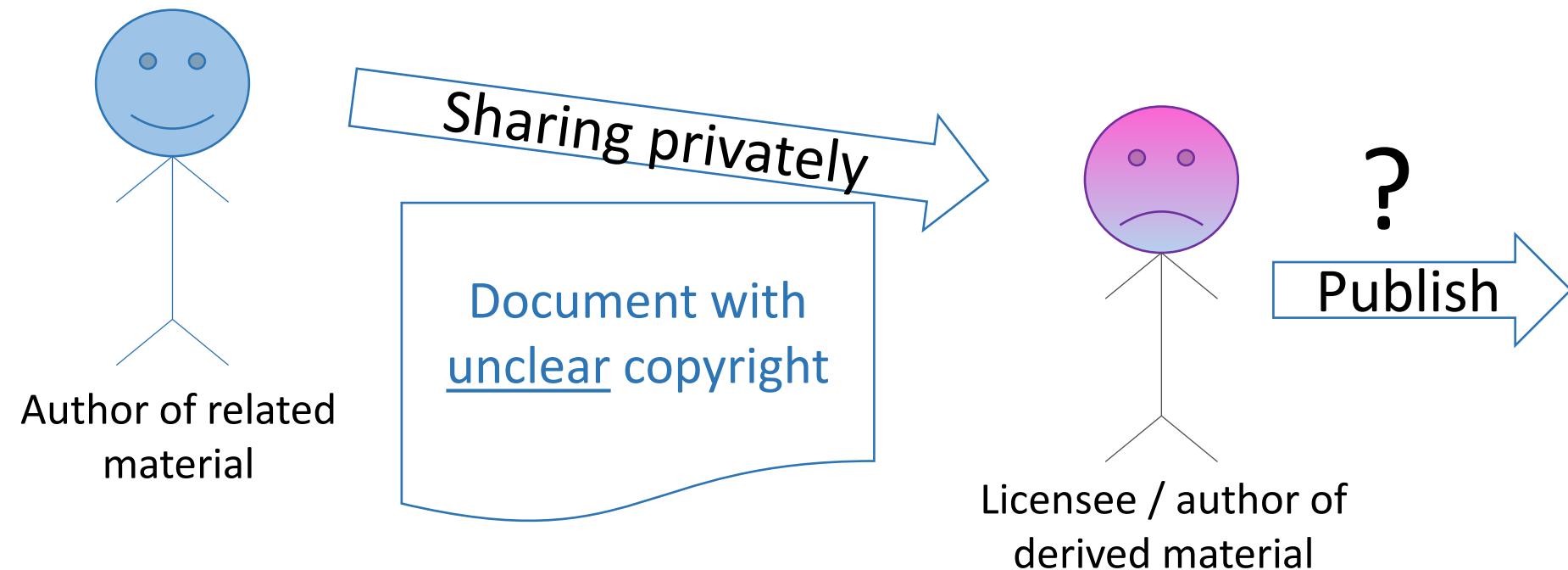
# Am I allowed to publish my stuff?

- ... it depends... on who is responsible



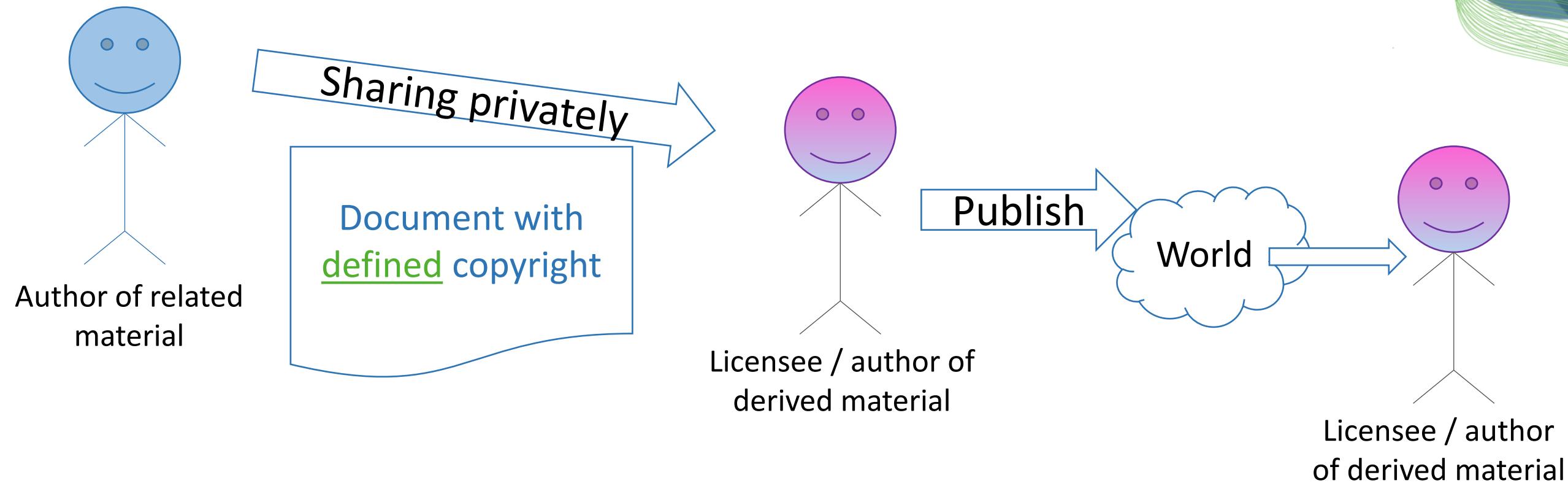
# Am I allowed to publish my stuff?

- ... it depends... on what materials served as basis



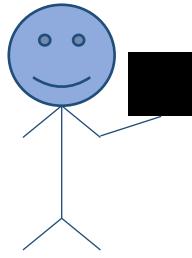
# Am I allowed to publish my stuff?

- ... it depends... on what materials served as basis



# Openness of software / projects

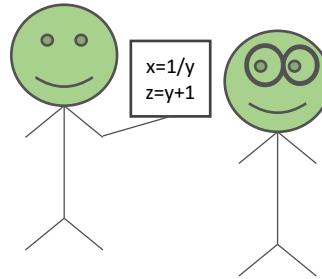
## Closed source



- Open to collaborations
- “Black box”
- Compiled code (e.g. C/C++)
- Good for protecting intellectual properties (\$\$\$)

Hardware device drivers

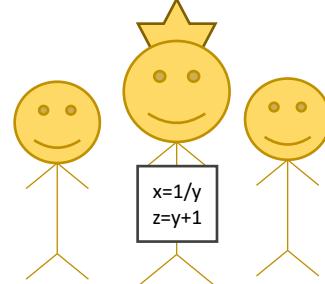
## Open source



- Code available to read
- Not necessarily executable code
- No maintenance / support efforts

Custom image analysis scripts

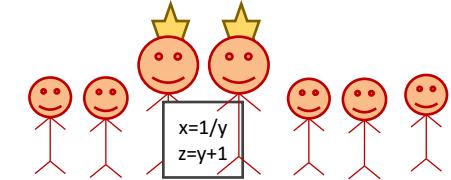
## Benevolent dictatorship



- Open to contributions
- Single maintainer, often overwhelmed
- Efficient decision making
- Bus factor ≈1

TrackMate, SNT, MorpholibJ, CLIJ

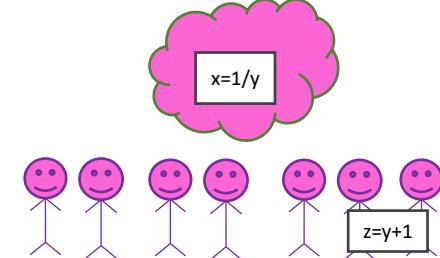
## Community driven



- Open to contributions
- Partially democratic
- Board of maintainers (core developers)
- Long-winded decision making

scikit-image, scipy, OpenCL

## Openly extensible



- Openly extensible; without maintainers involved
- Partially community driven

ImageJ, Python, numpy

# Quiz

- What is the role of the OpenData Portal of Leipzig in the context of publishing data?

Copyright holder



Author



Publisher



Licensee



# Standard for sharing: The FAIR-principles

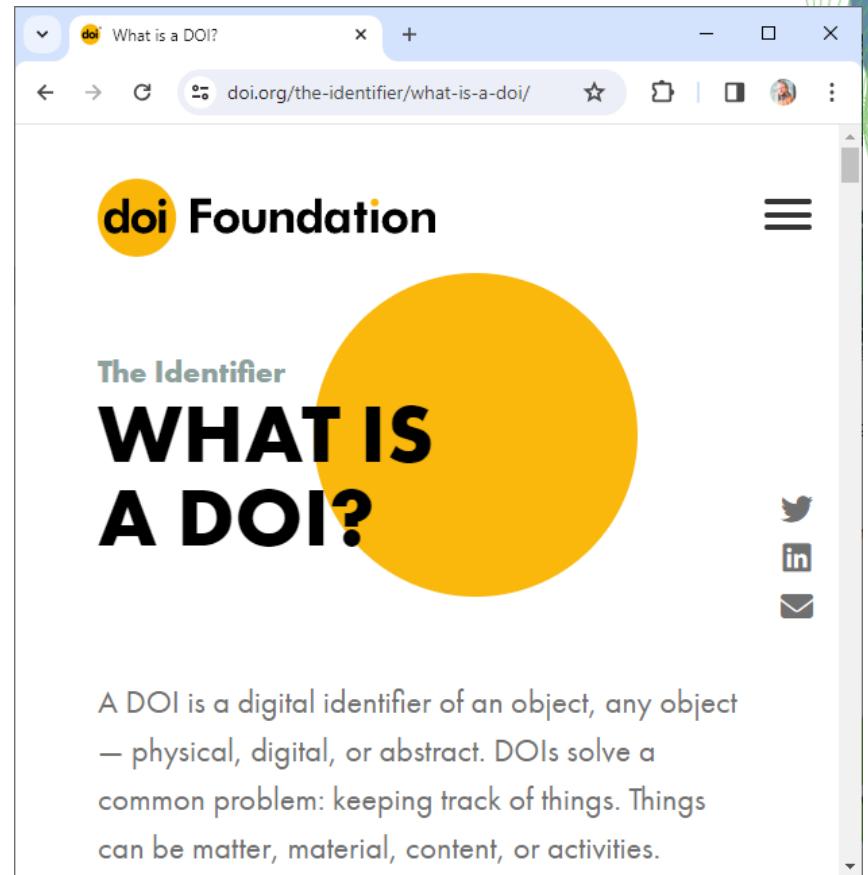
- Findable
- Accessible
- Interoperable
- Reusable



# The FAIR-principles

## Findable

- F1. (Meta)data are assigned a globally unique and persistent identifier
  - Universal Resource Identifier (URI)
  - Digital Object Identifier (DOI)
- F2. Data are described with rich metadata (defined by R1 below)
- F3. Metadata clearly and explicitly include the identifier of the data they describe
- F4. (Meta)data are registered or indexed in a searchable resource



# Findability

## Domain-specific Search repository registries for your field!

## Guidelines

Publish where your community  
publishes

Publish where everyone publishes  
(beyond your community)

Publish in your local institute's  
infrastructure

Your  
individual  
interest

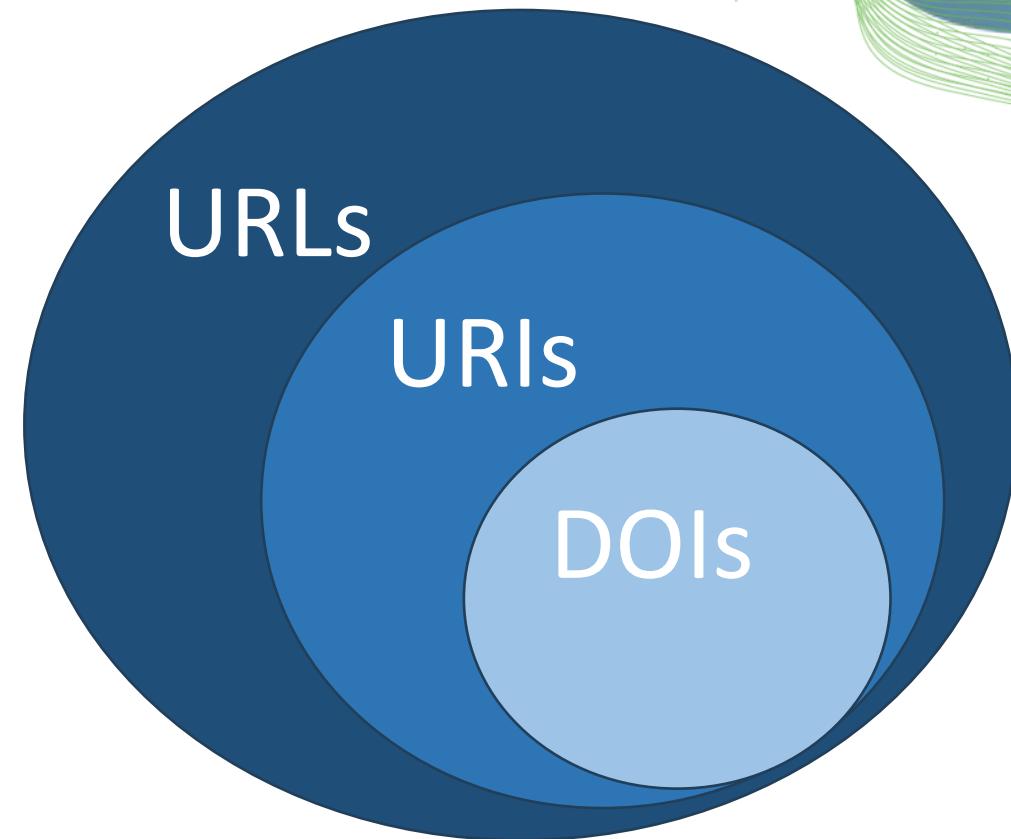
Your  
Institute's  
interest

The image displays two side-by-side browser windows. The top window shows the re3data.org search results for 'seismology', listing the 'World Data Center for Solid Earth Physics' (WDC for SEP) as a provider. The bottom window shows the FAIRsharing.org search results for 'seismology', specifically under the 'Databases' category, displaying a list of 14 entries, with one entry from IRIS Data highlighted.

# Object /Resource Identifiers (URI/DOI)

**Goals:** Cite resources, find them in the future

- DOIs / URIs always point at the same data (or different versions of it)
- DOIs are centrally registered, URIs not
- Unified Resource Locators (URLs) may point at different things over time.



# Unified Resource Locators

- These are all URLs

<https://fairsharing.org/>

<https://doi.org/10.5281/zenodo.28325>

<https://dx.doi.org/10.14470/TR560404>

<https://geofon.gfz.de/doi/network/GE>

# Unified Resource Identifiers

- Which of these are URIs?

<https://fairsharing.org/>

<https://doi.org/10.5281/zenodo.28325>

<https://dx.doi.org/10.14470/TR560404>

<https://geofon.gfz.de/doi/network/GE>

# Digital Object Identifiers

- These are also DOIs

<https://fairsharing.org/>

<https://doi.org/10.5281/zenodo.28325>

<https://dx.doi.org/10.14470/TR560404>

<https://geofon.gfz.de/doi/network/GE>

# Indexing

- Make sure your materials are listed in public search indices
- Do not trust google to make your stuff findable

The screenshot shows the bio.tools website. At the top, there's a header with the Elixir bio.tools logo, 'Explore', 'Login', and 'Sign-up' buttons. Below the header, a message about cookie usage is displayed. The main area features a large 'bio.tools' logo and the text 'Essential scientific and technical information about software tools, databases and services for bioinformatics and the life sciences.' A search bar at the bottom left contains the placeholder 'Search bio.tools'.

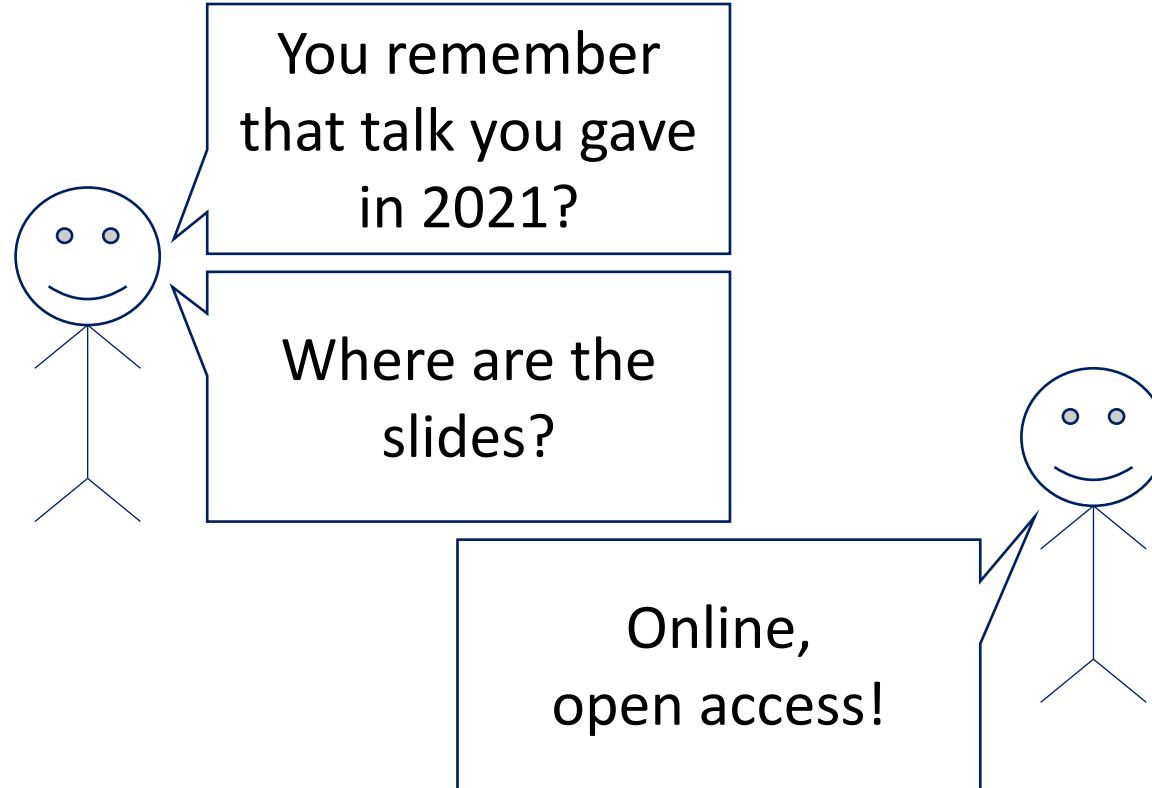
This screenshot shows a Jupyter Book titled 'NFDI4BioImage Training Materials'. It includes a search bar with the placeholder 'Search this book [ctrl + K]'. Below the search bar, there's a 'How to use this resource' section with the text: 'This Jupyter Book can be searched using the search bar on the right'. To the right, there's a screenshot of a browser window showing the search results for the book.

The screenshot displays three web applications:

- Biolimage Informatics Index (Biii):** The homepage features a logo with a microscope and the text 'Biii Biolimage Informatics Index'. It has sections for 'Recent' and 'Advanced search'.
- MicroscopyDB:** The homepage has a search bar and sections for 'How it Works', 'Who we are', and 'FAQs'. It also includes a sidebar for 'Add to the Database' with options for 'Job', 'Event', 'Resource', and 'Tool'.
- NFDI4BioImage Training Materials:** This is a specific page within the MicroscopyDB framework, showing a search interface and a 'How to use this resource' section.

# Incentives: Findability

- Your *future-self* will thank you, because they will find your work



Sharing and licensing material | f1000research.com/slides/10-519

f1000Research

BROWSE GATEWAYS & COLLECTIONS HOW TO PUBLISH ABOUT BLOG MY RESEARCH SIGN IN

Metrics | 411 Views | 60 Downloads

DOWNLOAD 30.92 MB

SHARE CITE

PART OF THE GATEWAY

neubias - the Bioimage Analysts Network

BROWSE BY RELATED SUBJECTS

Artificial intelligence

Computer and information sciences

Electrical engineering

Slides

Code

Text

Data

...

Sharing and licensing material  
Robert Haase  
June 30<sup>th</sup> 2021

This material is licensed by Robert Haase, PoL Dresden under the CC-BY 4.0 license <https://creativecommons.org/licenses/by/4.0/>

TECHNISCHE UNIVERSITÄT DRESDEN

# Incentives: Findability -> Visibility

- YouTube
- Github

Open & FAIR sharing  
is a PR instrument

... leading to

- more software users
- new collaborations

The image displays three browser windows side-by-side. The left window shows the YouTube channel 'ScaaS-AI Living Lab' with several playlists. The middle window shows the GitHub page for the 'Prompt Engineering Tutorial', featuring a Jupyter Notebook interface with code and generated images. The right window shows another Jupyter Notebook interface with similar code and generated images.

# The FAIR-principles

## Accessible

- A1. (Meta)data are retrievable by their identifier using a standardised communications protocol
  - A1.1 The protocol is open, free, and universally implementable
  - A1.2 The protocol allows for an authentication and authorisation procedure, where necessary
- A2. Metadata are accessible, even when the data are no longer available

HOW STANDARDS PROLIFERATE:  
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)



# Accessibility

- The ability to download data, for humans and computers

The screenshot shows the BioImage Archive website at [ebi.ac.uk/bioimage-archive/galleries/galleries.html](https://www.ebi.ac.uk/bioimage-archive/galleries/galleries.html). The page features a navigation bar with links for Home, Browse, Submit, Galleries (which is highlighted), Help, REMBI Help, Policies, and About us. Below the navigation is a section titled "The BioImage Archive explorer" featuring three circular thumbnails: "AI GALLERY" (a multi-colored fluorescence image), "VISUAL GALLERY" (a red and green stained image), and "VOLUME EM GALLERY" (a grayscale electron microscopy image). A blue callout box with the text "Essential for AI developers =)" points to the "Galleries" link in the navigation bar.

# Accessibility

- The ability to download data, for humans and computers

BioImage Archive

**S-BIAD634**

An annotated fluorescence image dataset for training nuclear segmentation methods

Released: 2023-03-07  
By: Sabine Taschner-Mandl, Inge M. Ambros, Peter F. Ambros, Klaus Beiske, Allan Hanbury, Wolfgang Doerr, Tamara Weiss, Maria Berneder, Magdalena Ambros, Eva Bozsaky, Florian Kromp, Teresa Zulueta-Coarasa

On this page: Study Information, Images, Annotations, Models used

In a nutshell: 388 images, 388 annotations, Study size: 472.2MiB, Filetype breakdown:

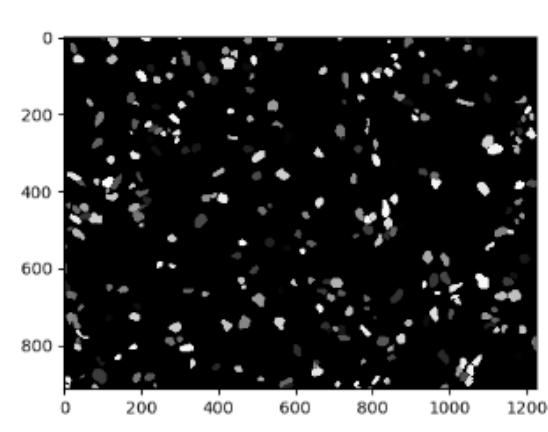
```
[1]: from bia_explorer import io, biostudies
from skimage.io import imread
import stackview

accession = 'S-BIAD634'
study = io.download_bia_study(accession)
image = study.images[0]
```

## Displaying images using stackview

```
[2]: uri = image.uri.replace("\\\\", "/")
image_data = imread(uri)
stackview.insight(image_data)
```

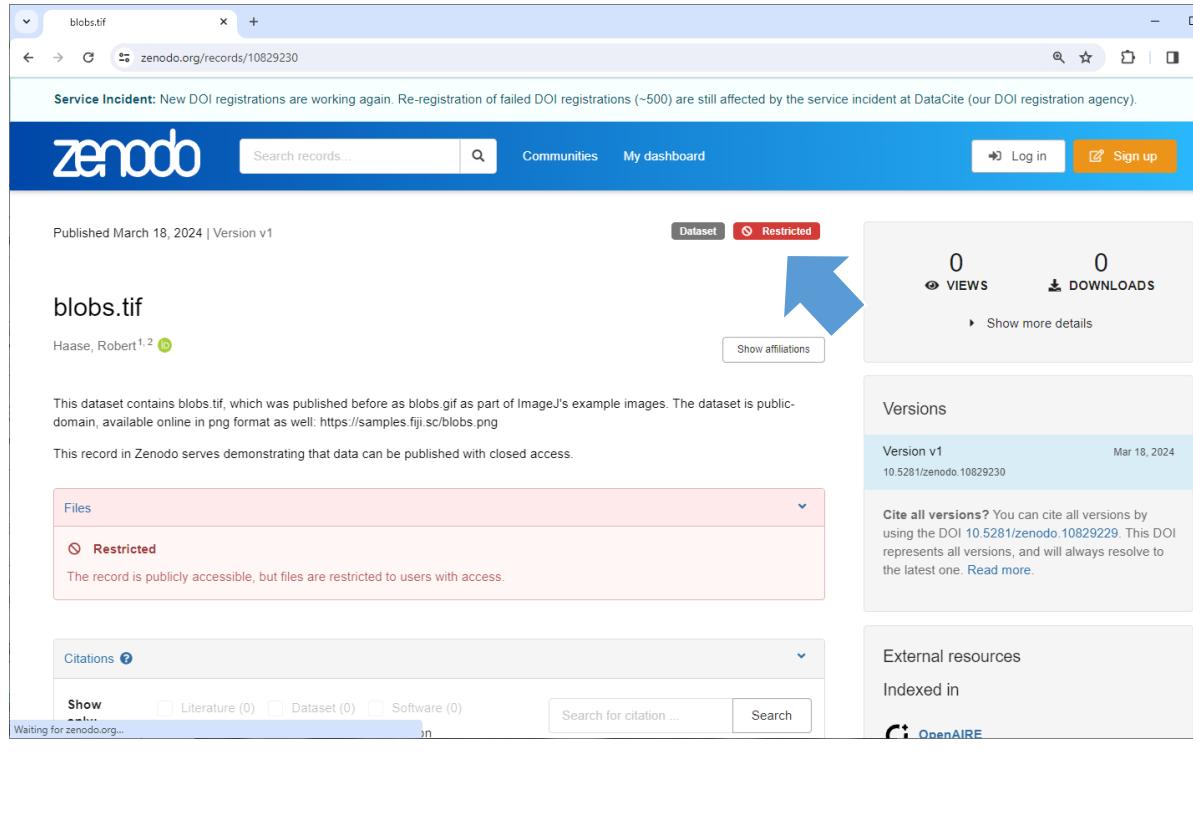
```
[2]:
```



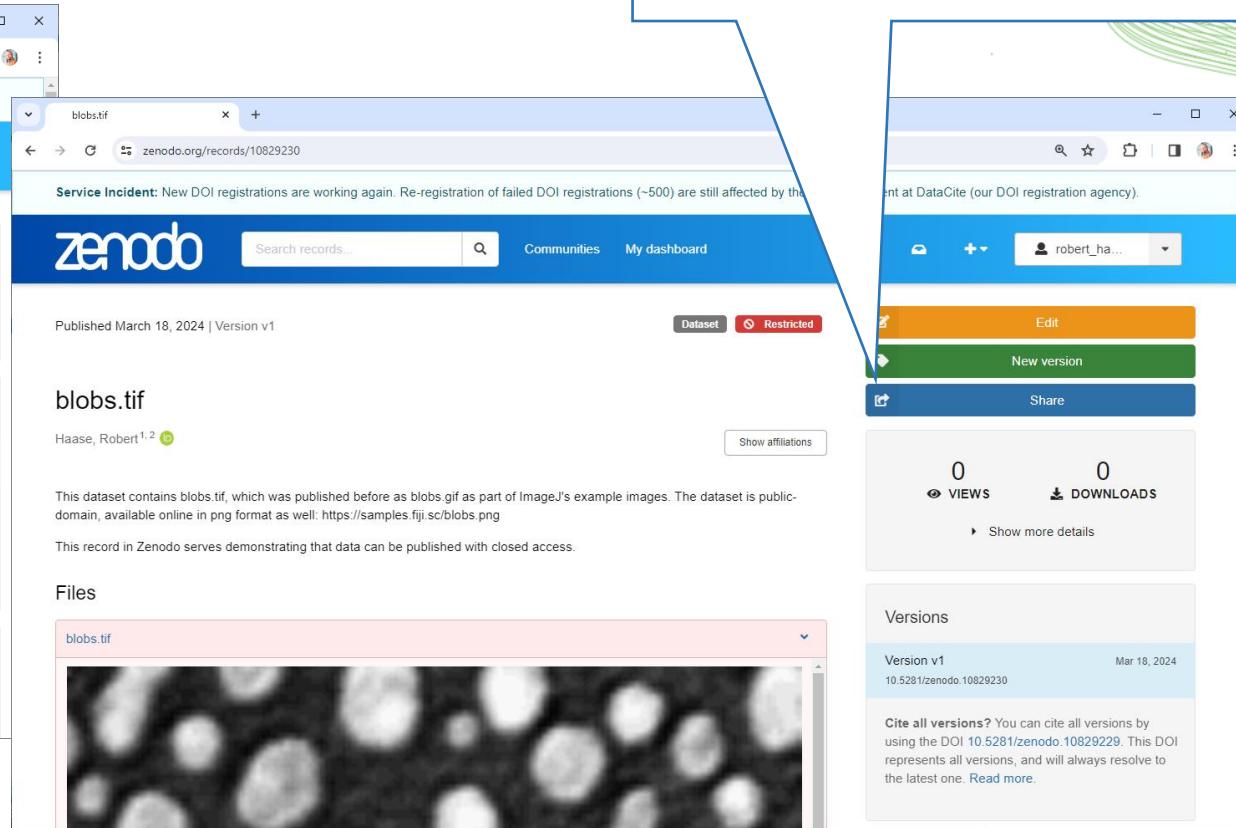
shape	(914, 1225)
dtype	uint16
size	2.1 MB
min	0
max	300

# Restricted Access

- The A in FAIR does not necessarily stand for Open Access



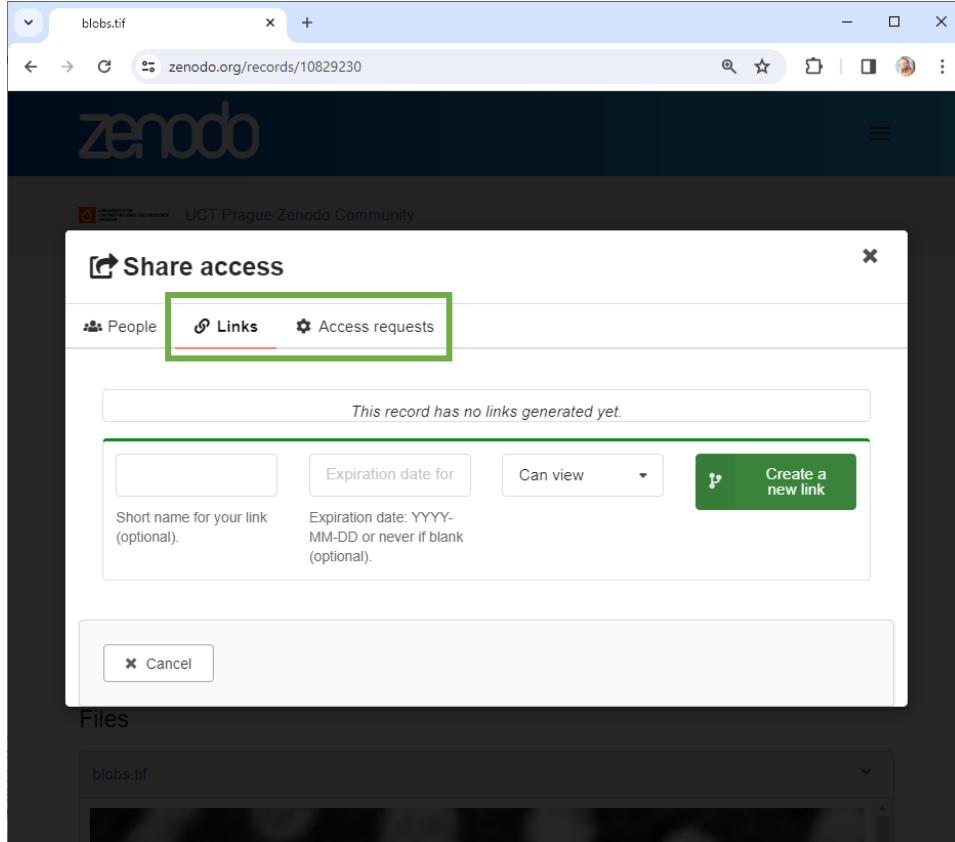
A screenshot of a Zenodo dataset page for "blobs.tif". The page shows basic statistics (0 views, 0 downloads) and a "Show more details" button. Below this is a "Versions" section listing "Version v1" (Mar 18, 2024). Further down are sections for "Files" (with a note about restricted access), "Citations", and "External resources". A blue arrow points from the "Show more details" button on the main stats to the "Show more details" button on the "Versions" section.



A screenshot of the same Zenodo dataset page for "blobs.tif", but with a larger "Show more details" button highlighted. This button is located on the "Versions" section. The rest of the page content is identical to the first screenshot.

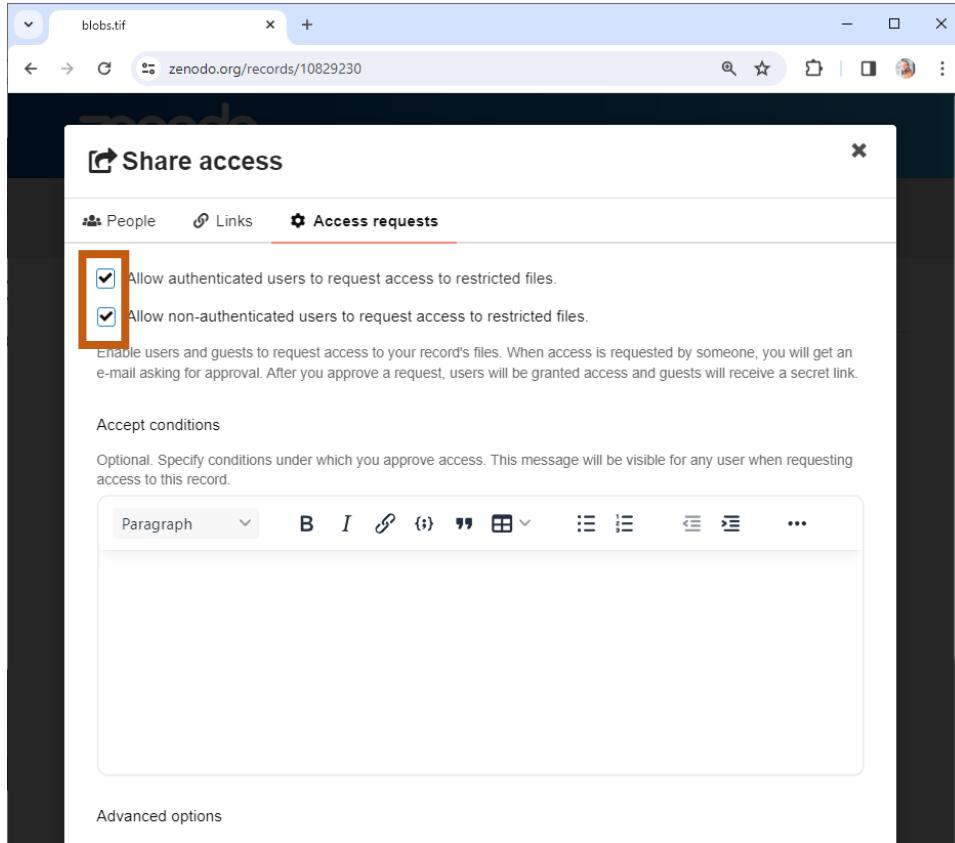
# Restricted Access

- The A in FAIR does not necessarily stand for Open Access



# Restricted Access

- The A in FAIR does not necessarily stand for Open Access



A screenshot of a web browser window showing the Zenodo dataset page for 'blobs.tif'. The page header shows the file was published on March 18, 2024, and includes a 'Dataset' and 'Restricted' badge. The main content area shows the file name 'blobs.tif' and authors 'Haase, Robert<sup>1,2</sup> [ORCID], Schätz, Martin'. A note states: 'This dataset contains blobs.tif, which was published before as blobs gif as part of ImageJ's example images. The dataset is public-domain, available online in png format as well: https://samples.fiji.sc/blobs.png'. Another note says: 'This record in Zenodo serves demonstrating that data can be published with closed access.' Below this is a 'Files' section with a 'Restricted' status message: 'The record is publicly accessible, but files are restricted to users with access.' A 'Request access' form follows, prompting the user to log in if they are not currently logged in. It includes fields for 'Your email address\*', 'Your full name\*', and a 'Request message' text area. A checkbox at the bottom agrees to share full name and email. At the bottom right is a 'Request access' button. To the right of the main content are sidebar sections for 'Views' (26), 'Downloads' (0), 'Versions' (Version v1), 'External resources' (Indexed in OpenAIRE), 'Communities' (UCT Prague Zenodo Community), and 'Details' (DOI: DOI 10.5281/zenodo.10829230).

# The FAIR-principles

## Interoperable

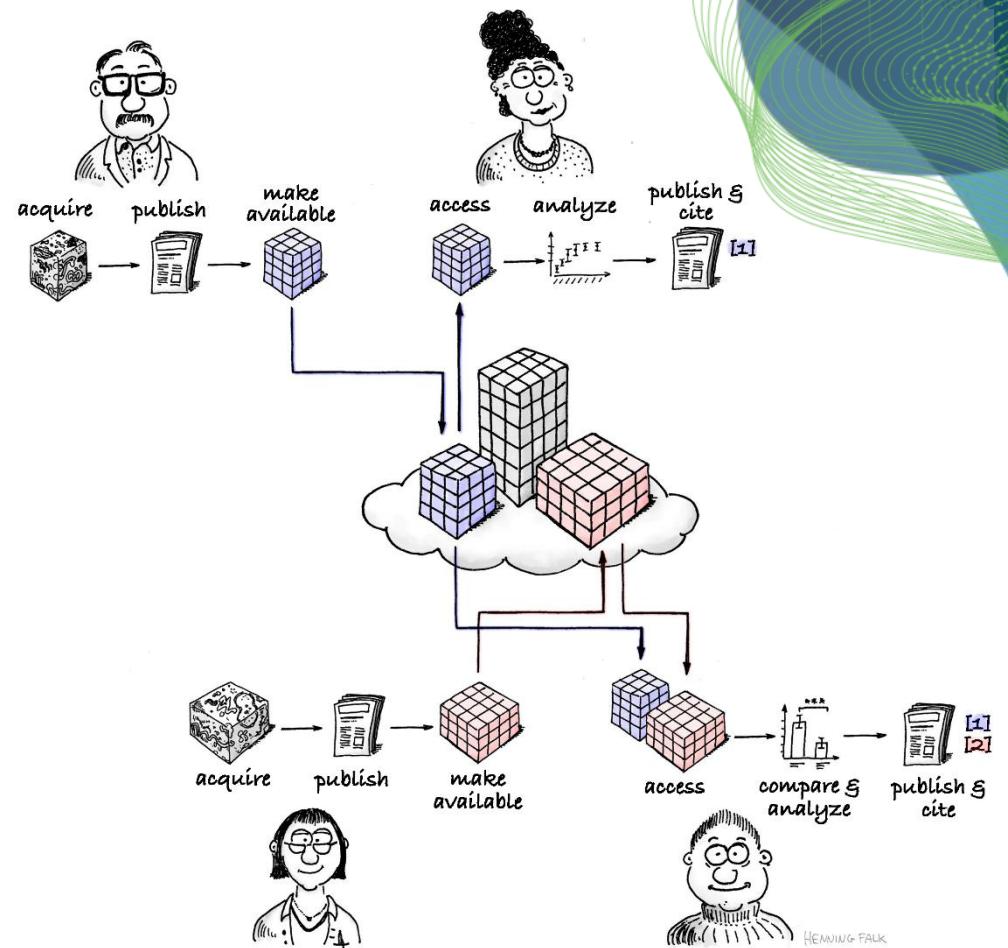
- I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (Meta)data use vocabularies that follow FAIR principles
- I3. (Meta)data include qualified references to other (meta)data



# The FAIR-principles

## Reusable

- R1. (Meta)data are richly described with a plurality of accurate and relevant attributes
- R1.1. (Meta)data are released with a clear and accessible data usage license
- R1.2. (Meta)data are associated with detailed provenance
- R1.3. (Meta)data meet domain-relevant community standards



# Incentives: Citability

The screenshot shows a Zenodo dataset page for a dataset associated with an article. The dataset was published on September 22, 2022, and uploaded on January 09, 2023. It has 240 views and 131 downloads. The dataset contains seismic data from Gornergletscher fieldtest, 2021, weather data from Monte Rosa, and MSR logger data. The citation section includes the authors (Ana Nap, Fabian Walter, & Martin P. Lüthi), the title (Self-sufficient seismic boxes for monitoring glacier seismology in Greenland), the journal (Zenodo), and the DOI (https://doi.org/10.5281/zenodo.7516192). The export section offers JSON format and an export button.

Dataset associated with article: Self-sufficient seismic boxes for monitoring glacier seismology in Greenland

Ana Nap<sup>1</sup>; Fabian Walter<sup>2</sup>; Martin P. Lüthi<sup>1</sup>

Dataset associated with article: Self-sufficient seismic boxes for monitoring glacier seismology in Greenland

Contains:

- Seismic data of both SG-boxes and regular geophones from Gornergletscher fieldtest, 2021( Seismic\_Data\_Gorner\_Fieldtest.zip)
  - > SG-box data naming: GO"station\_number"SG
  - > Geophone data naming: GO"station\_number"GP
- Weather data Gornergletscher fieldtest from Monte Rosa, Meteo Swiss Weather station (Weather\_data\_Gorner\_Fieldtest\_2021.zip)
  - > 1hr wind averages
  - > 1hr temperature averages
- MSR logger data from SG-boxes from Gornergletscher fieldtest, 2021. Every 5 min these log battery power, tilt (along three axes, temperature and humidity inside the box and light strength on two sides of the SG-box. (MSR\_logger\_data\_SGboxes\_Gorner\_Fieldtest.zip)

240 VIEWS    131 DOWNLOADS

Versions

Version Uploaded at 2023-01-09 Sep 22, 2022  
10.5281/zenodo.7516192

Version v1 Sep 22, 2022  
10.5281/zenodo.7105051

Cite all versions? You can cite all versions by using the DOI 10.5281/zenodo.7105051. This DOI represents all versions, and will always resolve to the latest one. [Read more](#).

Weather\_station\_data\_Greenland\_2021.zip  
md5:90d1bae30bde05352d97e09ee6897af1

23.8 kB

Rights

Creative Commons Attribution 4.0 International

Citation

Ana Nap, Fabian Walter, & Martin P. Lüthi. (2022). Dataset associated with article: Self-sufficient seismic boxes for monitoring glacier seismology in Greenland (Uploaded at 2023-01-09) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.7516192>

Style APA

Export

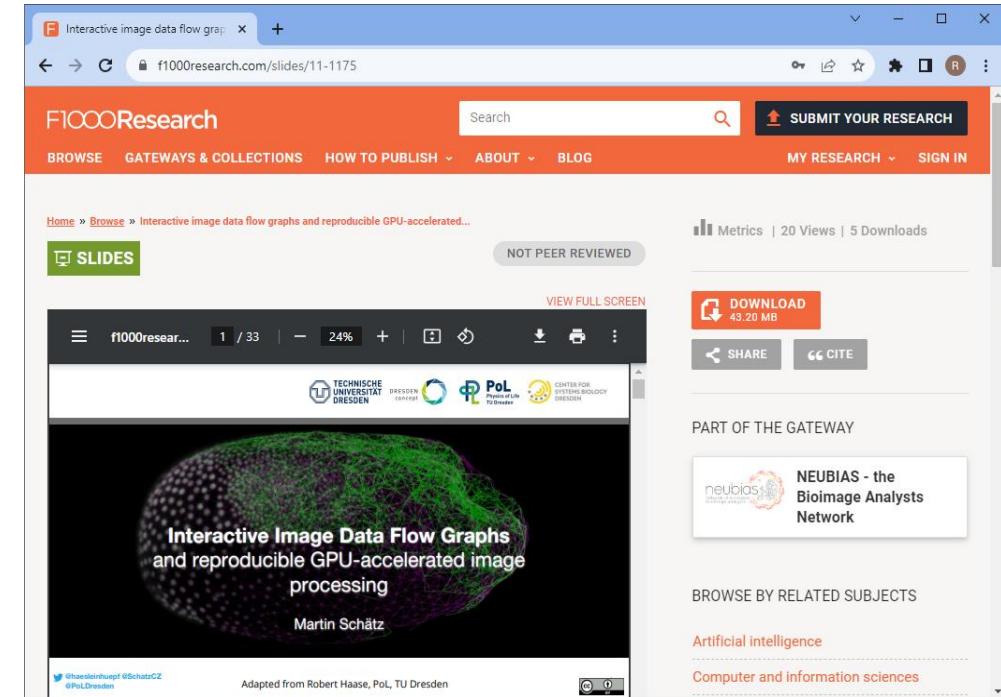
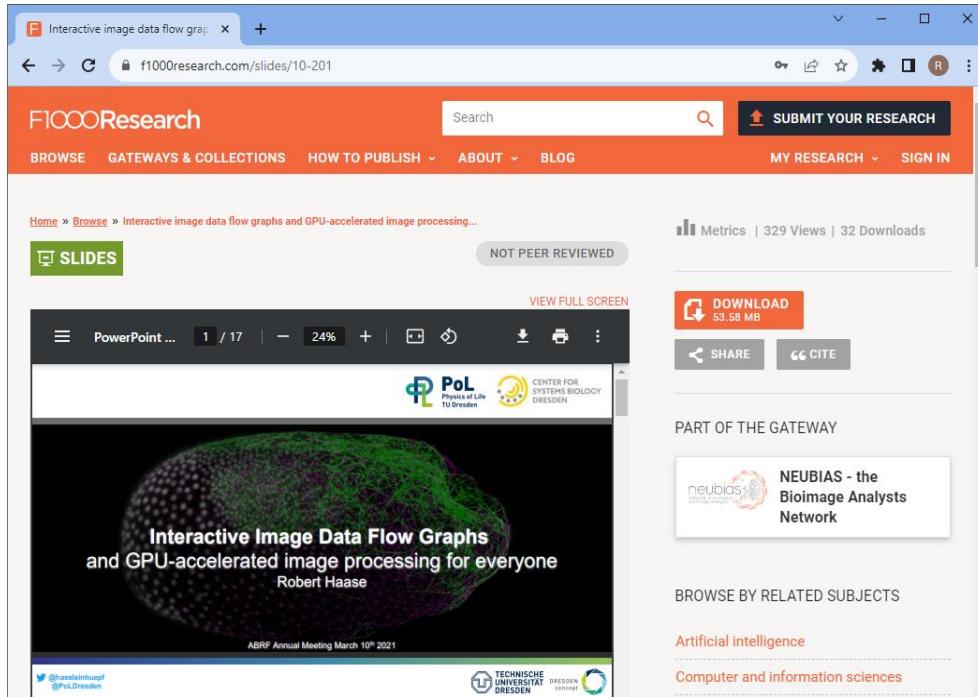
JSON Export

Technical metadata

Created January 9, 2023  
Modified April 3, 2023

# Incentives: Reusability

- Open Educational Resources  
-> Others teach how to use your *tools & methods*



# Where to share what?

## Manuscripts

- <https://eartharxiv.org/>
- <https://arxiv.org/>

This screenshot shows a web browser displaying a preprint from Earth ArXiv. The title of the preprint is "An analysis of the dynamic range of Distributed Acoustic Sensing for Earthquake Early Warning". Below the title, it states: "This is a Preprint and has not been peer reviewed. This is version 1 of this Preprint." The page includes sections for "Downloads" (with a "Download Preprint" button) and "Authors" (listing Martijn van den Ende, Alister Trabattoni, Marie Baille, and Diane Rivet). A small thumbnail image of the preprint's content is visible on the left.

## Code, Models & Data

- <https://github.com>
- <https://huggingface.co>
- <https://zenodo.org>

Ongoing work

Publicly funded archive

This screenshot shows a web browser displaying a dataset on Zenodo. The title of the dataset is "Data and scripts for: An analysis of the dynamic range of Distributed Acoustic Sensing for Earthquake Early Warning". It was published on April 18, 2024, by Martijn van den Ende (Contact person). The dataset has 89 views and 137 downloads. The page also lists contributors and project members, including Martijn van den Ende, Marie Baillet, Alister Trabattoni, and Diane Rivet. A "Cite all versions?" link is present at the bottom.

# Zenodo

- Publicly funded infrastructure @ CERN / Switzerland

The image displays two side-by-side screenshots of the Zenodo website. The left screenshot shows the homepage with a blue header and a 'Featured communities' section. It highlights the European Climate and Modelling Forum, which is associated with a circular logo composed of overlapping colored lines. A 'Browse' button is visible next to the forum's name. Below this, a text snippet reads: 'ECEMF is a Horizon 2020-funded project to establish a European forum for energy...'. The right screenshot shows the website's navigation menu, which includes links for 'About', 'Blog', 'Help', 'Developers', 'Contribute', and various documentation and support links. It also features a 'Funded by' section with logos for CERN, OpenAIRE, and the European Union. At the bottom of the right screenshot, there is a footer bar with links for 'Status', 'Privacy policy', 'Cookie policy', 'Terms of Use', and 'Support'.

# Sharing files on Zenodo

- ... is easier than you think

The image shows three screenshots of the FocalPlane website, which integrates with the Zenodo platform for sharing research data.

- Screenshot 1:** A blog post titled "Sharing research data with Zenodo" by Robert Haase. It discusses the benefits of using Zenodo for sharing data openly, mentioning CERN, OpenAIRE, and the European Union Horizon 2020 programme. It highlights the ability to implement best practices for sharing, licensing, reusing, and citing research data.
- Screenshot 2:** A screenshot of the FocalPlane homepage featuring the Zenodo integration. It shows a sidebar with links like "How to", "Write a 'How to'", "Create an account", "post your story or", and "Log in/register".
- Screenshot 3:** A screenshot of the Zenodo "Upload form" interface. It shows a list of uploaded files, including "BIAPol/Image-data-science-with-Python-and-Napari-EPFL2022: 2022.12.12", "haesleinhuepf/napari-ownlcloud: 0.1.2", "haesleinhuepf/napari-assistant-p: 0.1.0-for-zend", and "haesleinhuepf/napari-assistant: 0.4.4". A green arrow points to the "Upload" button.

**On the Zenodo page (Screenshot 3):**

On this page, you can immediately upload files. The limit of 50 GB is amazing if you keep in mind that this is a free service. And more is possible by getting in touch with the platform maintainers. After choosing files, don't forget to click the **Start Upload** button. I recommend using open standardized file formats such as TIF for imaging data allowing others to use any kind of software for opening your data. Also upcoming

# Sharing posters on Figshare

- ... is also super easy

The screenshot shows the FocalPlane website with a main banner featuring a green and purple fluorescence microscopy image of neurons. Below the banner, a navigation bar includes links for Home, How to, and Sharing Your Poster on Figshare. The main content area is titled "Sharing Your Poster on Figshare: A Community Guide to How-To and Why". It was posted by Elisabeth Kugler on 26 July 2023. The text explains the importance of open science and how sharing posters can foster a more robust and impactful scientific community.

The screenshot shows the Figshare user interface. At the top, there's a header with the FocalPlane logo and a sub-header "III. Uploading Data and Research Outputs to Figshare". The main content area has a heading "Once you're logged in, take advantage of the easy upload process." It provides instructions for new users to upload files via drag-and-drop or browse. Below this, there's a "My data" section with tabs for Projects, Collections, and Activity. A prominent "Drag files to upload" box is centered on the page.

The screenshot shows the continuation of the Figshare submission form. It includes sections for "Funding" (with a search bar and "Add another" button), "Related Materials" (with a "Manage materials" button), and "Licence" (with a dropdown menu set to "CC BY 4.0"). At the bottom right, there's a note: "Item actions in the upper right part of the screen:" followed by a small circular icon with a gear symbol.

# Quiz

- Where might open source code be most *visible*?

Git server of the  
university



Zenodo.org

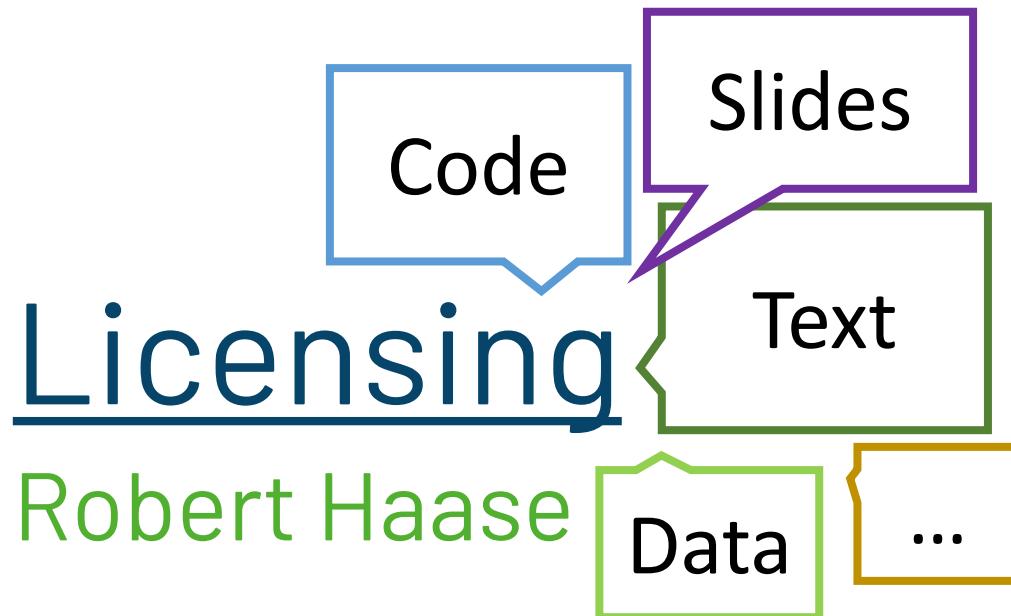


Github.com



Company / institute  
/ personal website

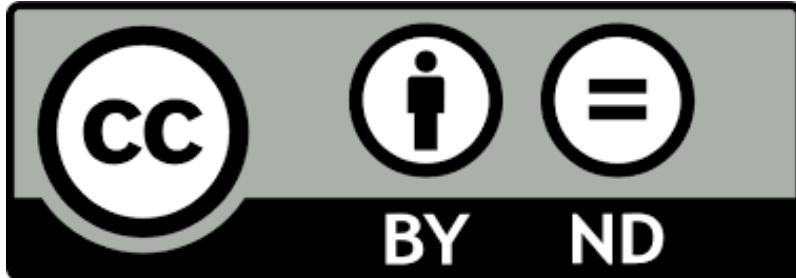
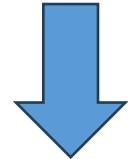




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- Who knows what the ND stands for?



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**“permissive”**

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**“restrictive”**

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by the following slides.

I just would like to  
make a point.

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## Example

The screenshot shows a browser window displaying an arXiv.org article. The title is "SeisCLIP: A seismology foundation model pre-trained by multi-modal data for multi-purpose seismic feature extraction" by Xu Si, Ximeng Wu, Hanlin Sheng, Jun Zhu, Zefeng Li. The abstract discusses the limitations of training specific deep learning models and how SeisCLIP addresses them. The page includes a "view license" link under the "Access Paper" section, which is highlighted with a red box.

I would love to  
show you a Figure  
from this paper!

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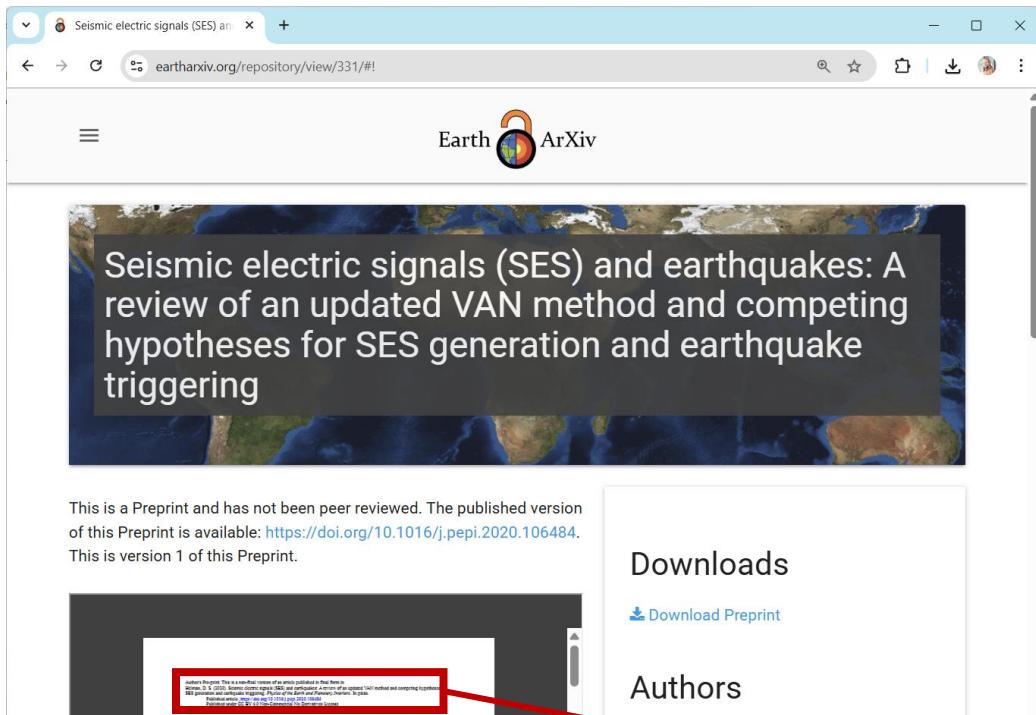
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## Example



Author's Pre-print. This is a non-final version of an article published in final form in  
Helman, D. S. (2020). Seismic electric signals (SES) and earthquakes: A review of an updated VAN method and competing hypotheses for  
SES generation and earthquake triggering. *Physics of the Earth and Planetary Interiors*. In press.

Published article: <https://doi.org/10.1016/j.pepi.2020.106484>

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Home > KI 2011: Advances in Artificial Intelligence > Conference paper

Swarm Intelligence for Medical Volume Segmentation:  
The Contribution of Self-reproduction

Robert Haase, Hans-Joachim Böhme, Daniel Zips & Nasreddin Abolmaali

Conference paper

1628 Accesses | 2 Citations | 3 Altmetric

Part of the Lecture Notes in Computer Science book series (LNCS, volume 7006)

### Abstract

For special applications in diagnostics for oncology the analysis of imaging data from Positron Emission Tomography (PET) is obfuscated by low contrast and high noise. To deal with this issue we propose a segmentation algorithm based on Ant Colony Optimization (ACO) and evolutionary selection of ants for self reproduction. The self reproduction approach is no standard for ACO, but appears to be crucial for volume segmentation. This investigation was focused on two different ways for reproduction control and their contribution to quantity and

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much paying 100 Eur,  
but the related  
administrative effort.

[https://link.springer.com/chapter/10.1007/978-3-642-24455-1\\_10](https://link.springer.com/chapter/10.1007/978-3-642-24455-1_10)

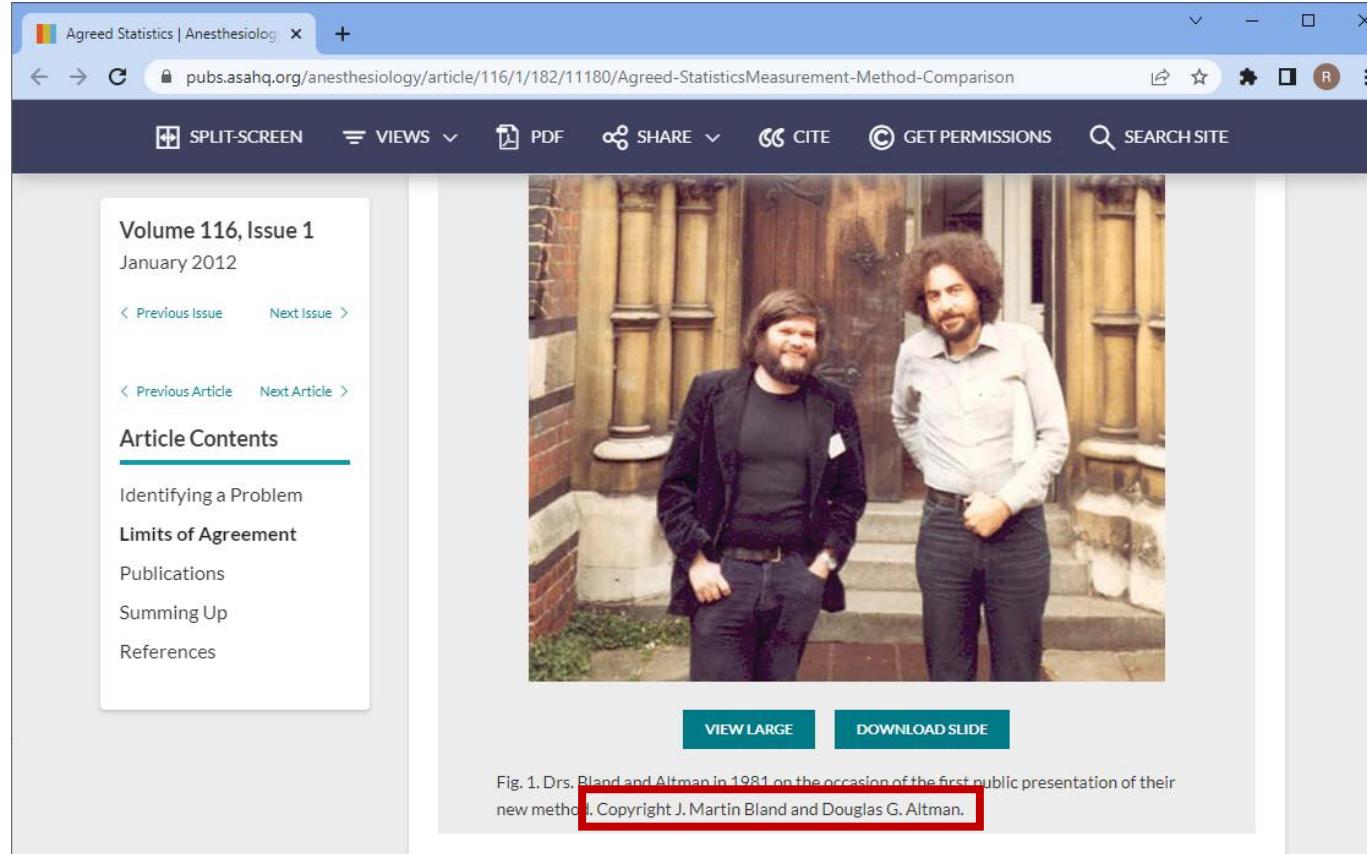
53



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Example when you need to ask



Agreed Statistics | Anesthesiologist

SPLIT-SCREEN VIEWS PDF SHARE CITE GET PERMISSIONS SEARCH SITE

Volume 116, Issue 1  
January 2012

Previous Issue Next Issue  
Previous Article Next Article

Article Contents

- Identifying a Problem
- Limits of Agreement
- Publications
- Summing Up
- References

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Fig. 1. Drs. Bland and Altman in 1981 on the occasion of the first public presentation of their new method. Copyright J. Martin Bland and Douglas G. Altman.

Reusing some of your pictures for teaching

Von: Martin Bland  
An: Robert Haase

5. Juni 2020 22:37

You are welcome to use any of my pictures in your teaching.  
Thanks for asking.

Martin

On Fri, 5 Jun 2020 at 21:24, <rhaase@mpi-cbg.de> wrote:

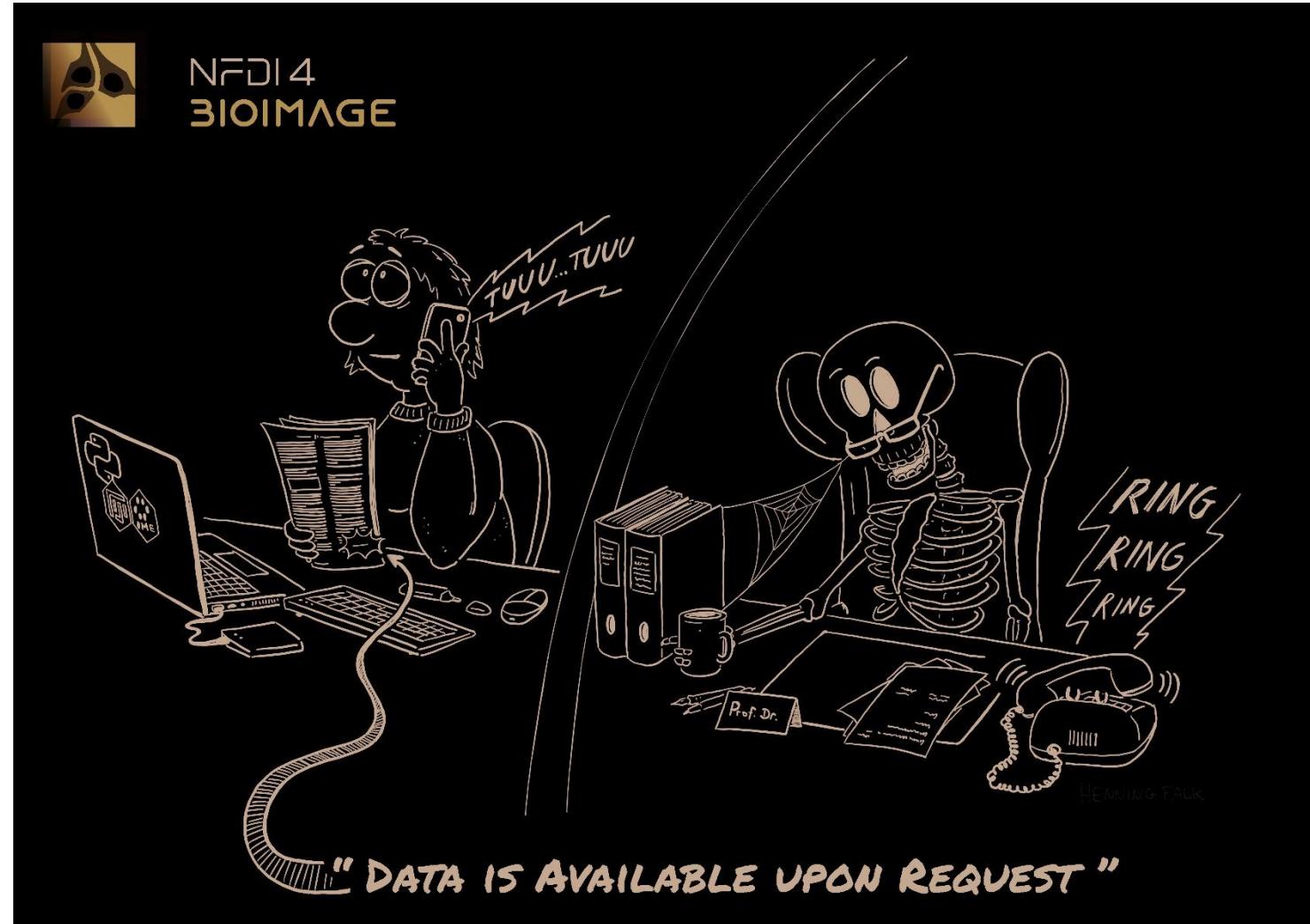
Dear Prof. Bland,

I hope you are doing well. I'm approaching you because I'm preparing a lecture for students about Bio-statistics at the Technical University Dresden and I would like to use some pictures where you are copyright holder.

I'm referring to the photos published in this article:

<https://anesthesiology.pubs.asahq.org/article.aspx?articleid=1933992>

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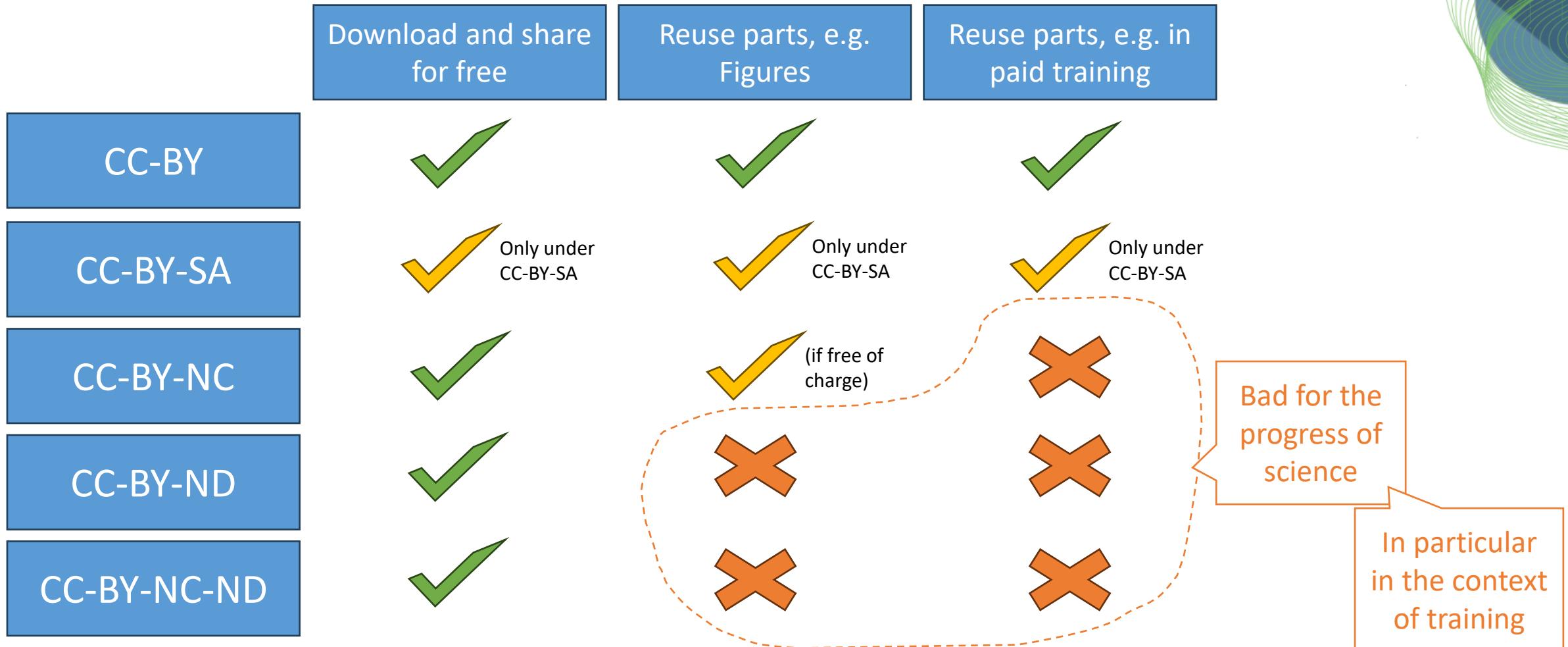
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Restrictive licensing is  
a community-wide issue.

*I presume due to lack of  
awareness & training*

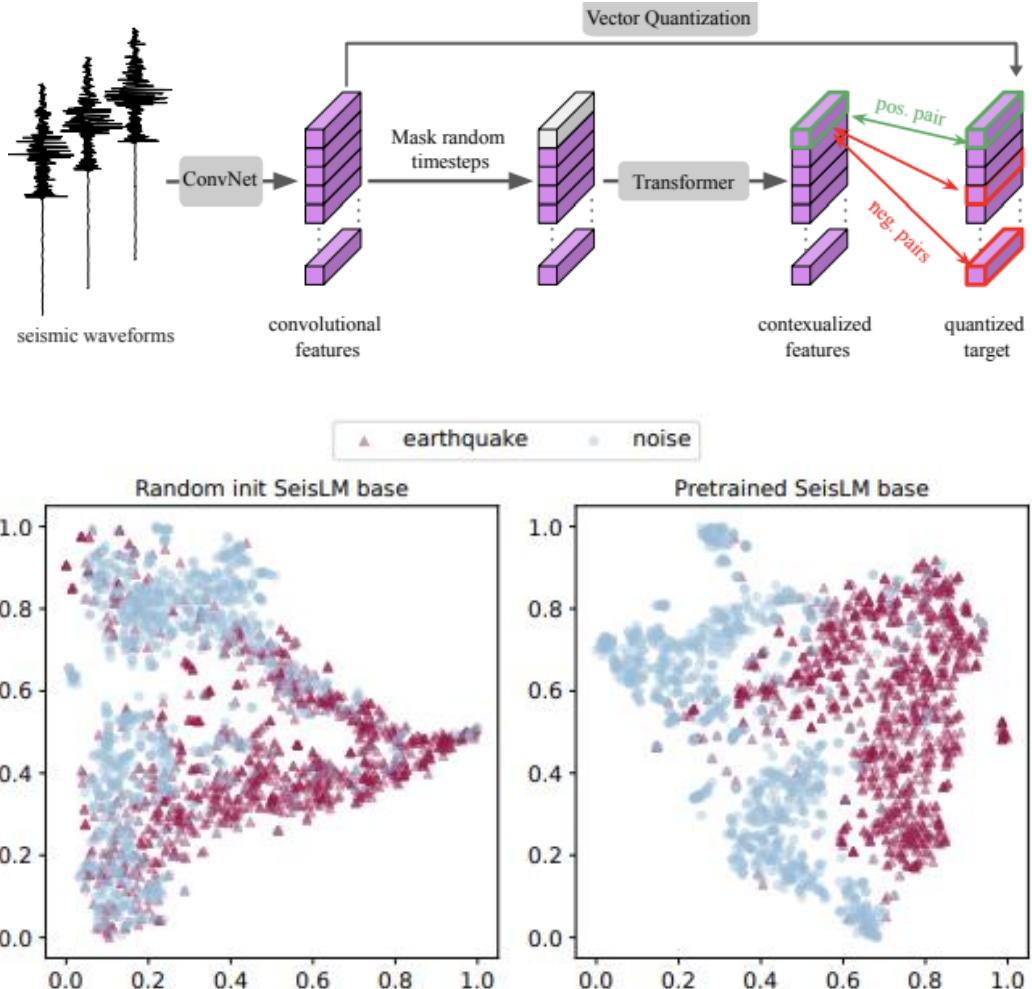
Train the trainers!

# Licensing: Permissive versus restrictive



# Licensing: Permissive versus restrictive

## Example



Look at these great figures! They are from  
<https://arxiv.org/abs/2410.15765v1>  
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A screenshot of the arXiv page for the paper "SeisLM: a Foundation Model for Seismic Waveforms" by Tianlin Liu, Jannes Münchmeyer, Laura Laurenti, Chris Marone, Maarten V. de Hoop, and Ivan Dokmanić. The page shows the abstract, authors, and a green arrow pointing to the "View PDF" link under the "Access Paper:" section. The arXiv URL is arxiv.org/abs/2410.15765v1.

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## Example

Look at this great figure! It's taken from M. Hartley et al.

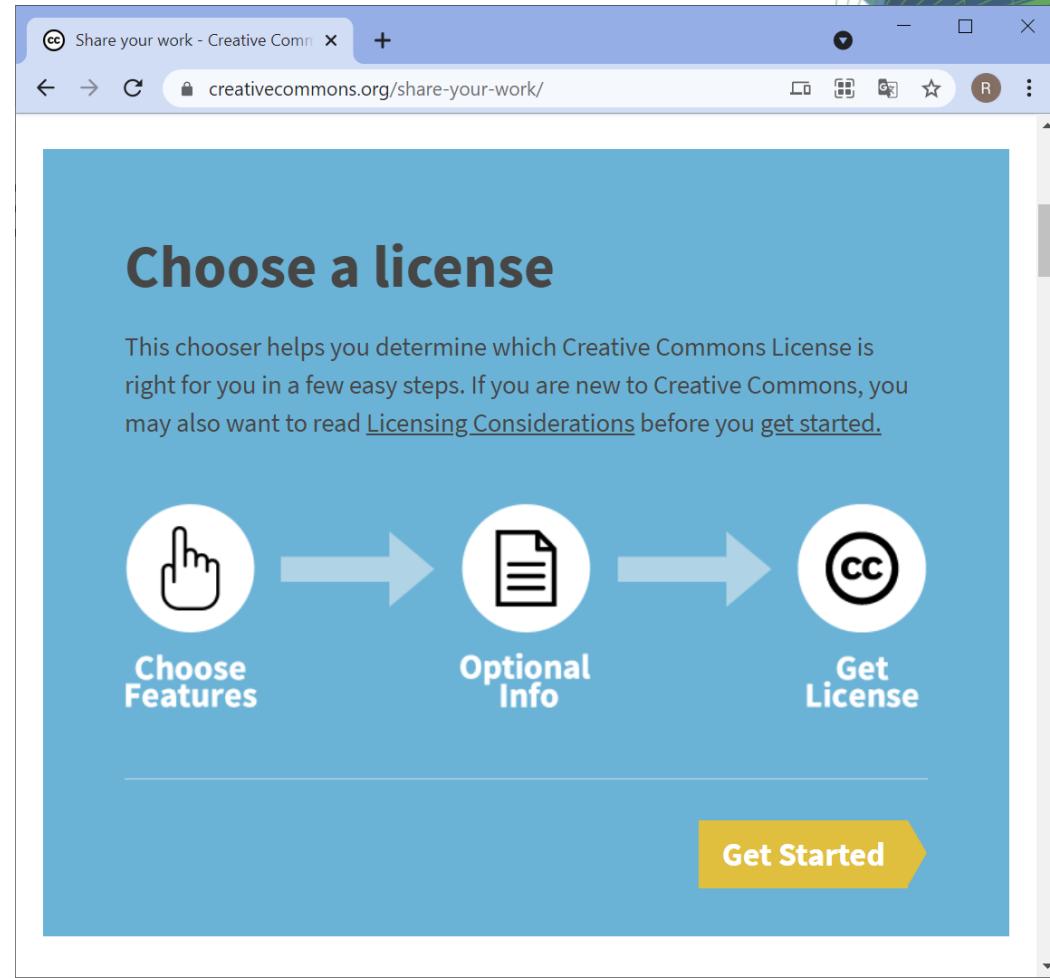
The screenshot shows the BioImage Archive homepage with a study details page overlaid. The study title is "The glucosylceramide synthase inhibitor PDMP causes lyso-somal lipid accumulation and mTOR inactivation". The study is attributed to Pia Hartwig and Doris Höglunger from Heidelberg University. The accession number is S-BIAD144. A data file list table is shown, with one row highlighted:

Name	Size	Section	staining	cells	labeling	treatment	Channel 1	Channel 2	timepoint
experimentA_11_WT_Miglustat.cz	1.6 MB	Study Component	click chemistry and IF	WT	pacSph	50 µM NB-DNJ (Miglustat)	pacSph	Lamp1	continuous labeling

The screenshot shows the bioRxiv preprint page for the study. The title is "The BioImage Archive - building a home for life-sciences microscopy data". The authors listed are Matthew Hartley, Gerard J. Kleywegt, Ardan Patwardhan, Ugis Sarkans, Jason R. Swedlow, and Alvis Brazma. The DOI is <https://doi.org/10.1101/2021.12.17.473169>. The status is "Now published in *Journal of Molecular Biology* doi: 10.1016/j.jmb.2022.167505". The copyright notice in the bottom right corner states: "The copyright holder has placed this preprint in the Public Domain. It is no longer restricted by copyright. Anyone can legally share, reuse, remix, or adapt this material for any purpose without crediting the original authors."

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## Example



You must put such a sentence and keep the link to CC-BY

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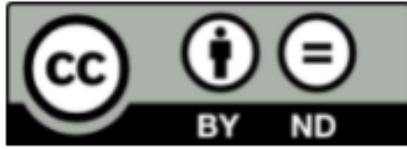
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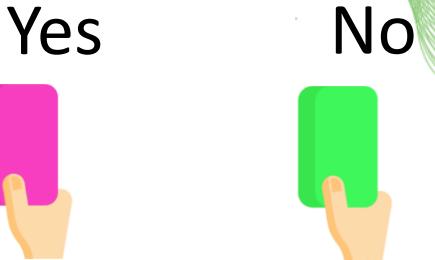
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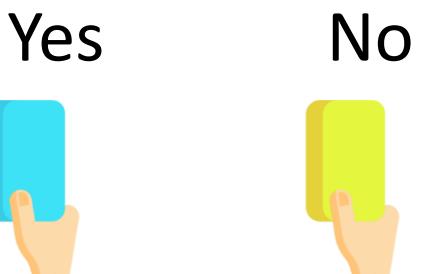
# Quiz

- May I use one of the Figures from this preprint?
- May I download and redistribute this preprint to students of a course for free?

The screenshot shows a web browser displaying a preprint on EarthArXiv. The title of the preprint is "Enhancing and Interpreting Deep Learning for Sea Ice Charting using the AutoICE Benchmark". Below the title, it says "This is a Preprint and has not been peer reviewed. The published version of this Preprint is available: <https://doi.org/10.1016/j.rse.2025.101538>. This is version 1 of this Preprint." The page includes a thumbnail of the preprint's cover, a "Downloads" section with a "Download Preprint" button, and an "Authors" section listing Sepideh Jalayer, Samira Alkaee Taleghan, Rafael Pires de Lima, Behzad Vahedi, Nick Hughes, Farnoush Banaei-Kashani, and Morteza Karimzadeh.

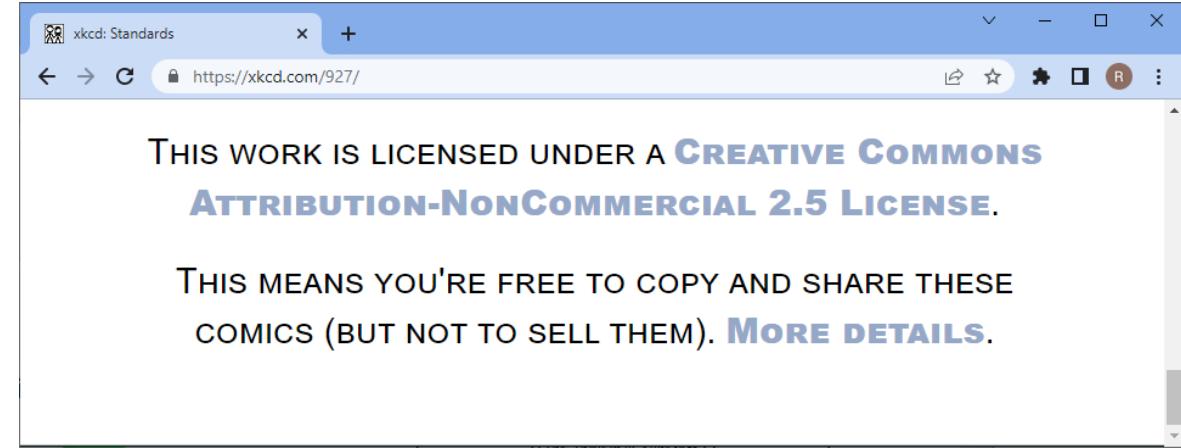
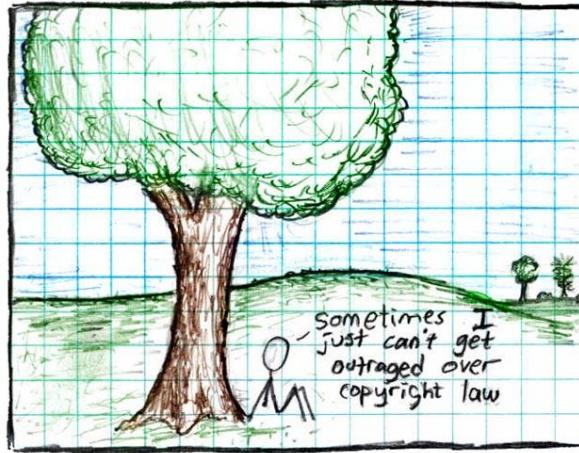


The screenshot shows a license page for the preprint. The title is "License" and the text reads "CC-By Attribution-NonCommercial-NoDerivatives 4.0 International".



# Quiz

- It's ok to reuse Figures from XKCD.com if...



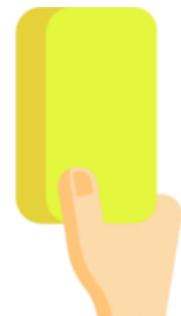
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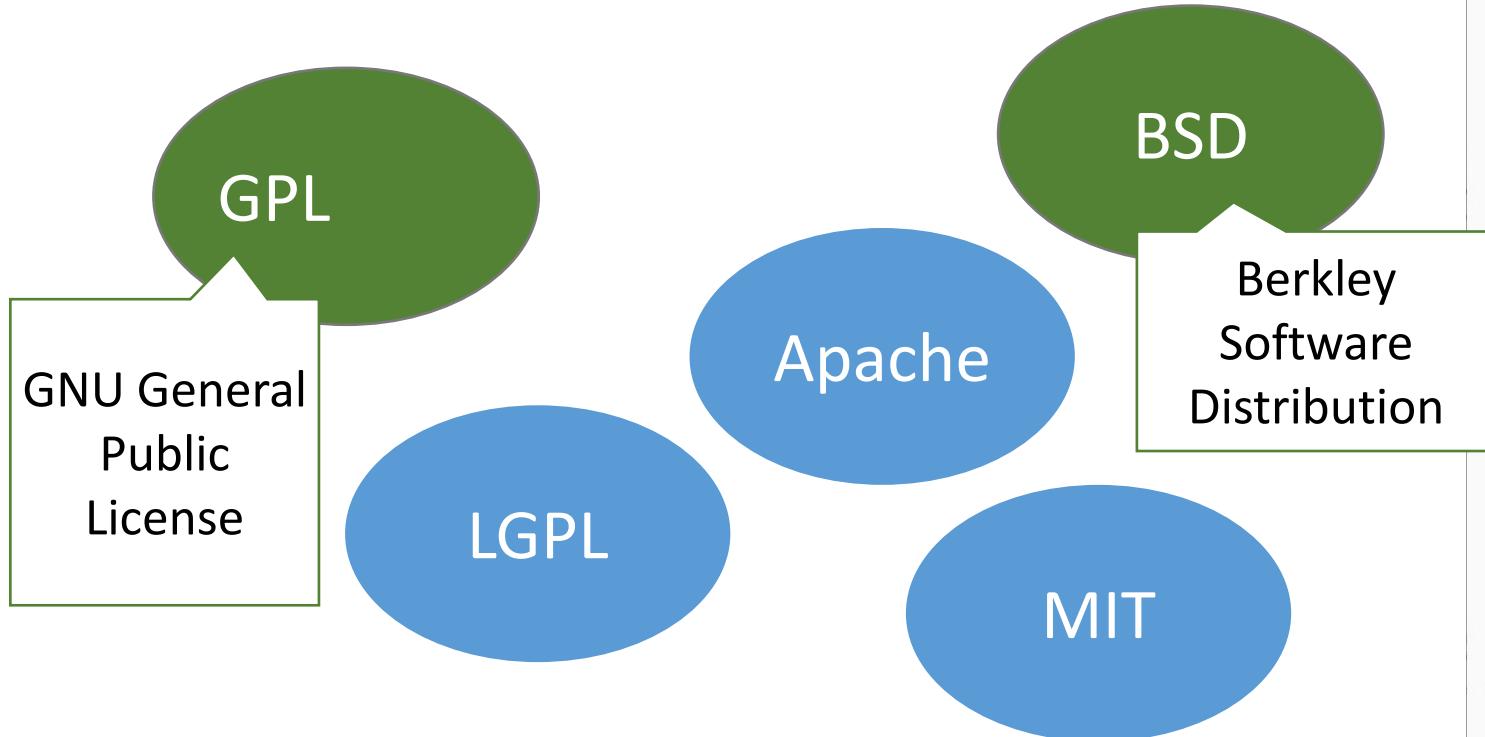
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Choose an open source license

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Which of the following best describes your situation?

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I care about sharing improvements.

What if none of these work for me?

My project isn't software.

I want more choices.

I don't want to choose a license.

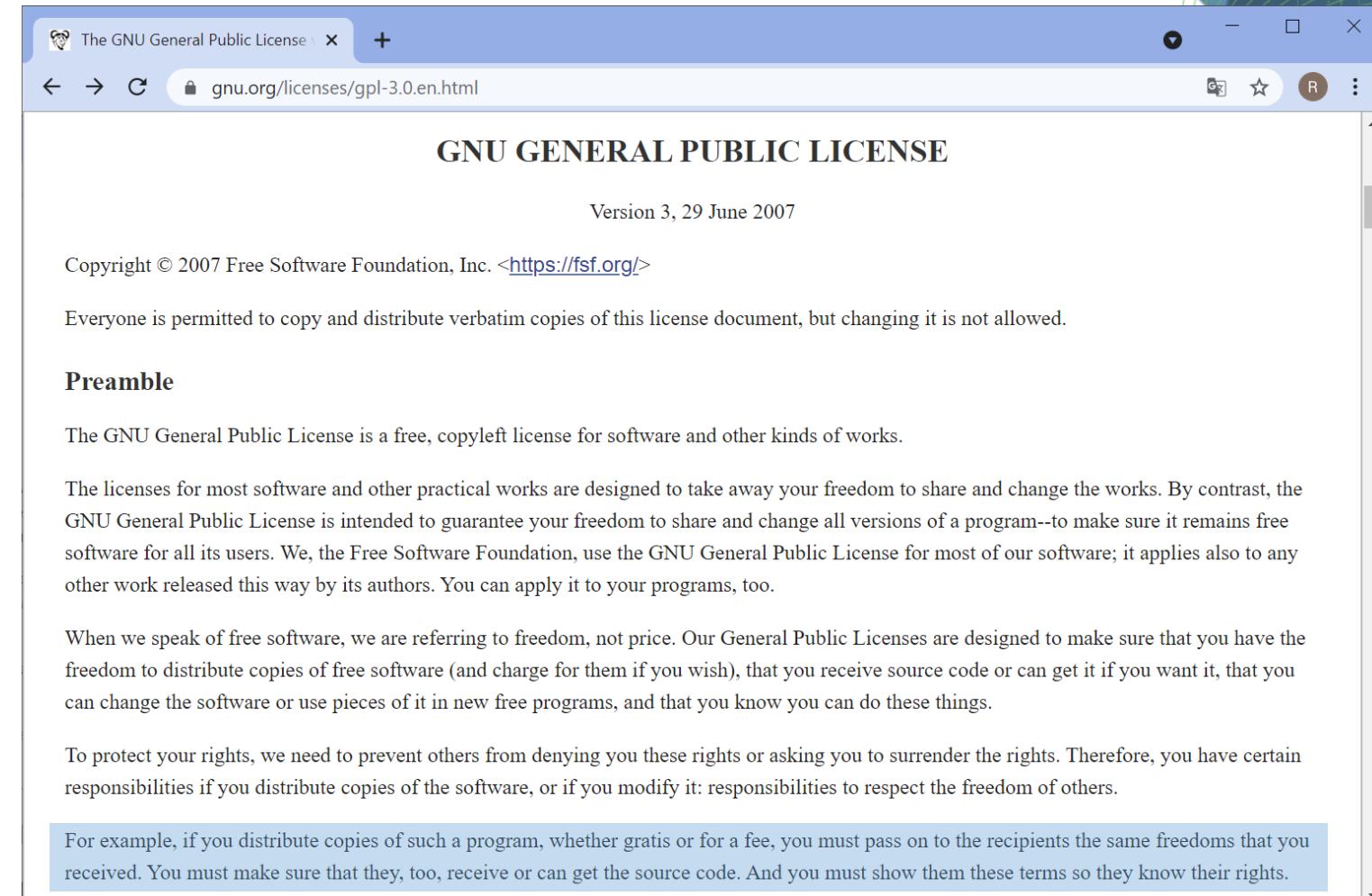
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# Quiz

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Yes



No



Do I have to release the code for this commercial product?

Yes



No



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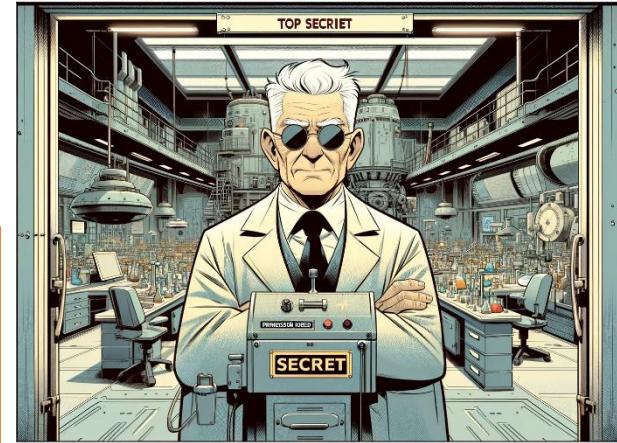
} Similar to  
CC-BY

You must not use the  
copyright holder's name  
to endorse your  
derivative of the work.

# Licensing: Permissive versus restrictive

- Restrictive
  - You can reuse our stuff, but only if you ...
    - License your work with the same license we do
    - Make your stuff openly available
    - Make no money with derivatives of our work
  - Examples: **GPL, CC-BY-SA, CC-BY-NC, CC-BY-ND**
- Permissive licensing:
  - Do whatever you like with our stuff, just make sure to mention / cite us ...
  - Examples: **BSD, MIT, Apache, CC-BY**

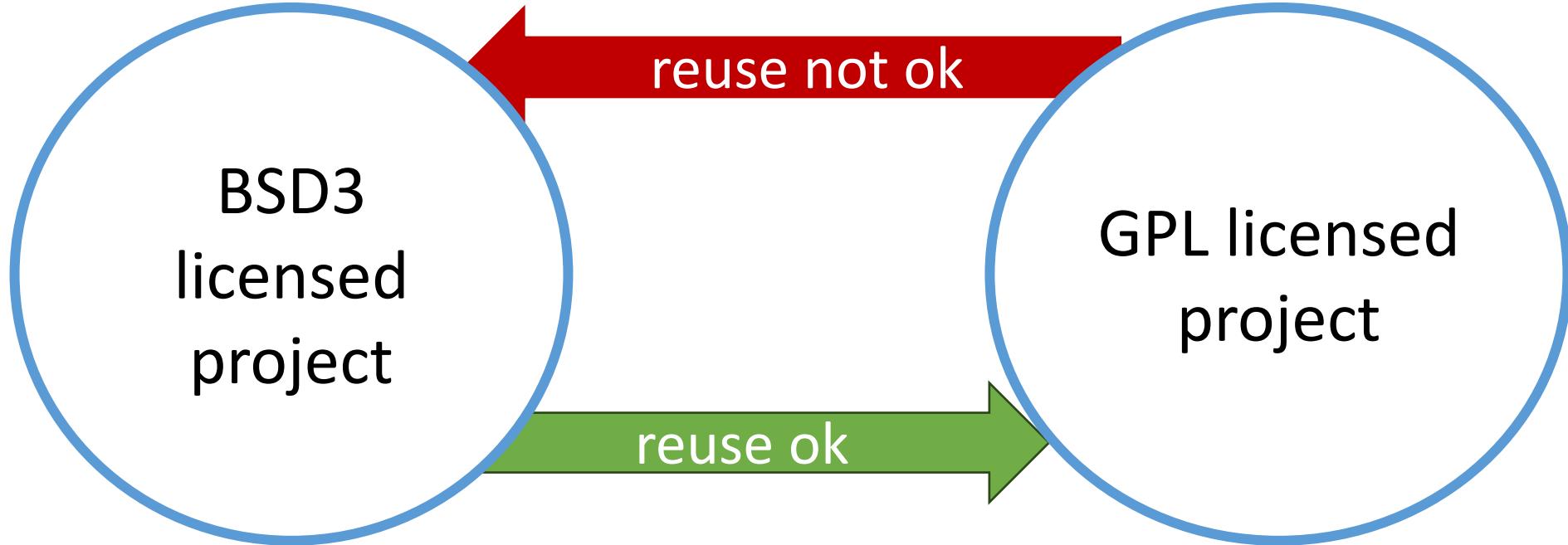
I conclude,  
these are  
*less open* in  
a sense



# Permissive versus restrictive

Use a license which

- is compatible to other projects you're collaborating with and
- fits to your needs / role.



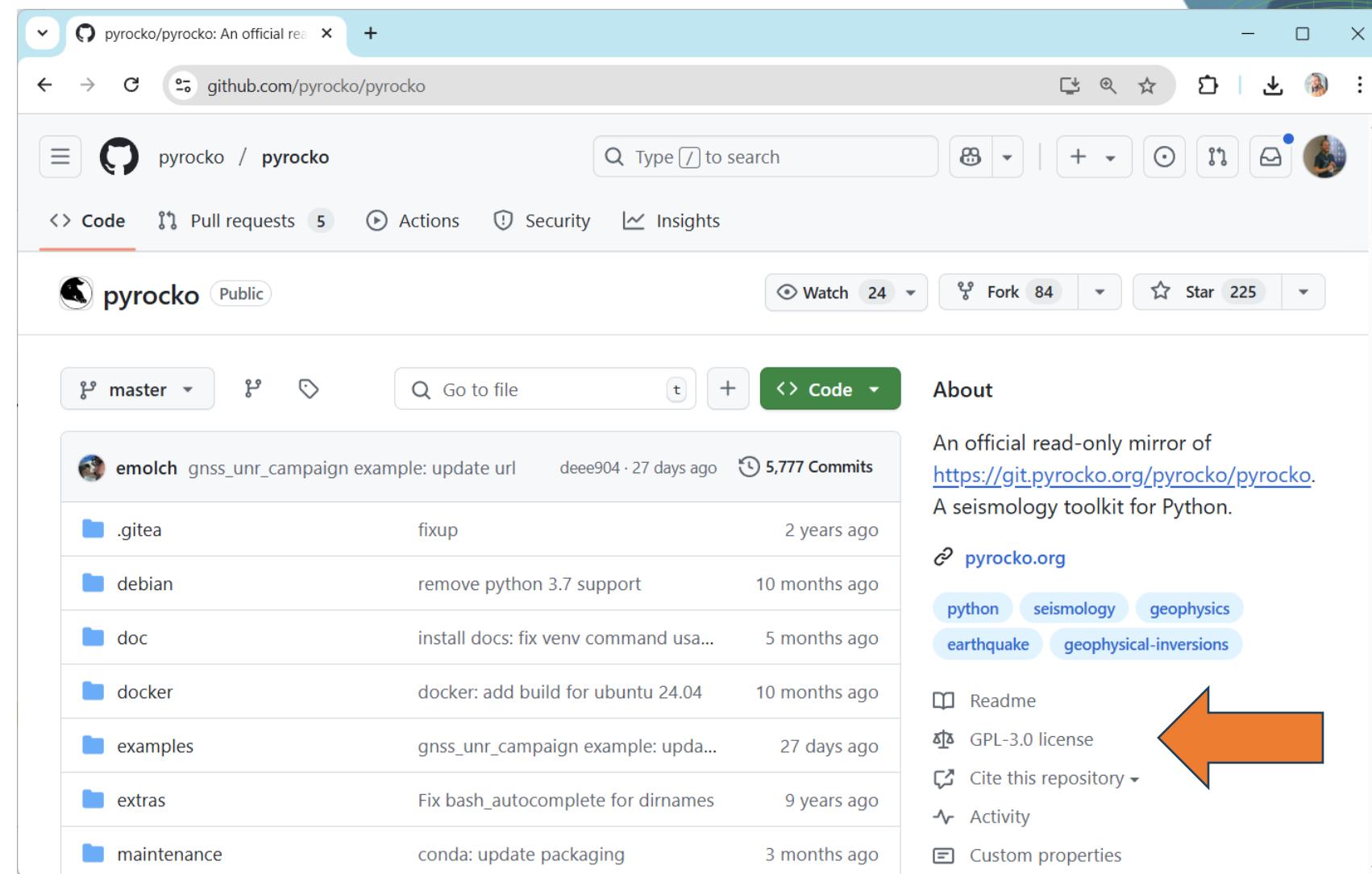
# Quiz

May I reuse code  
from this repository  
in my own BSD-  
licensed work?

Yes



No



pyrocko/pyrocko: An official re... [github.com/pyrocko/pyrocko](https://github.com/pyrocko/pyrocko)

pyrocko / pyrocko

Type  to search

Code Pull requests 5 Actions Security Insights

pyrocko Public Watch 24 Fork 84 Star 225

master Go to file + Code

emolch gnss\_unr\_campaign example: update url deee904 · 27 days ago 5,777 Commits

.gitea fixup 2 years ago

debian remove python 3.7 support 10 months ago

doc install docs: fix venv command usa... 5 months ago

docker docker: add build for ubuntu 24.04 10 months ago

examples gnss\_unr\_campaign example: upda... 27 days ago

extras Fix bash\_autocomplete for dirnames 9 years ago

maintenance conda: update packaging 3 months ago

About

An official read-only mirror of <https://git.pyrocko.org/pyrocko/pyrocko>. A seismology toolkit for Python.

pyrocko.org

python seismology geophysics

earthquake geophysical-inversions

Readme

GPL-3.0 license

Cite this repository

Activity

Custom properties

# Quiz

May I use this library in a software product of a company?

Yes



No



A screenshot of a web browser displaying the GitHub repository page for [pyrocko/pyrocko](https://github.com/pyrocko/pyrocko). The repository is described as an official read-only mirror of <https://git.pyrocko.org/pyrocko/pyrocko>, a seismology toolkit for Python. The 'Code' tab is selected, showing a list of recent commits from the 'master' branch. An orange arrow points from the bottom right towards the 'About' section on the right side of the page.

An official read-only mirror of <https://git.pyrocko.org/pyrocko/pyrocko>. A seismology toolkit for Python.

[pyrocko.org](https://pyrocko.org)

python seismology geophysics  
earthquake geophysical-inversions

About

Readme  
GPL-3.0 license  
Cite this repository  
Activity  
Custom properties

Author	Commit Message	Date
emolch	gnss_unr_campaign example: update url	deee904 · 27 days ago
	fixup	2 years ago
	remove python 3.7 support	10 months ago
	install docs: fix venv command usa...	5 months ago
	docker: add build for ubuntu 24.04	10 months ago
	gnss_unr_campaign example: upda...	27 days ago
	Fix bash_autocomplete for dirnames	9 years ago
	conda: update packaging	3 months ago

# Quiz

May I reuse code  
from this repository  
in my own GPL-  
licensed work?

Yes



No



A screenshot of a web browser displaying a GitHub repository page. The URL in the address bar is [github.com/fatiando/verde](https://github.com/fatiando/verde). The repository name is **verde**, it is public, and has 38 issues, 6 pull requests, 333 commits, 22 watchers, 74 forks, and 626 stars. The main branch is **main**. The right sidebar contains sections for **About**, **Readme**, **BSD-3-Clause license**, **Code of conduct**, **Activity**, and **Custom properties**. An orange arrow points from the "Custom properties" section towards the bottom of the sidebar. The main content area shows a list of recent commits:

Author	Commit Message	Date
leouieda	Add a link to the Fatiando F...	4a961f6 · 2 months ago
	Bump pypa/gh-action-pypi-public...	2 months ago
	Move the sources of gallery/tutoria...	4 years ago
	Minor fixes to docs (#473)	5 months ago
	Replace Sphinx napoleon for numpy...	11 months ago
	Add acknowledgements and SOES...	7 years ago
	Minor fixes to docs (#473)	5 months ago
	Start the repository with basic tem...	7 years ago
	Update GitHub Actions configurati...	4 years ago



# Take home message

If you share material (openly or not)

## license it

and it'll be harder to steal it

# Summary

- If you want to make your stuff reusable:
  - Use permissive licenses
  - Share it on community-wide platforms (not institutional servers)
  - Register them in search-indices
- Read more:
  - Sharing on Zenodo  
<https://focalplane.biologists.com/2023/02/15/sharing-research-data-with-zenodo/>
  - Sharing on Figshare  
<https://focalplane.biologists.com/2023/07/26/sharing-your-poster-on-figshare/>
  - Collaborative work on github  
<https://focalplane.biologists.com/2021/09/04/collaborative-bio-image-analysis-script-editing-with-git/>
  - Licensing  
<https://focalplane.biologists.com/2023/05/06/if-you-license-it-itll-be-harder-to-steal-it-why-we-should-license-our-work/>

# Acknowledgements

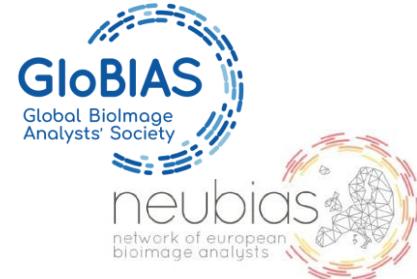
Communities &  
platforms



NFDI4  
BIOIMAGE



image.sc



BIDS team UL



Lea Gihlein, Lea Kabjesz, Mara Lampert

Funding



Bundesministerium  
für Bildung  
und Forschung



Diese Maßnahme wird gefördert durch die Bundesregierung  
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der Grundlage des von den Abgeordneten des Sächsischen  
Landtags beschlossenen Haushaltes.

Chan  
Zuckerberg  
Initiative



Deutsche  
Forschungsgemeinschaft

Some Figures were  
generated using



DALL-E