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CENTER FOR SCALABLE DATA ANALYTICS AND
ARTIFICIAL INTELLIGENCE

NFDI 4 BIOIMAGE

NATIONAL RESEARCH DATA MANAGEMENT INFRASTRUCTURE
FOR MICROSCOPY AND BIOIMAGE ANALYSIS

Sharing & licensing

Robert Haase

https://doi.org/10.5281/zenodo.10829166

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@haesleinhuepf
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ScaDS.AI March 2024

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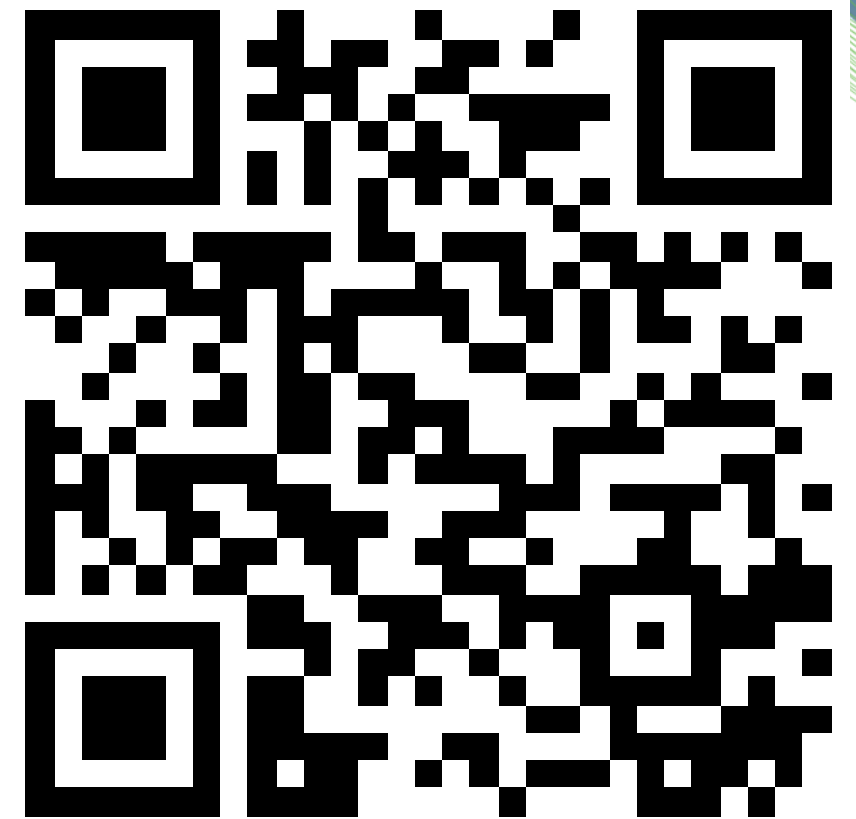
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Quiz

What should we focus on in this session?
(select all that apply)

Open Science   FAIR principles   Sharing
                                         data/code/...   Licensing

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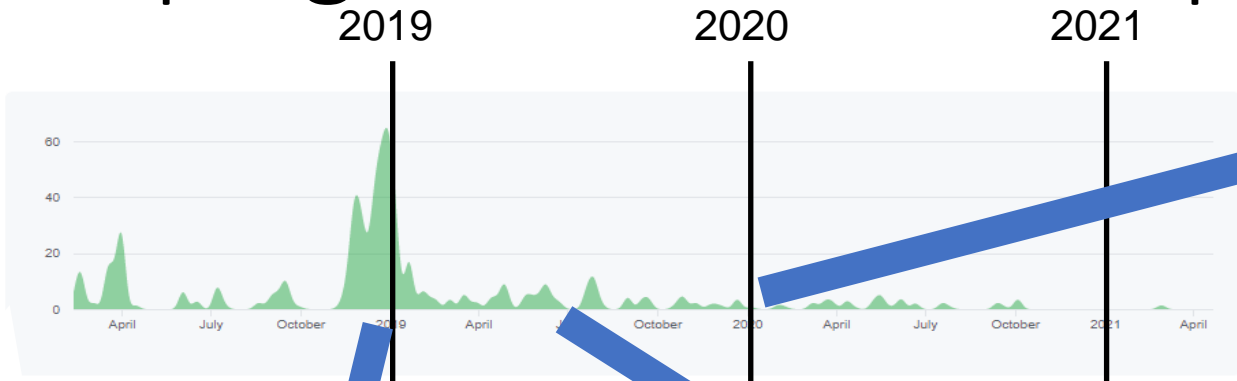ScaDS.AI March 2024

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*?)
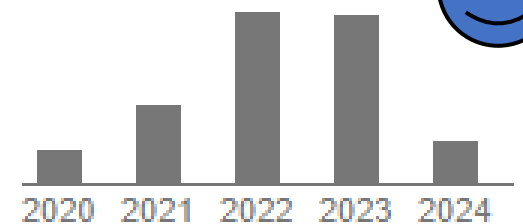
- Assumption: it's not worth the effort.

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Sustainability of *my* contribution to science

What happens to research software once the PhD student leaves the institute / field?

Developing software in the open

2019   2020   2021

Nov. 2017: I took over microscopy control software from Loic and "found" some GPU-accelerated image processing in there

Loic A. Royer
(CZ Biohub)
@loicaroyer

Correspondence | Published: 18 November 2019

CLIJ: GPU-accelerated image processing for everyone

Robert Haase ✉, Loic A. Royer ✉, Peter Steinbach, Deborah Schmidt, Alexandr Dibrov, Uwe Schmidt, Martin Weigert, Nicola Maghelli, Pavel Tomancak, Florian Jug & Eugene W. Myers

Nature Methods **17**, 5–6(2020) | Cite this article

Today: 134 citations
(Google scholar, 2024-03-18)

Zitiert von: 134

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https://github.com/clij/clij/graphs/contributors https://forum.image.sc/t/opencl-gpu-based-image-processing-in-imagej-macro/21286
https://www.biorxiv.org/content/10.1101/660704v1?versioned=true
https://www.nature.com/articles/s41592-019-0650-1

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Scientific culture

Public access to research results -> Reusability

"Kodex"

Guidelines for Safeguarding Good Research Practice

Code of Conduct

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

Scientific culture

DFG Deutsche Forschungsgemeinschaft

About Us ⌄   Funding ⌄   Basics and Topics ⌄   Funded Projects ⌄   News ⌄

DFG > News > News and Current Topics > Information for Researchers > Package of Measures to Support a Shift in the Culture of Research Assessment

Information for Researchers, No. 61 | September 1, 2022

Package of Measures to Support a Shift in the Culture of Research Assessment

DFG changes proposal forms and introduces mandatory CV template / The aim is to support a shift in the culture of research assessment / Improvement of equal opportunity practices

DFG changes proposal forms and introduces mandatory CV template / The aim is to support a shift in the culture of research assessment / Improvement of equal opportunity practices

Successful science and research require suitable framework conditions. The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) ensures these conditions by regularly conducting analyses, providing the relevant information and adapting its procedures accordingly. The DFG set out the challenges and fields of action in a position paper on academic publishing published in May of this year: it sees both the academic community as a whole and itself as a funding organisation as being responsible for initiating a cultural shift towards research assessment that is geared more towards equal opportunity and attaches even greater importance to the substance of research. In the interests of bringing about such a shift, it is up to research funding organisations to broaden the spectrum of accepted publication formats, to attach greater value to content-based evidence of achievement and to strengthen the recipient side of publishing. The DFG has launched a comprehensive and far-reaching package of measures in order to fulfil this mandate.

Binding CV template across all funding programmes

For this reason, the assessment of a researcher's accomplishments must be holistic and based on substantive qualitative criteria. In order to strengthen qualitative evaluation criteria over quantitative indicators, the DFG will be introducing a curriculum vitae template that will be mandatory across all programmes from 1 March 2023 (the template will be adapted shortly for proposals under the Collaborative Research Centre and Research Training Group programmes; information will be provided separately in this regard). The template adopted by the DFG Senate allows applicants to provide both narrative and tabular information, thereby facilitating a holistic view of the applicant's academic career in the review and evaluation process.

In addition to the mandatory information required in order to assess eligibility, applicants may also provide details of special circumstances or additional services to scholarship such as committee activities or the establishment of research infrastructures. As such, the template provides the basis for a qualitatively sound assessment of academic performance that takes greater account of the respective stage of the individual's life and career. Accordingly, reviewers are now instructed to consider applicants' academic performance in the context of their individual curriculum vitae and career stage.
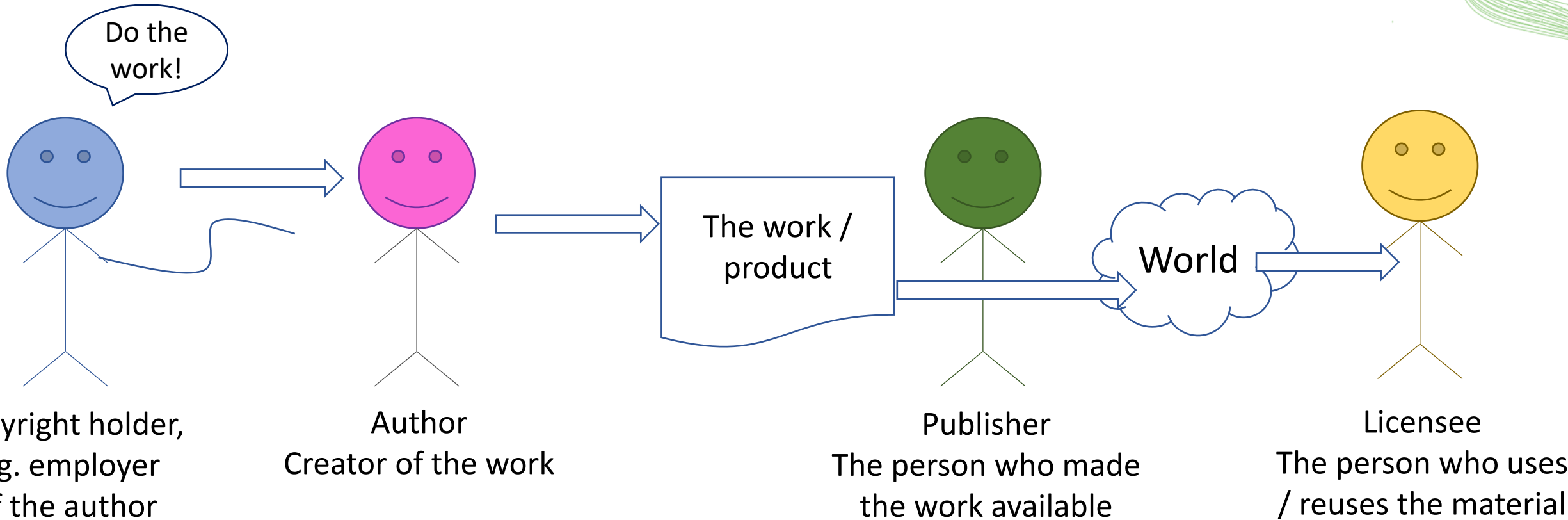
Publication details in proposals and CVs

Performance assessment based on content-related qualitative criteria also explicitly includes ensuring that the entire spectrum of academic publication types are equally displayed and acknowledged in funding proposals and CVs. In addition to a maximum of ten publications in the more common publication formats, the CV can therefore now list up to ten further sets of research outcomes and findings that have been publicised in a variety of other ways, including articles on preprint servers, data sets or software packages, for example. In DFG proposals, the project-specific list of publications will be included in the general bibliography. The intention here is to shift the focus of the review and the evaluation of a proposal away from the list of publications and towards the substance of the applicant's accomplishments. In order to document their own published preliminary work, applicants can typographically highlight (e.g. in bold) a maximum of ten of their own publications in the bibliography that are important for the project. No information on quantitative metrics such as impact factors and h-indices is required in the CV or the proposal, and such information is not to be considered in the review. The relevant details are included in DFG forms and review instructions.

These modifications and innovations reflect the fact that the DFG is continuing to promote the cultural shift in research assessment that was advocated in May with the publication of the position paper on academic publishing. The DFG hopes that this refocus – away from quantitative indicators and towards the substance of scholarship – will lead to improved equality of opportunity and a higher-quality basis for review overall.
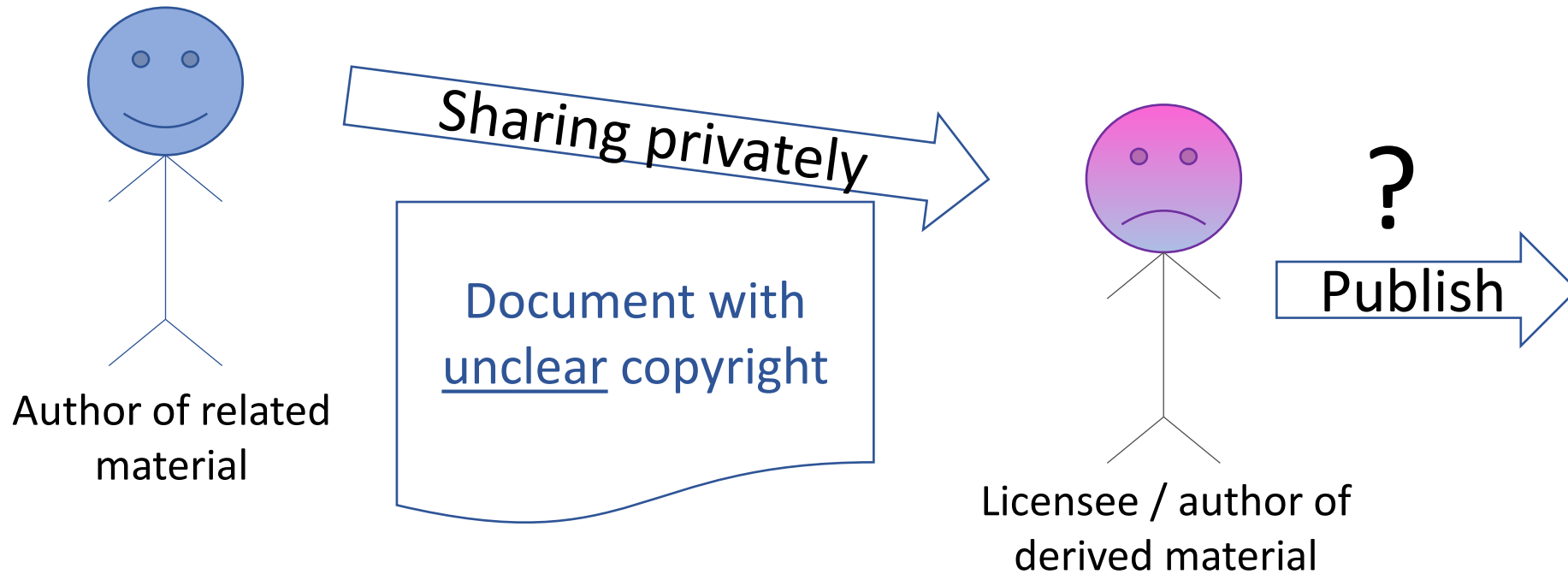
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https://www.dfg.de/en/news/news-topics/announcements-proposals/2022/info-

7

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Am I allowed to publish my stuff?

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

Do the work!

The work / product

World

Copyright holder, e.g. employer of the author

Author
Creator of the work

Publisher
The person who made the work available

Licensee
The person who uses / reuses the material

Am I allowed to publish my stuff?

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

Author of related material

Sharing privately

Document with <u>unclear</u> copyright

?
Publish

Licensee / author of derived material

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Am I allowed to publish my stuff?

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

Sharing privately

Document with **defined** copyright

Author of related material

Licensee / author of derived material

Publish

World

Licensee / author of derived material

Openness of software / projects
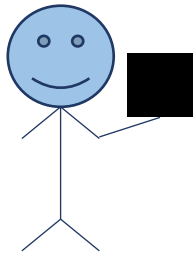
Closed source	Open source	Benevolent dictatorship	Community driven	Openly extensible
• <u>Open to collaborations</u> • "Black box" • Compiled code (e.g. C/C++) • Good for protecting intellectual properties ($$$)	• <u>Code available to read</u> • Not necessarily executable code • No maintenance / support efforts	• <u>Open to contributions</u> • Single maintainer, often overwhelmed • Efficient decision making • Bus factor ≈1	• Open to contributions • <u>Partially democratic</u> • Board of maintainers (core developers) • Long-winded decision making	• <u>Openly extensible;</u> without maintainers involved • Partially community driven
Hardware device drivers	Custom image analysis scripts	TrackMate, SNT, MorpholibJ, CLIJ	scikit-image, scipy, OpenCL	ImageJ, Python, numpy

Quiz

What is the role of Github in the context of publishing open-source code?

Copyright holder   Author   Publisher   Licensee

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Data Management Plans (DMPs)

Define responsibilities and procedures early!

Open Science	Experiment design	Imaging / data acquisiton	Data Analysis	Paper writing
Open Training	Training design	Attendee + trainer acquisition	Training material preparation	Conduct workshop

"Data / materials we produce will be published under CC-BY 4.0"

"Robert will do this by end of 2025!"

→ DMP

- Only if procedures are defined early, everyone can follow them.
- Licenses are important when assembling materials (-> Copyright)
- Meta-data might have *higher quality* if the person responsible for publishing the data is aware of their duties.

Are we going to publish data / materials / code?

What license can we use?

Deciding by the end of the project is too late!

Standard for sharing: The FAIR-principles

- Findable
- Accessible
- Interoperable
- Reusable

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The FAIR-principles

Findable
- F1. (Meta)data are assigned a globally unique and persistent identifier
- 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. <u>(Meta)data are registered or indexed in a searchable resource</u>
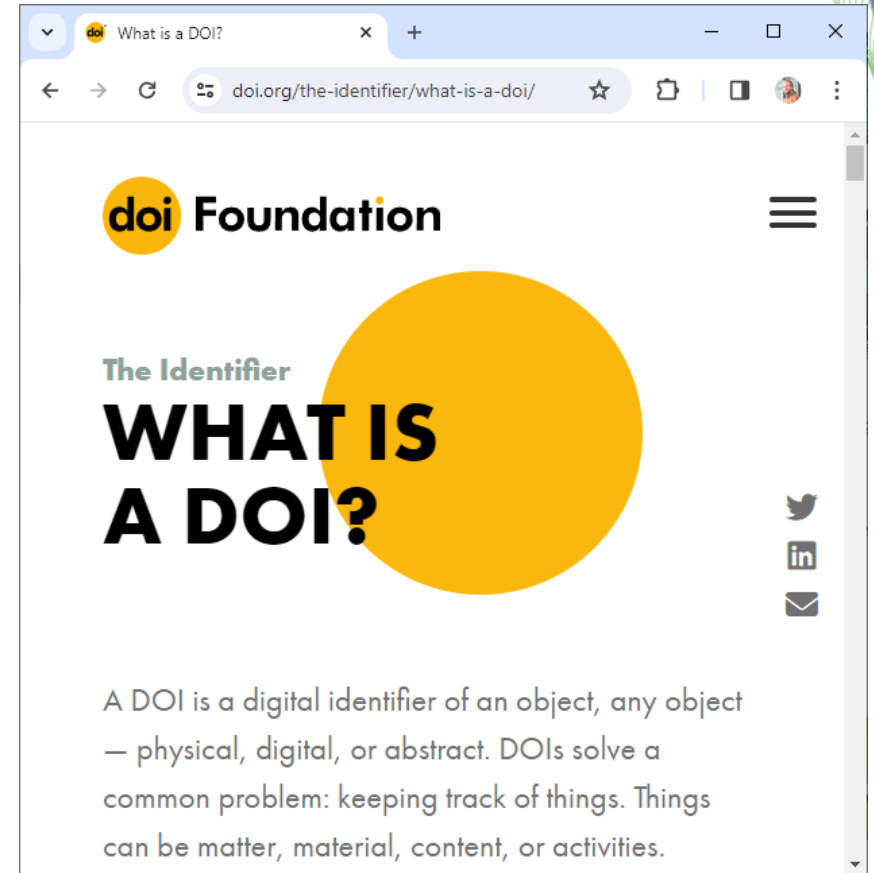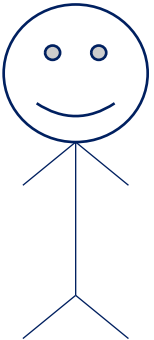
Indexing

- Make sure your materials are listed in public search indices

- Do not trust google to make your stuff findable

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https://biii.eu/ https://bio.tools/
https://microscopydb.io/#get-involved
https://nfdi4bioimage.github.io/training

16
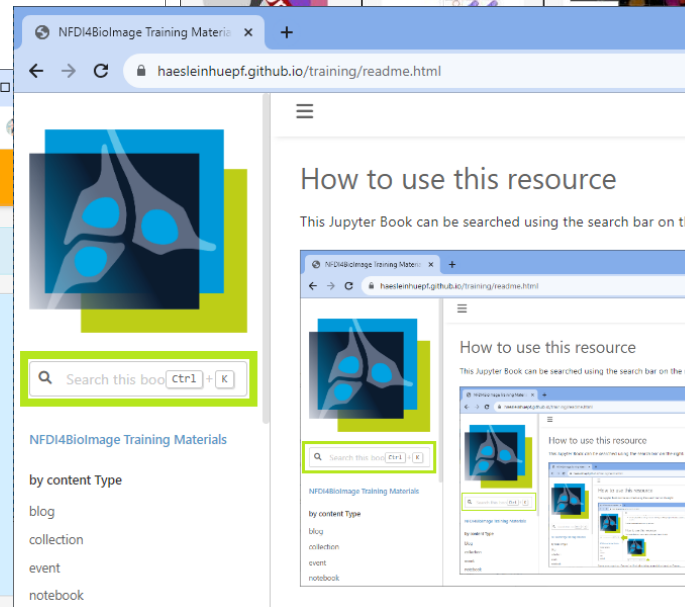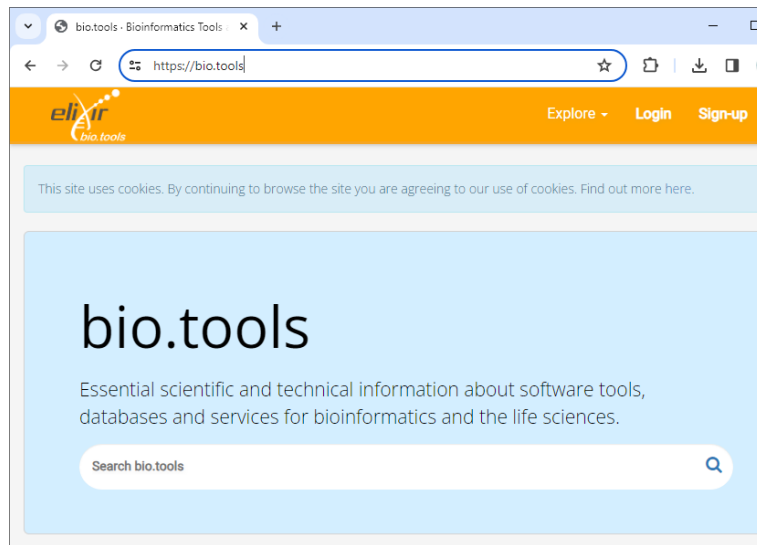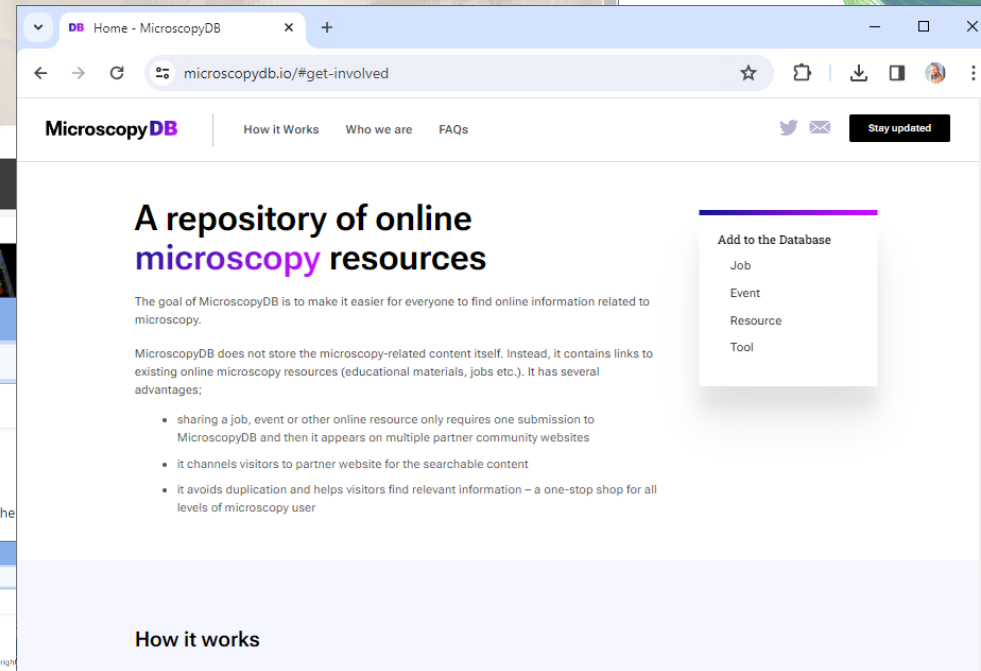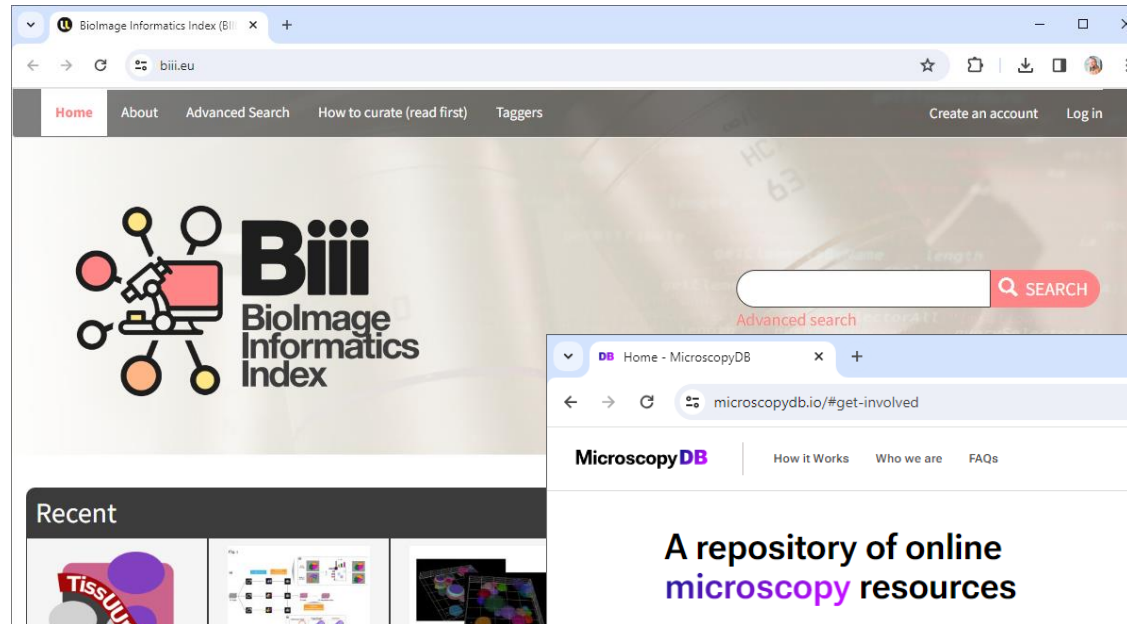
Incentives: Findability

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

Incentives: Findability -> Visibility

- **YouTube**

- **Github**
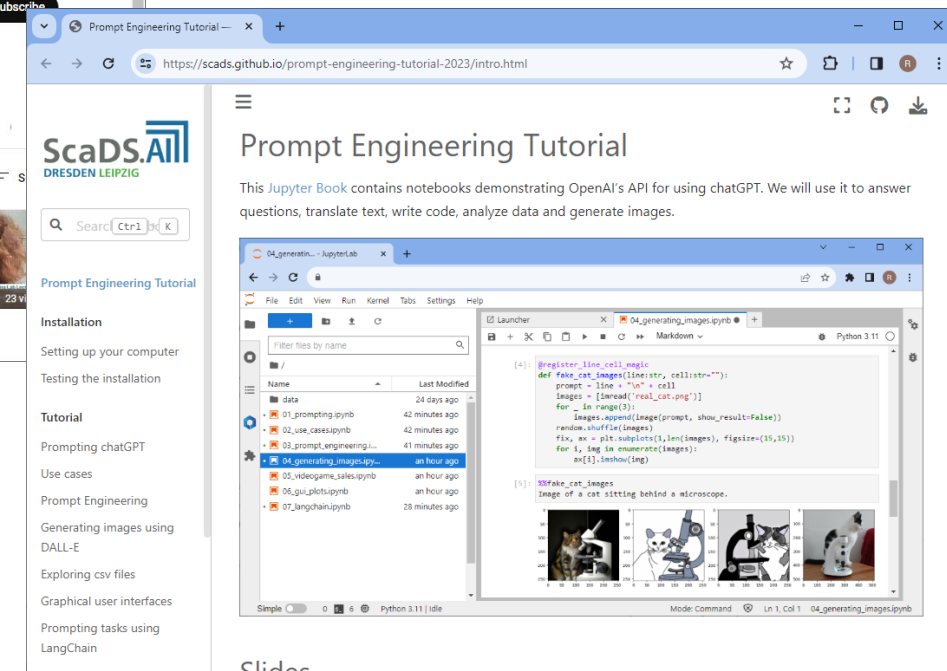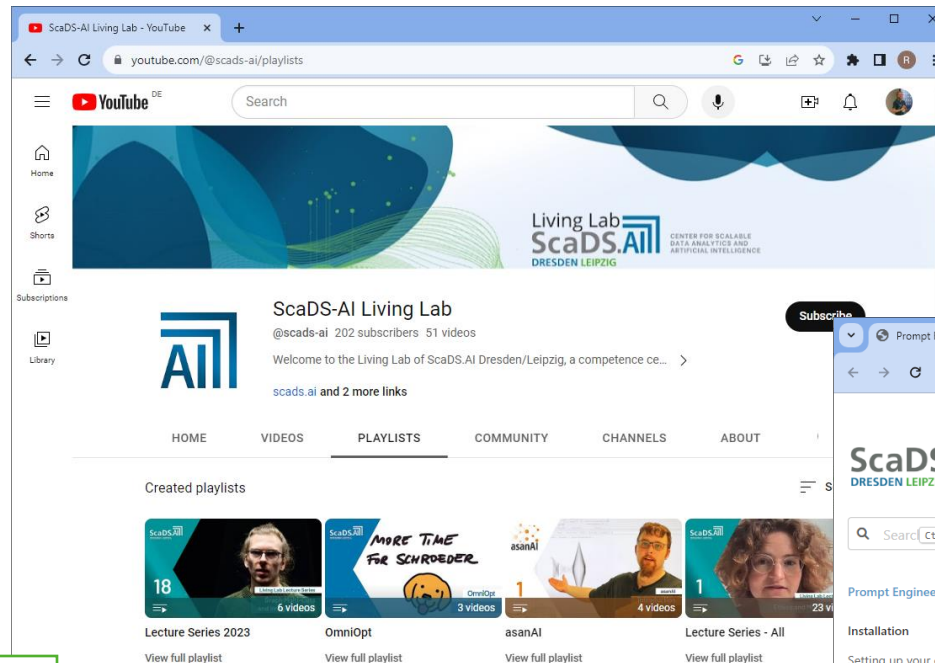
Open & FAIR Training
is a PR instrument

... leading to
- more software users
- more course attendees
- new collaborations

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https://www.youtube.com/@scads-ai
https://scads.github.io/prompt-engineering-tutorial-2023

18

The FAIR-principles

Accessible
- A1. (Meta)data are retrievable by their identifier using a <u>standardised</u> 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.)

SITUATION: THERE ARE 14 COMPETING STANDARDS.

14?! RIDICULOUS! WE NEED TO DEVELOP ONE UNIVERSAL STANDARD THAT COVERS EVERYONE'S USE CASES. YEAH!

SOON: SITUATION: THERE ARE 15 COMPETING STANDARDS.
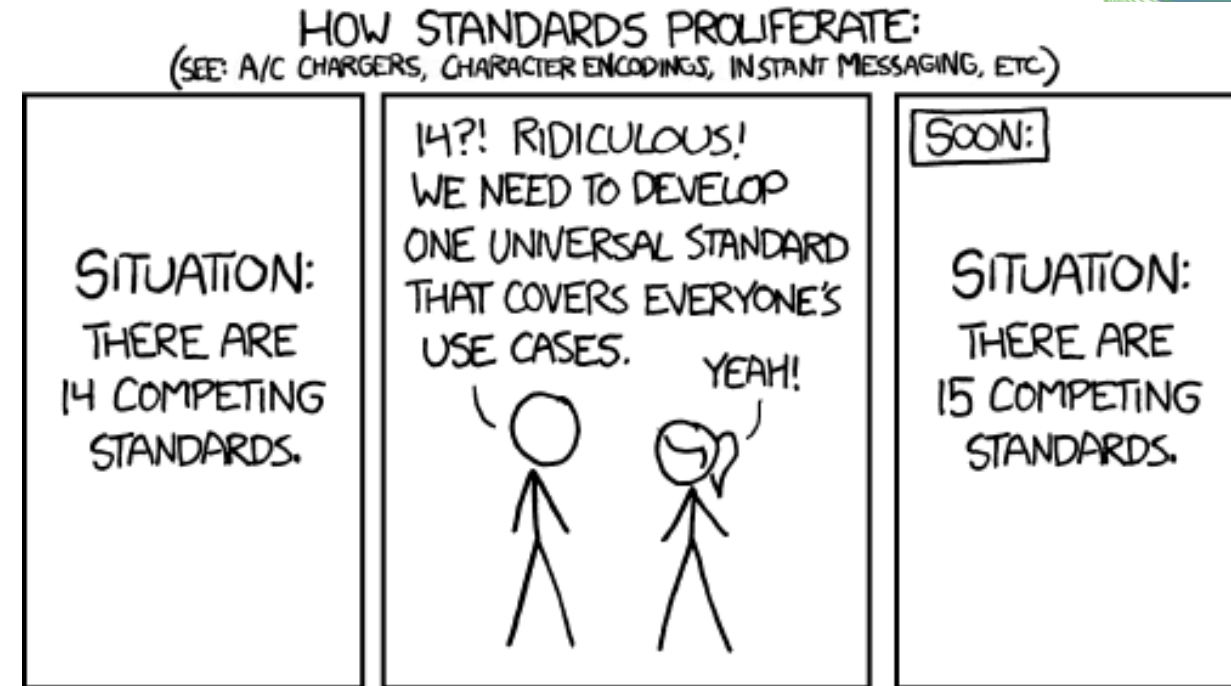
Open Access

The A in FAIR does not necessarily stand for Open Access

The FAIR-principles

Interoperable
- I1. (Meta)data use a <u>formal, accessible, shared, and broadly applicable language</u> 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
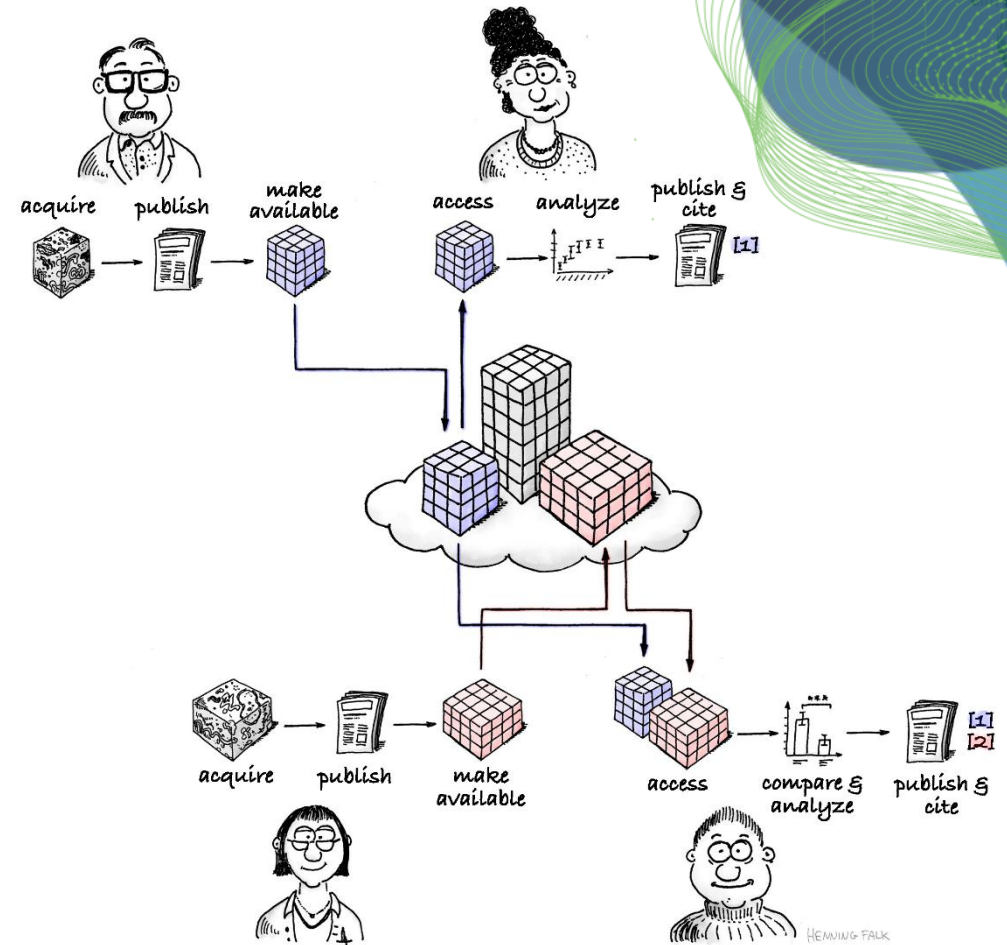
Incentives: Reusability

- Open Access -> Others teach how to use <u>your</u> *tools & methods*

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https://f1000research.com/slides/10-201
https://f1000research.com/slides/11-1175

Use cases: Data

- Unique datasets
- Valuable for domain scientists
- Valuable for software developers
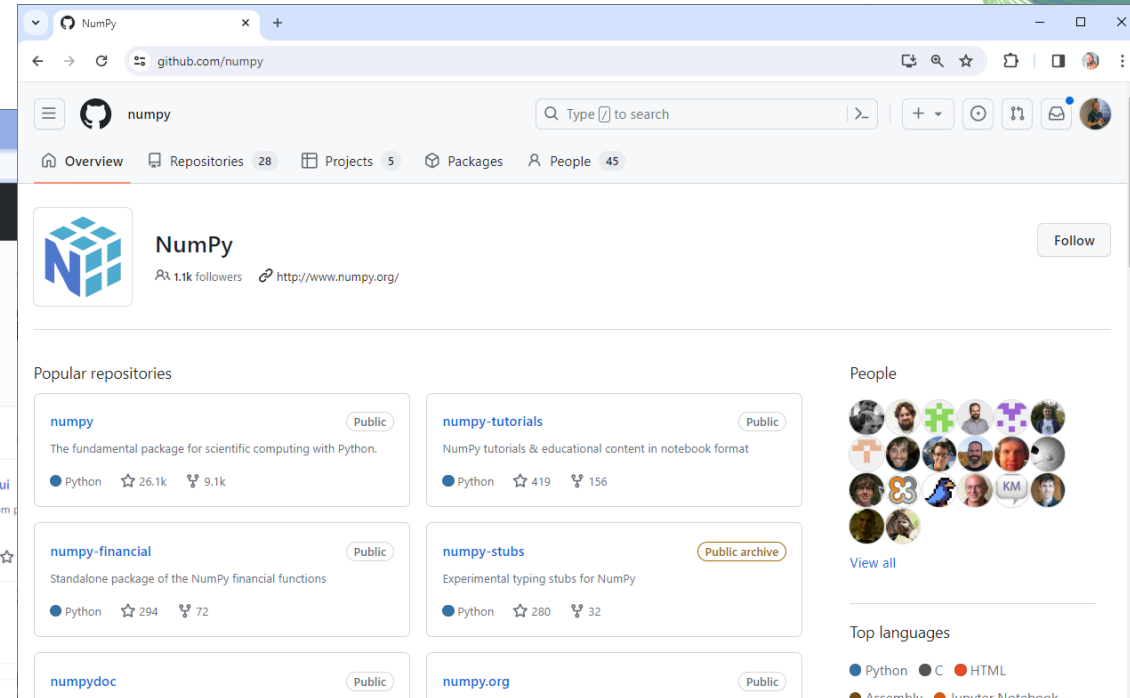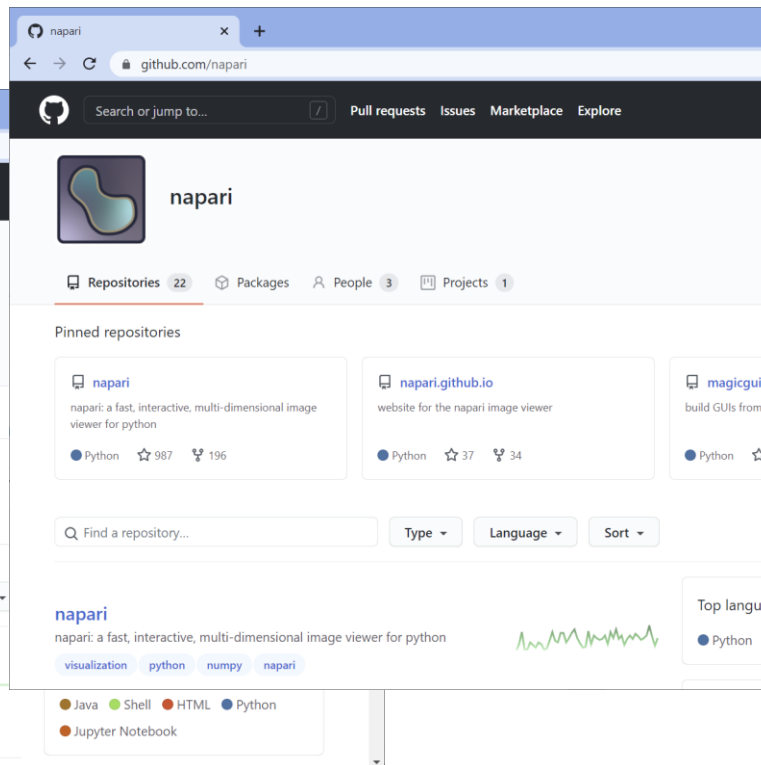- https://zenodo.org
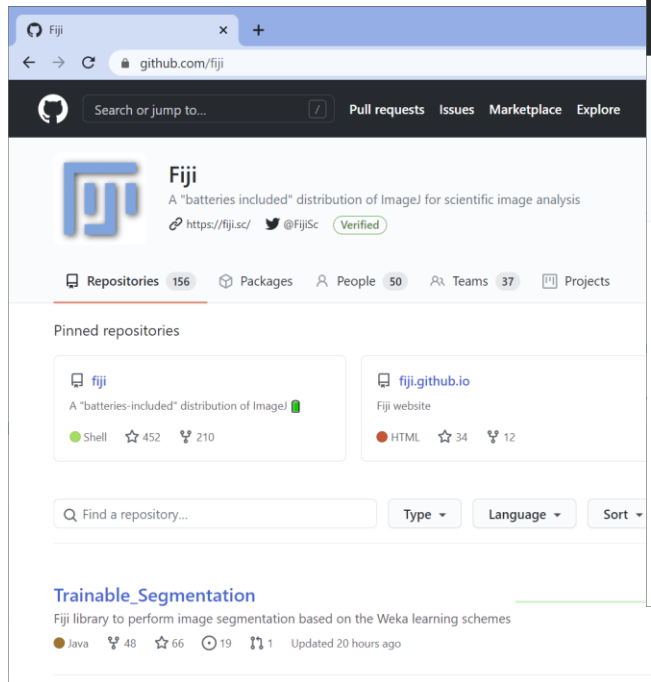- If possible avoid institutional servers / services

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https://rodare.hzdr.de/record/915
https://twitter.com/nKiaru/status/1409194004219142148?s=20

Use cases: Code

Collaboration in open-source projects *unthinkable*
without openly sharing and transparent licensing

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https://github.com/fiji
https://github.com/napari
https://github.com/numpy

Where to share?

- Open *science* related content
  - <u>bioRxiv</u> (manuscripts, no reviews)
  - Figshare
  - F1000
  - Bioimage Archive (data)
  - <u>Github</u> (code)
  - <u>Zenodo</u>
  - <u>Focalplane</u>
  - Institutional servers (if there is no alternative)

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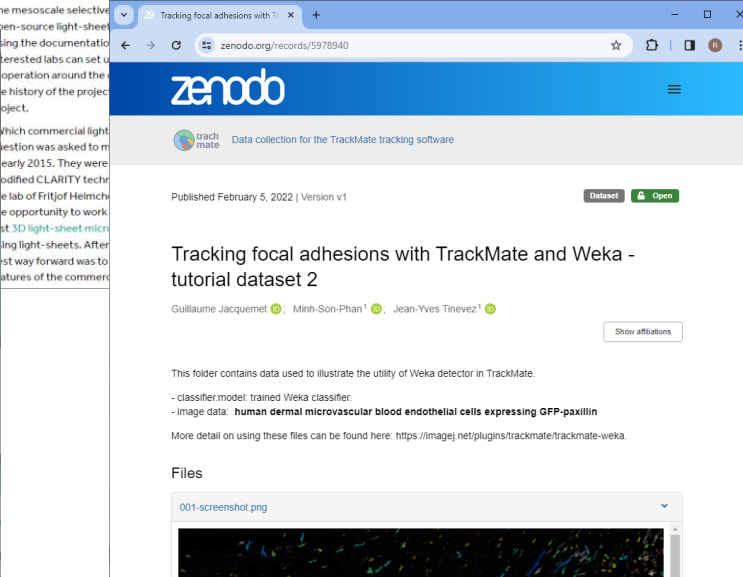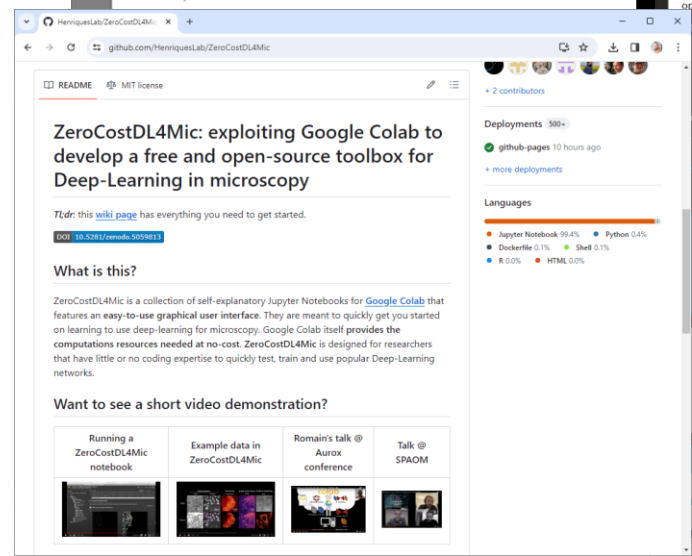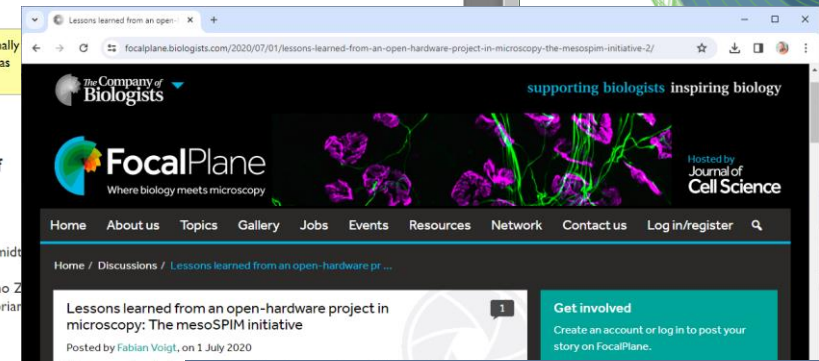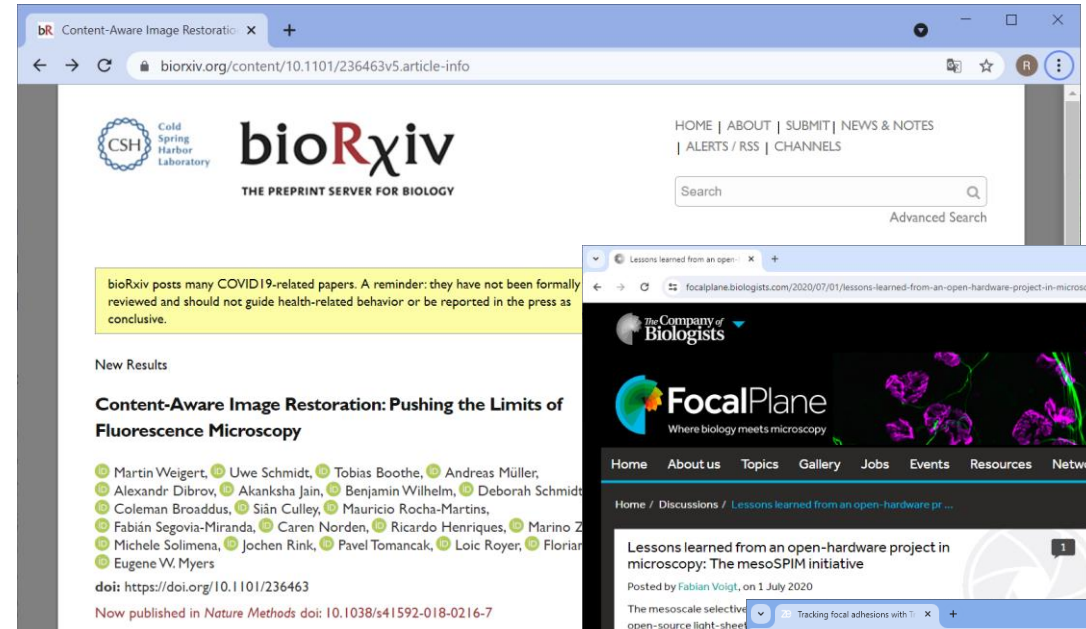
Where to share?

- Open *training* related content
  - bioRxiv (manuscripts, no reviews)
  - Figshare
  - F1000
  - Bioimage Archive (data)
  - Github (code)
  - Zenodo
  - Focalplane
  - Institutional servers
    (if there is no alternative)

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https://f1000research.com/slides/10-519
https://scads.github.io/prompt-engineering-tutorial-2023/intro.html
https://zenodo.org/records/4071471
https://github.com/NEUBIAS/training-resources

Quiz

Where might open source code be most *visible*?

Git server of the university

Zenodo.org

Github.com

Group / institute website

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- Attribution ShareAlike Int. (CC-BY-SA)
- Attribution Non-Commercial Int. (CC-BY-NC)
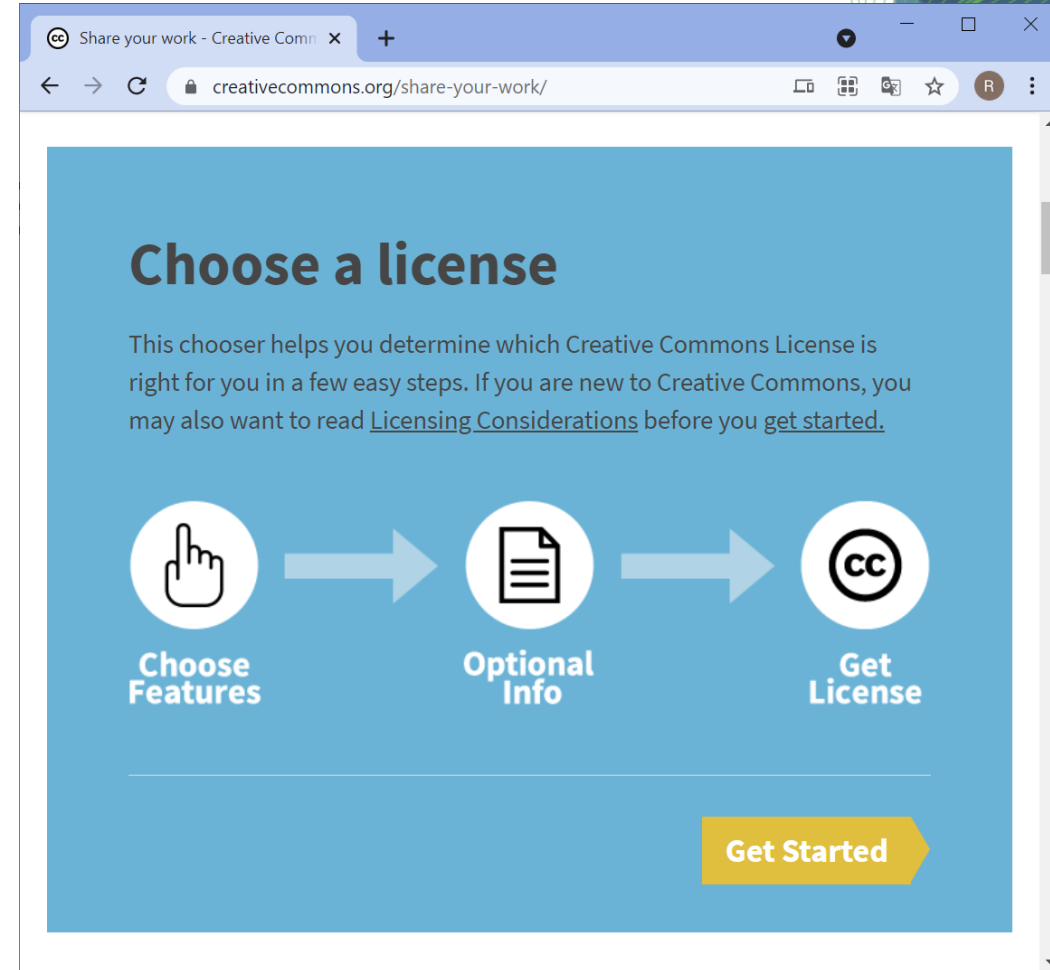- Attribution NoDerivatives Int. (CC-BY-ND)

+ Combinations, e.g. CC-BY-NC-ND

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PUBLIC DOMAIN

- **Public domain (CC0)**
- Everyone can <u>reuse without mentioning</u> the source or author of the shared resource.
- Public domain licenses cannot be revoked.
- The author must own the right to copy (copyright) the resource.
  - If you authored work as part of your job, you may not be the copyright holder. (check your employers' guidelines)

> Employers don't like this one because you give away the rights to *exploit* you work.

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Example

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

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CC BY-SA: This license allows reusers to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to the creator. The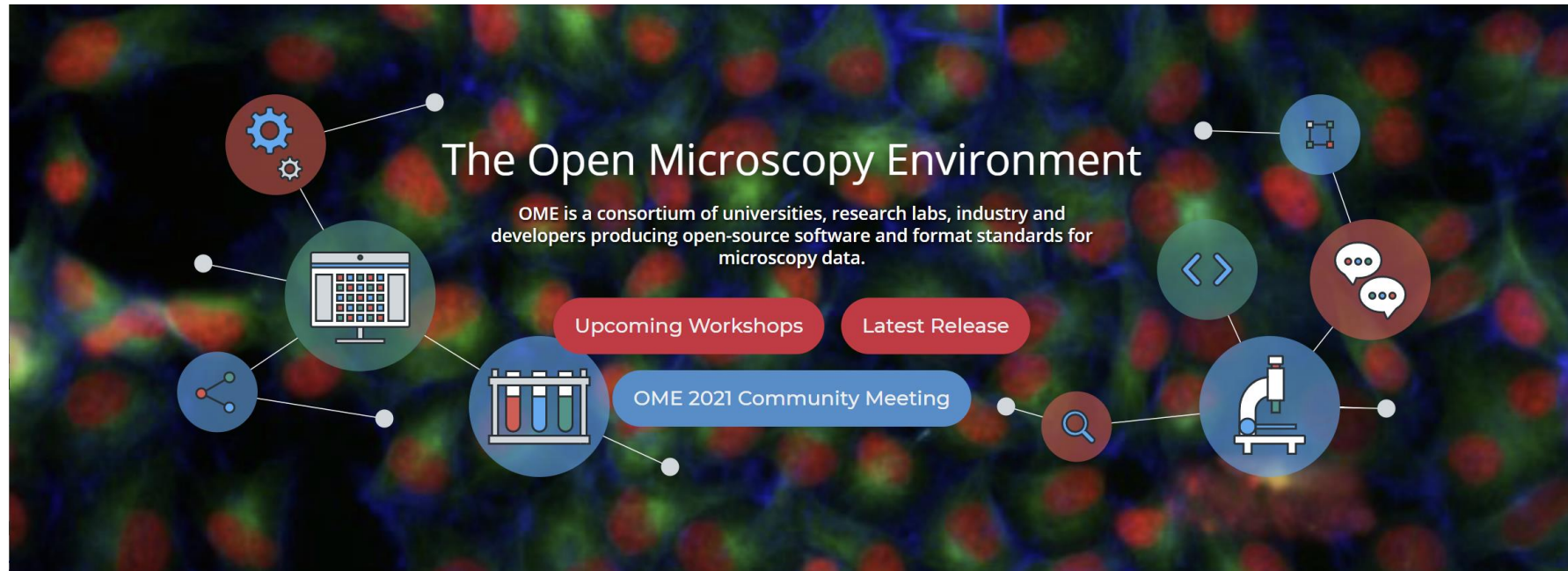 license allows for commercial use. If you remix, adapt, or build upon the material, you must license the modified material under identical terms.

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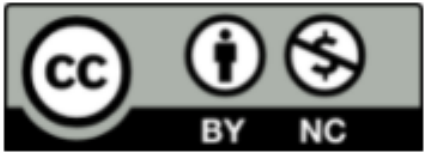
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Licensing: Permissive versus restrictive

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CC-BY	✓	✓	✓
CC-BY-SA	✓ Only under CC-BY-SA	✓ Only under CC-BY-SA	✓ Only under CC-BY-SA
CC-BY-NC	✓	✓ (if free of charge)	✗
CC-BY-ND	✓	✗	✗
CC-BY-NC-ND	✓	✗	✗

Bad for the progress of science

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Quiz

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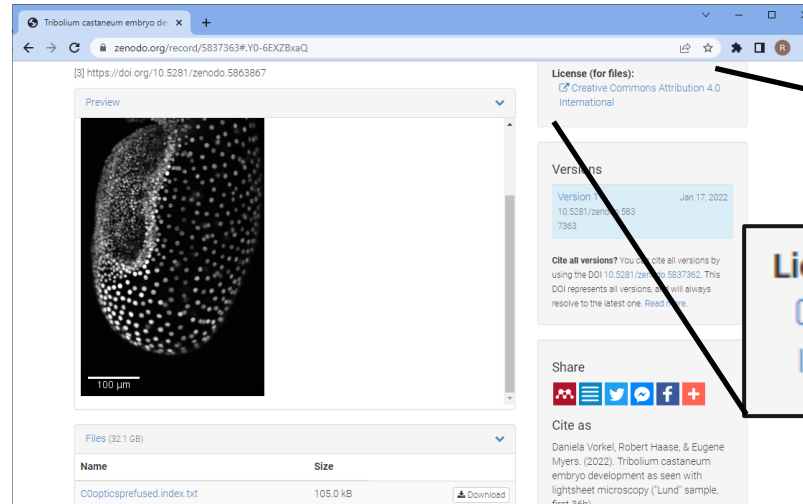
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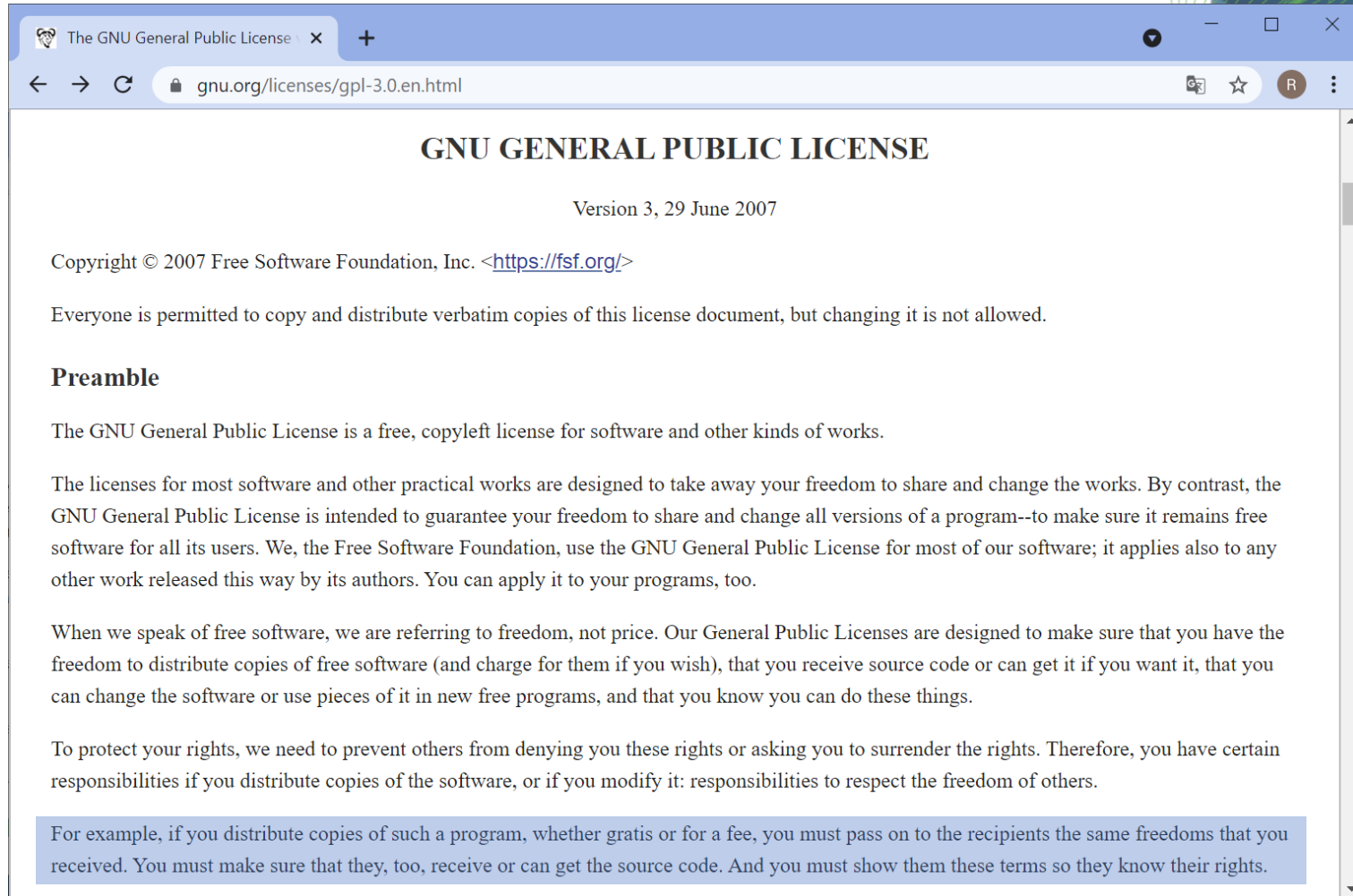
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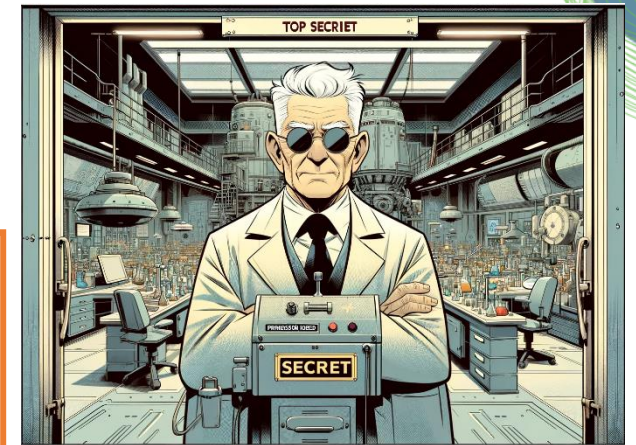
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45

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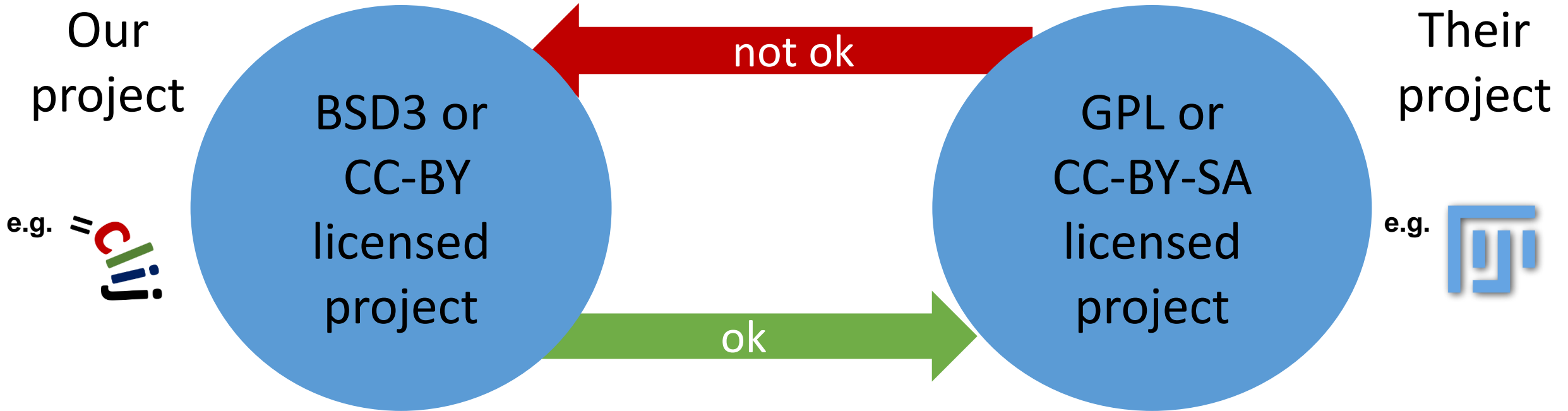 - Examples: BSD, MIT, Apache, CC-BY

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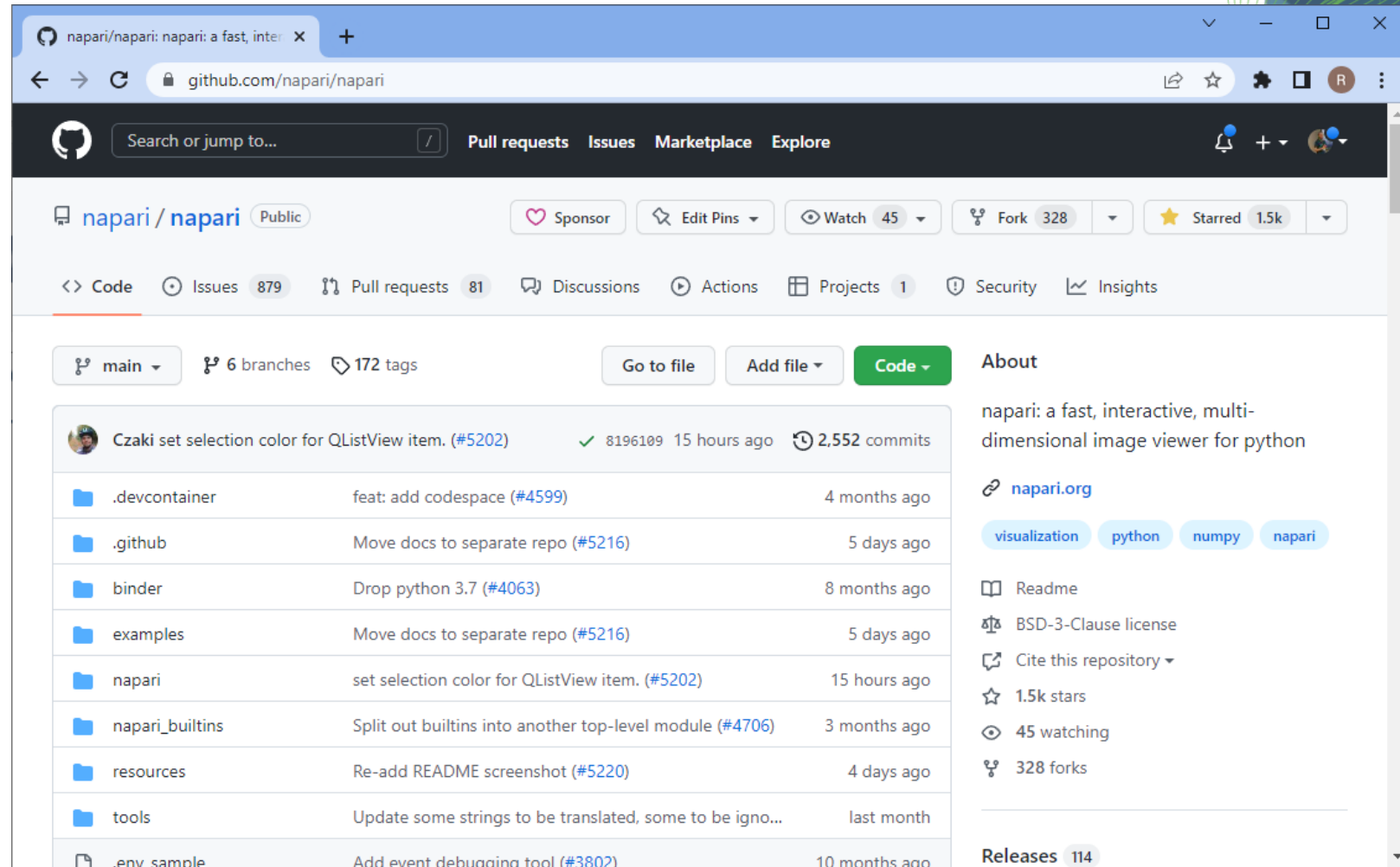General Assembly
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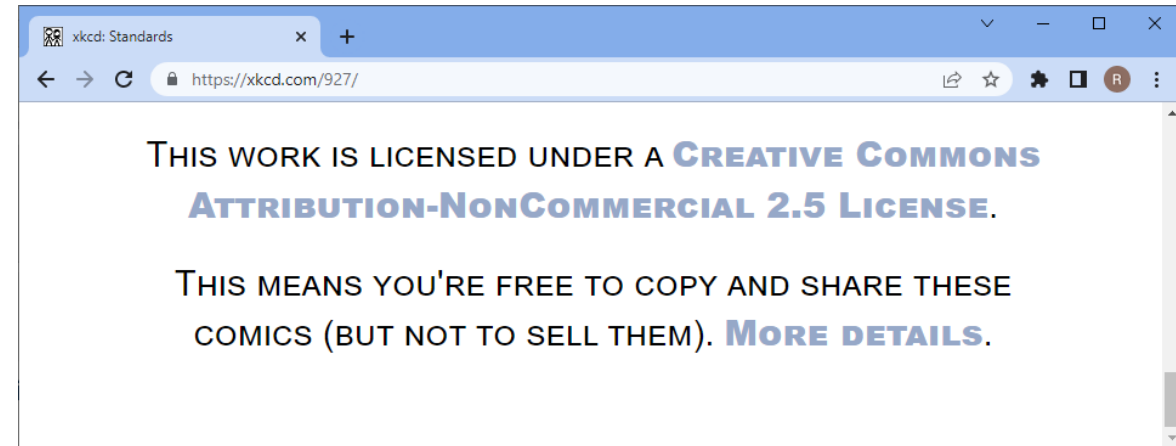May I reuse code from this repository in my own GPL-licensed work?

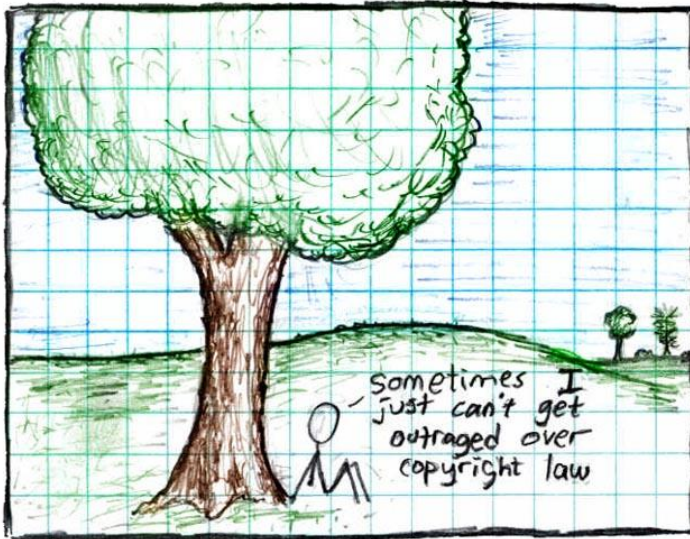Yes   No

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52

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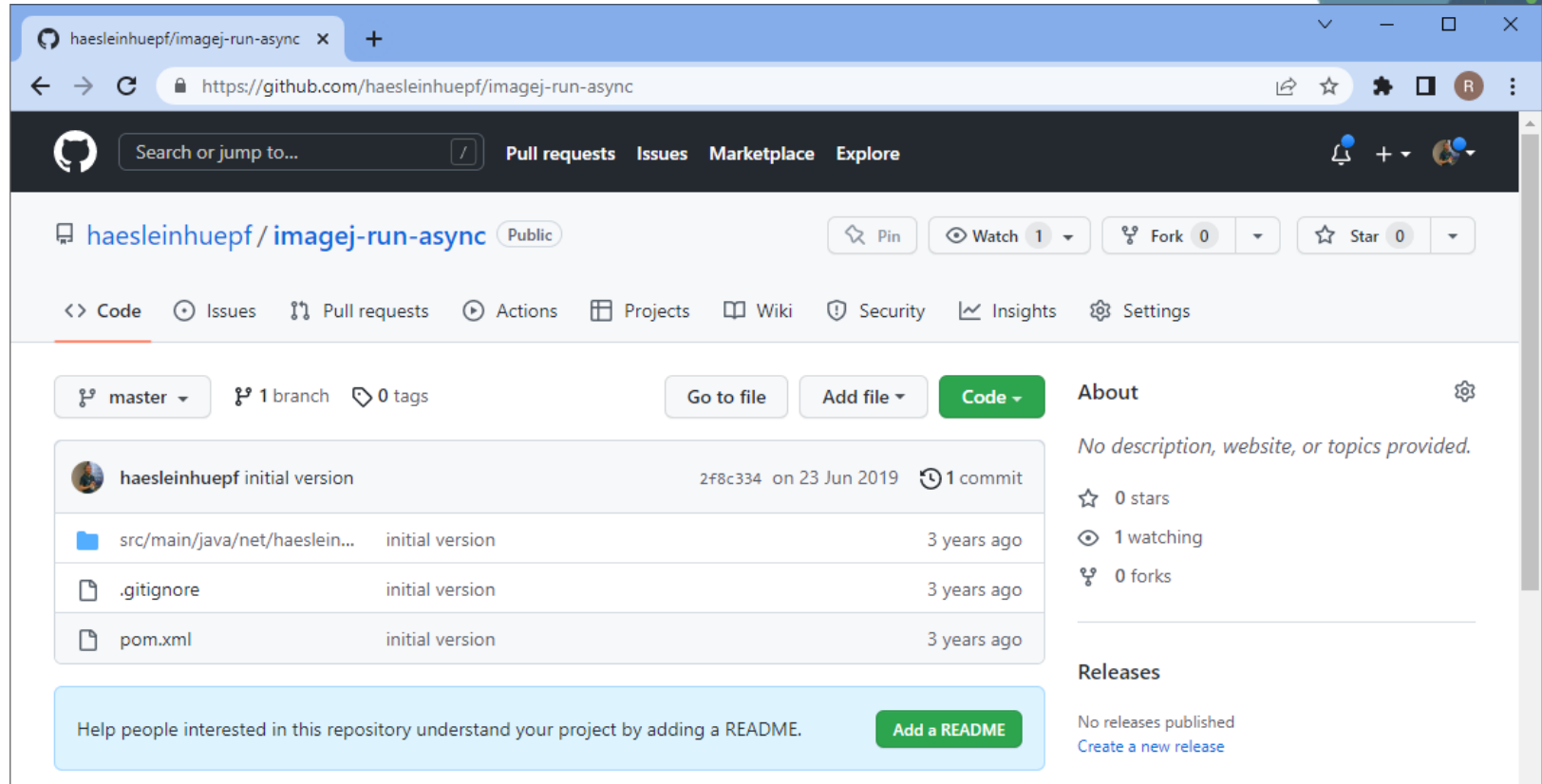
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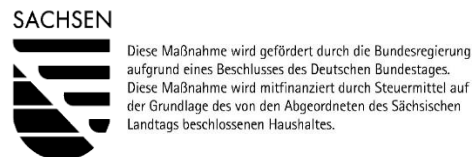
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