ScaDS.AI DRESDEN LEIPZIG

CENTER FOR SCALABLE DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE

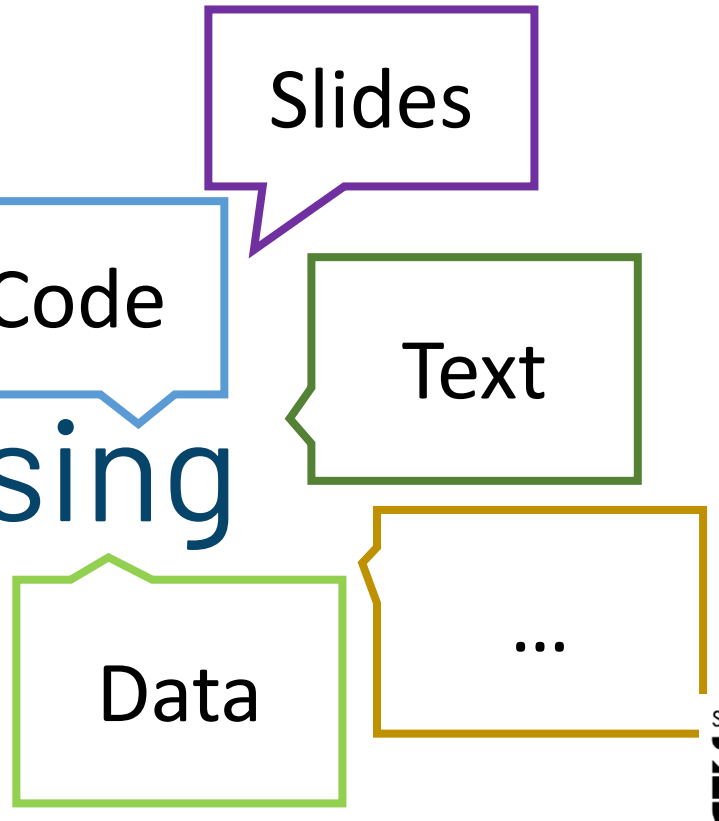
NFDI 4 BIOIMAGE

NATIONAL RESEARCH DATA MANAGEMENT INFRASTRUCTURE FOR MICROSCOPY AND BIOIMAGE ANALYSIS

GloBIAS Global BioImage Analysts' Society

GLOBAL BIOIMAGE ANALYST'S SOCIETY

Open Science, Sharing & Licensing



Robert Haase

GEFÖRDERT VOM

Bundesministerium für Bildung und Forschung

SACHSEN

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.

https://doi.org/10.5281/zenodo.10966230

Sharing & Licensing

- Here I'm sharing the slides #openaccess
- They are licensed CC-BY 4.0 unless mentioned otherwise.
- This means, you can legally reuse them.

https://doi.org/10.5281/zenodo.10966230

Quiz

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

Onedrive/Google cloud/Dropbox/etc.	Zenodo/Figshare/ [bio]arxiv/F1000	Email	Other



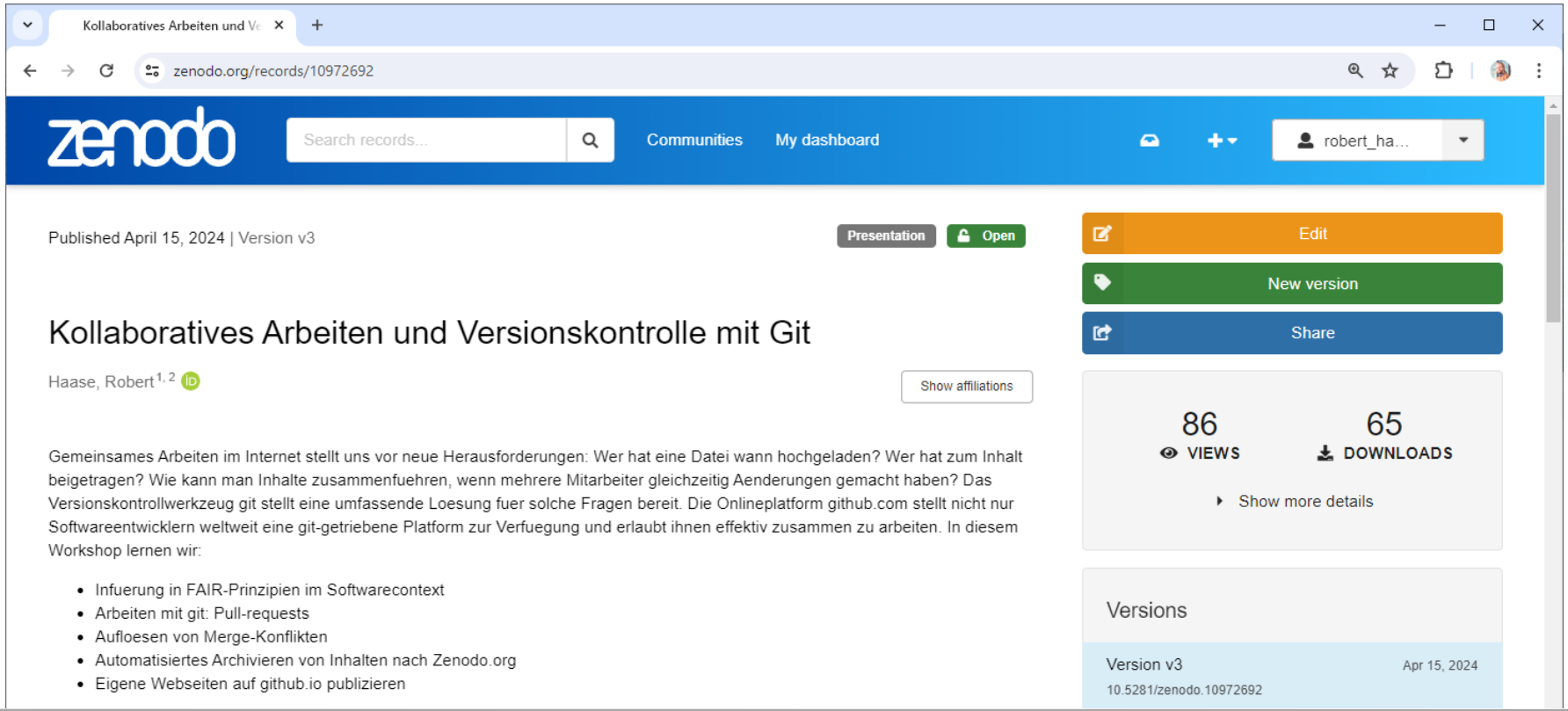

Quiz

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

None	Public Domain	Creative Commons	BSD/GPL/ MIT/…
			

Sharing & Licensing

- I work in public service, and my work should be available publicly.



Closed science

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

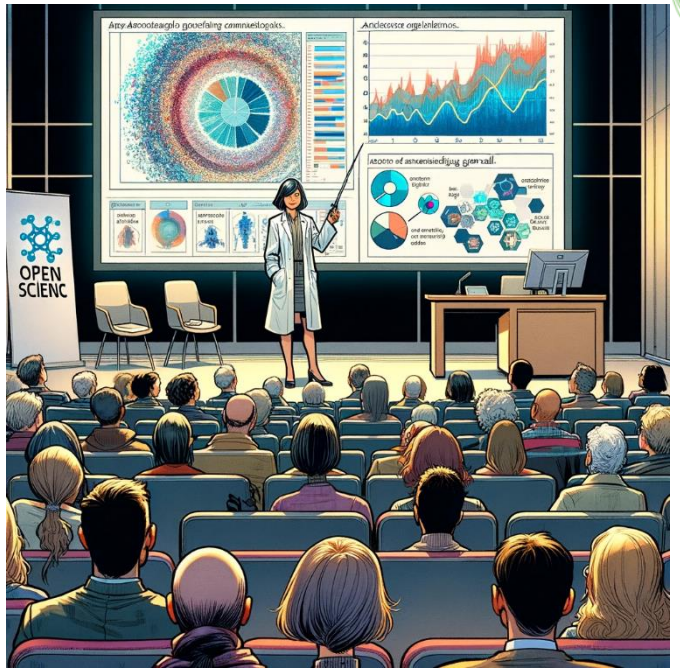
- Risk of being scooped
- Fear of blaming oneself (imposter syndrome)
- Lack of awareness (who is allowed to publish *my work*?)
- Assumption: it’s not worth the effort.

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

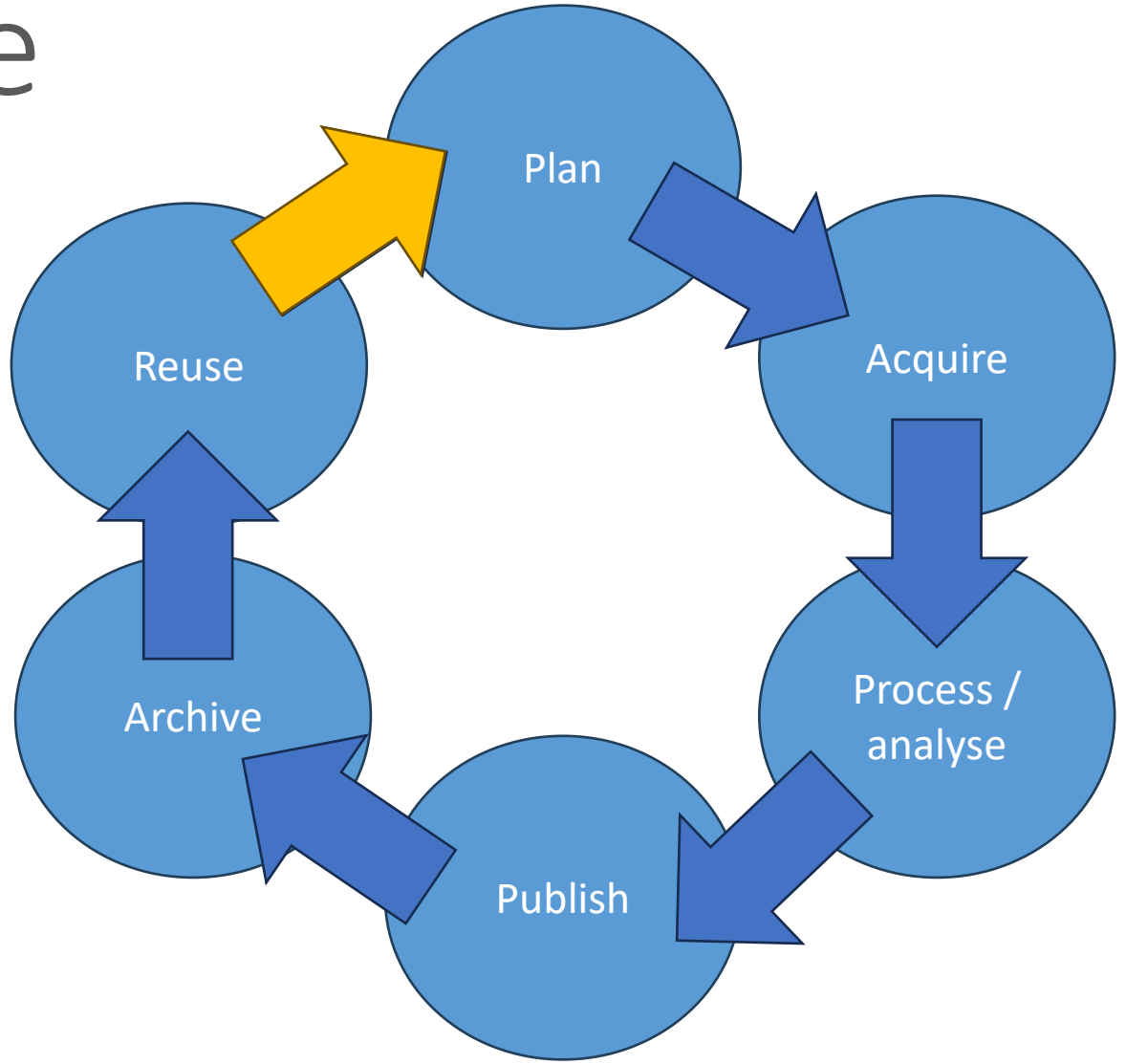


[Research] Data Management (RDM)

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

RDM Life Cycle

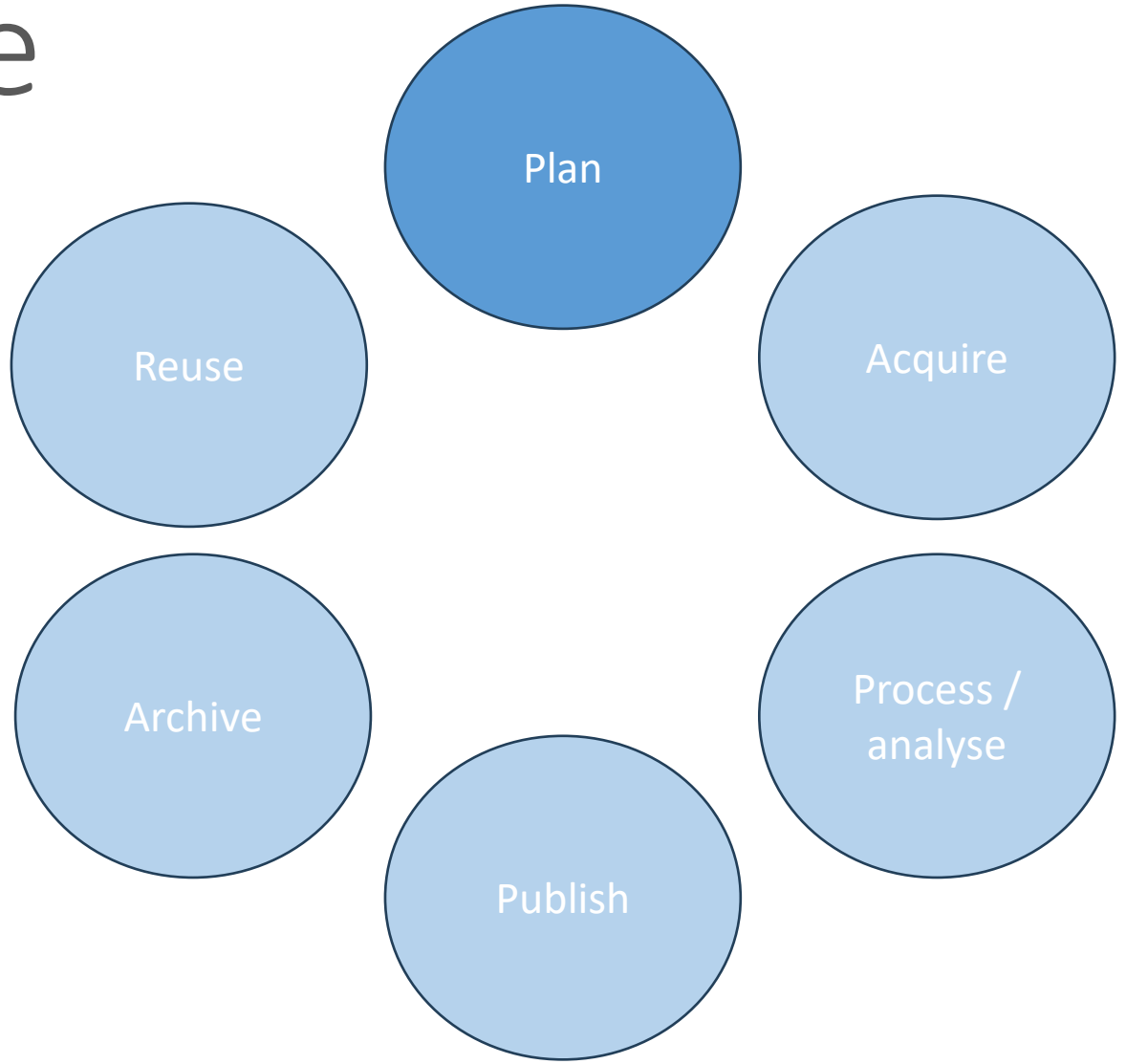
- Processes are ideally cyclic



Adaptiert von:
https://forschungsdaten.info/themen/informieren-und-planen/datenlebenszyklus/

RDM Life Cycle

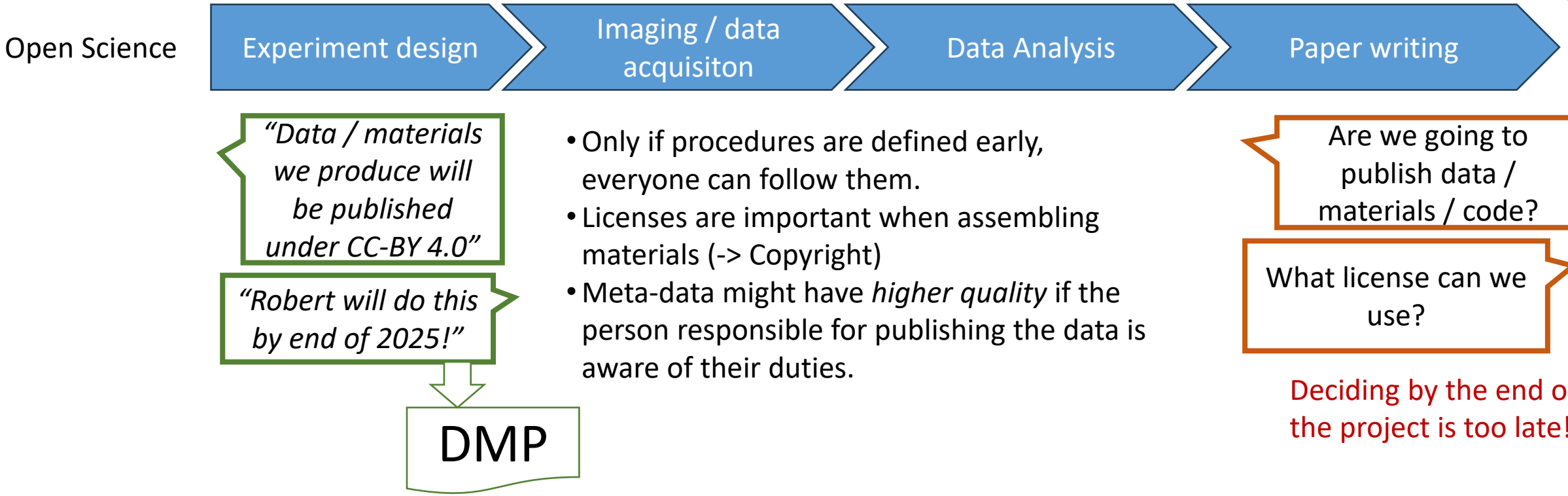
- Cost
- Benefit
- Quality
- Strategic decisions



Adaptiert von:
https://forschungsdaten.info/themen/informieren-und-planen/datenlebenszyklus/

Data Management Plans (DMPs)

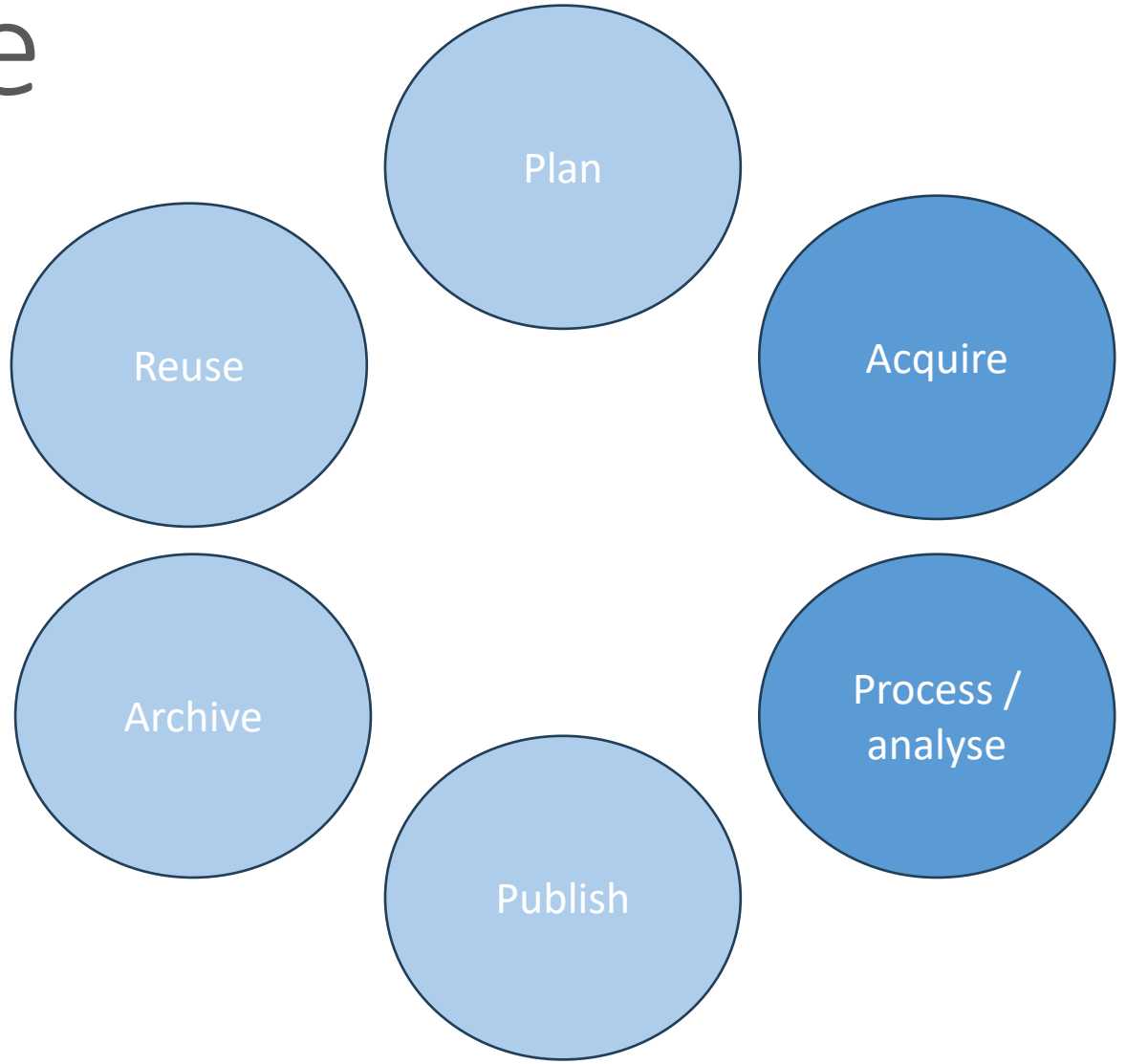
- Define responsibilities and procedures early!



RDM Life Cycle

- Types of data
- Terms and conditions
  - Usage rights
  - Copyright

- IT infrastructure
- Backup



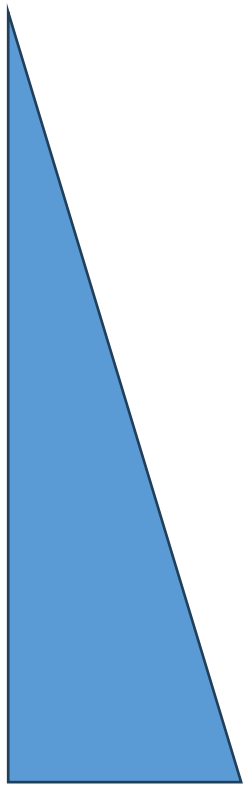
Adaptiert von:
https://forschungsdaten.info/themen/informieren-und-planen/datenlebenszyklus/

Types of data

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

Types of data

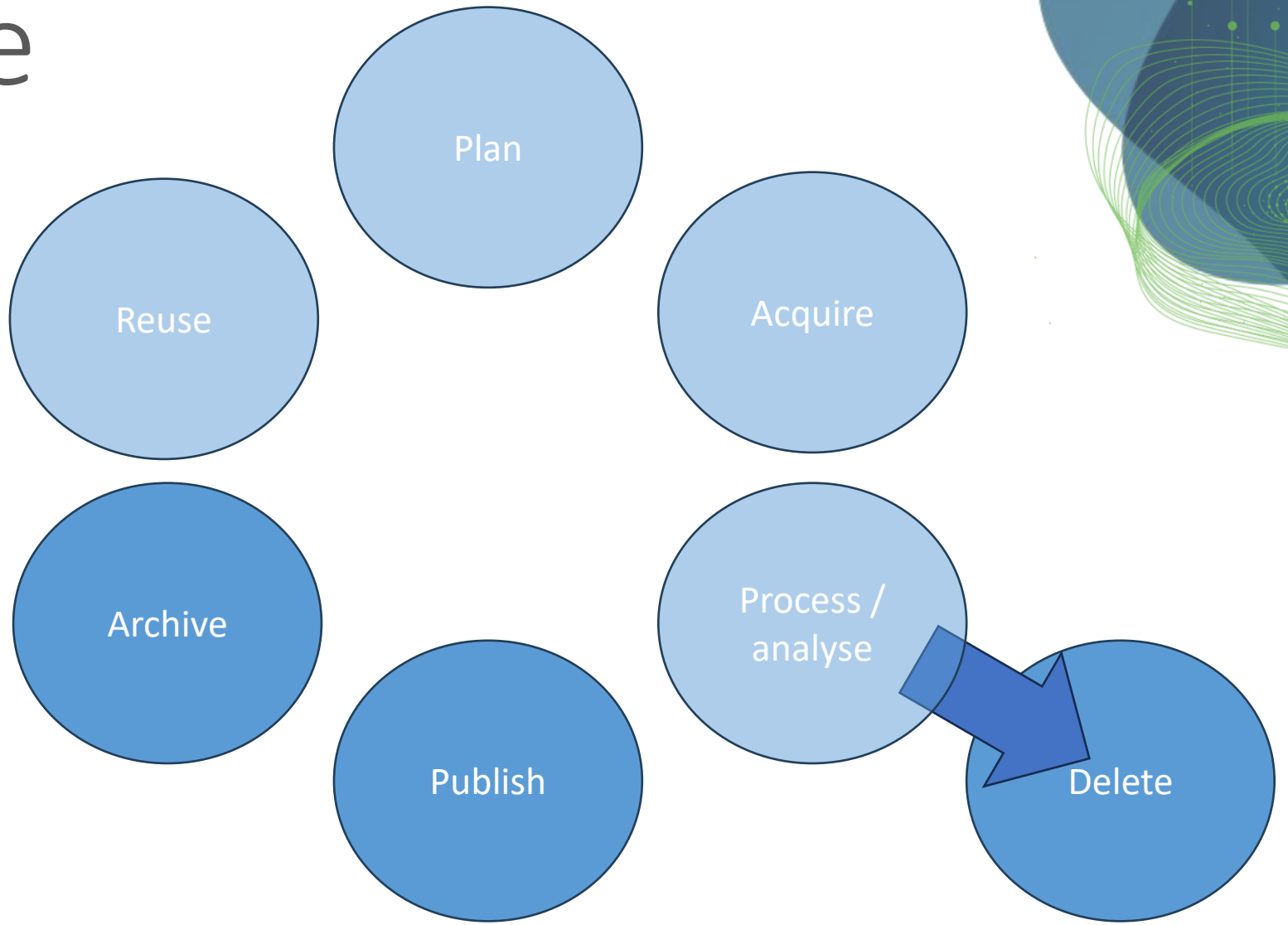
- Openly accessible data
  - „open data“
  - „open source“ software
- Business data
- Research data
  - Hot / cold
- Personal data
- Secret data



In need of protection (schutzbedürftig)

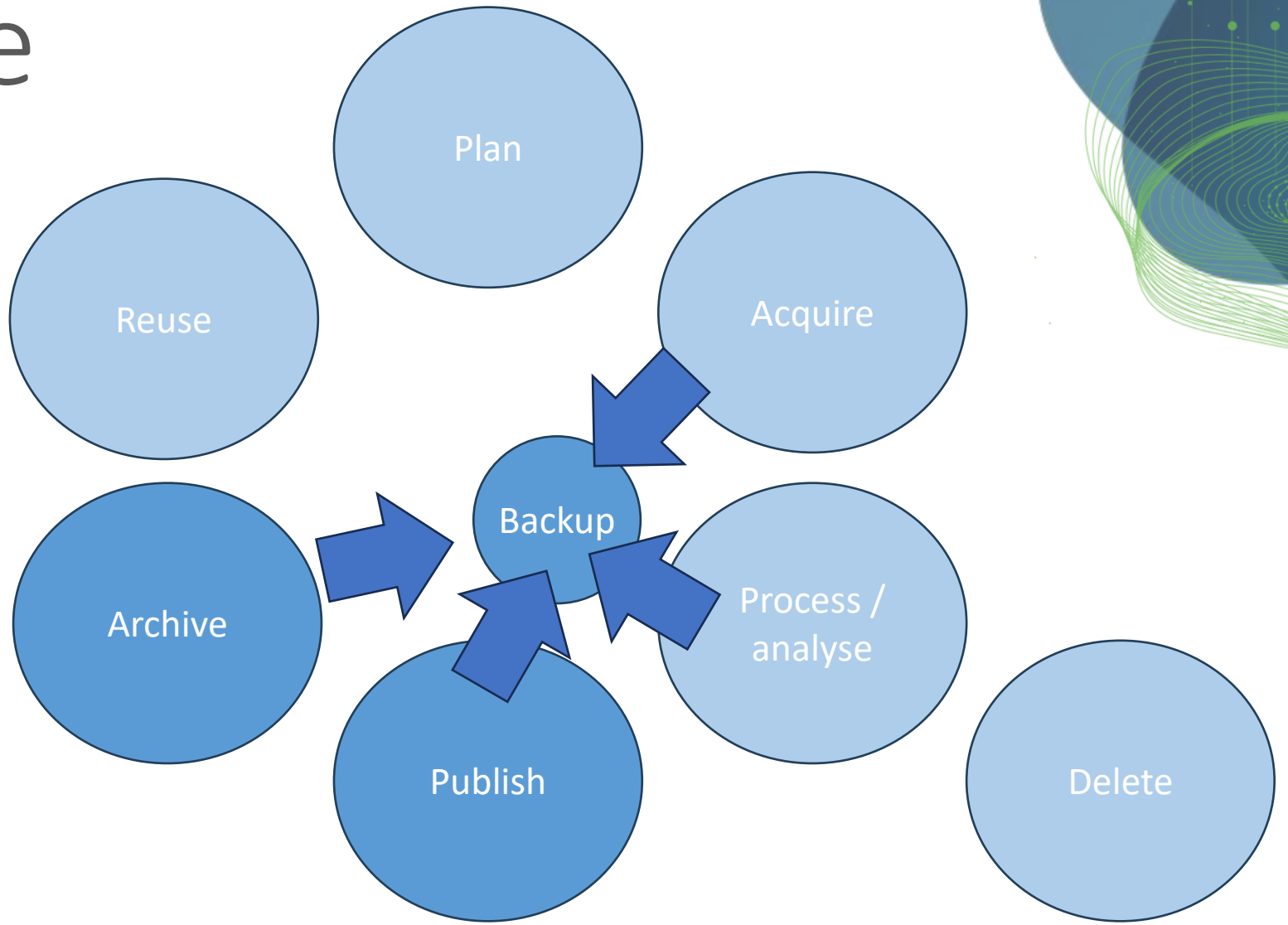
RDM Life Cycle

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



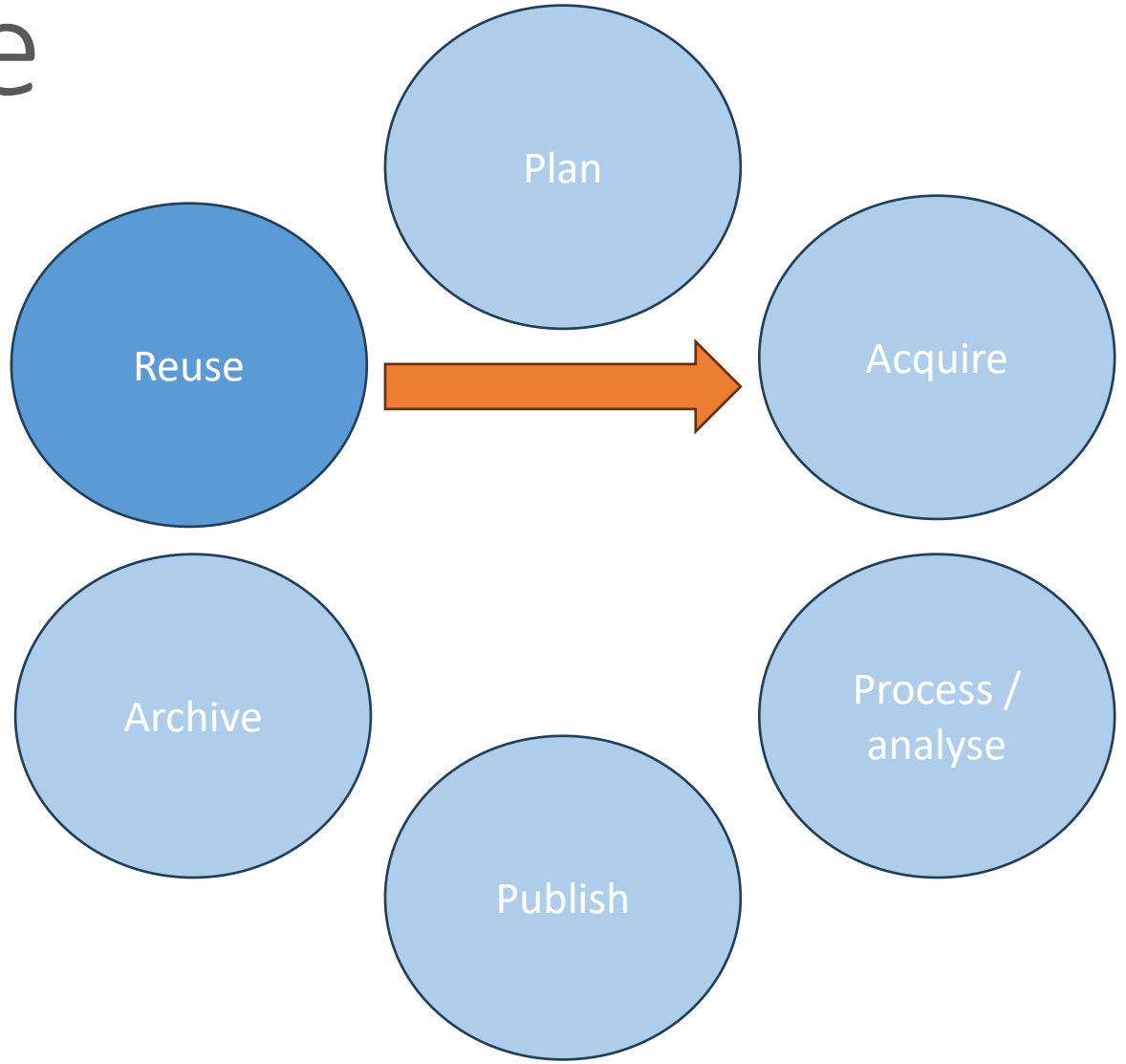
RDM Life Cycle

- 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



Adaptiert von: https://forschungsdaten.info/themen/informieren-und-planen/datenlebenszyklus/

Scientific culture

Public access to research results -> Reusability

"Kodex"

Guideline 13: Providing public access to research results

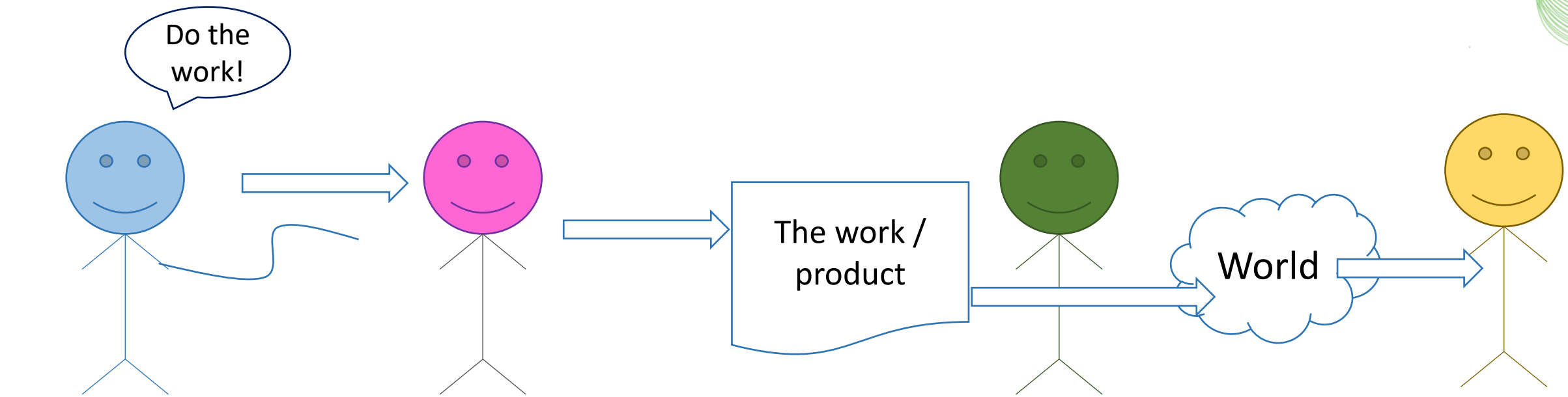
- As a rule, researchers make all results available as part of scientific/academic discourse. In specific cases, however, there may be reasons not to make results publicly available (in the narrower sense of publication, but also in a broader sense through other communication channels); this decision 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 (**F**indable, **A**ccessible, **I**nteroperable, **R**eusable). 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



Copyright holder, e.g. employer of the author

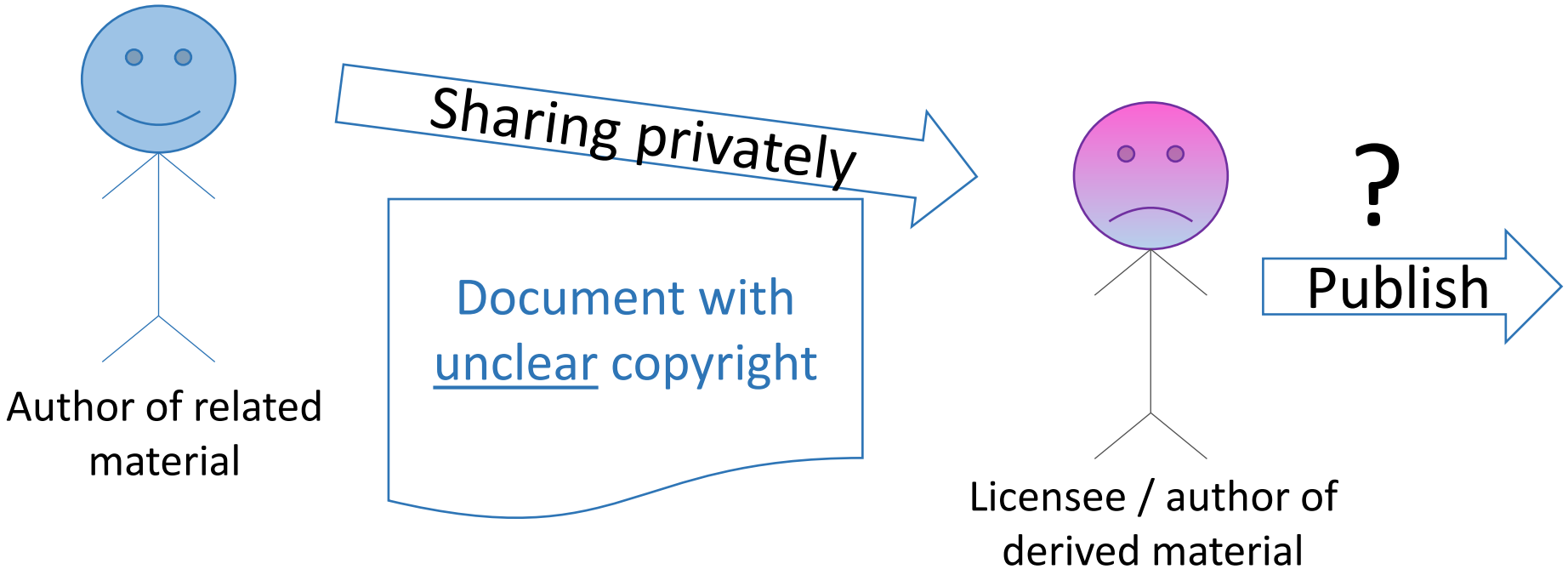
Author
Creator of the work

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



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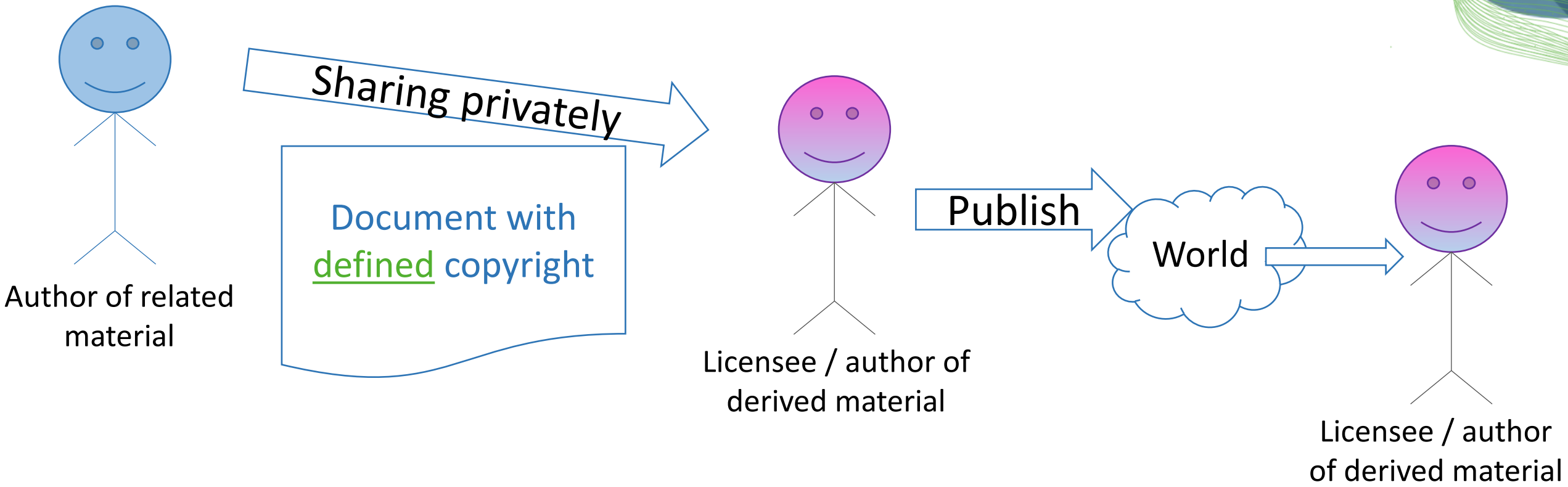
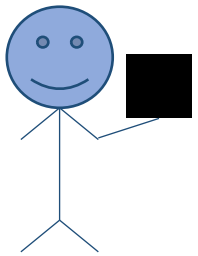


Openness of software / projects

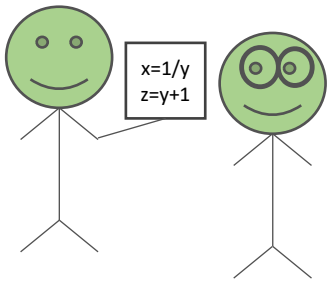
Closed source



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

Hardware device drivers

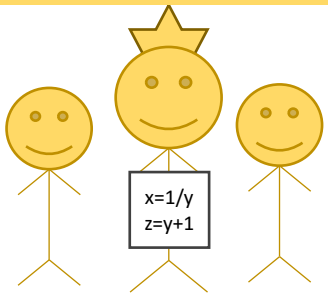
Open source



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

Custom image analysis scripts

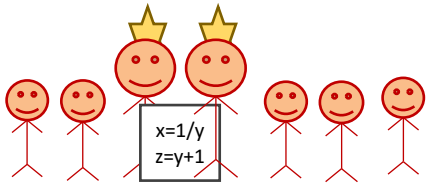
Benevolent dictatorship



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

TrackMate, SNT, MorpholibJ, CLIJ

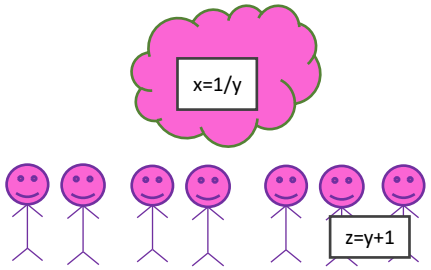
Community driven



- 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

Read more: https://coiled.io/blog/stages-of-openness/

Quiz

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

Copyright holder

Author

Publisher

Licensee

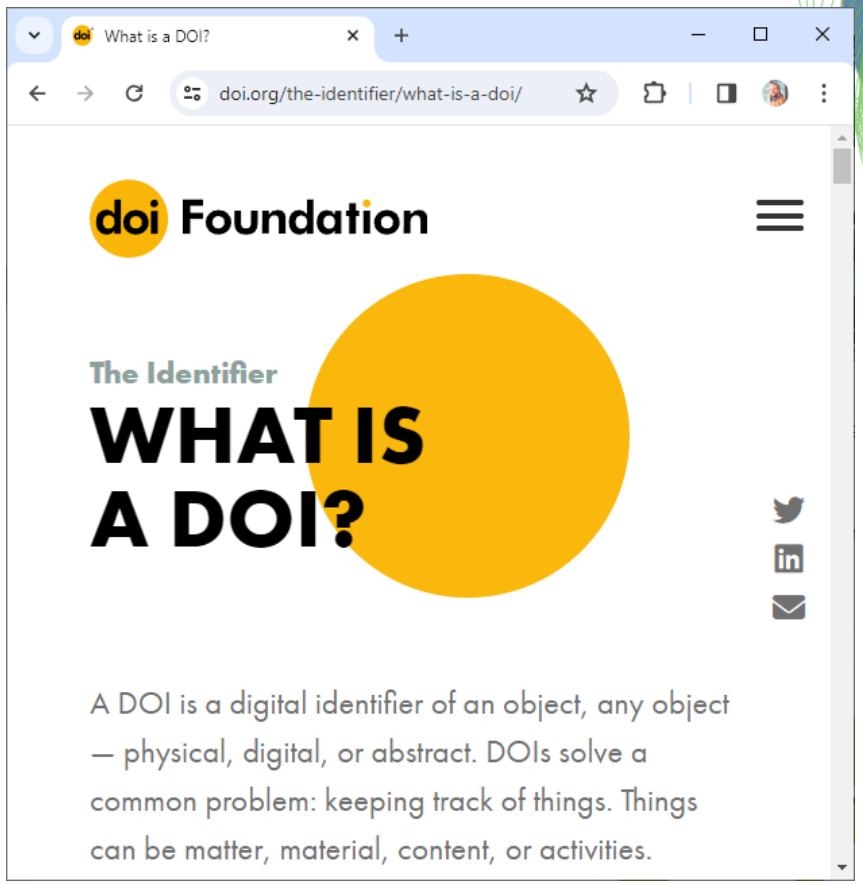
Standard for sharing: The FAIR-principles

- Findable
- Accessible
- Interoperable
- Reusable

The FAIR-principles

Findable

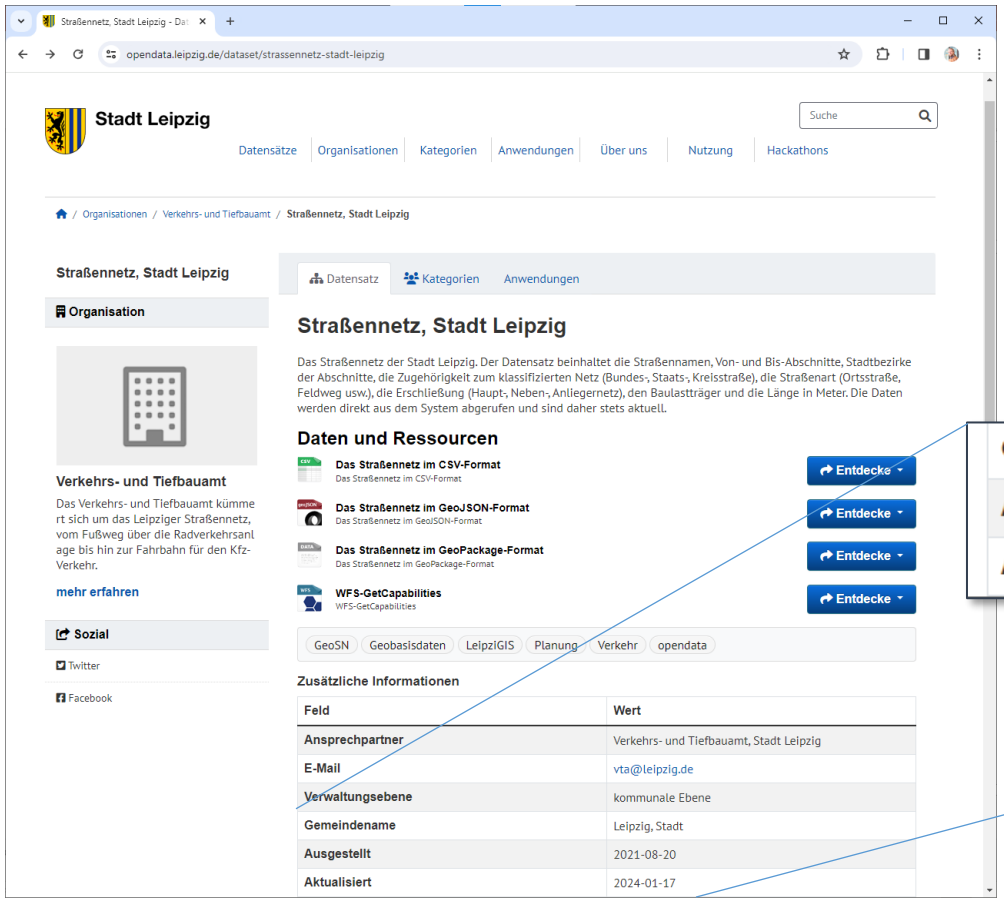
- F1. (Meta)data are assigned a globally unique and persistent identifier
  - Universal Resource Identifier (URI)
  - Digital Object Identifier (DOI)
- F2. Data are described with rich metadata (defined by R1 below)
- F3. Metadata clearly and explicitly include the identifier of the data they describe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



Screenshot source: https://www.doi.org/the-identifier/what-is-a-doi/ licensed CC-BY 4.0
https://www.go-fair.org/fair-principles/
https://biii.eu/introduction-3d-analysis-3d-imagej-suite

Object /Resource Identifiers (URI/DOI)

- DOIs / URIs always point at the same data
- DOIs are centrally registers, URIs not
- Unified Resource Locators (URLs) may point at different things



Gemeindename	Leipzig, Stadt
Ausgestellt	2021-08-20
Aktualisiert	2024-01-17

This no DOI, no URI, it's a URL

Unified Resource Locators

- These are all URLs

https://twitter.com/haesleinhuepf/status/891596662782779392

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

https://opendata.leipzig.de/dataset/vornamenstatistik-2023

https://www.leipzig.de/

Unified Resource Identifiers

- Which of these are URIs?

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Digital Object Identifiers

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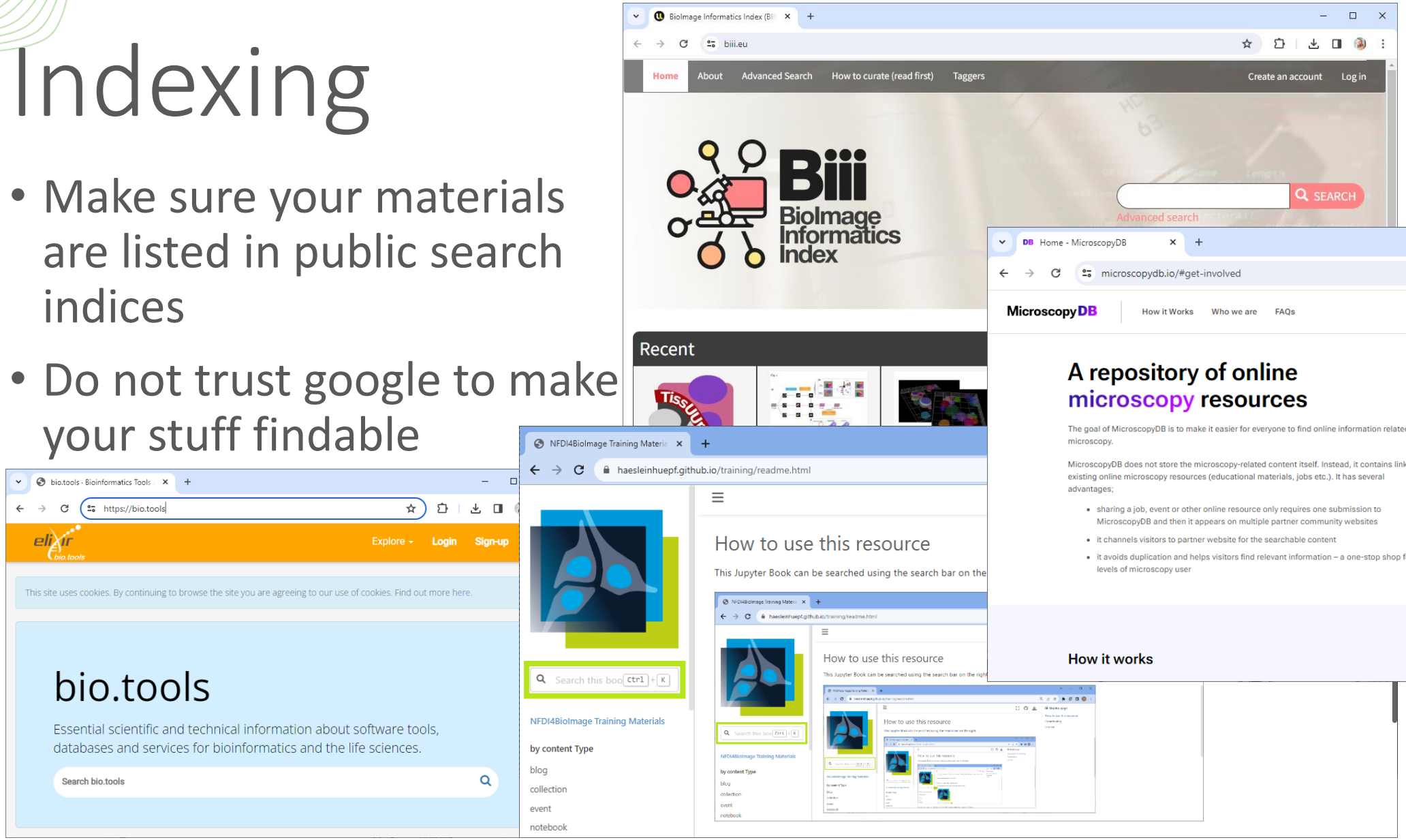
https://www.leipzig.de/

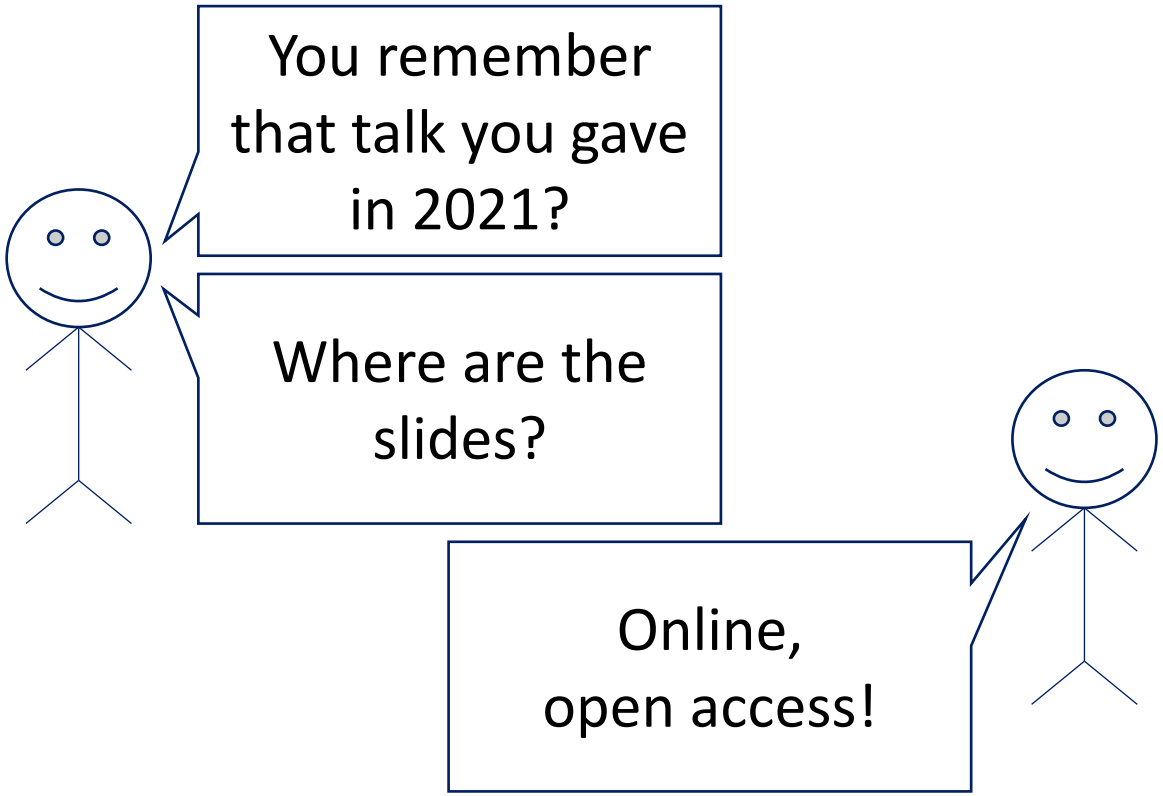
Indexing

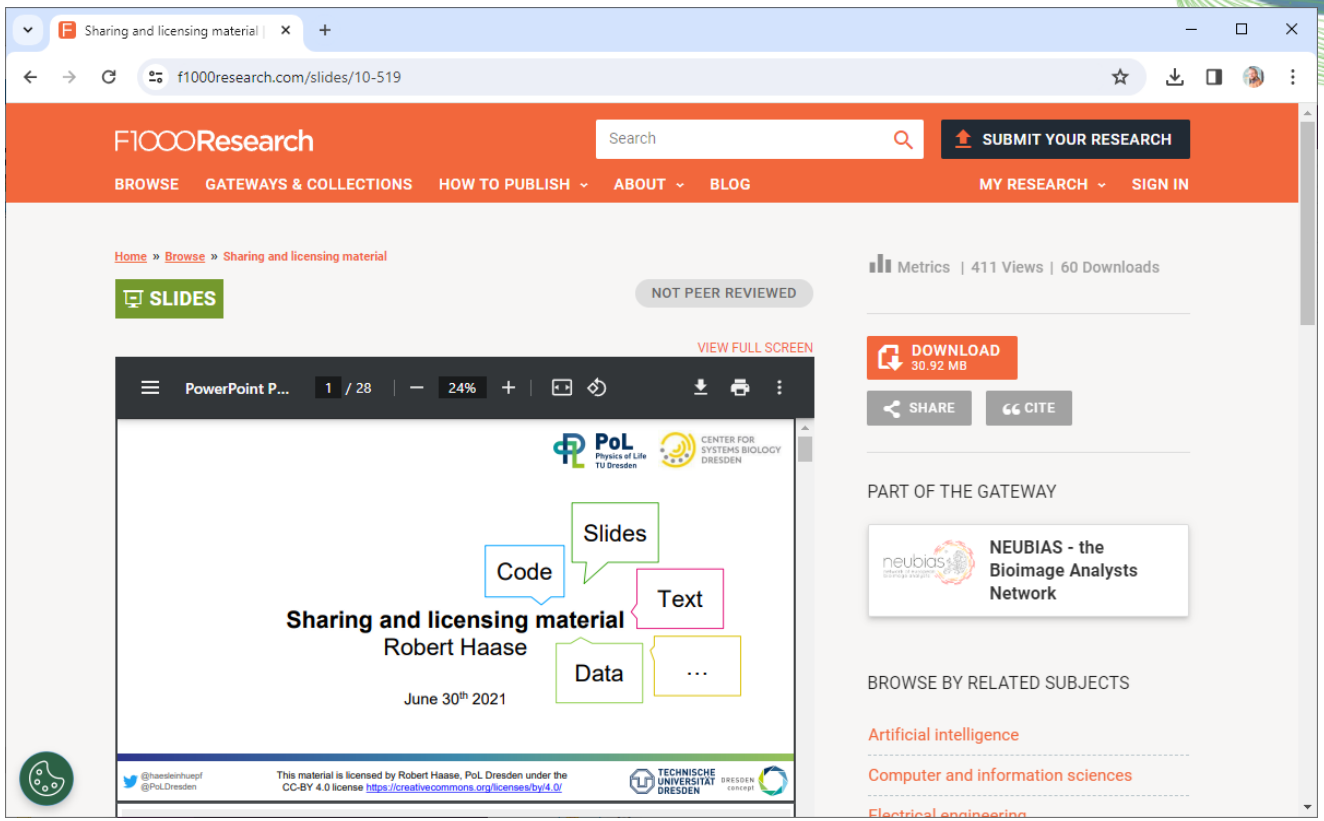
- Make sure your materials are listed in public search indices
- Do not trust google to make your stuff findable



Incentives: Findability

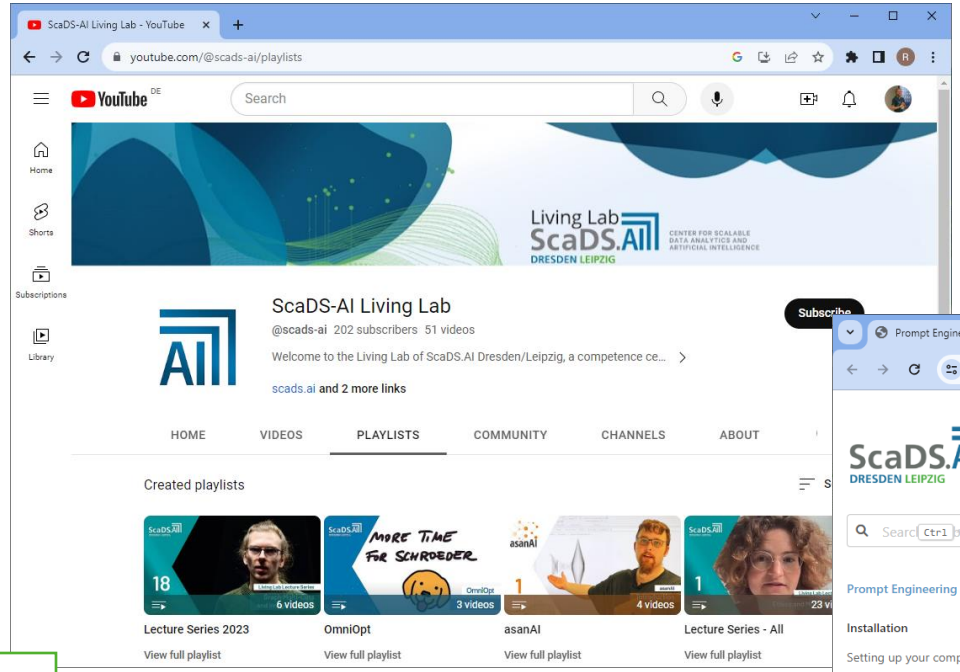
- Your *future-self* will thank you, because they will find your work

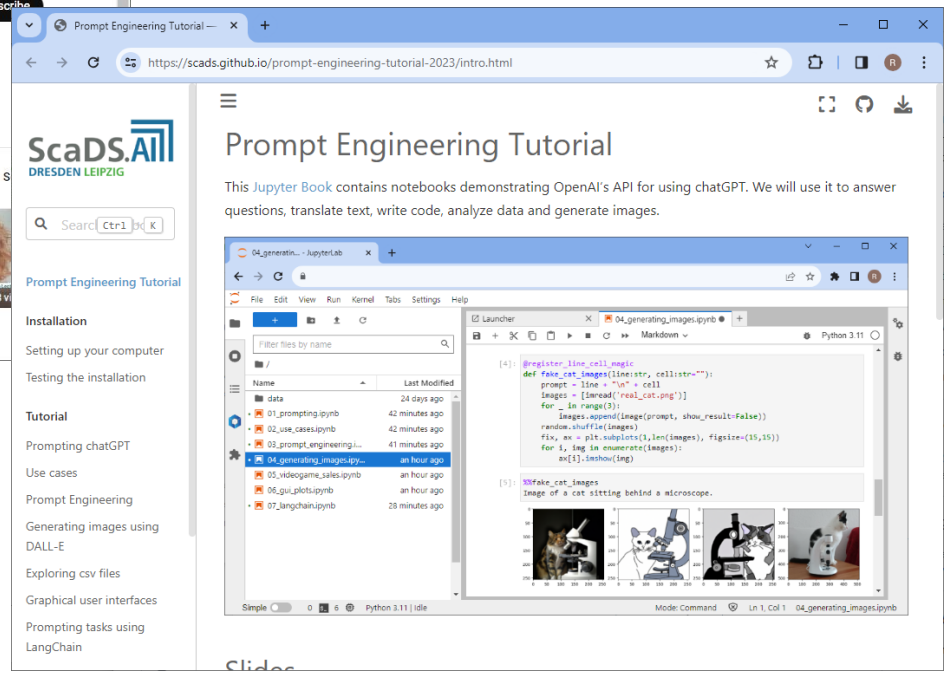




Incentives: Findability -> Visibility

- YouTube
- Github





Open & FAIR sharing is a PR instrument

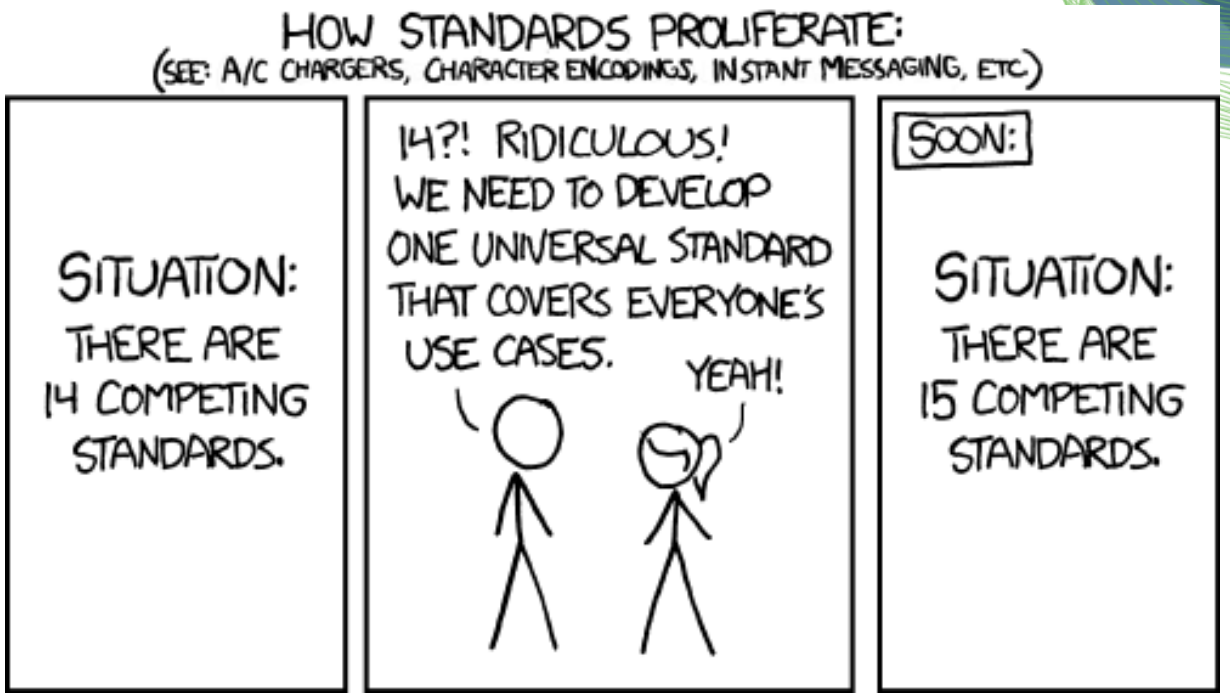
… leading to

- more software users
- new collaborations

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

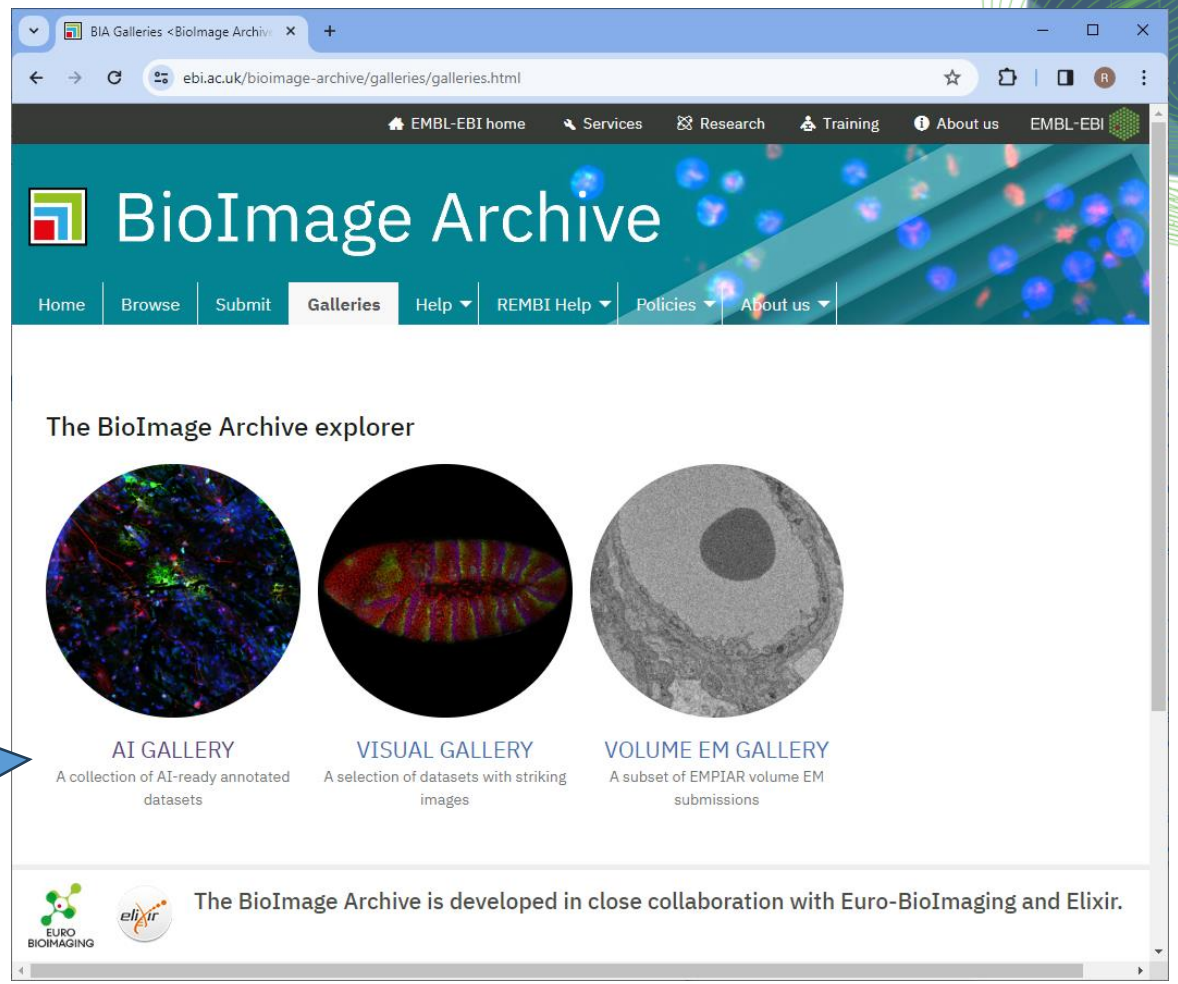


https://www.go-fair.org/fair-principles/

Accessibility

- The ability to download data, for humans and computers

Essential for AI developers =-)



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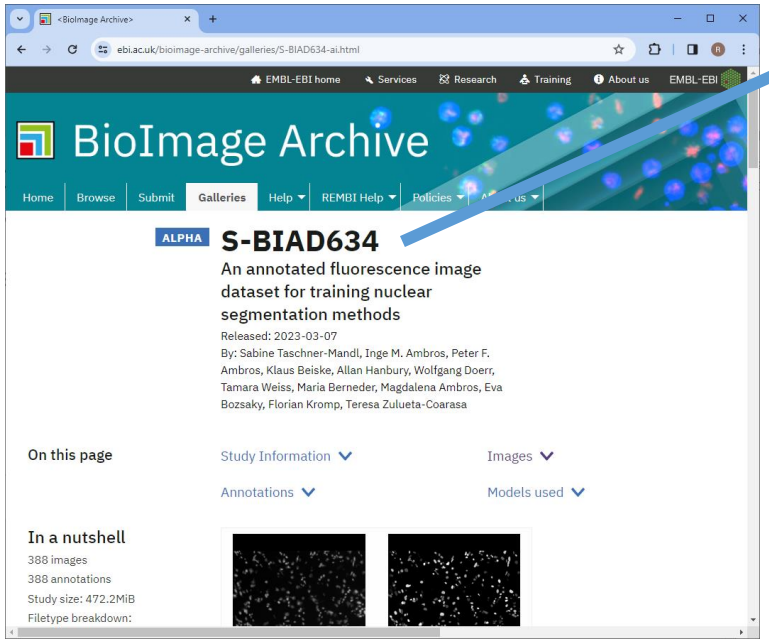


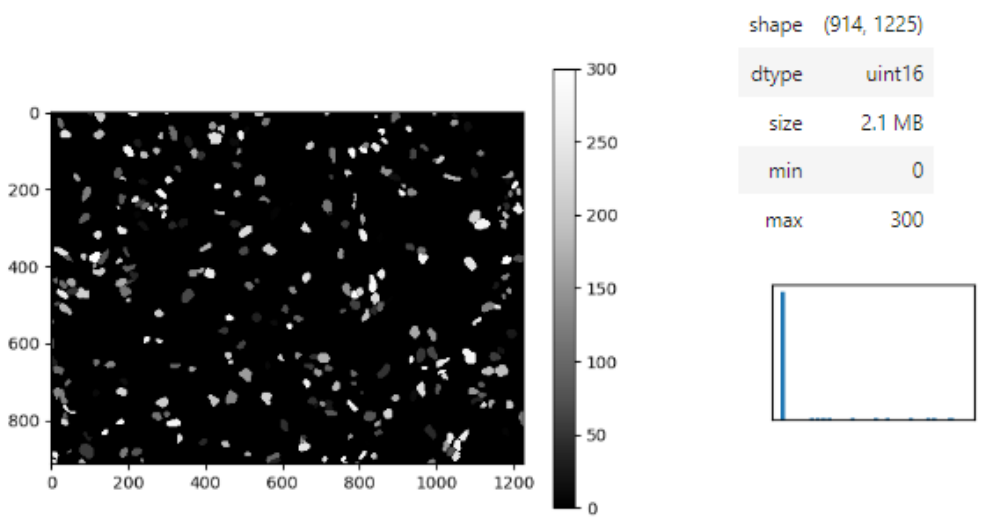

```
[1]: from bia_explorer import io, biostudies
     from skimage.io import imread
     import stackview

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

Displaying images using stackview

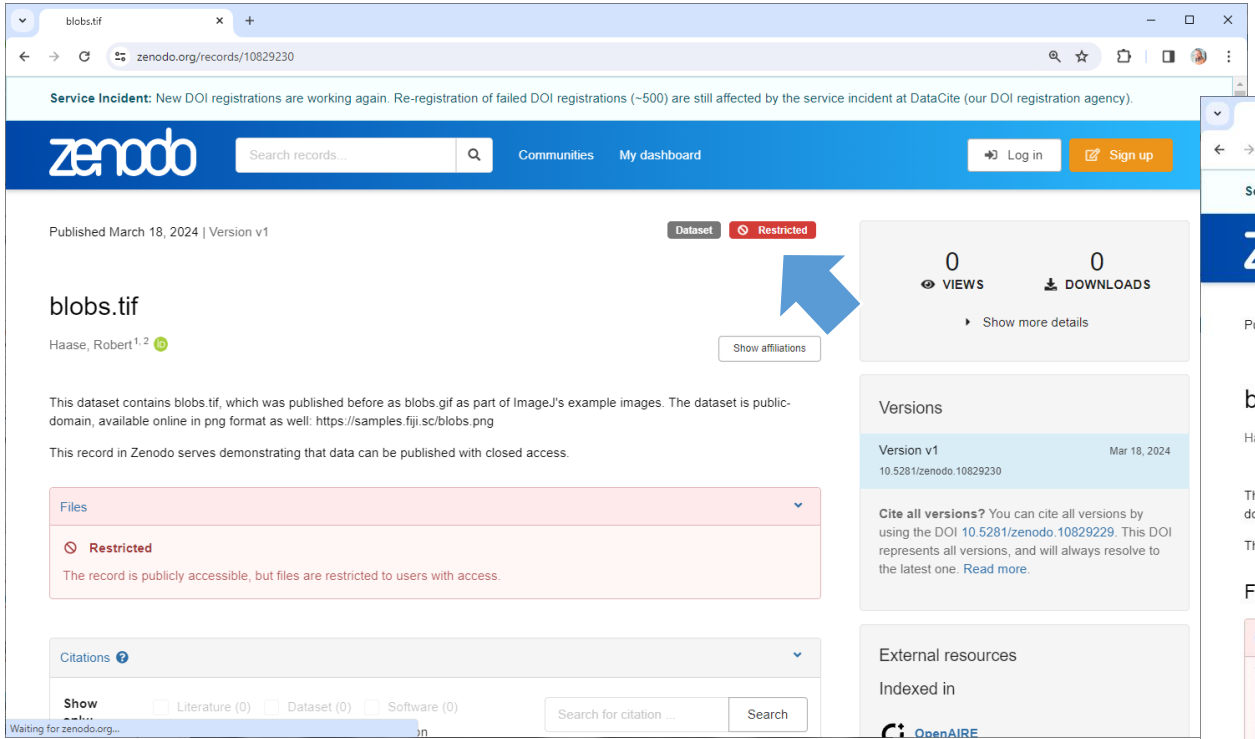
```
[2]: uri = image.uri.replace("\\", "/")
     image_data = imread(uri)
     stackview.insight(image_data)
```

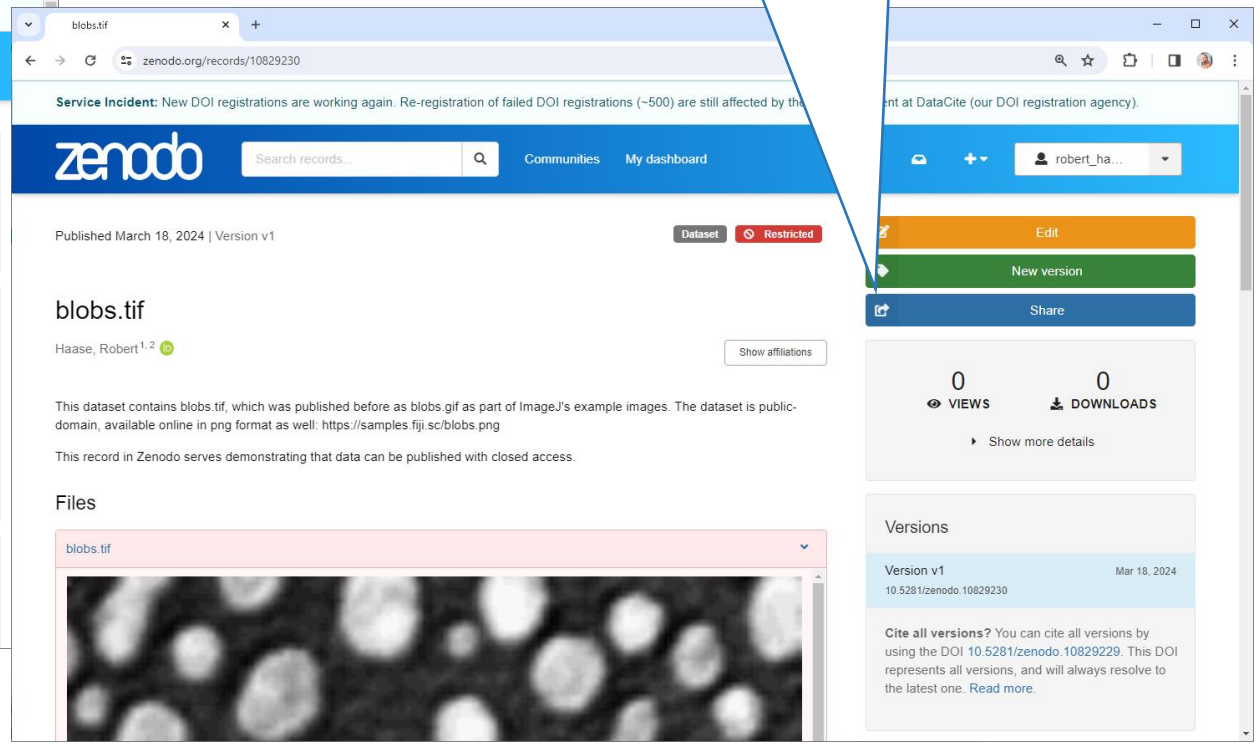
[2]:

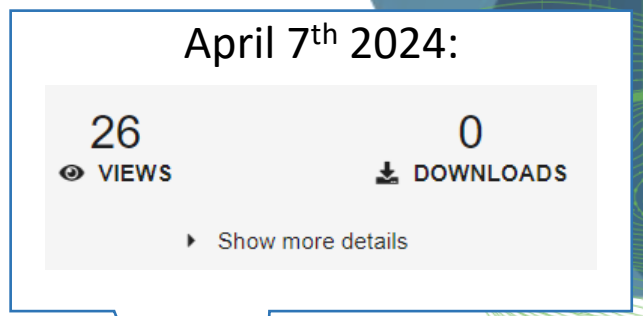


Restricted Access

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







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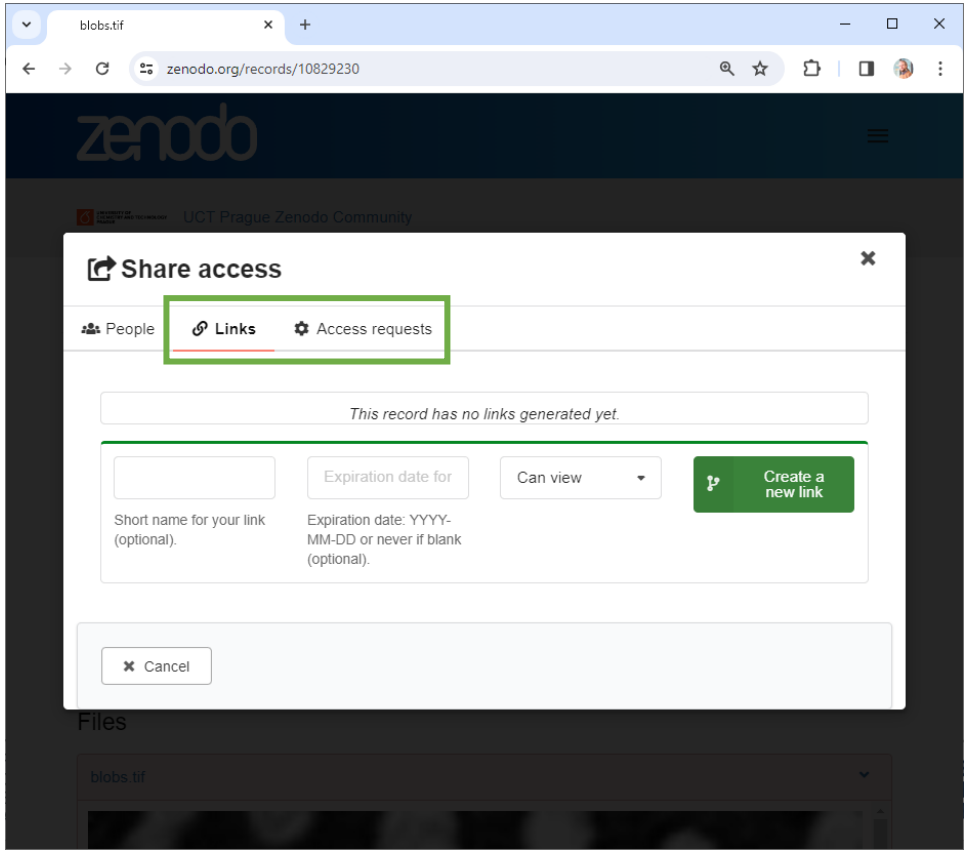

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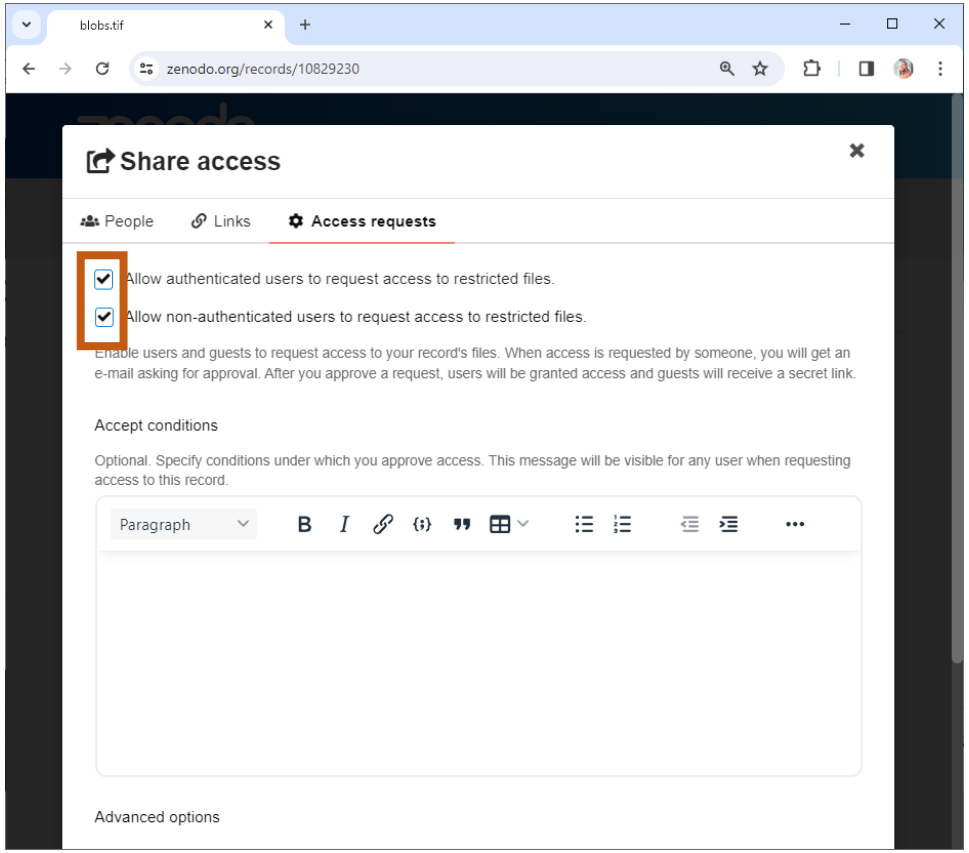
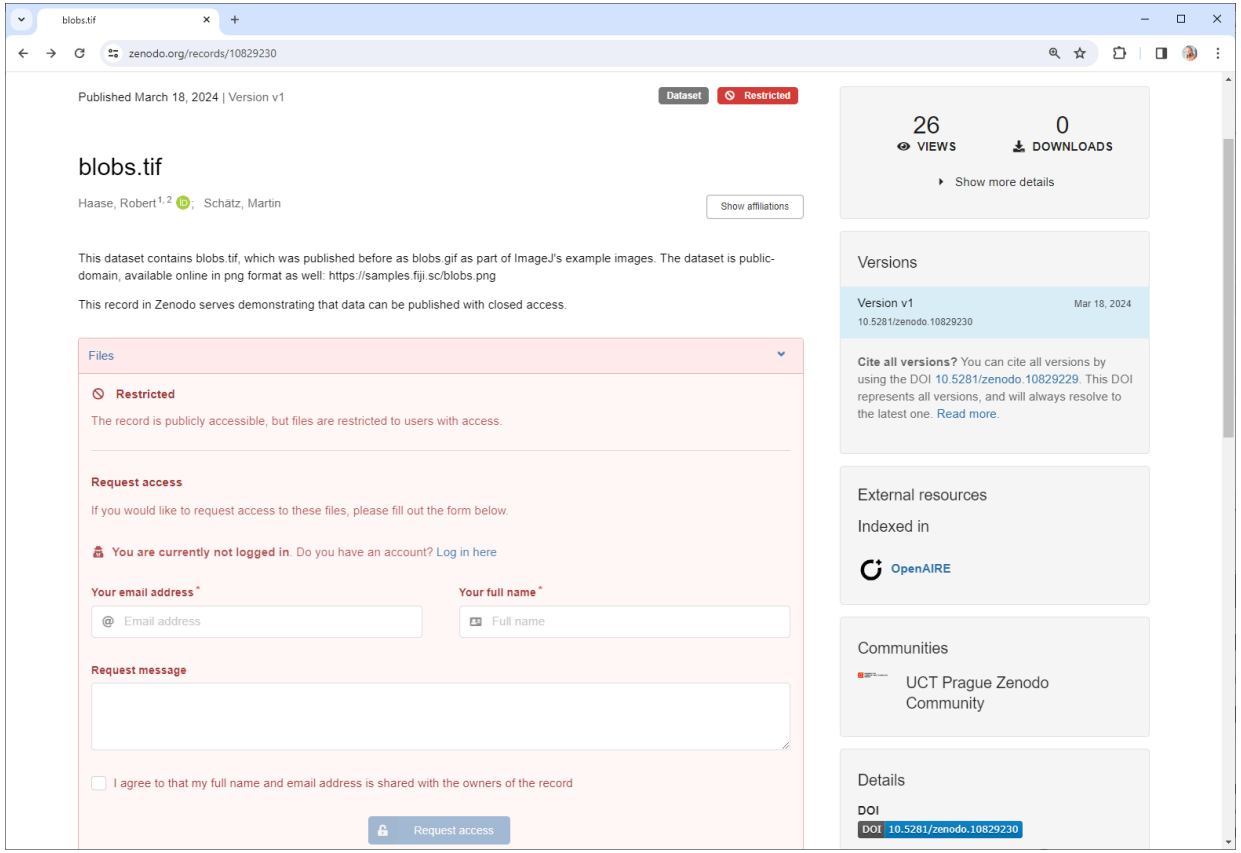
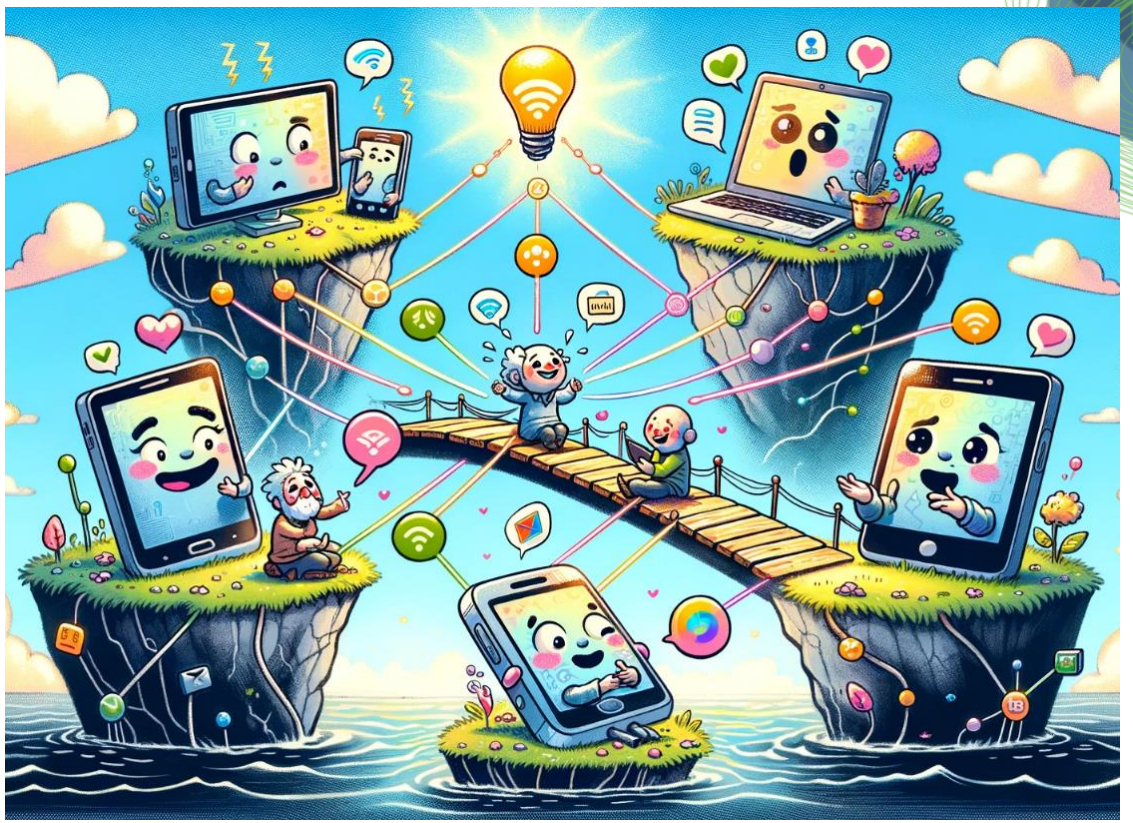




The FAIR-principles

Interoperable

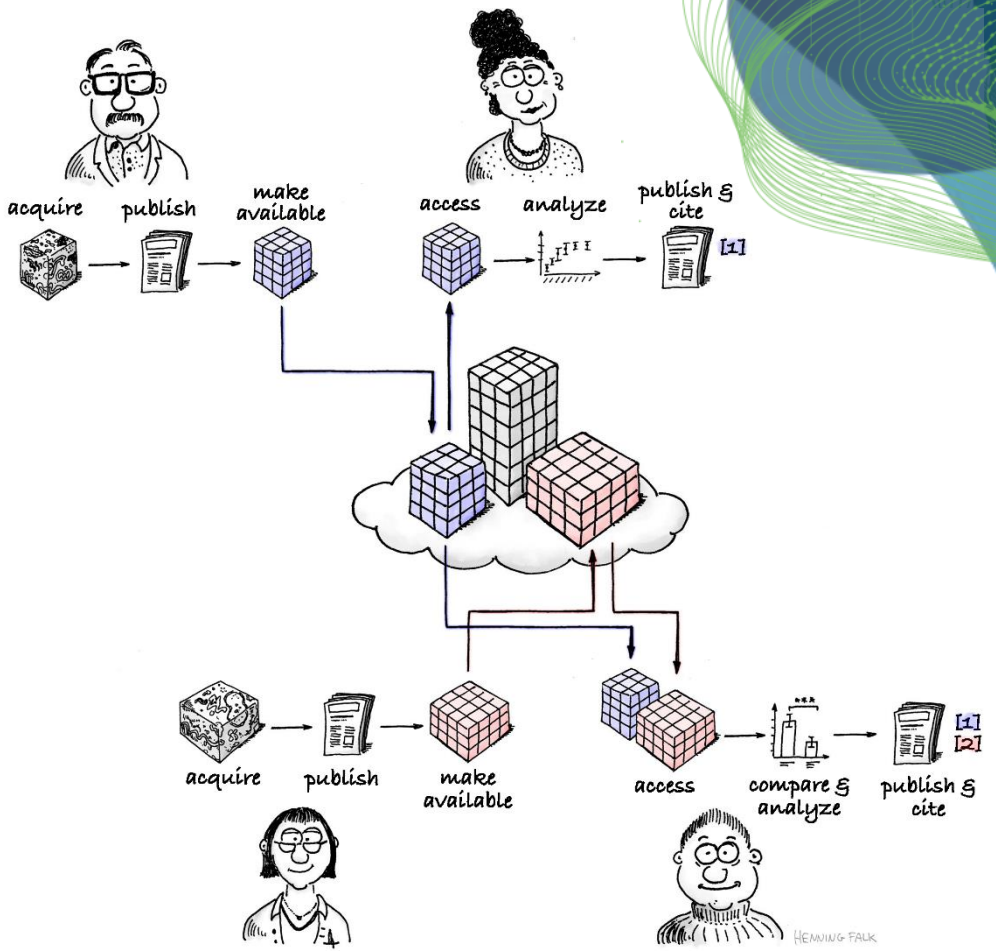
- I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (Meta)data use vocabularies that follow FAIR principles
- I3. (Meta)data include qualified references to other (meta)data



The FAIR-principles

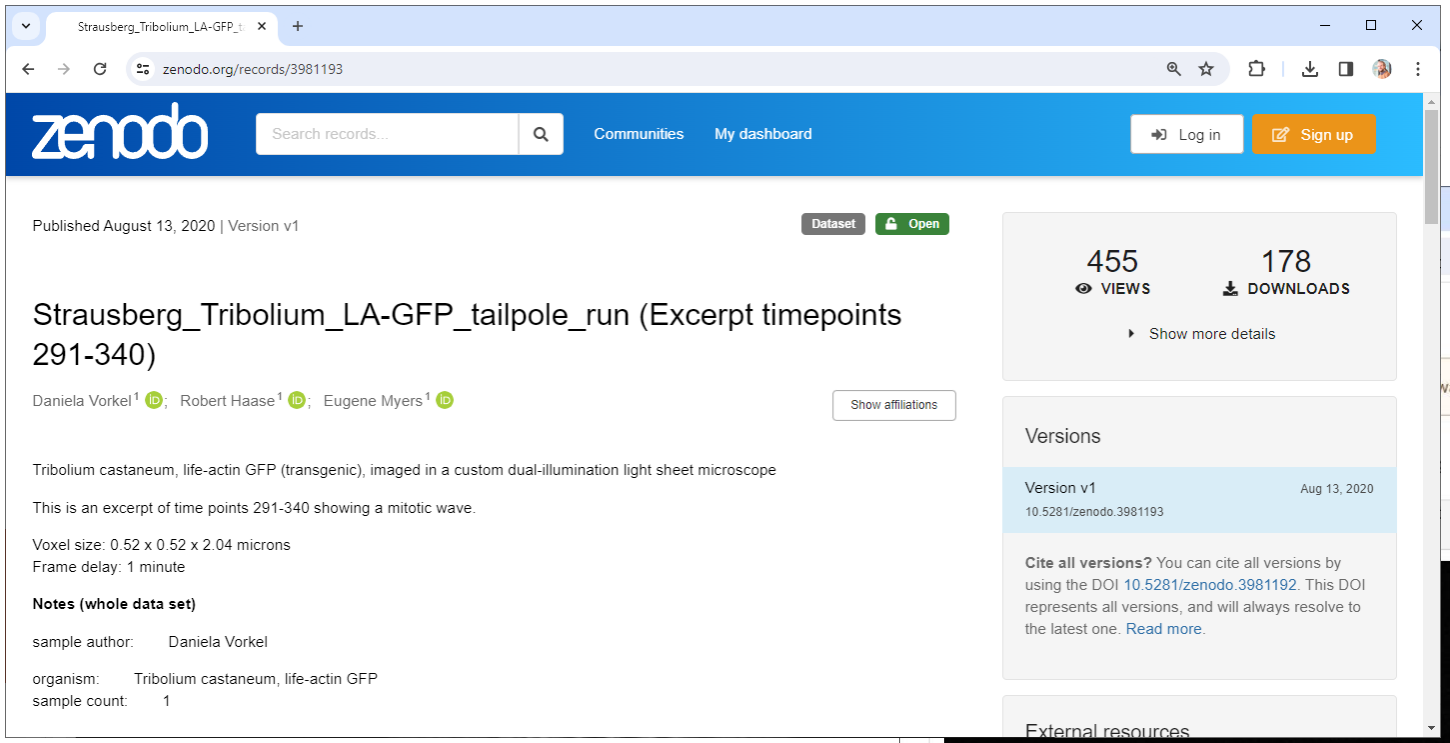
Reusable

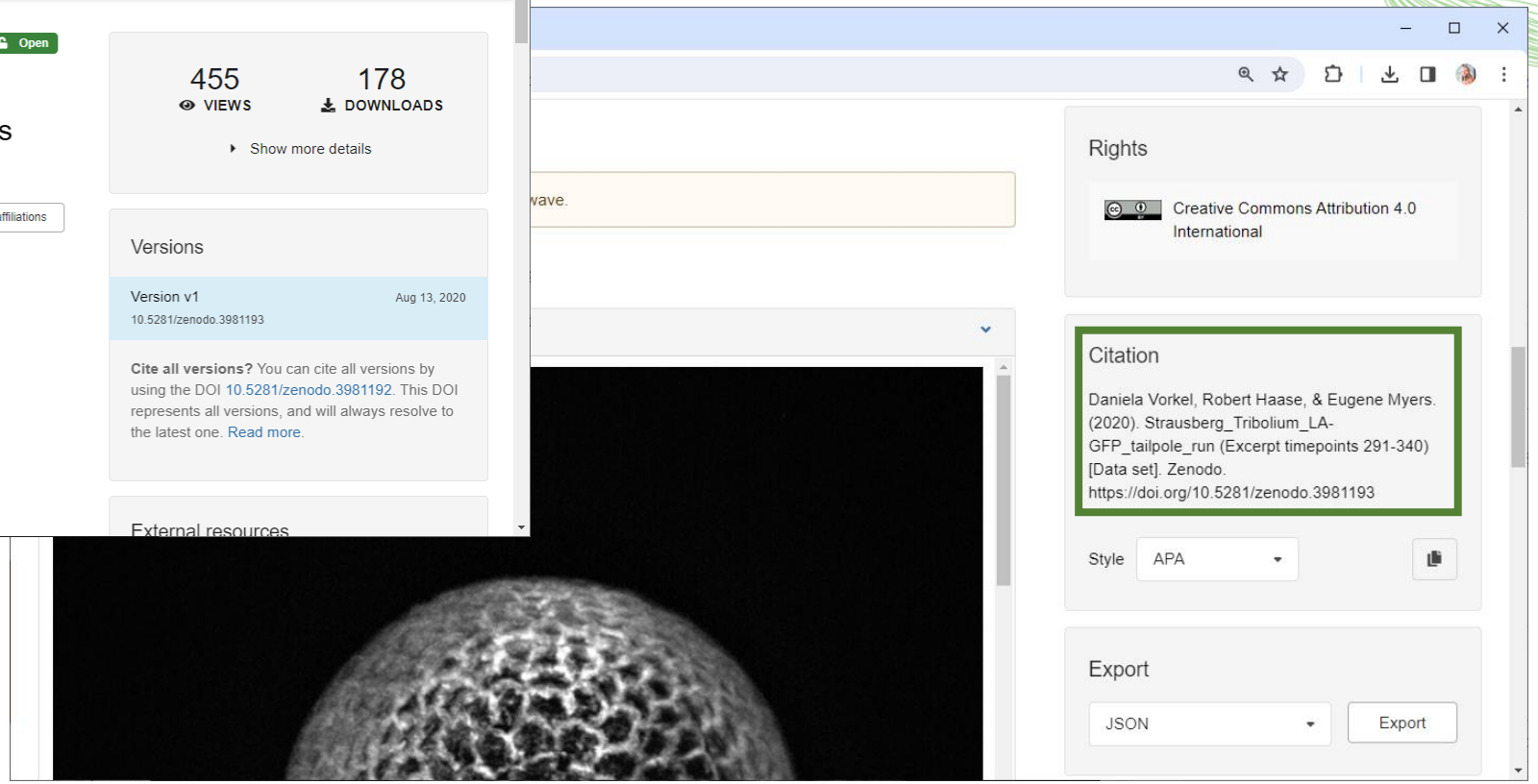
- R1. (Meta)data are richly described with a plurality of accurate and relevant attributes
- R1.1. (Meta)data are released with a clear and accessible data usage license
- R1.2. (Meta)data are associated with detailed provenance
- R1.3. (Meta)data meet domain-relevant community standards



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

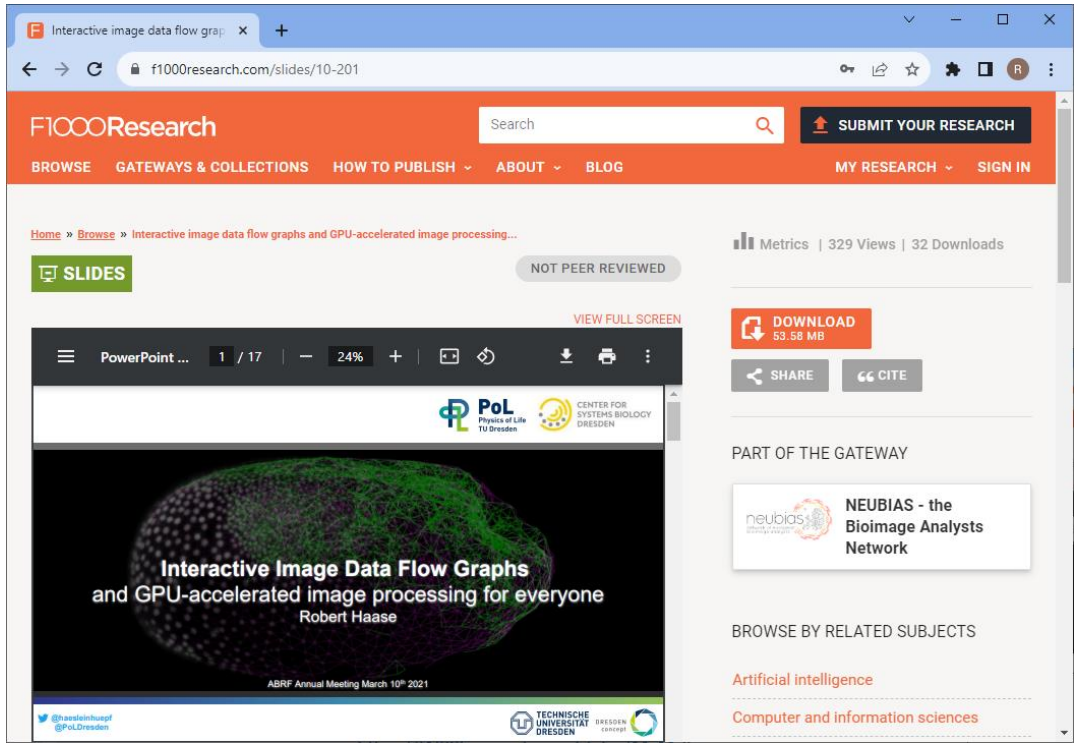
Incentives: Citability

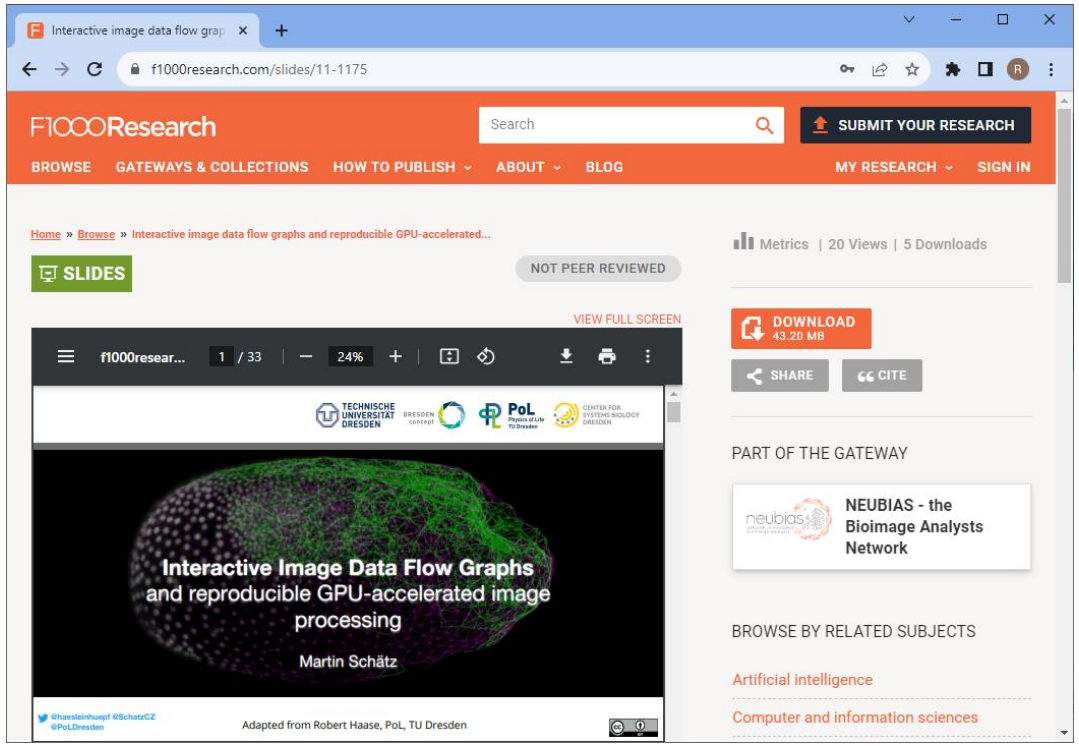




Incentives: Reusability

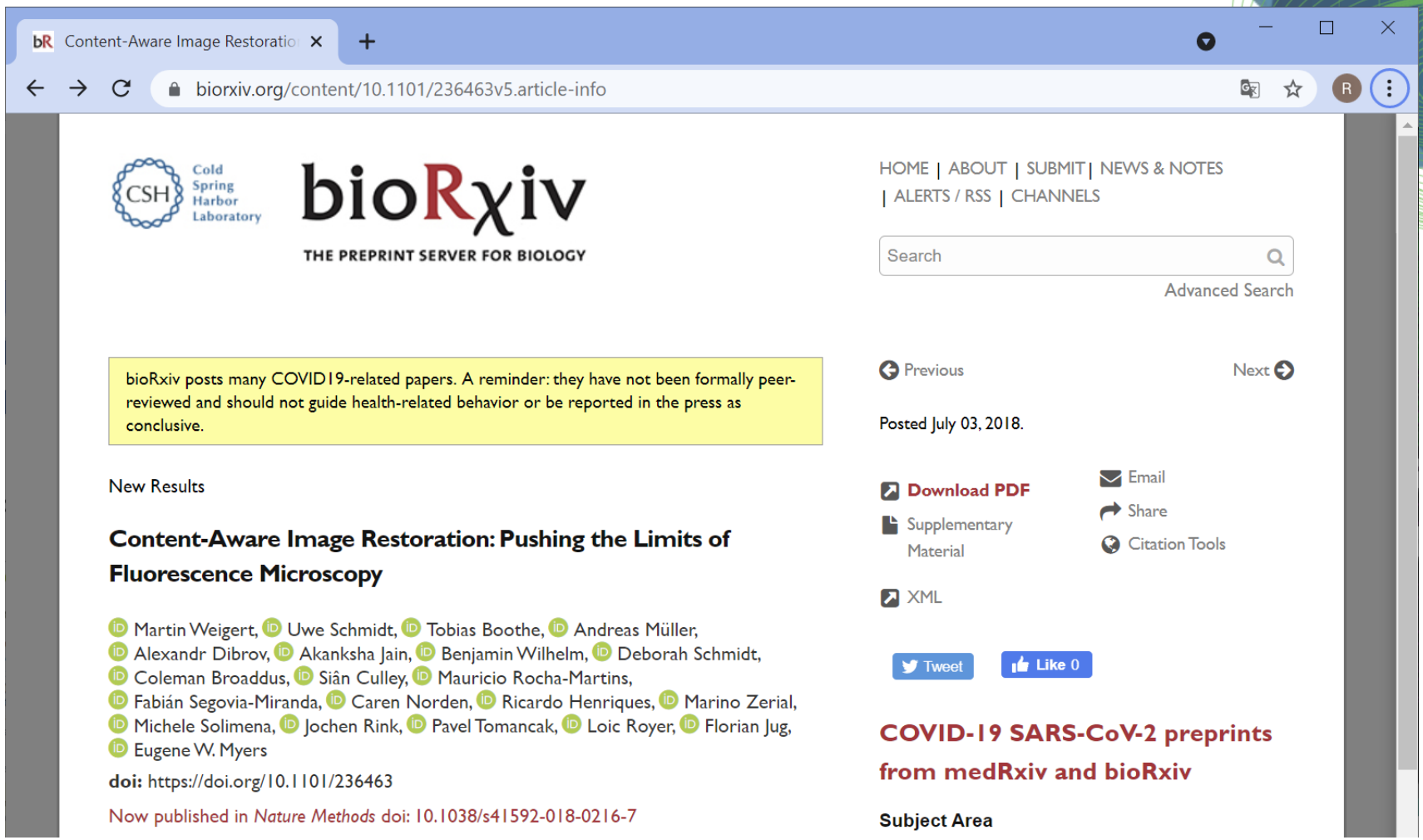
- Open Access -> Others teach how to use <u>your</u> *tools & methods*





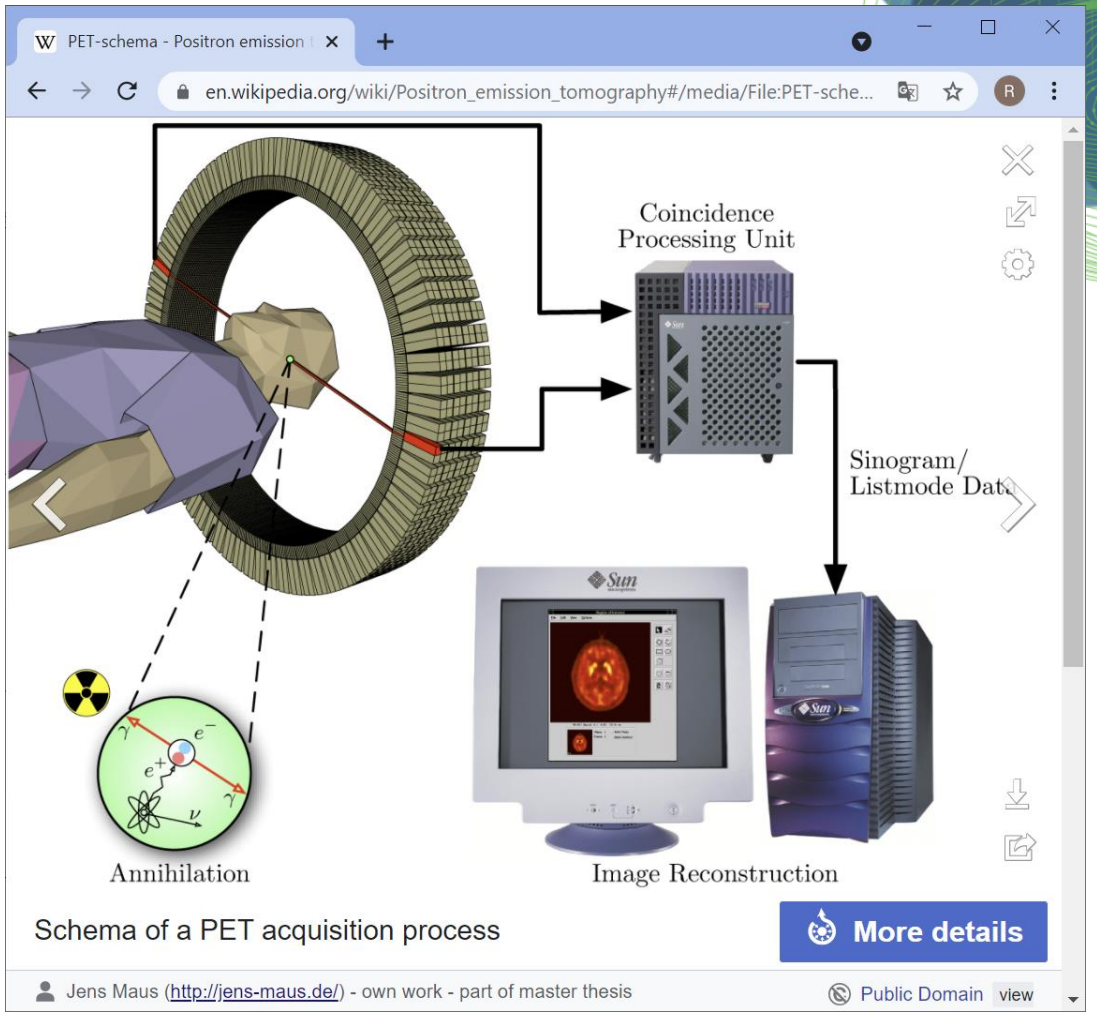
Use cases: Manuscripts

- Preprints
  - Accessible / reusable
  - https://arxiv.org/
  - https://biorxiv.org/
  - https://medrxiv.org/
- Journals

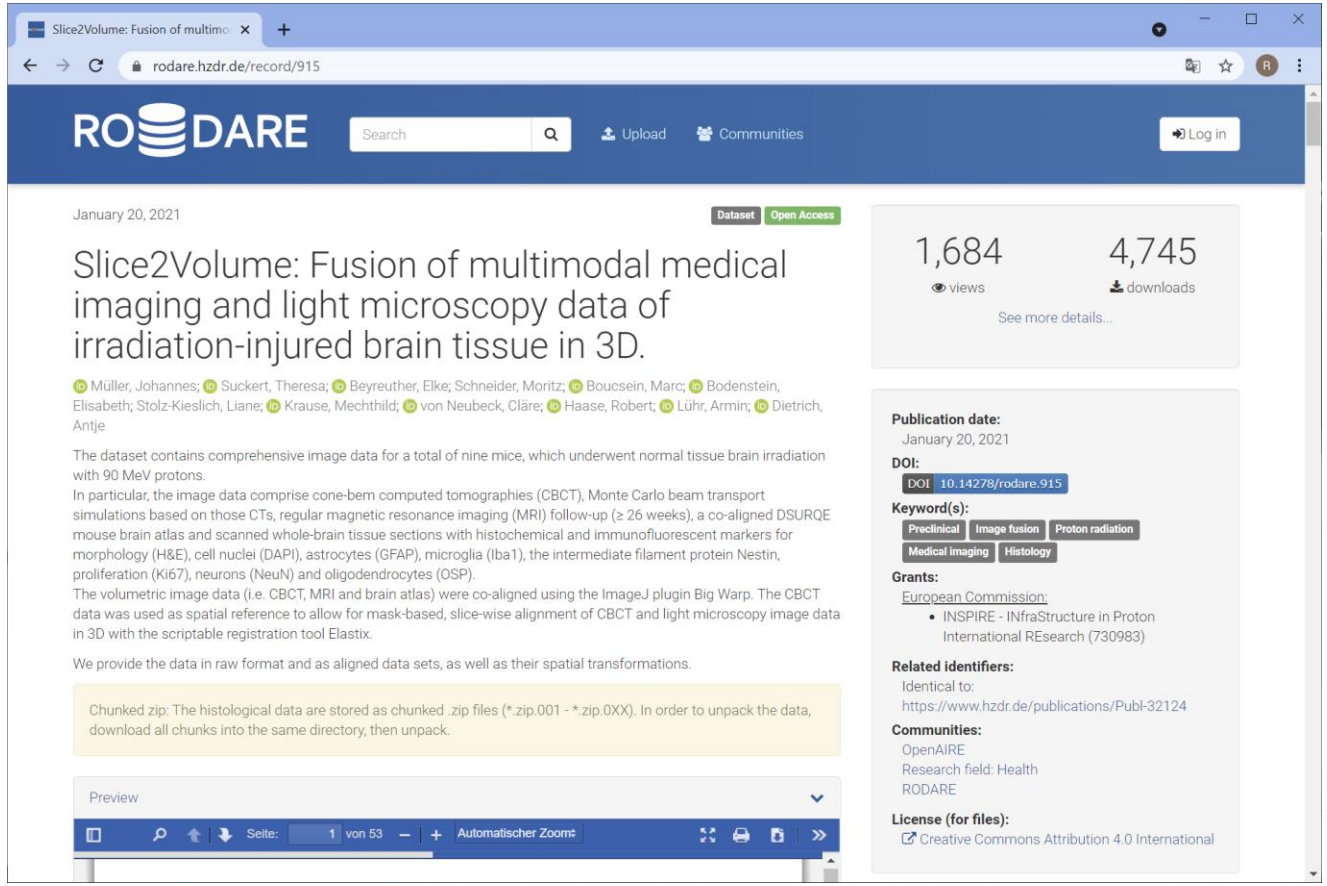


Use cases: Figures

- Talk about each others' work
- Advertise your work
- … because our work is often publicly funded
- https://commons.wikimedia.org/wiki/Main_Page
- https://figshare.com



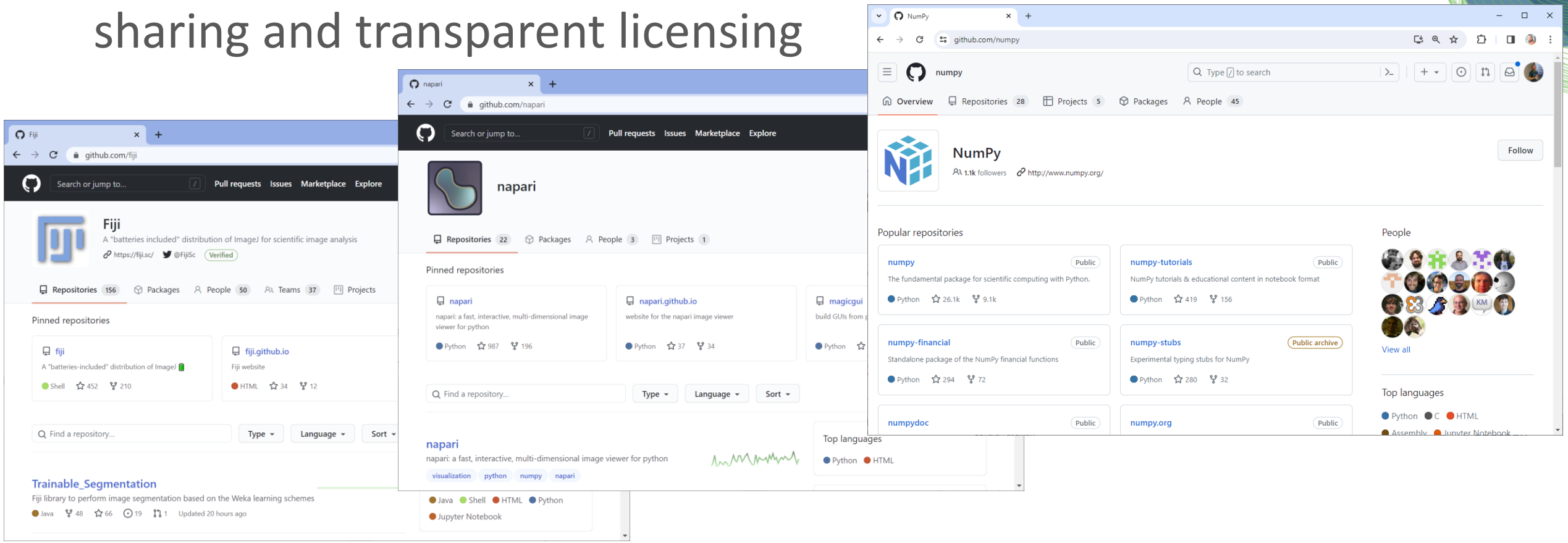
Use cases: Data



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

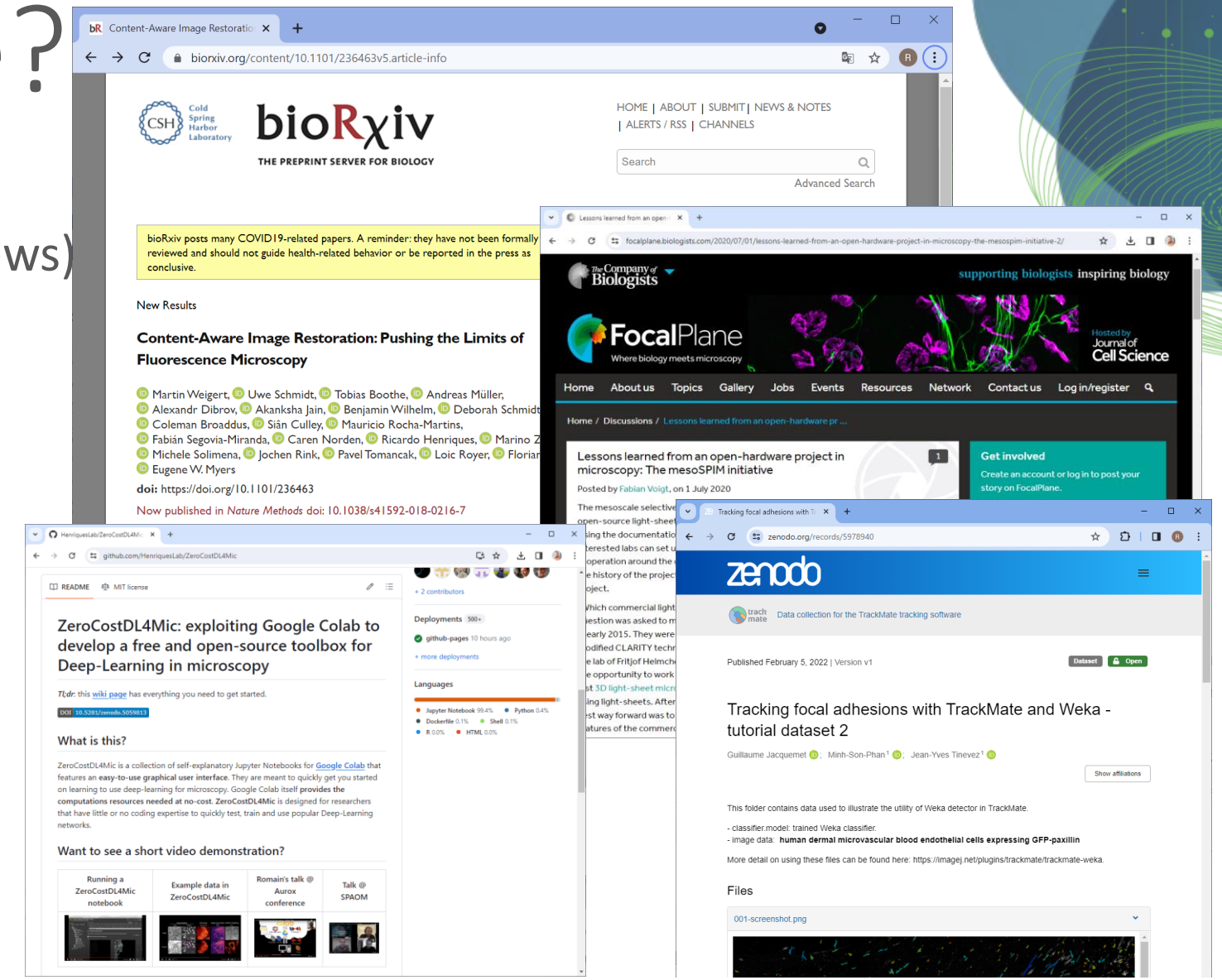
Use cases: Code

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



Where to share?

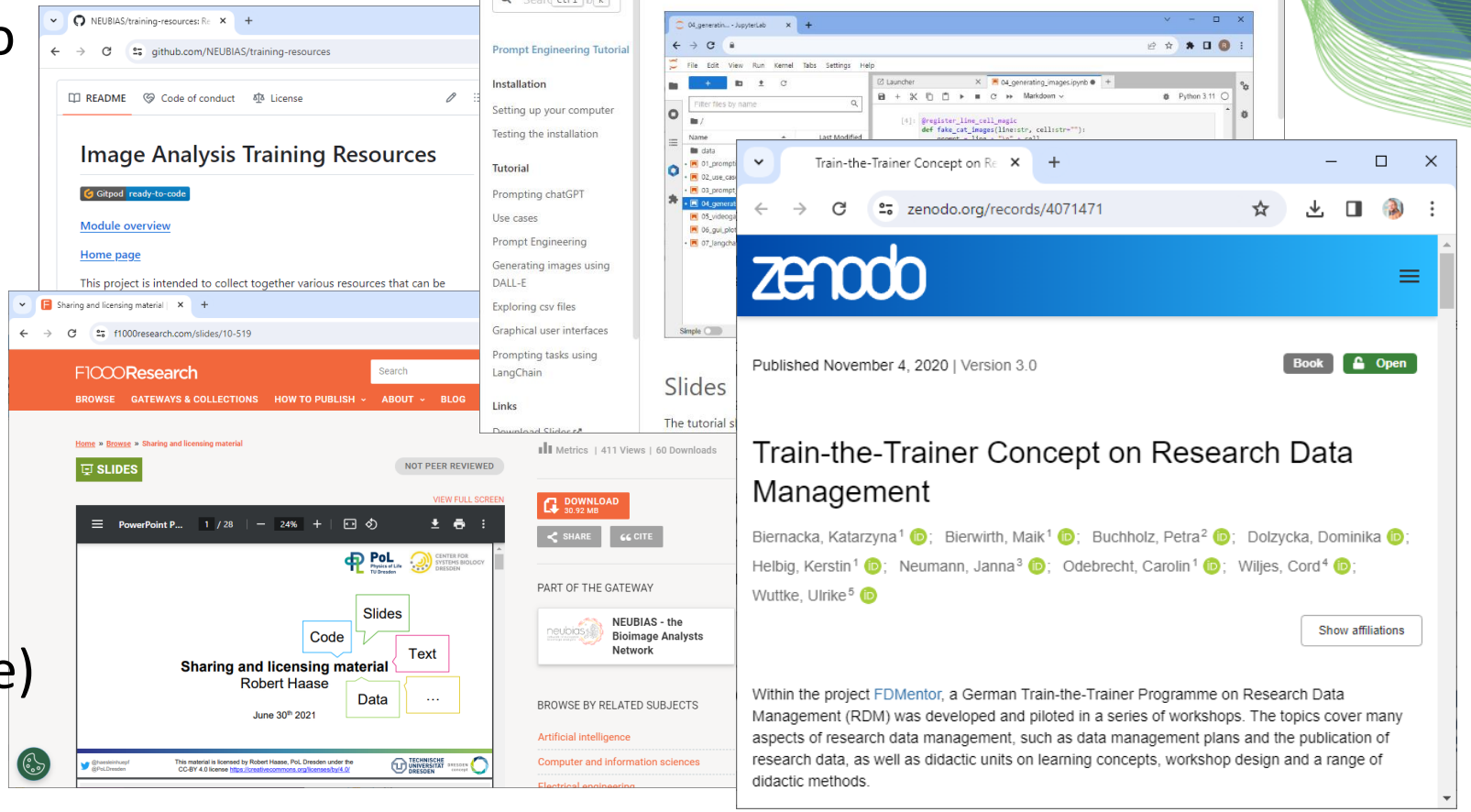
- Open *science* related content
  - bioRxiv (manuscripts, no reviews)
  - Figshare
  - F1000
  - Bioimage Archive (data)
  - Github (code)
  - Zenodo
  - Focalplane
  - Institutional servers
    (if there is no alternative)



Where to share?

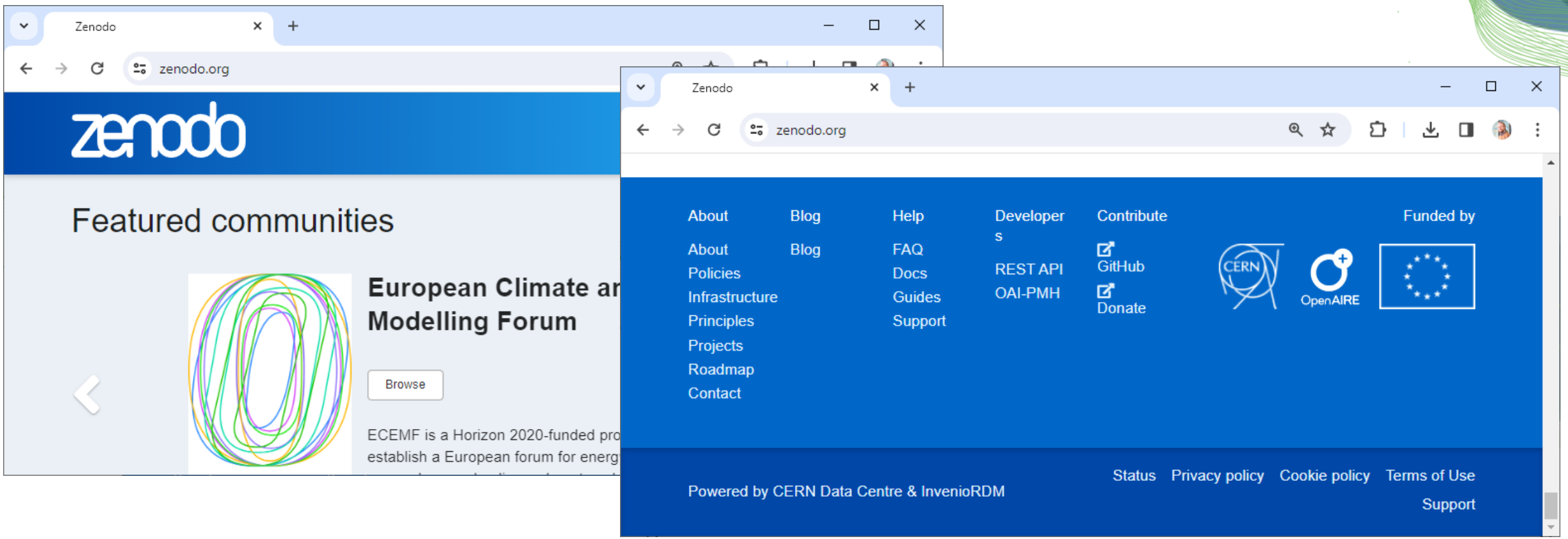
- Open *training* related content
  - bioRxiv (manuscripts, no reviews)
  - Figshare
  - F1000
  - Bioimage Archive (data)
  - Github (code)
  - Zenodo
  - Focalplane
  - Institutional servers (if there is no alternative)

Github pages 🤯



Zenodo

- Publicly funded infrastructure @ CERN / Switzerland



Quiz

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

Git server of the university

Zenodo.org

Github.com

Company / institute / personal website

ScaDS.AI
DRESDEN LEIPZIG
CENTER FOR SCALABLE DATA ANALYTICS
AND ARTIFICIAL INTELLIGENCE

Exercises

Robert Haase

GEFÖRDERT VOM
Bundesministerium
für Bildung
und Forschung

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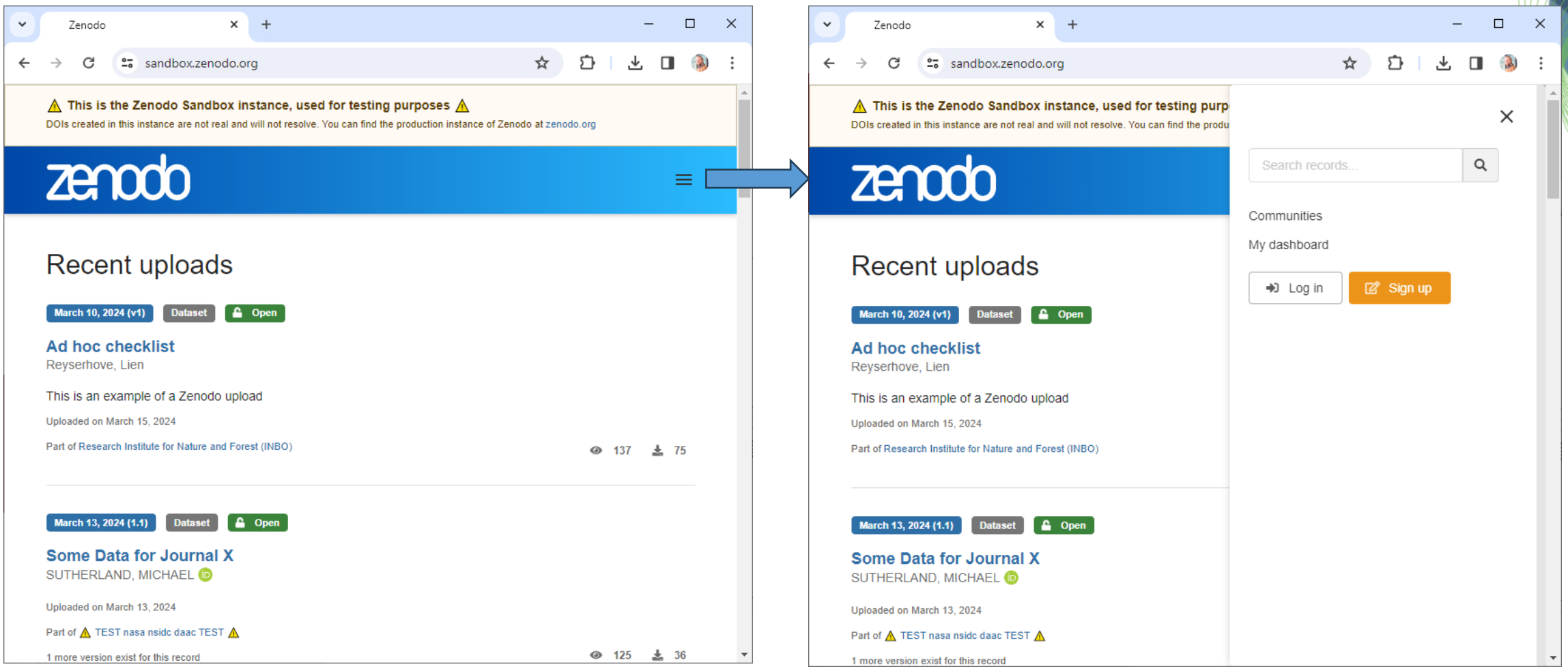
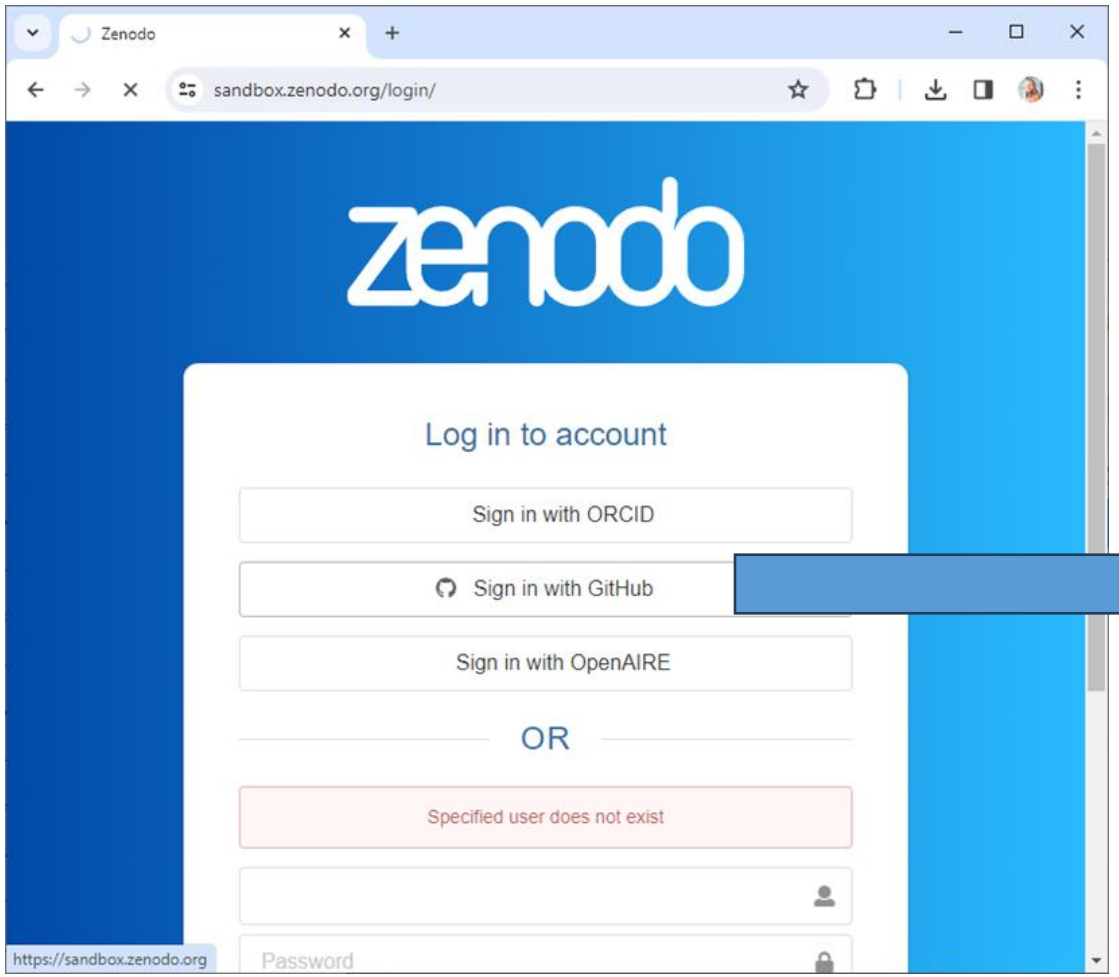
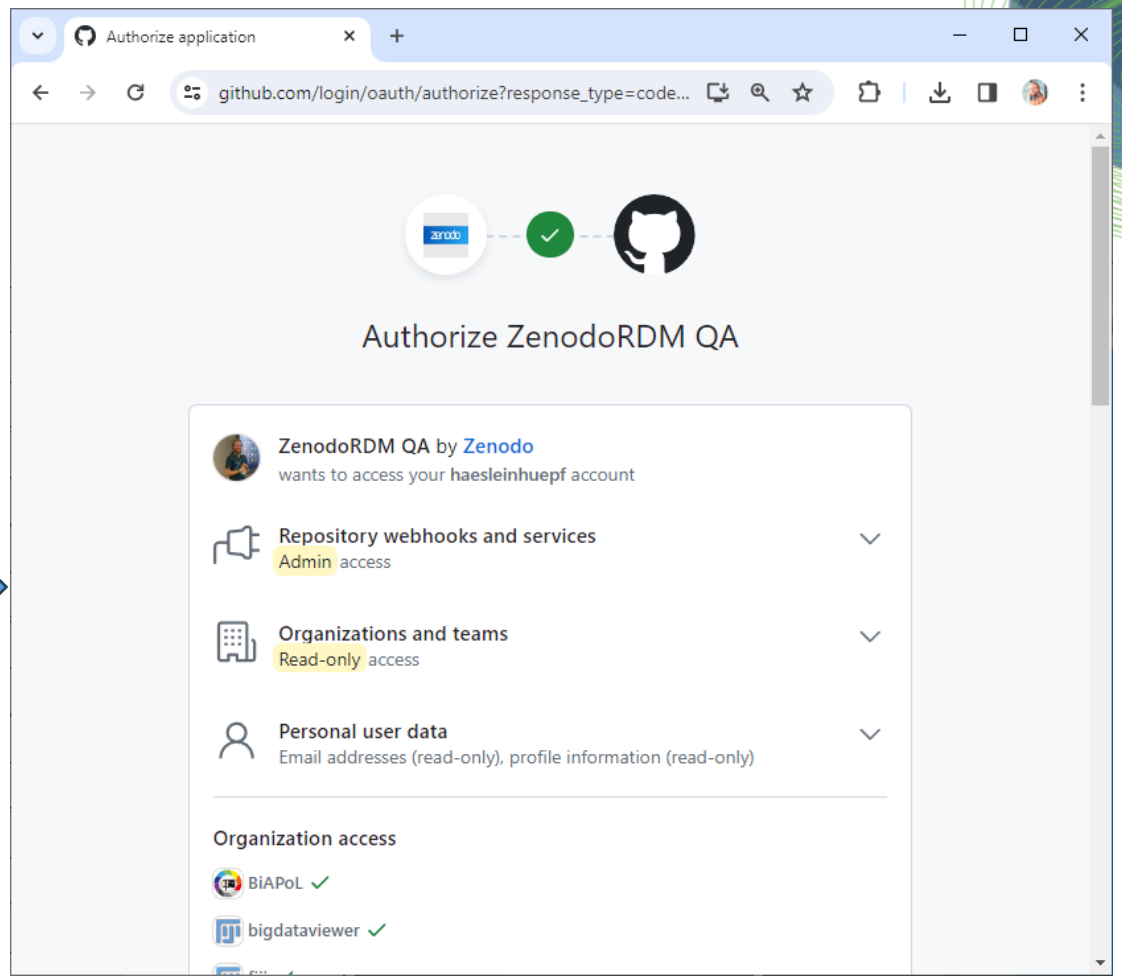
Exercise: Sharing files on Zenodo

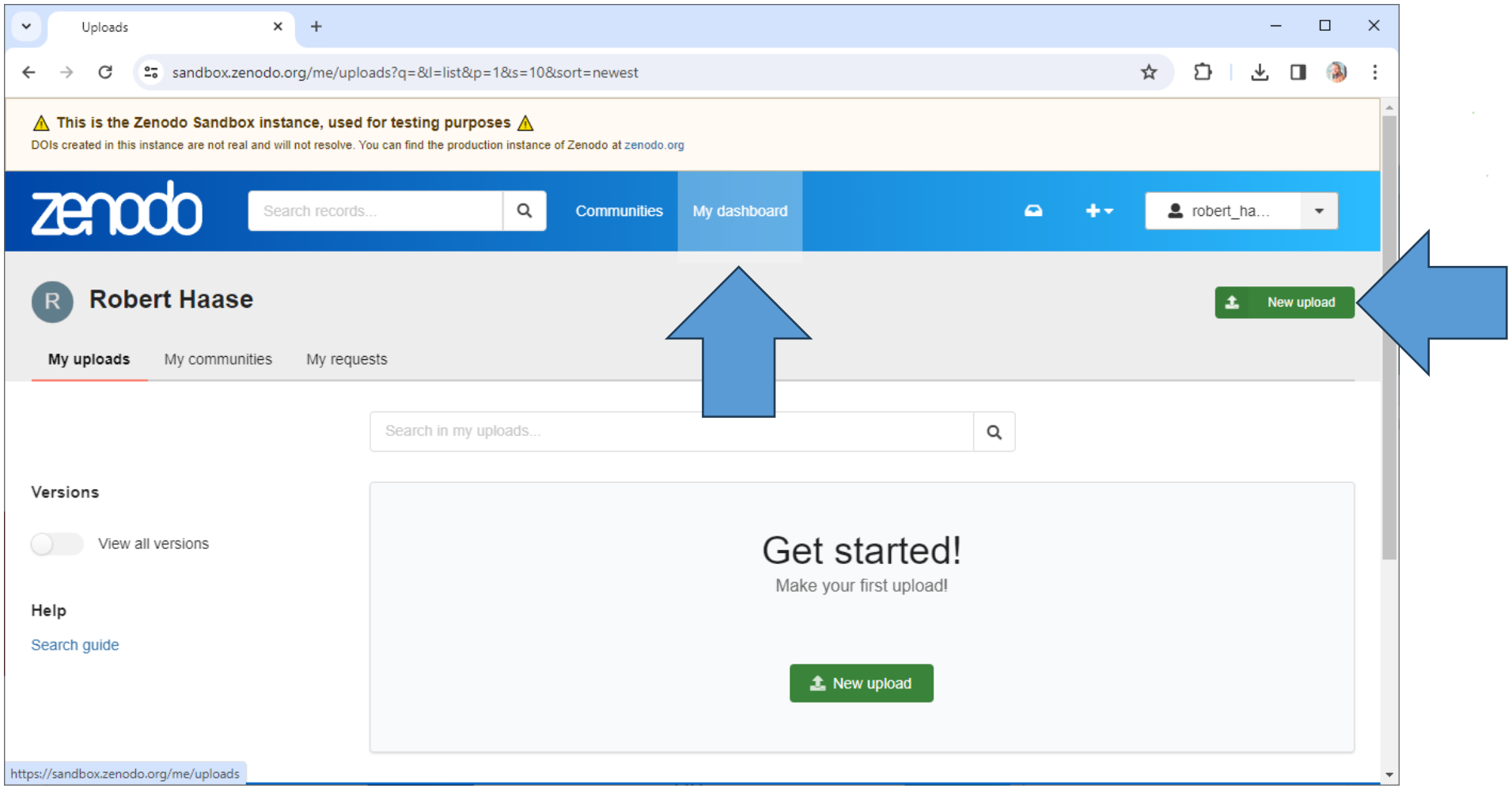


Exercise: Sharing files on Zenodo

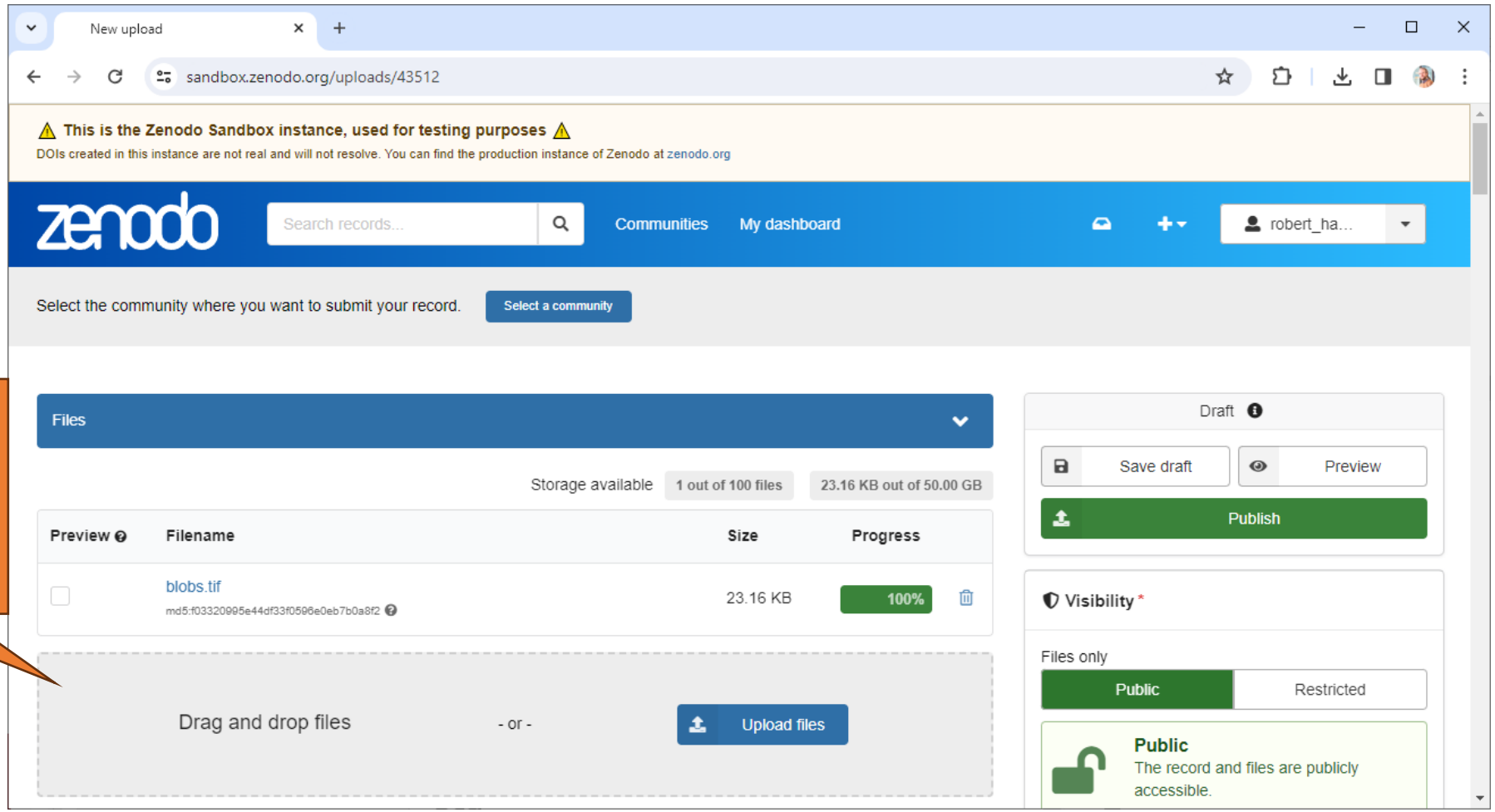




Exercise: Sharing files on Zenodo

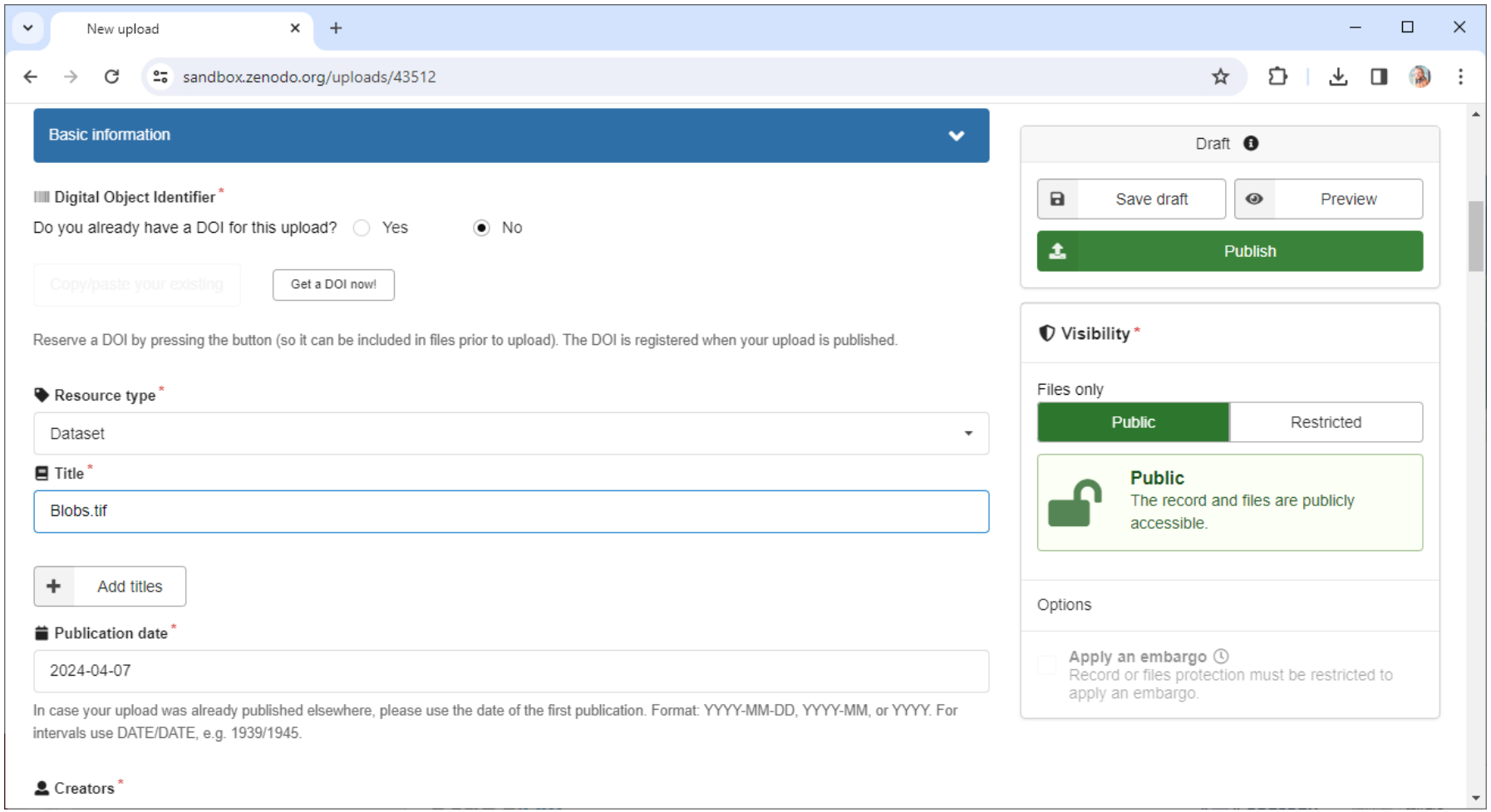


Exercise: Sharing files on Zenodo

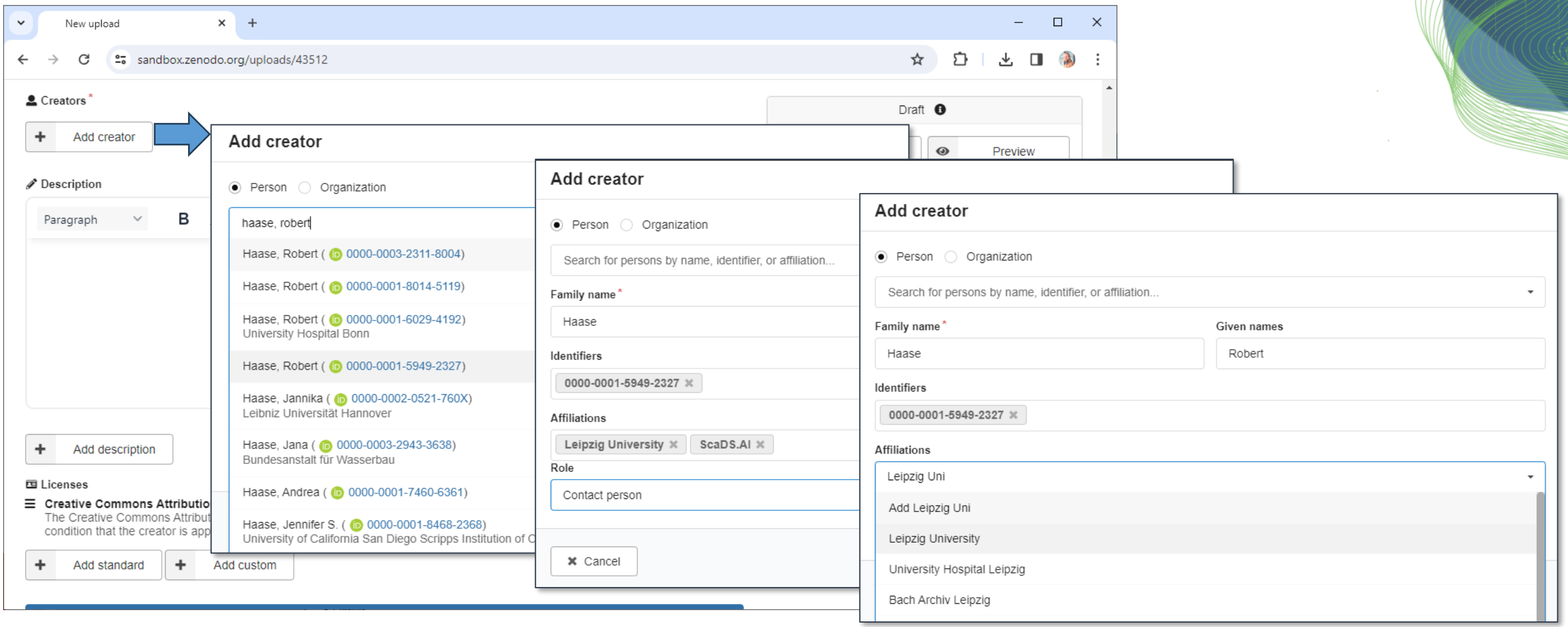


Only drop files here you are allowed to share!

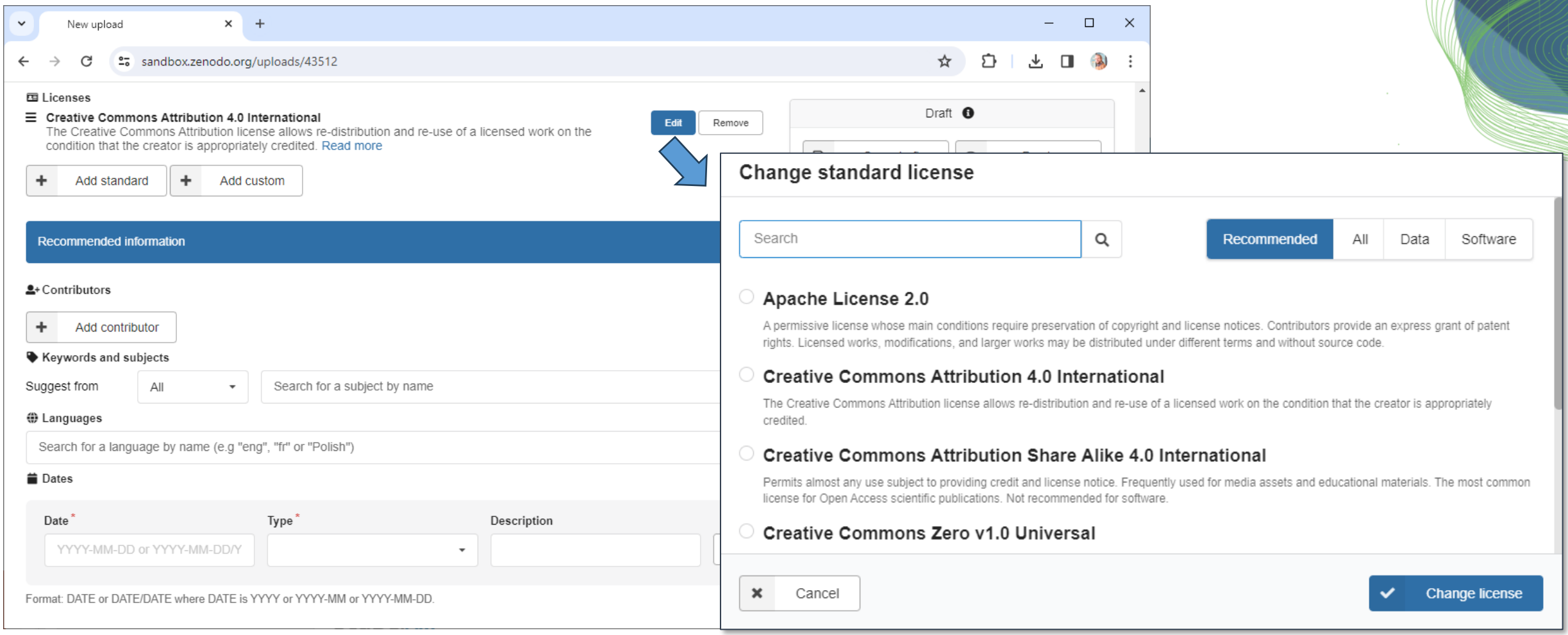
Exercise: Sharing files on Zenodo



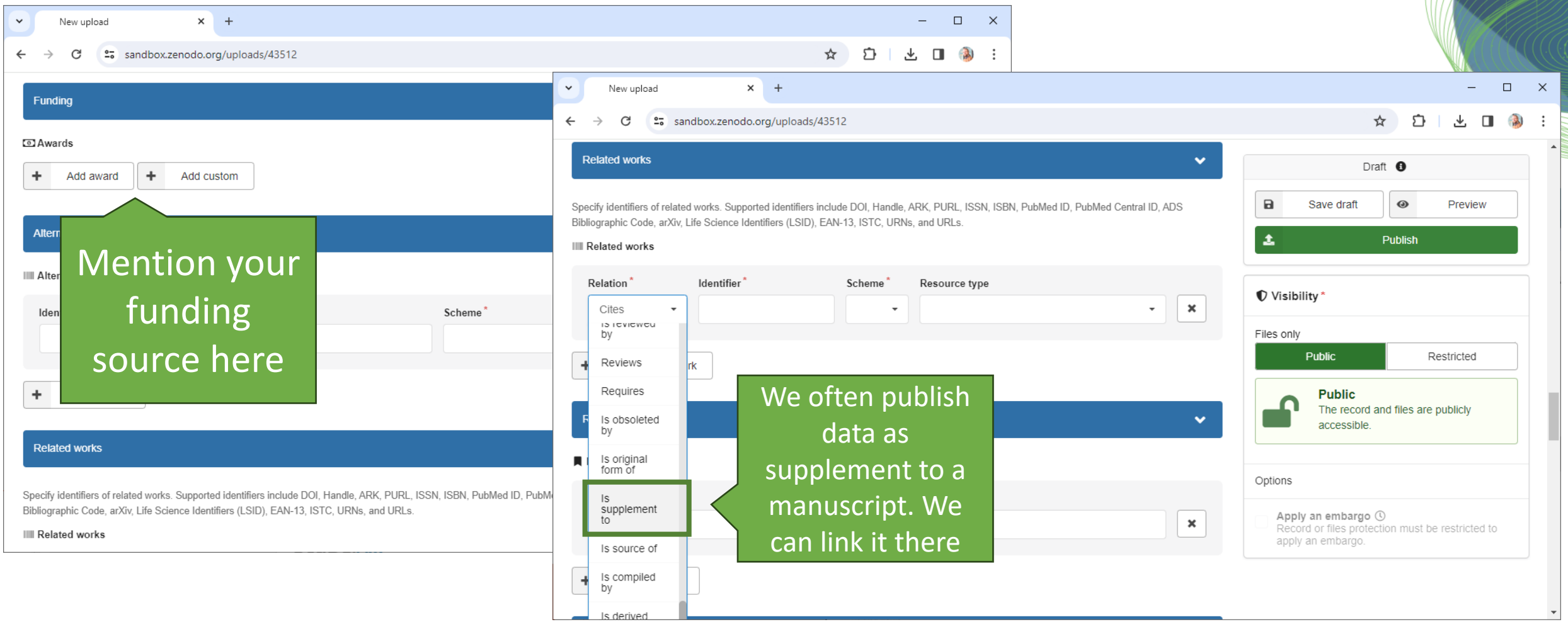
Exercise: Sharing files on Zenodo



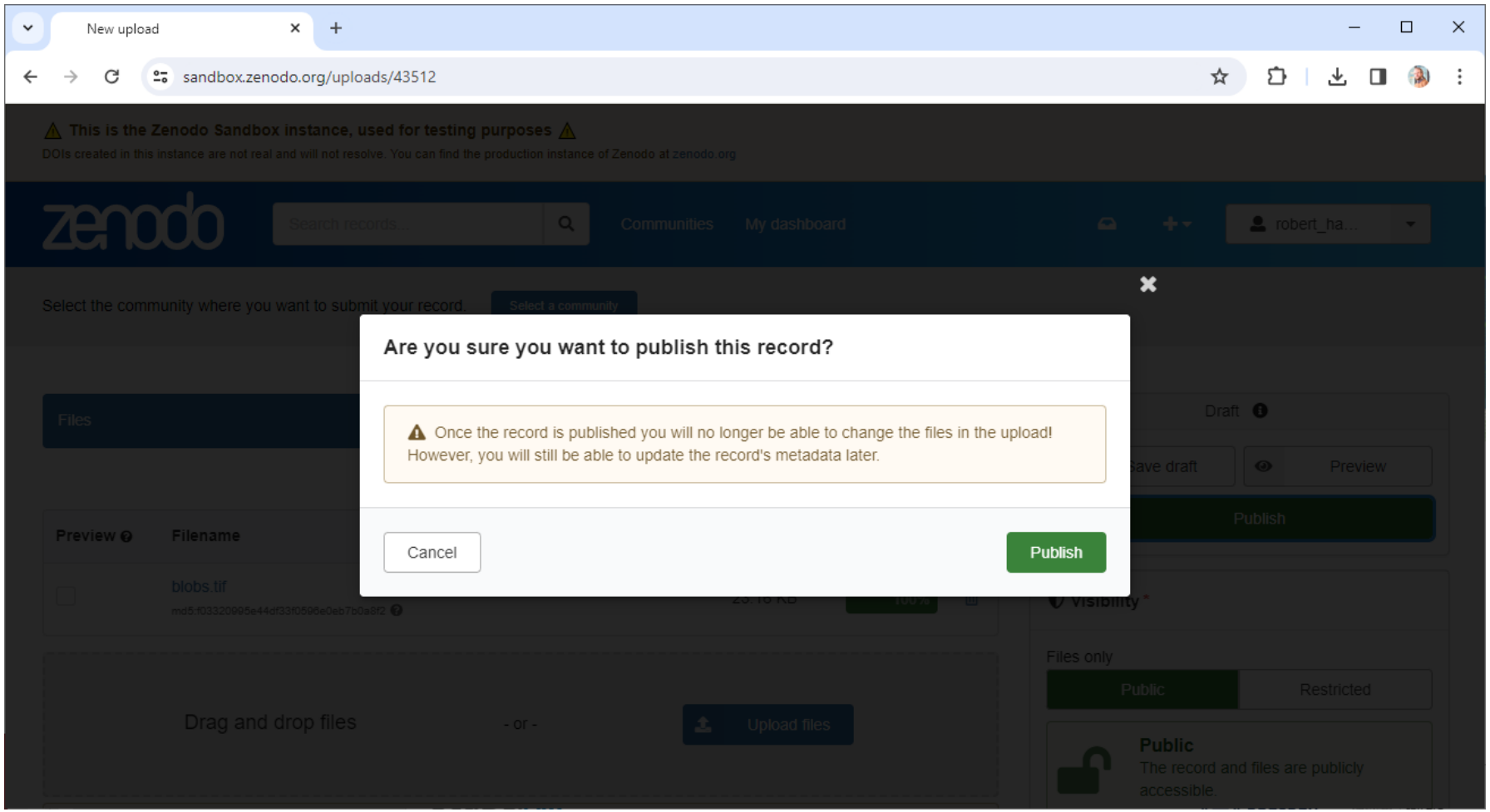
Exercise: Sharing files on Zenodo



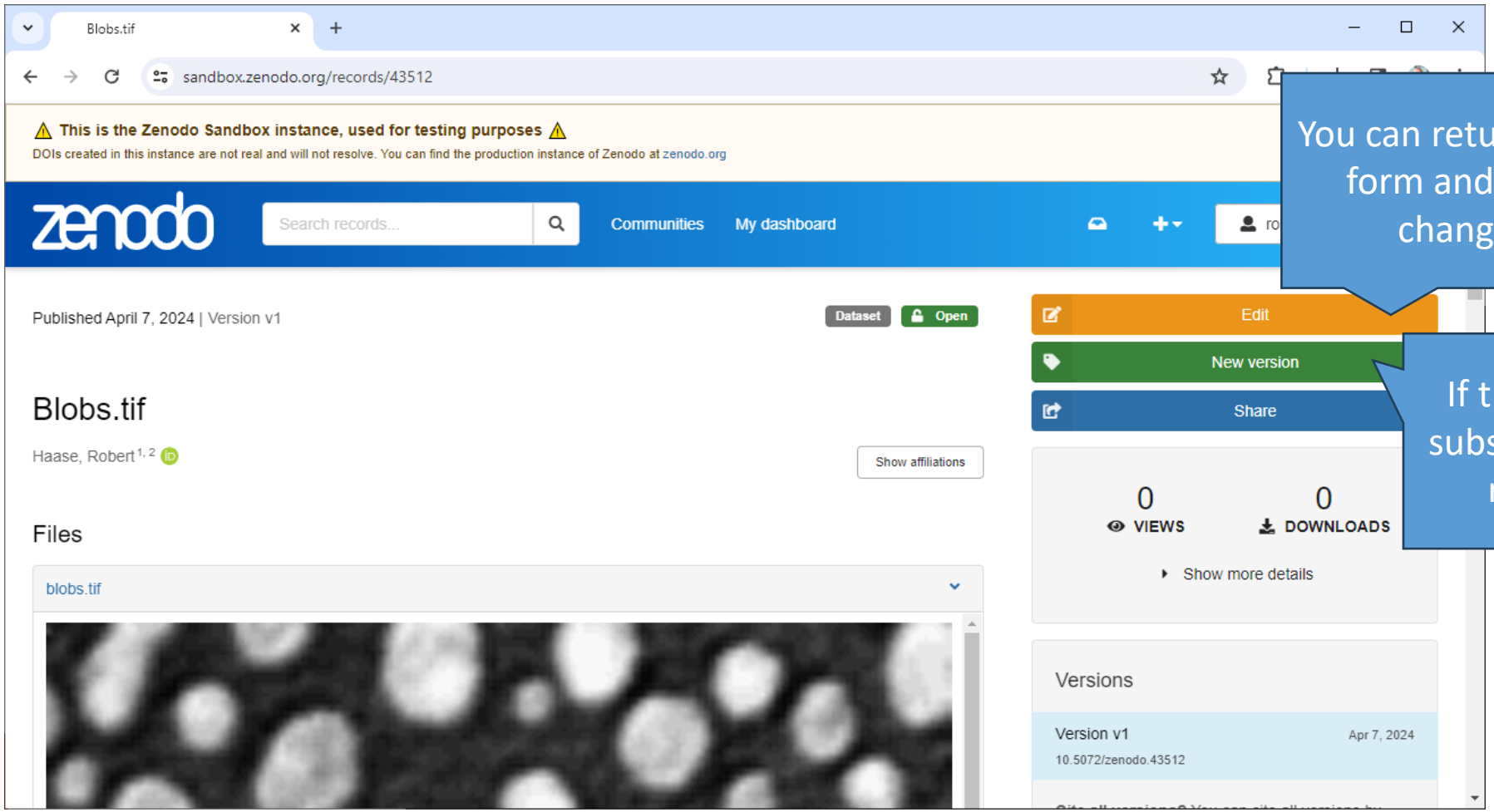
Exercise: Sharing files on Zenodo



Exercise: Sharing files on Zenodo



Exercise: Sharing files on Zenodo

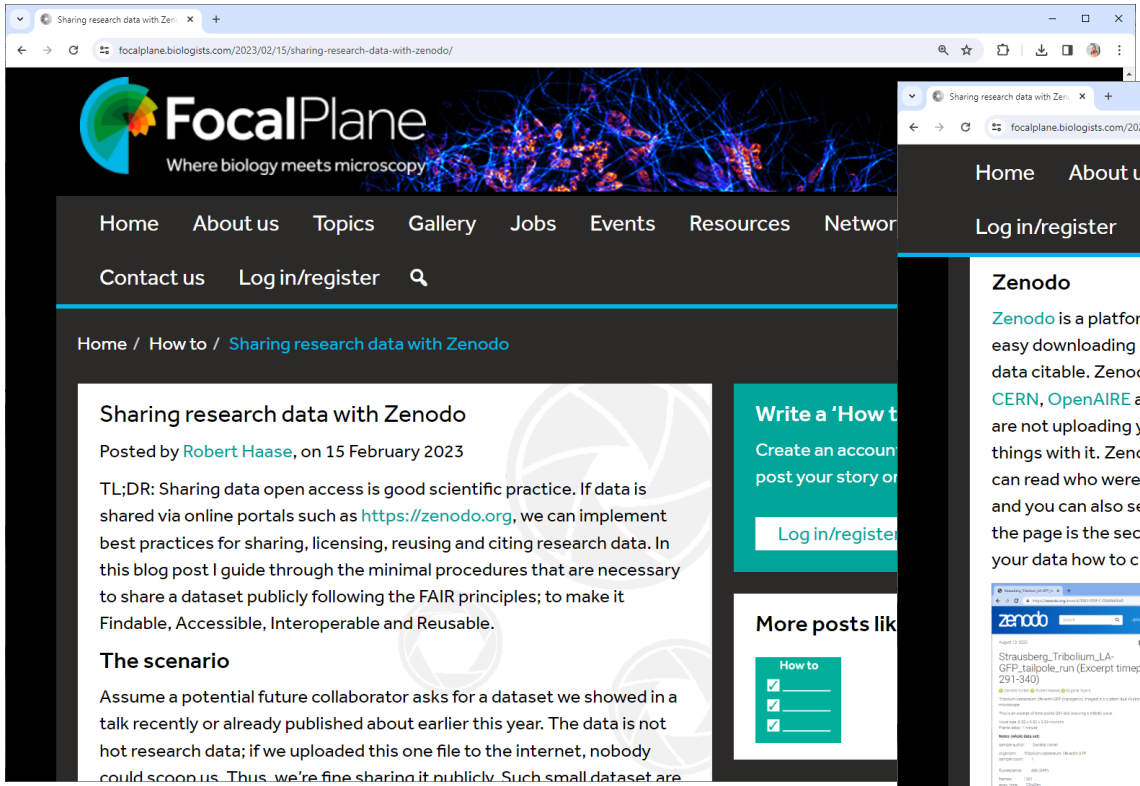


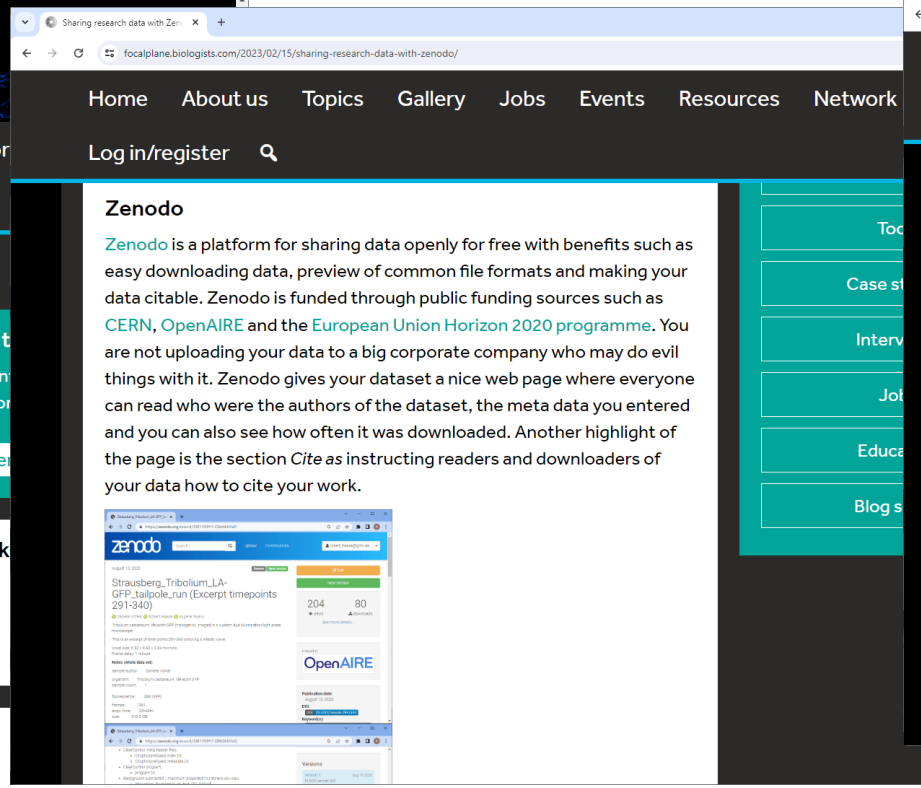
You can return to the form and make changes.

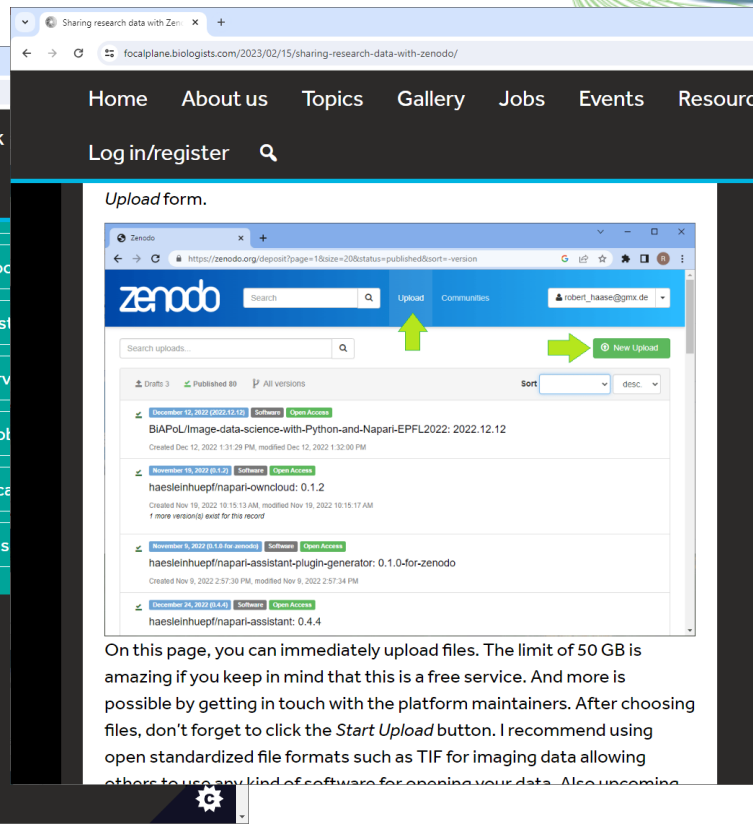
If the changes are substantial, create a new version.

Exercise: Sharing files on Zenodo

- If this was too fast…

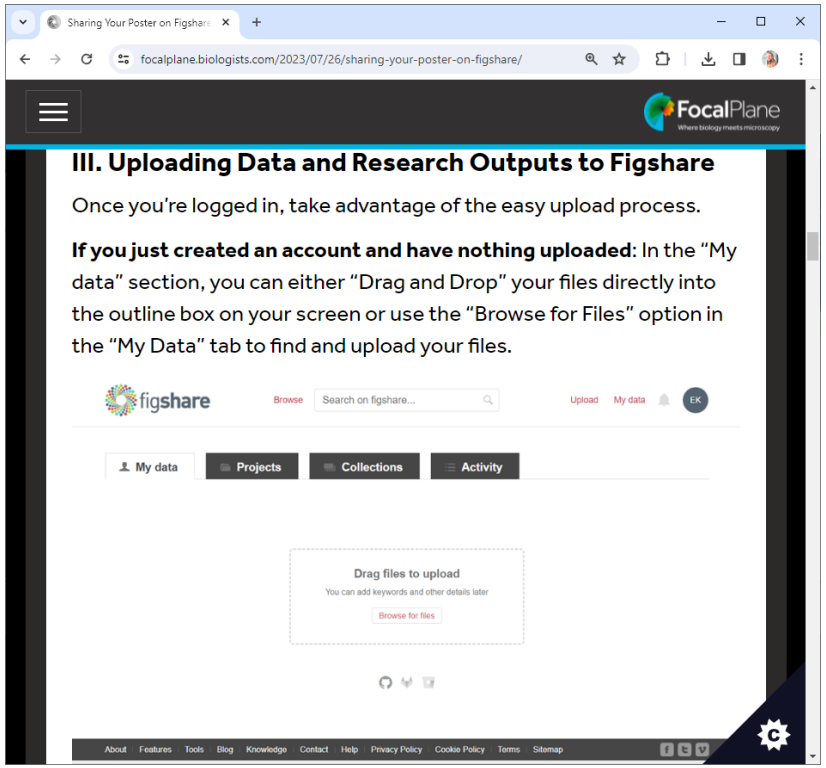


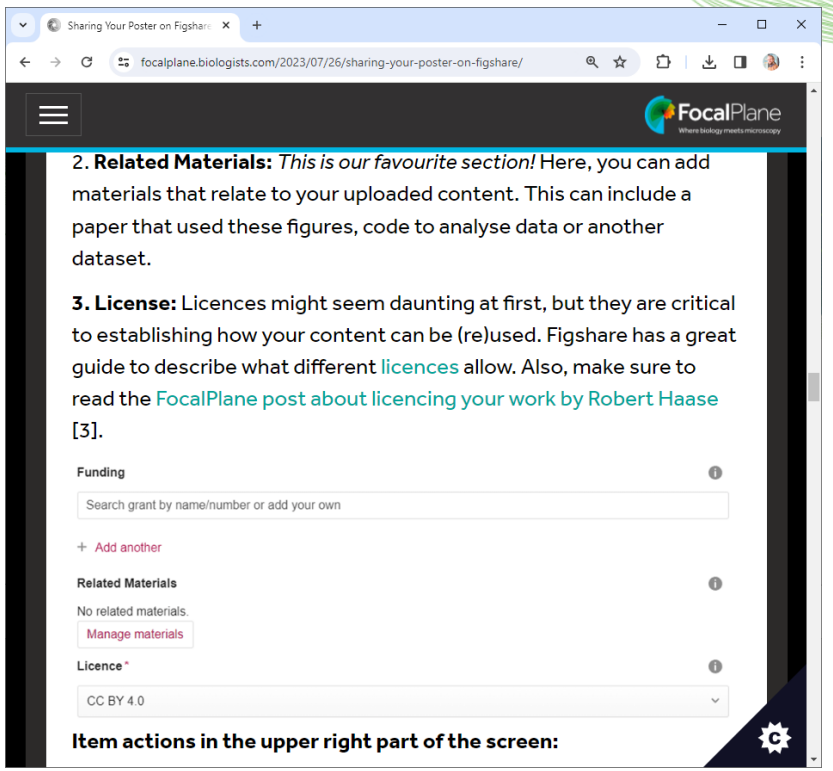




Exercise: Sharing files

- Alternatively: Try Figshare!





Lunch break

We continue 13:30

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

SACHSEN
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.

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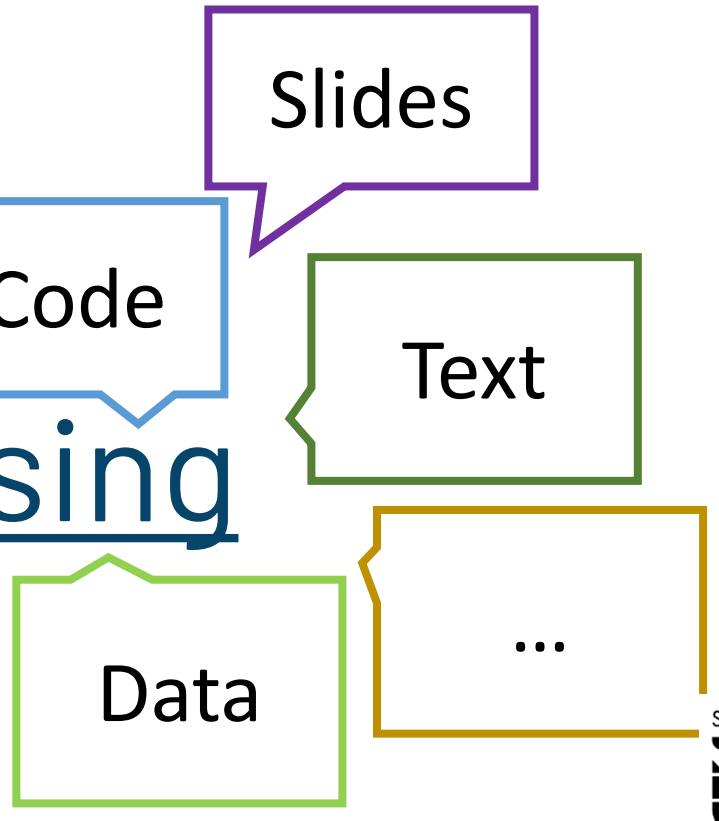
NFDI 4 BIOIMAGE
NATIONAL RESEARCH DATA MANAGEMENT INFRASTRUCTURE FOR MICROSCOPY AND BIOIMAGE ANALYSIS

GloBIAS Global BioImage Analysts' Society
GLOBAL BIOIMAGE ANALYST'S SOCIETY

Open Science, Sharing & Licensing



Robert Haase

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https://doi.org/10.5281/zenodo.10966230

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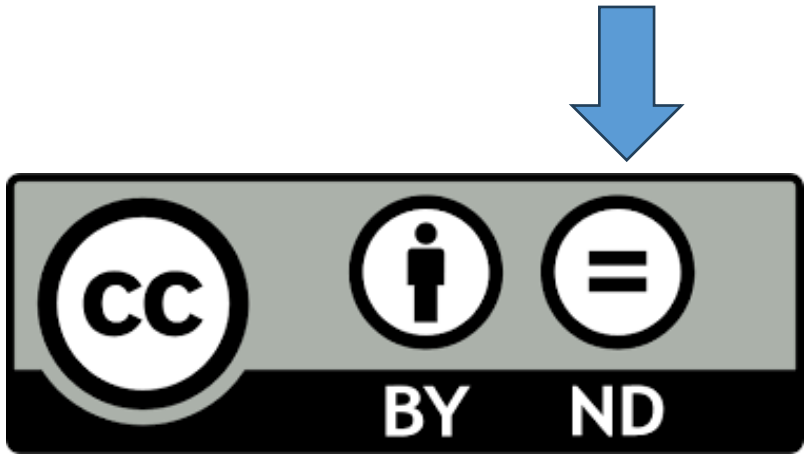
- Who knows what the ND stands for?



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"restrictive"

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I hope nobody feels hurt
by the following slides.

I just would like to make a point.

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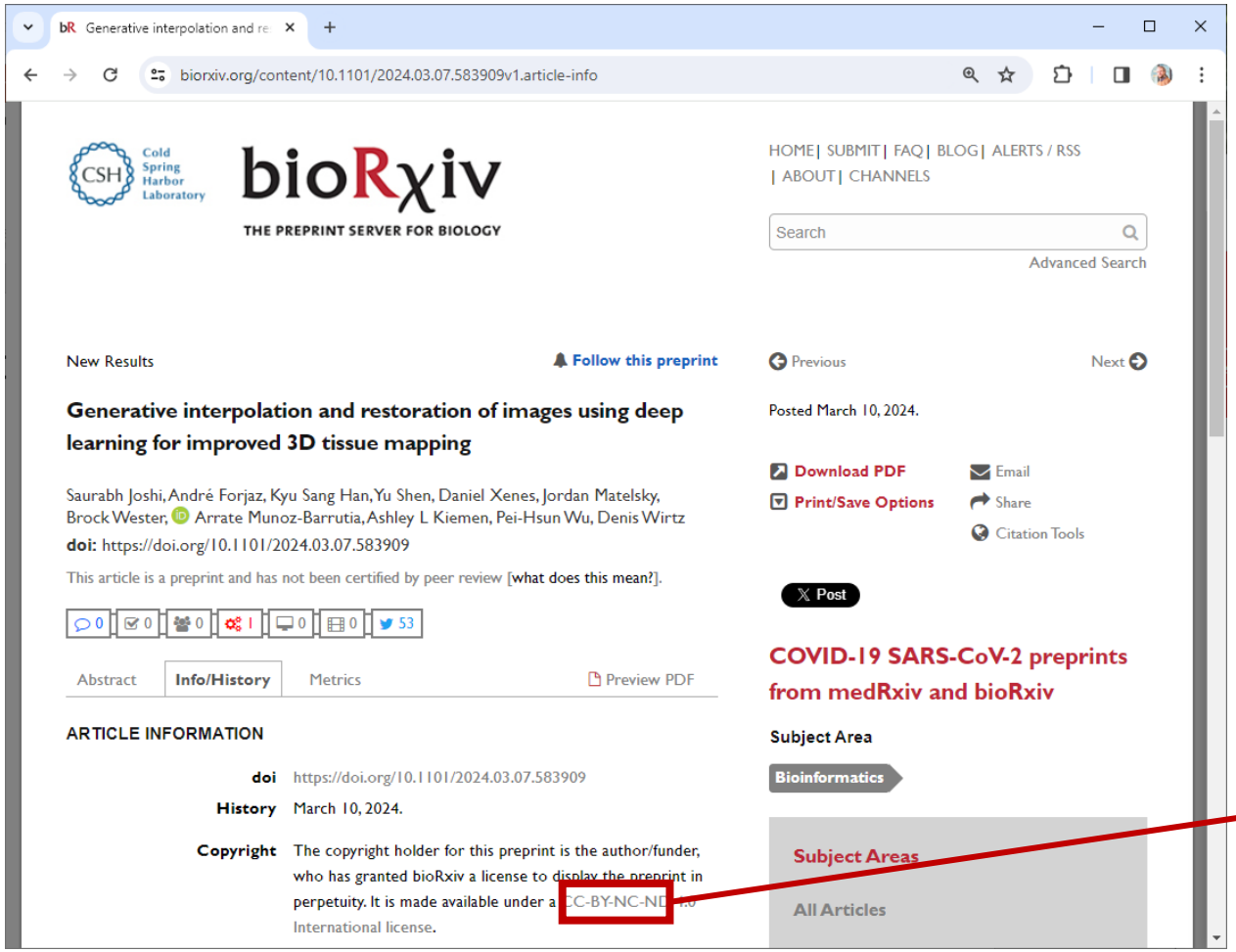
Example



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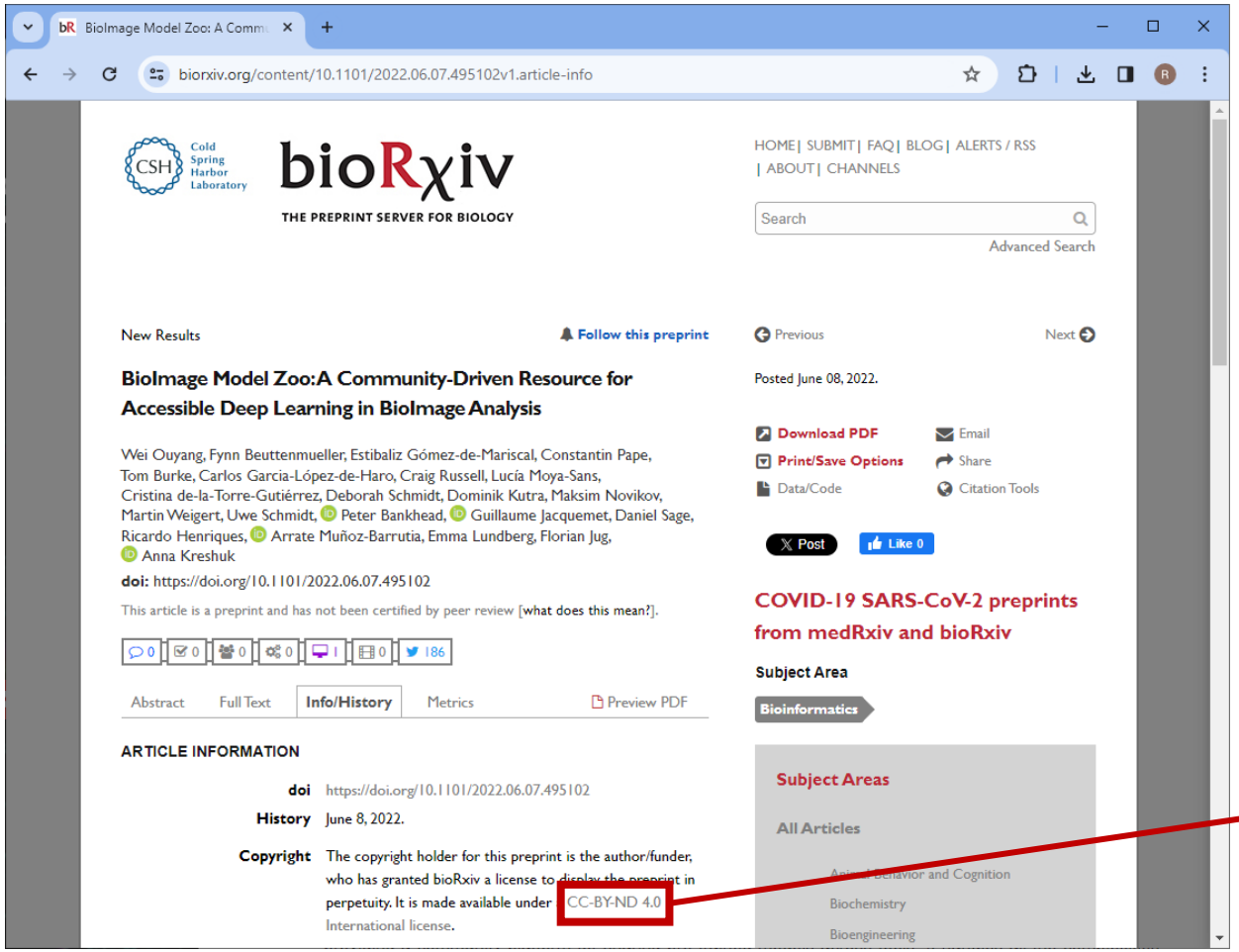

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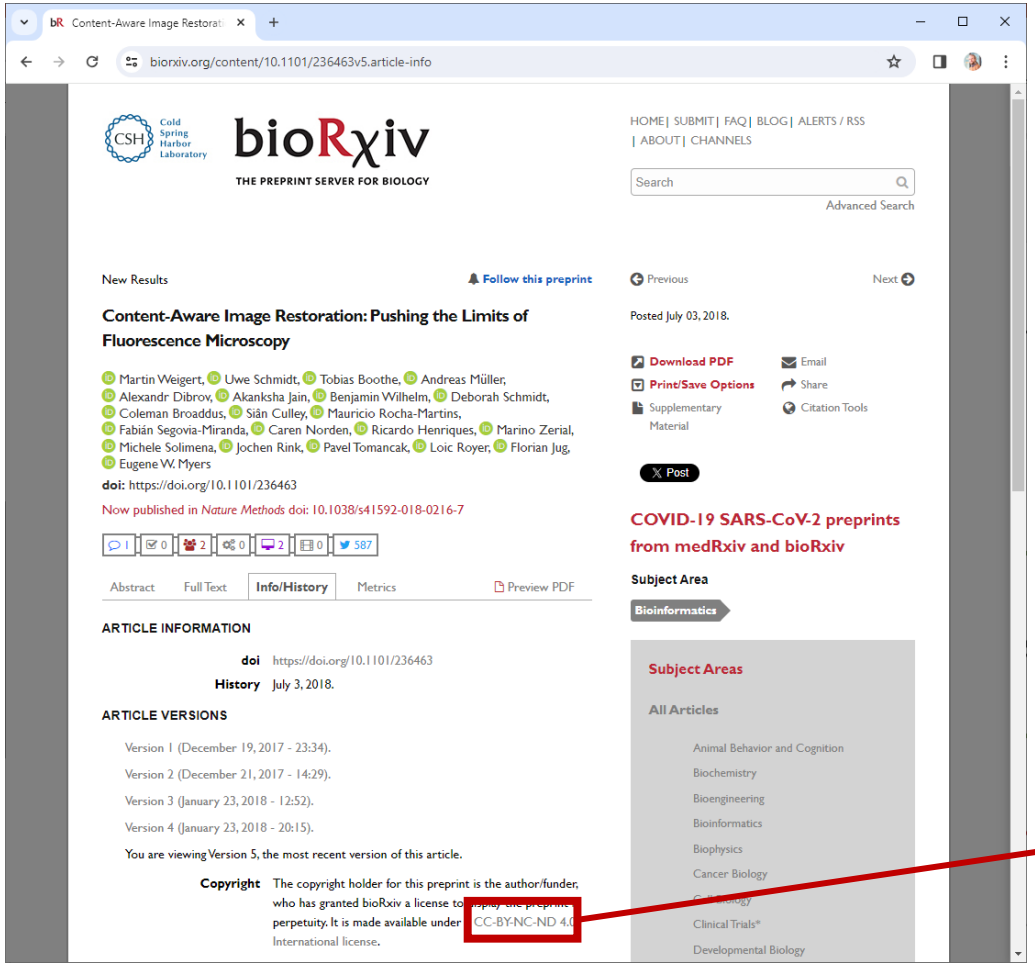

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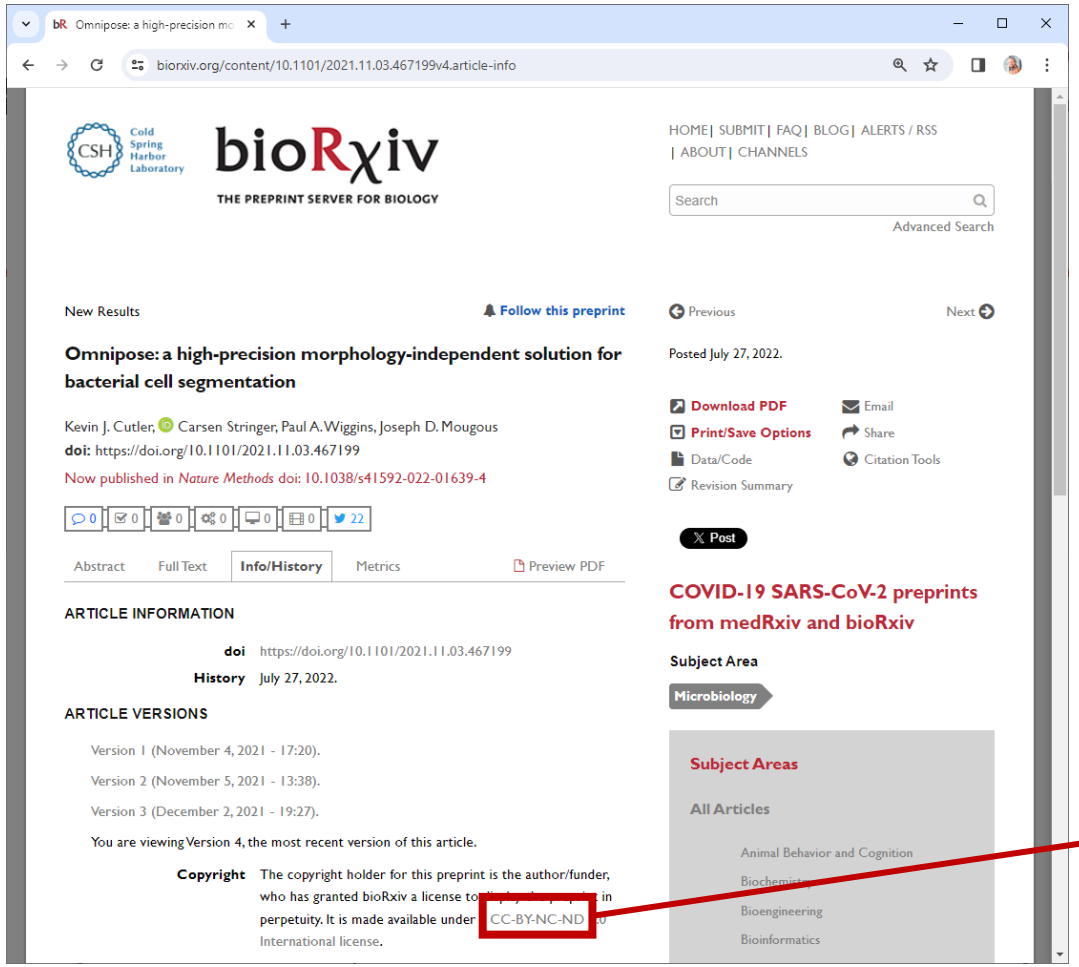

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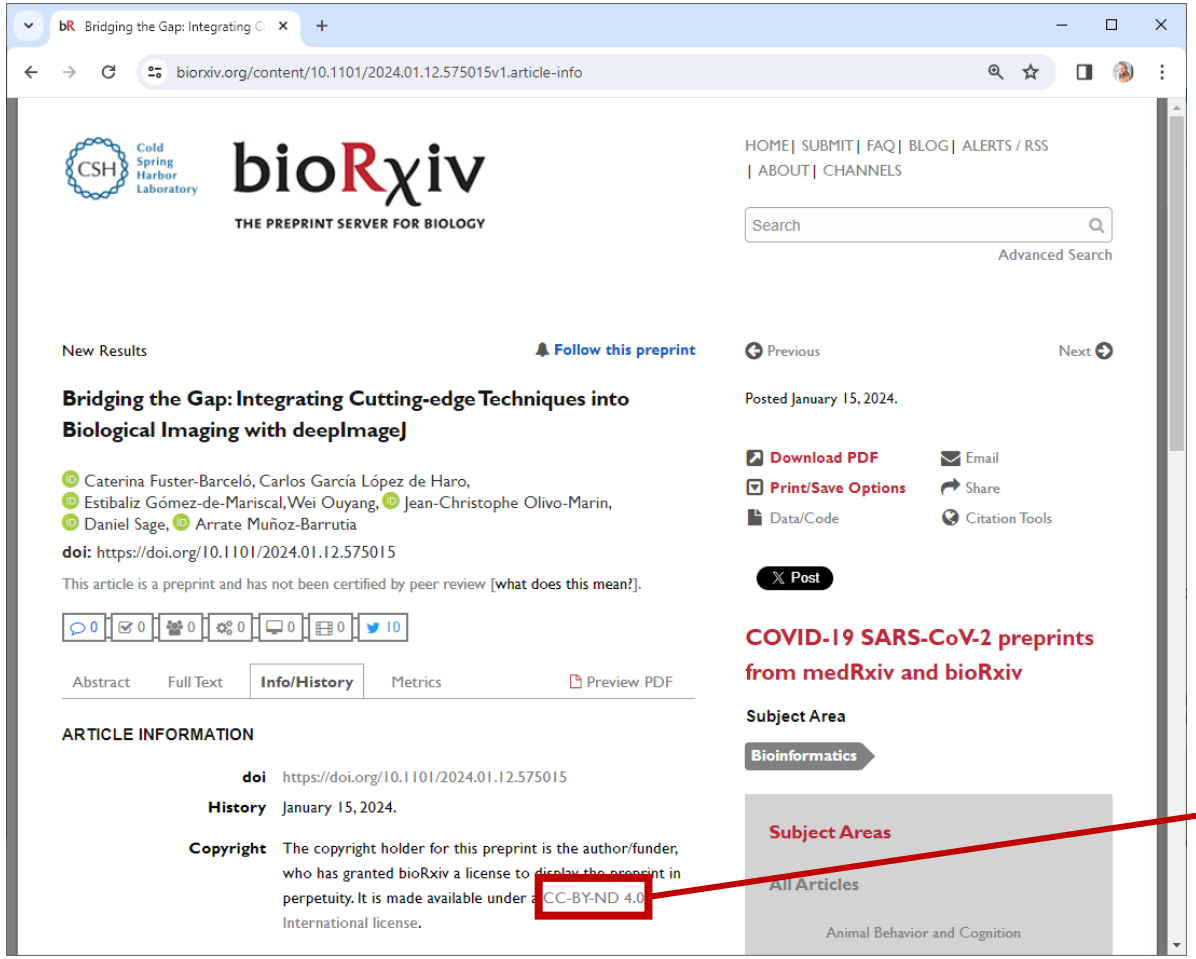

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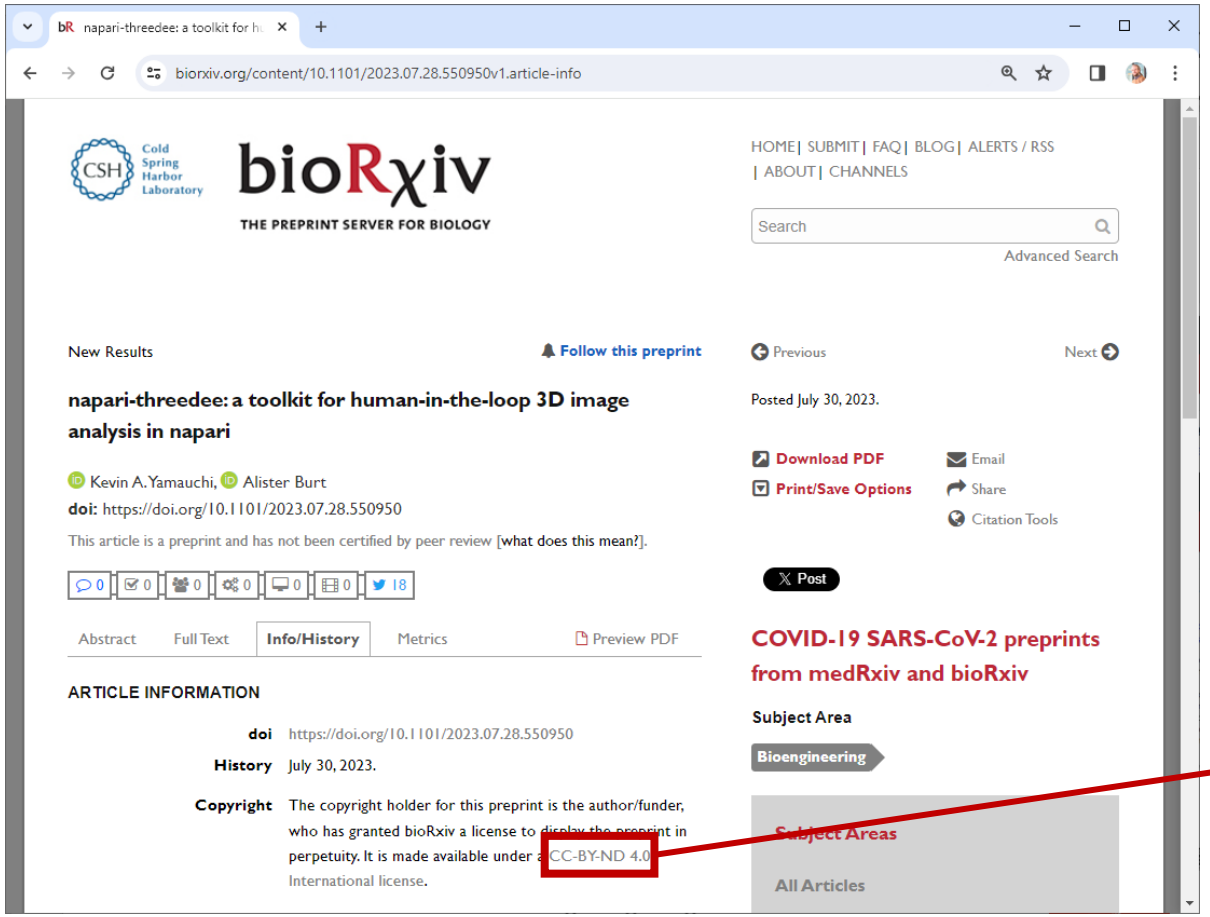

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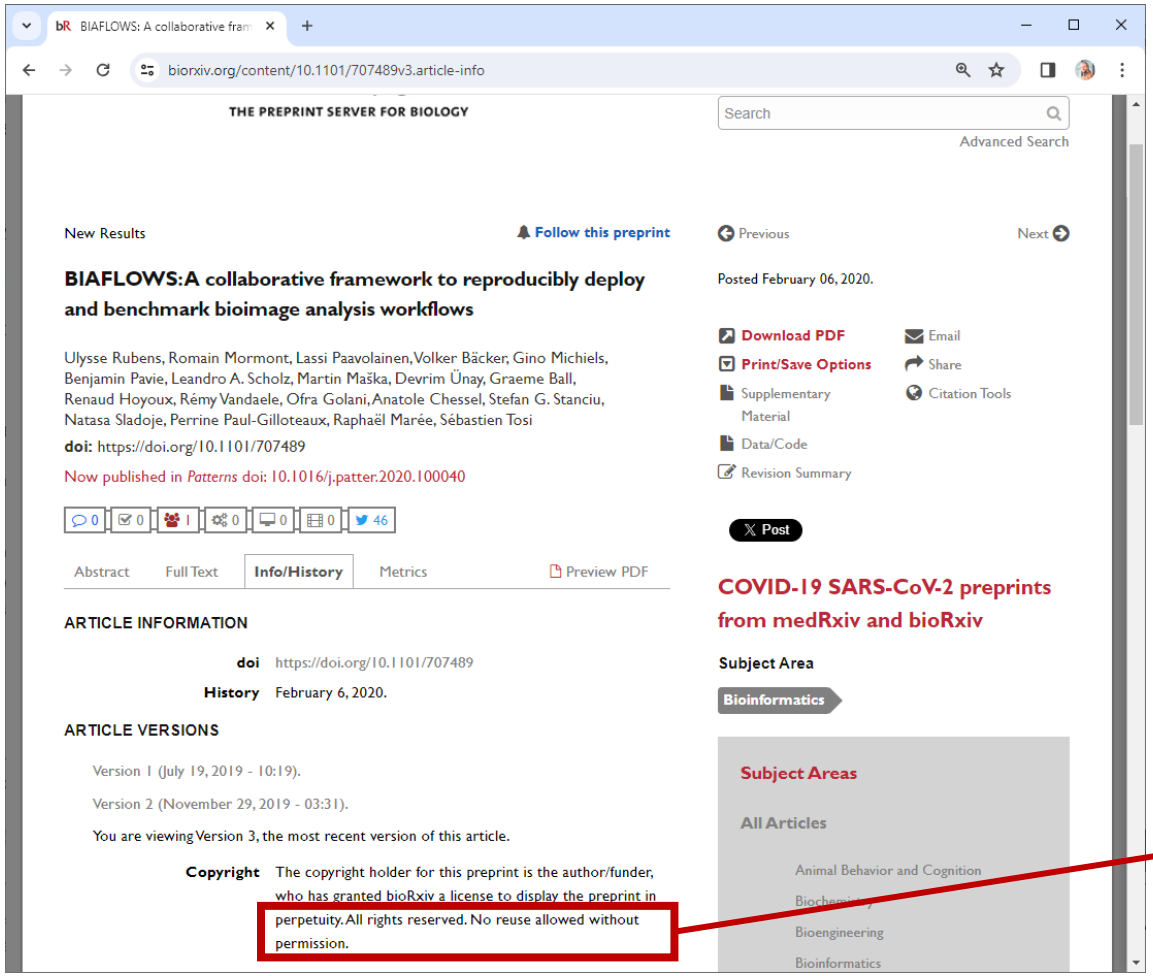

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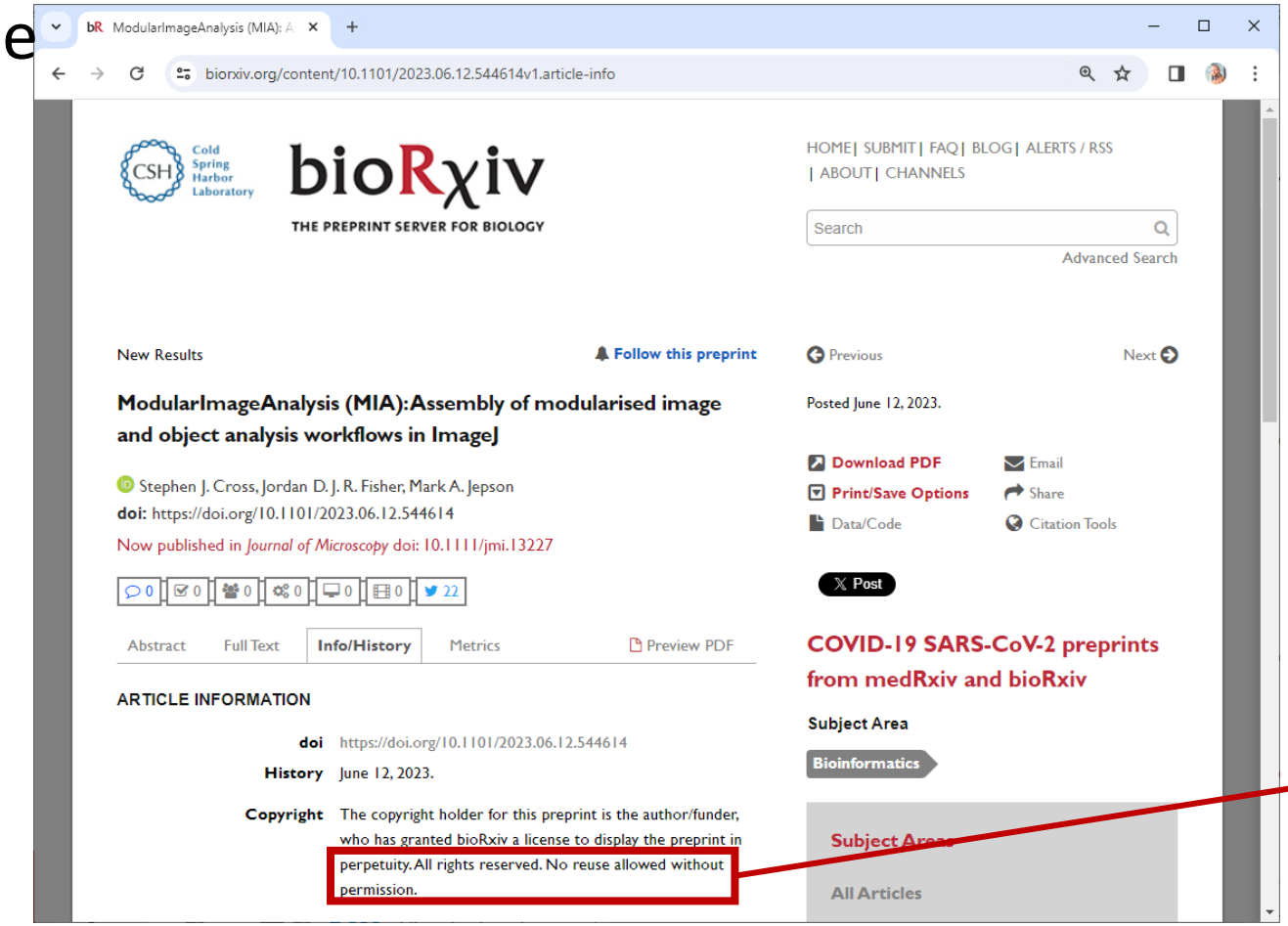

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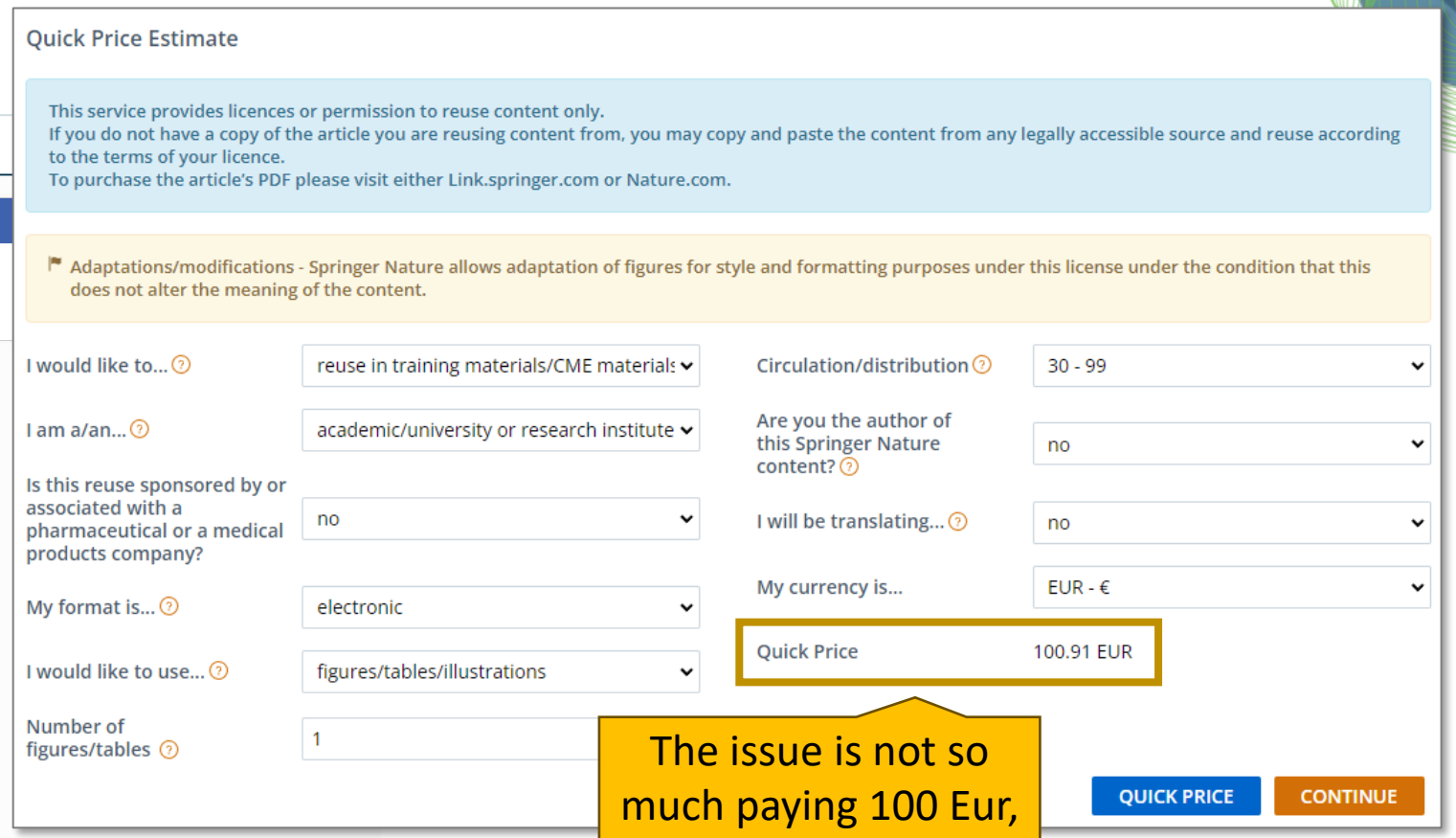

The issue is not so much paying 100 Eur, but the related administrative effort.

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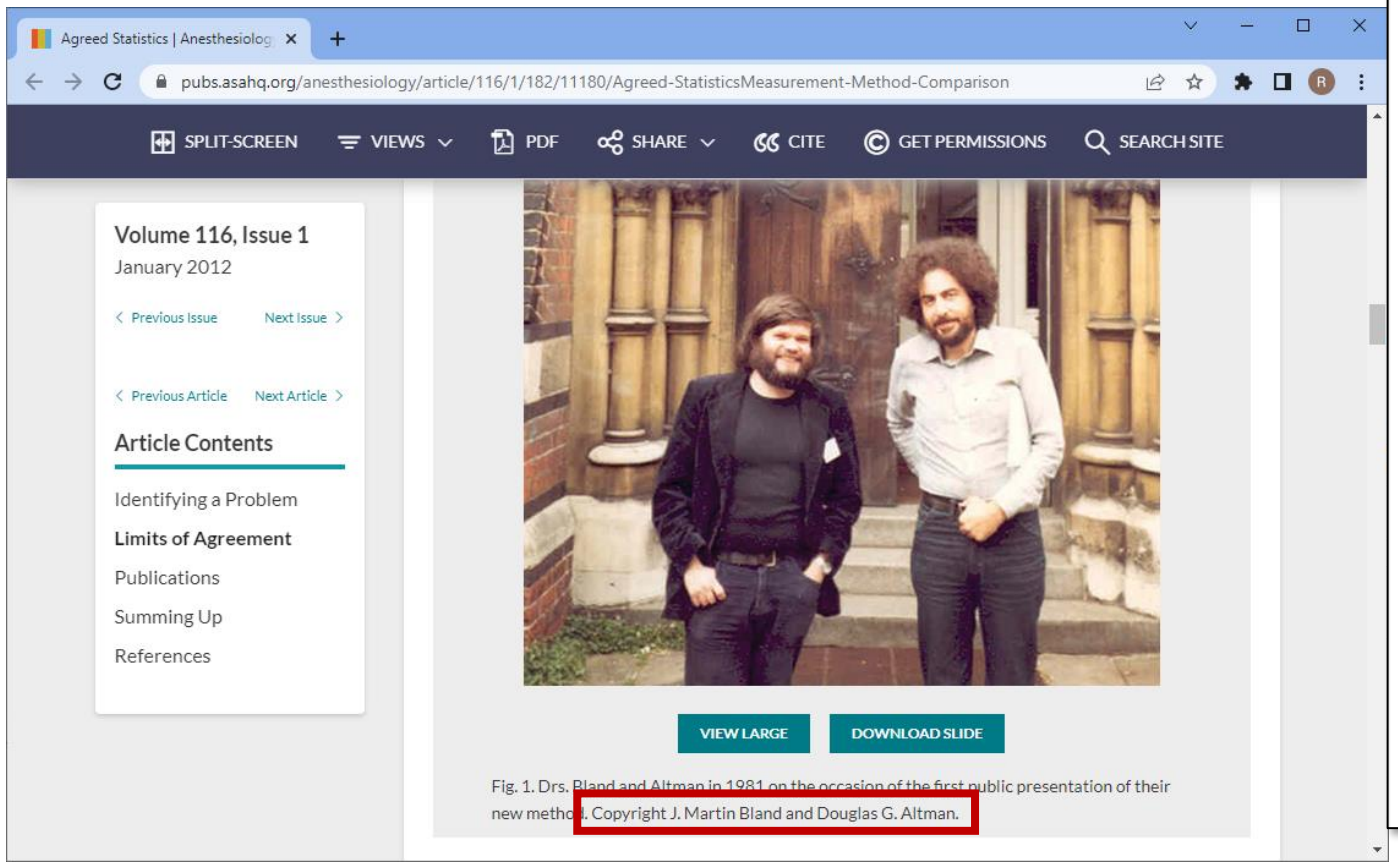

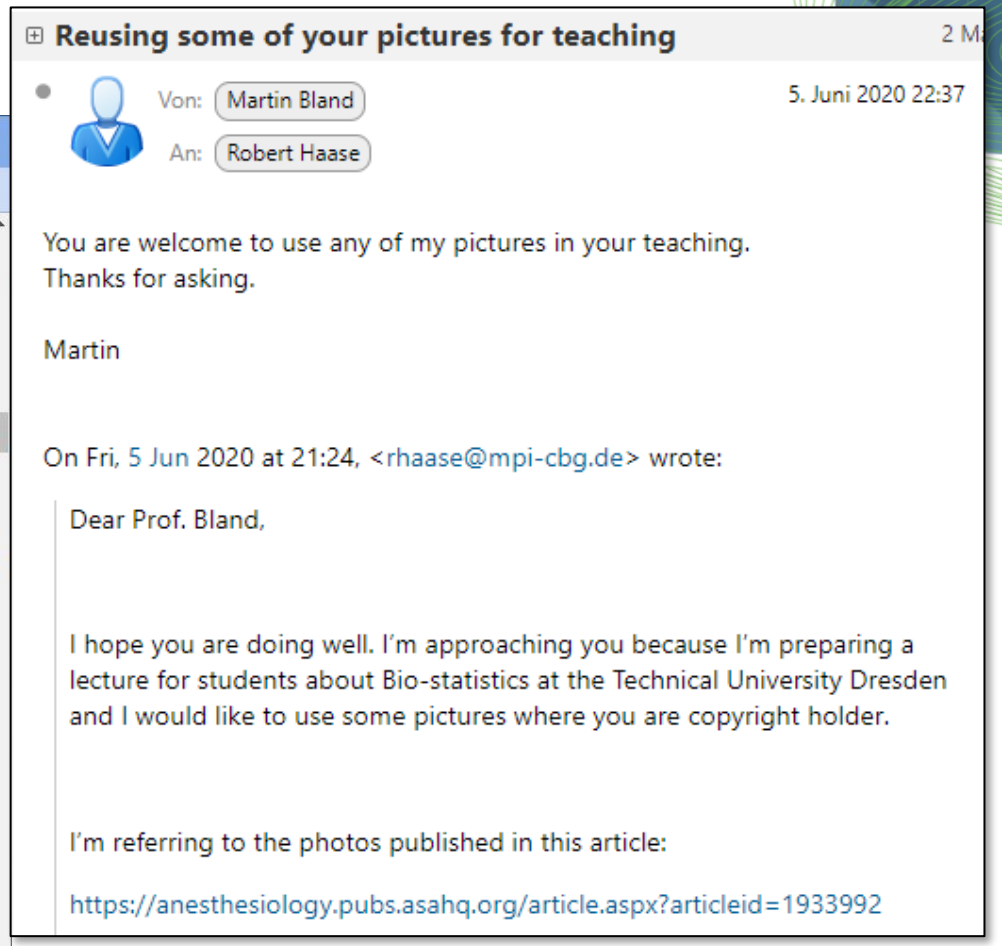

Source:
https://anesthesiology.pubs.asahq.org/article.aspx?articleid=1933992

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Restrictive licensing is
a community-wide issue.

I *presume* due to lack of awareness & training

Train the trainers!

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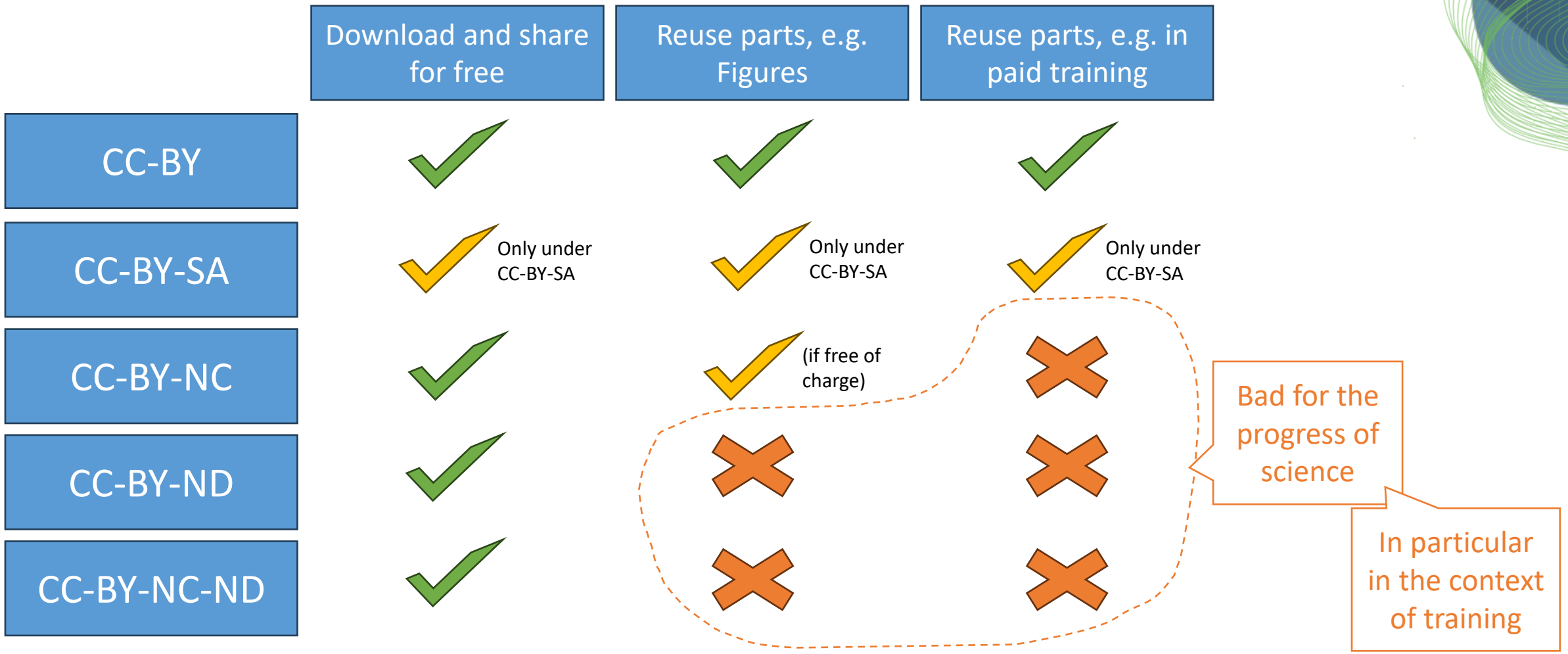

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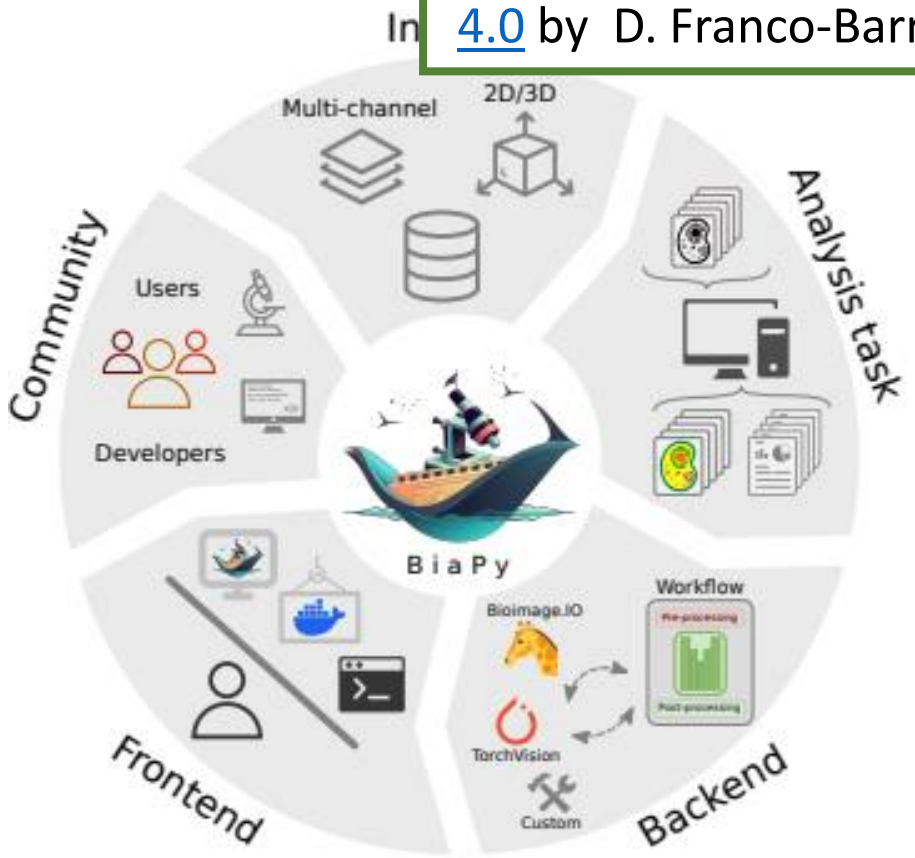

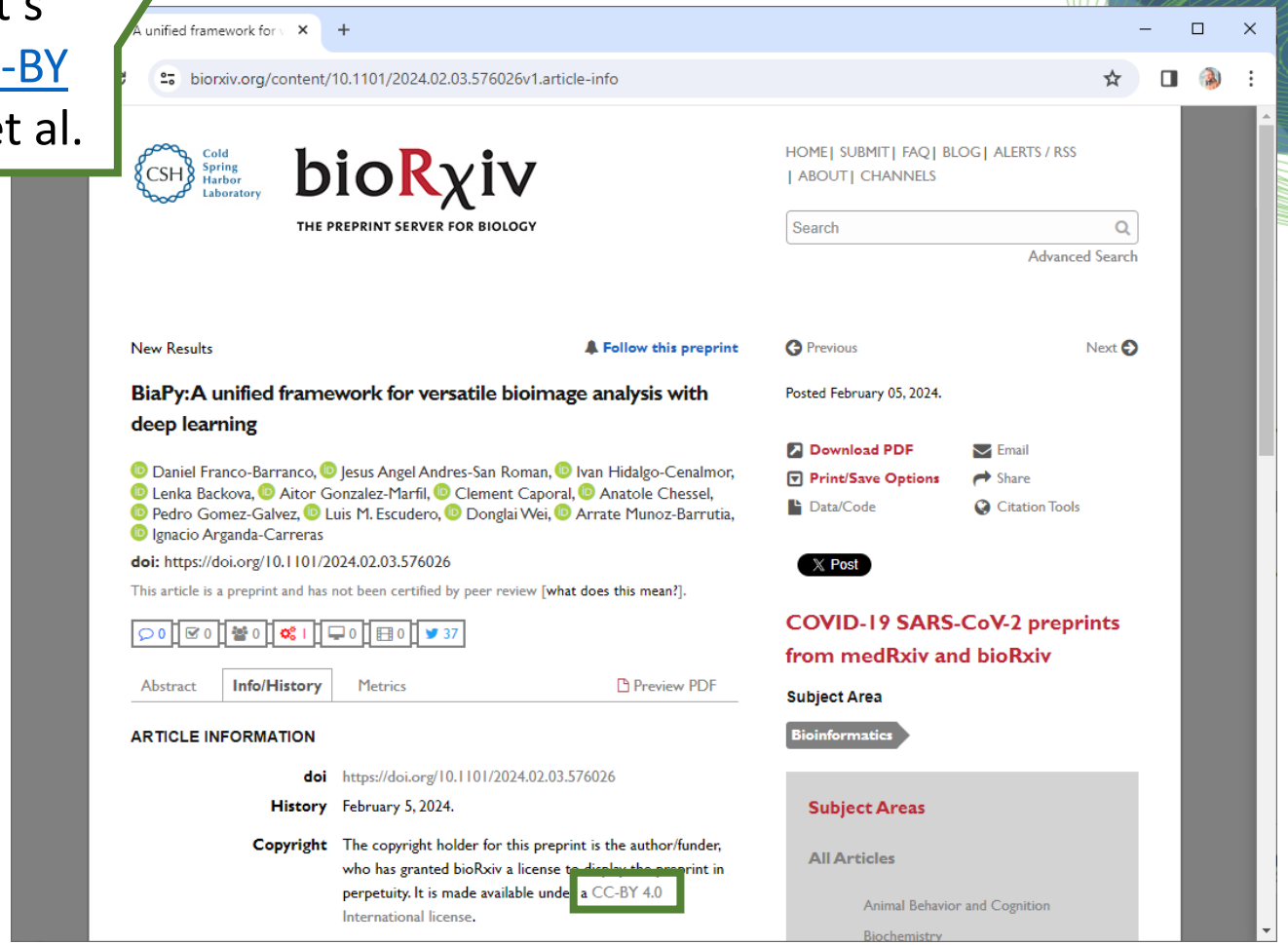

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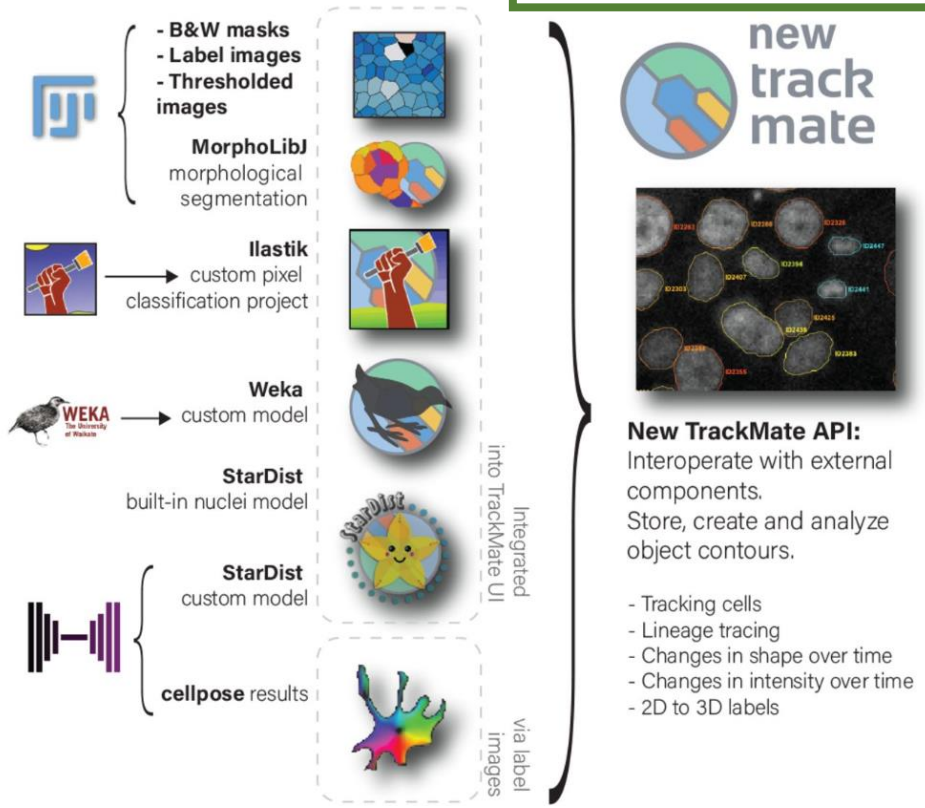

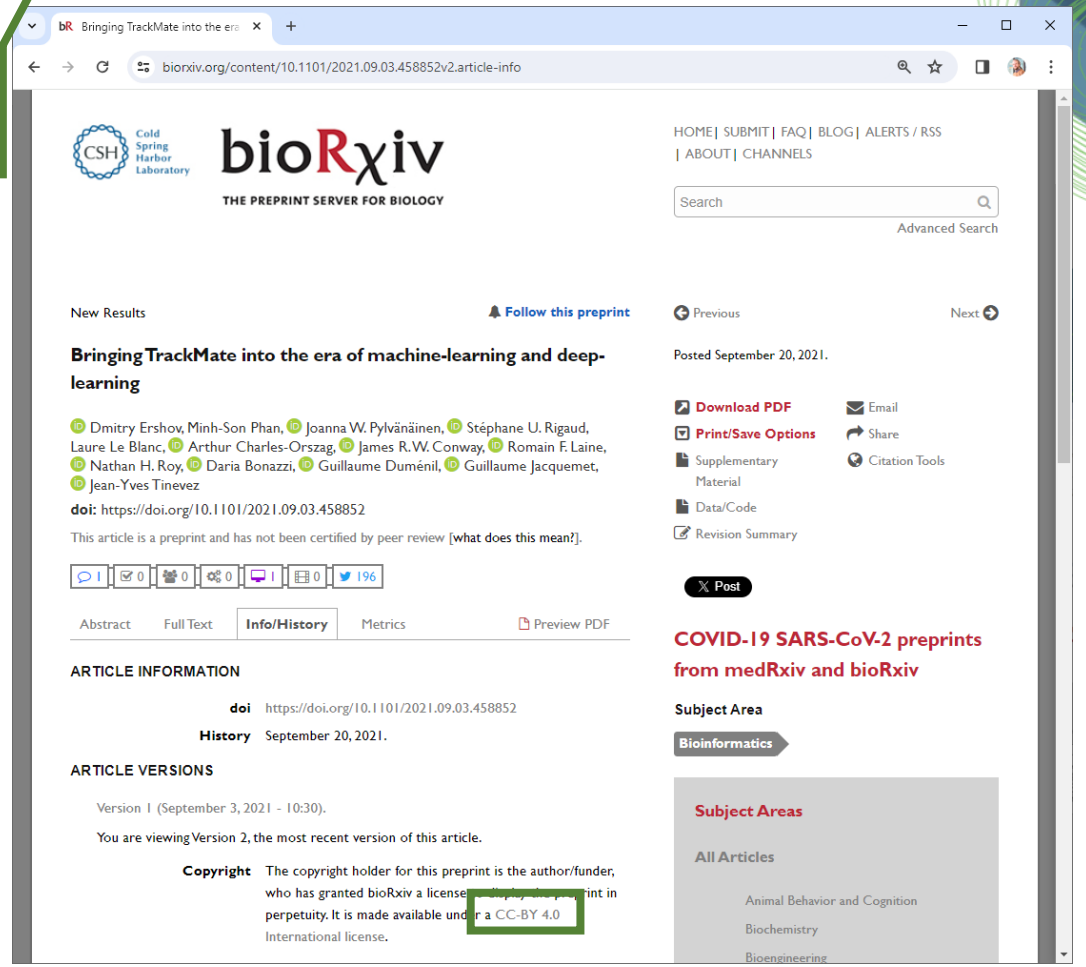

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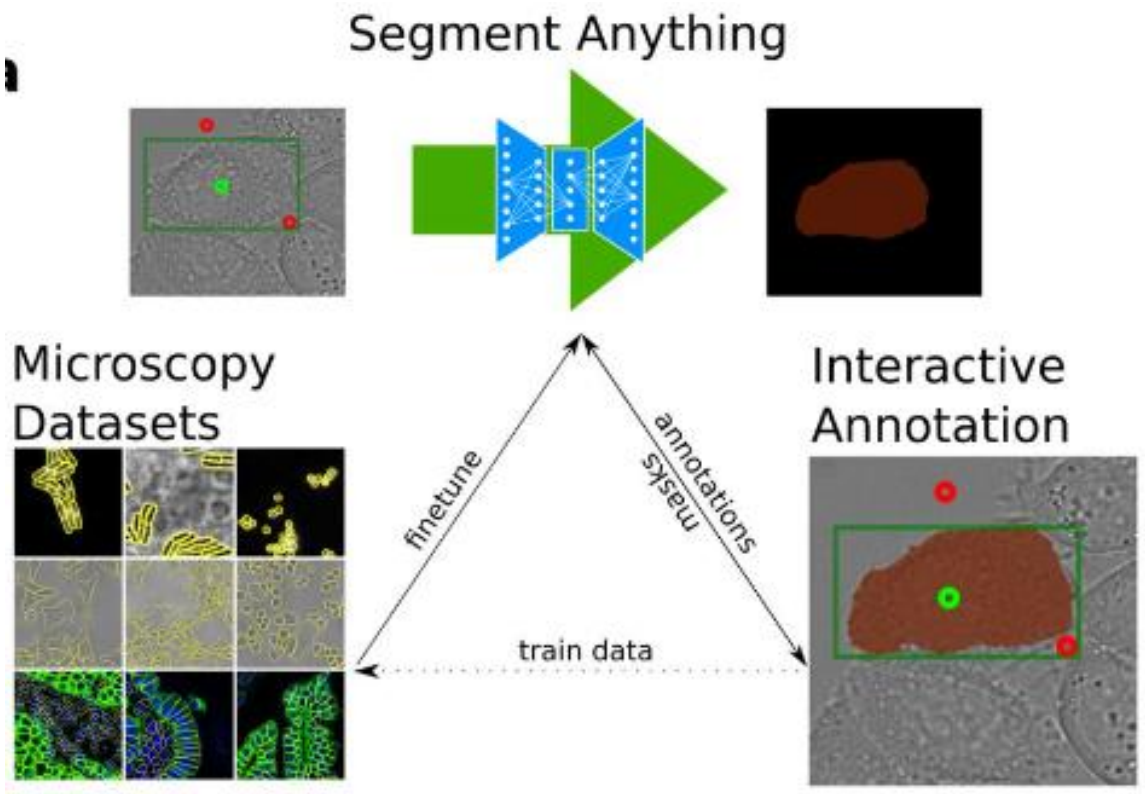

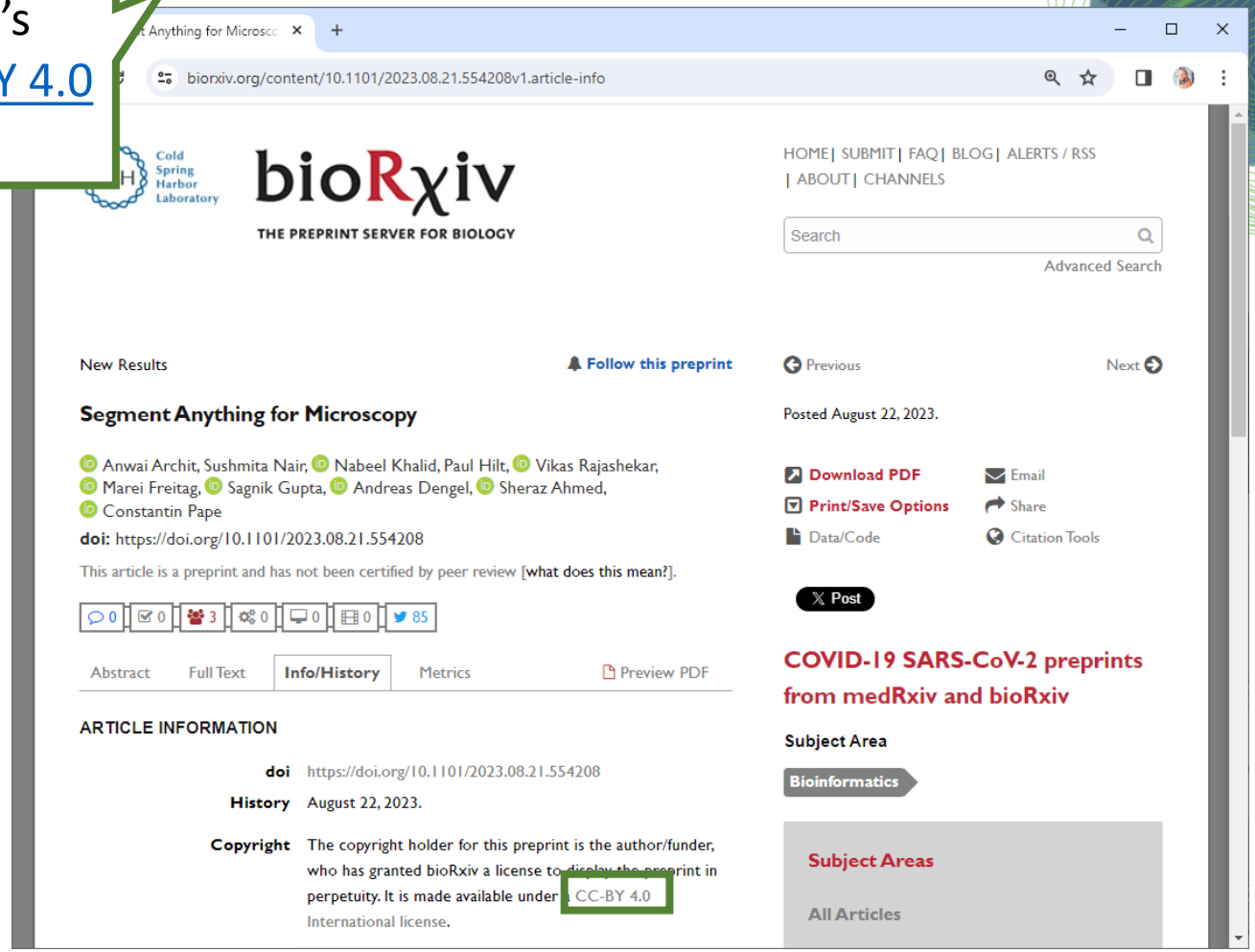

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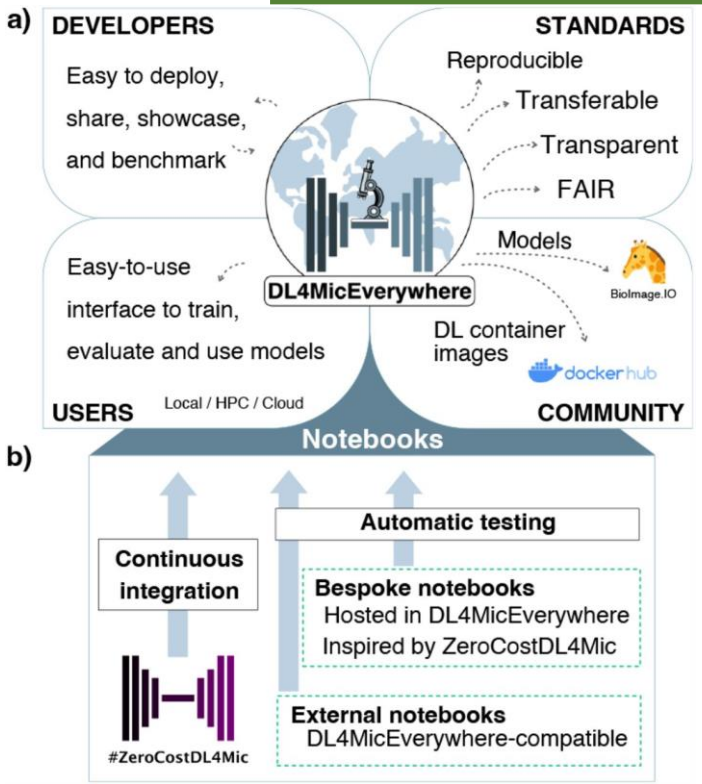

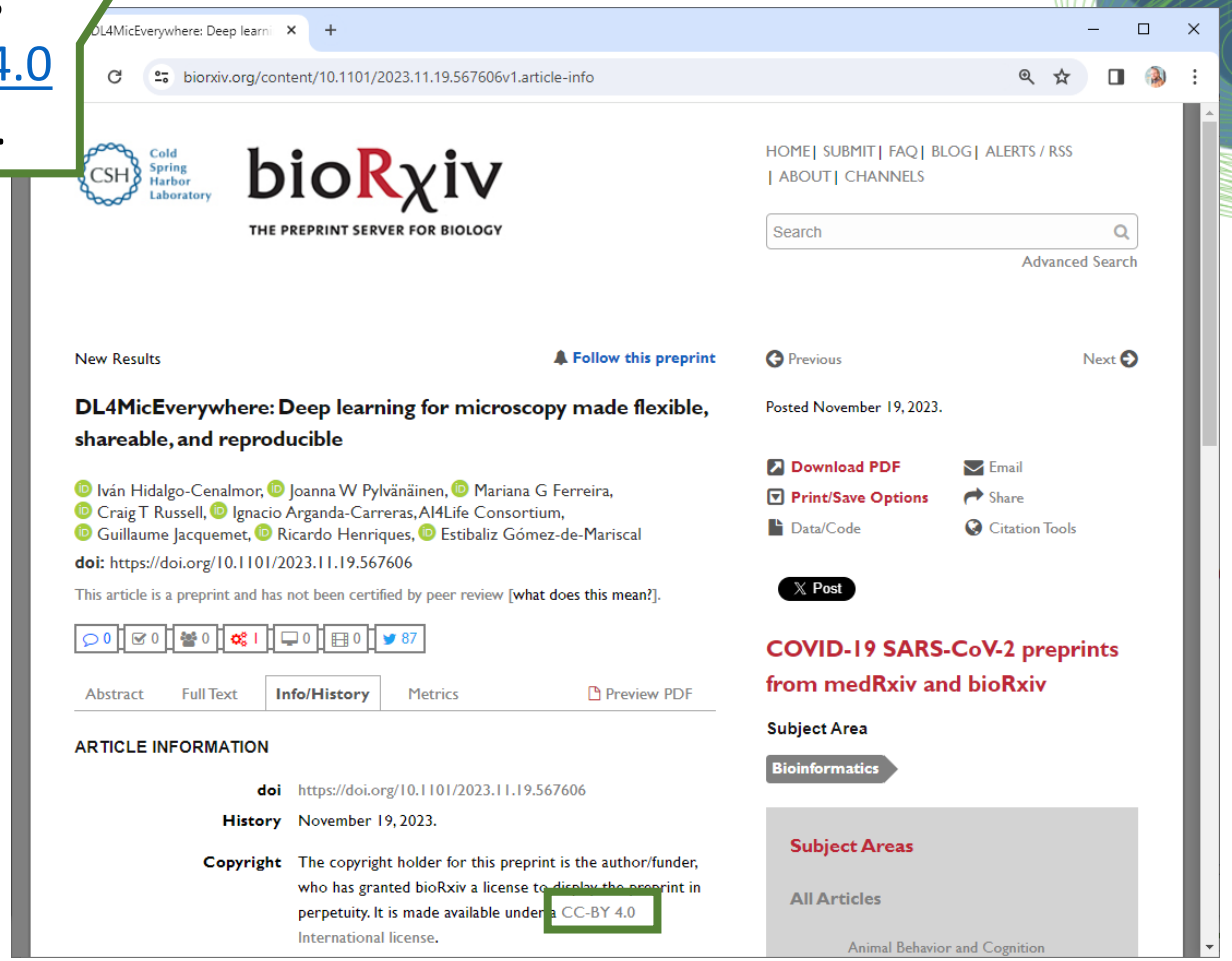

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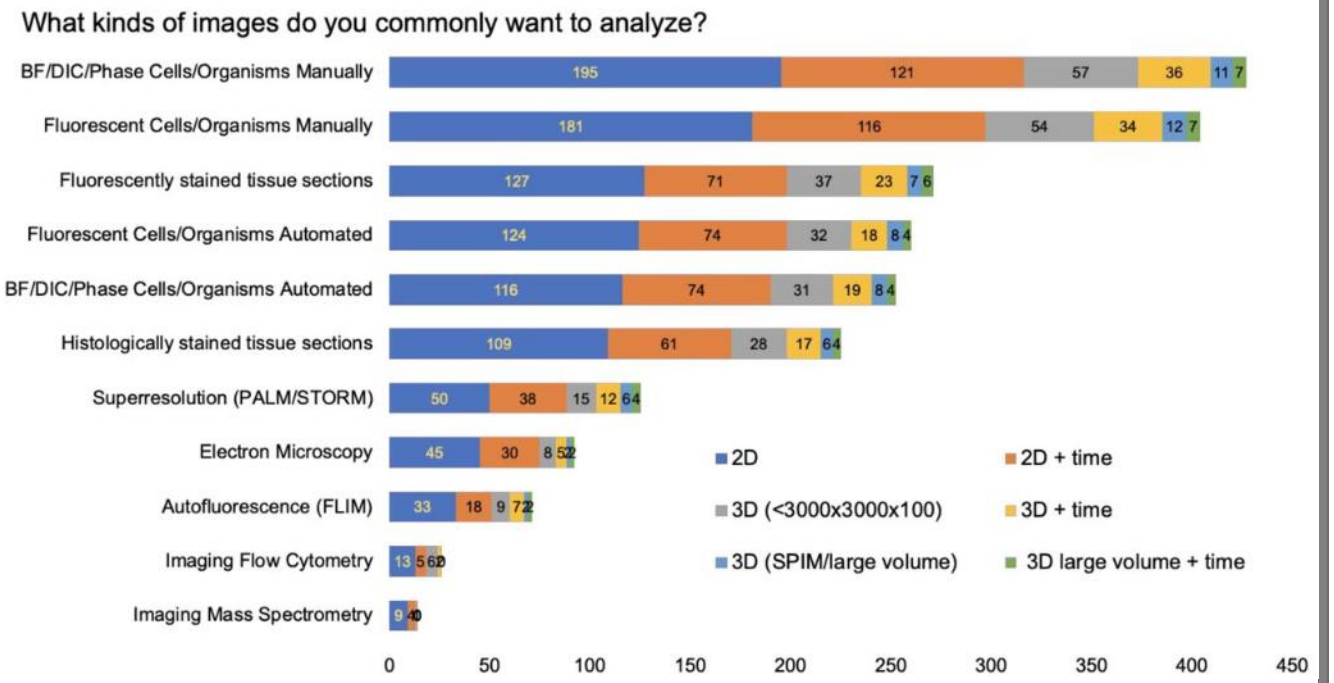

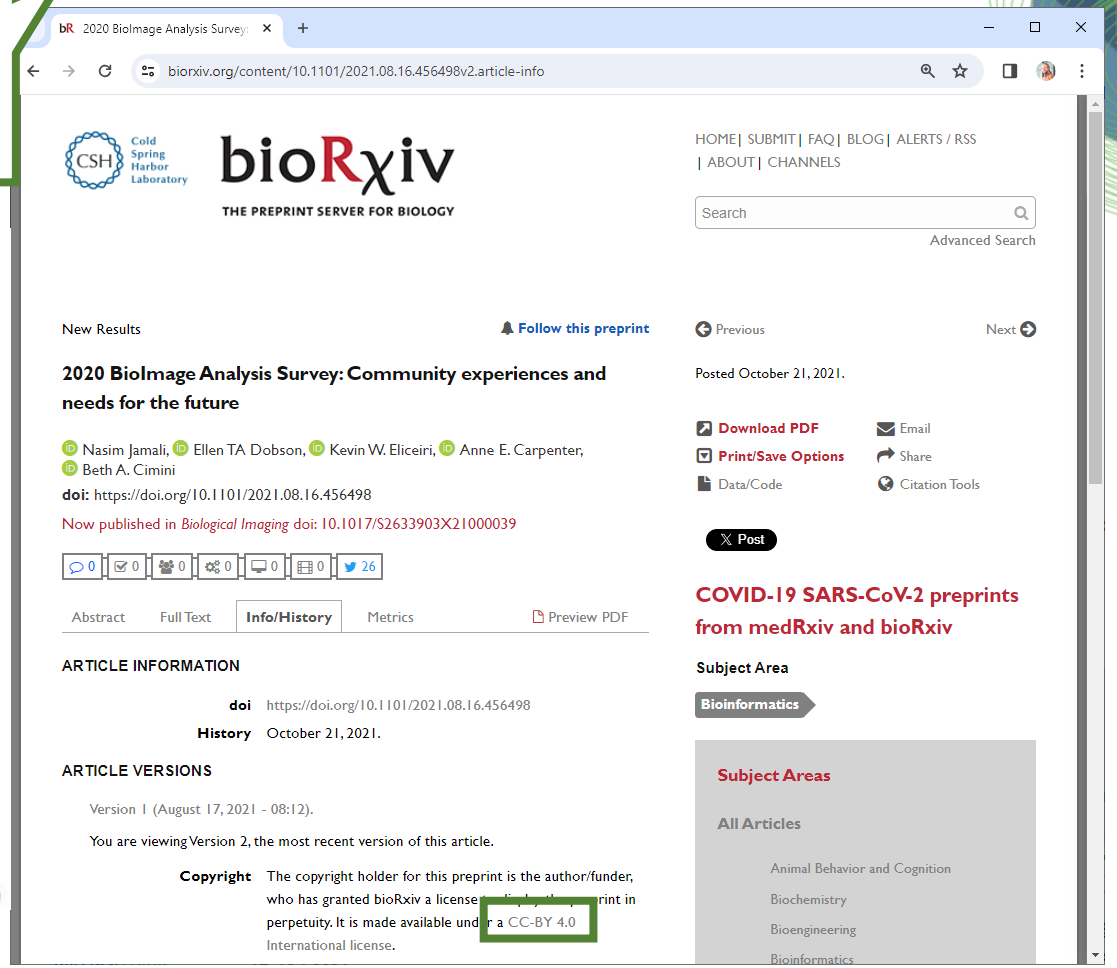

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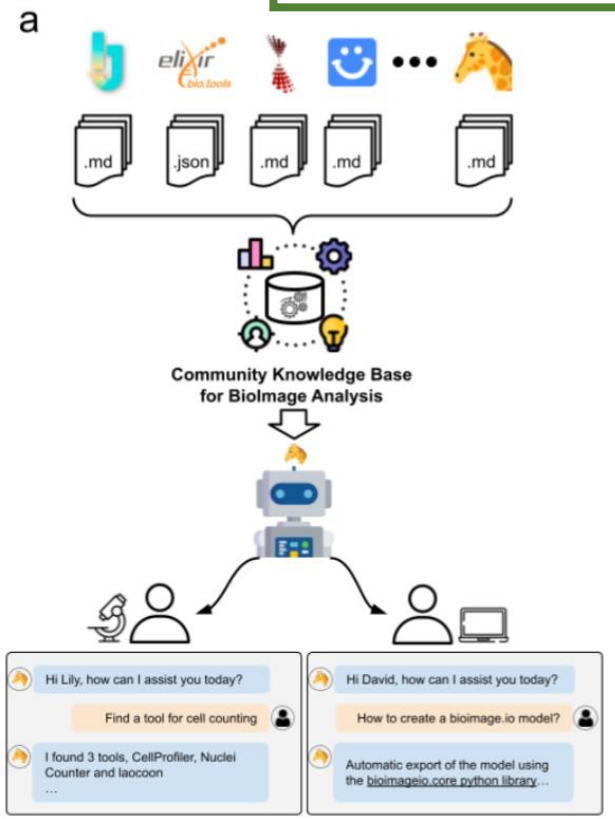

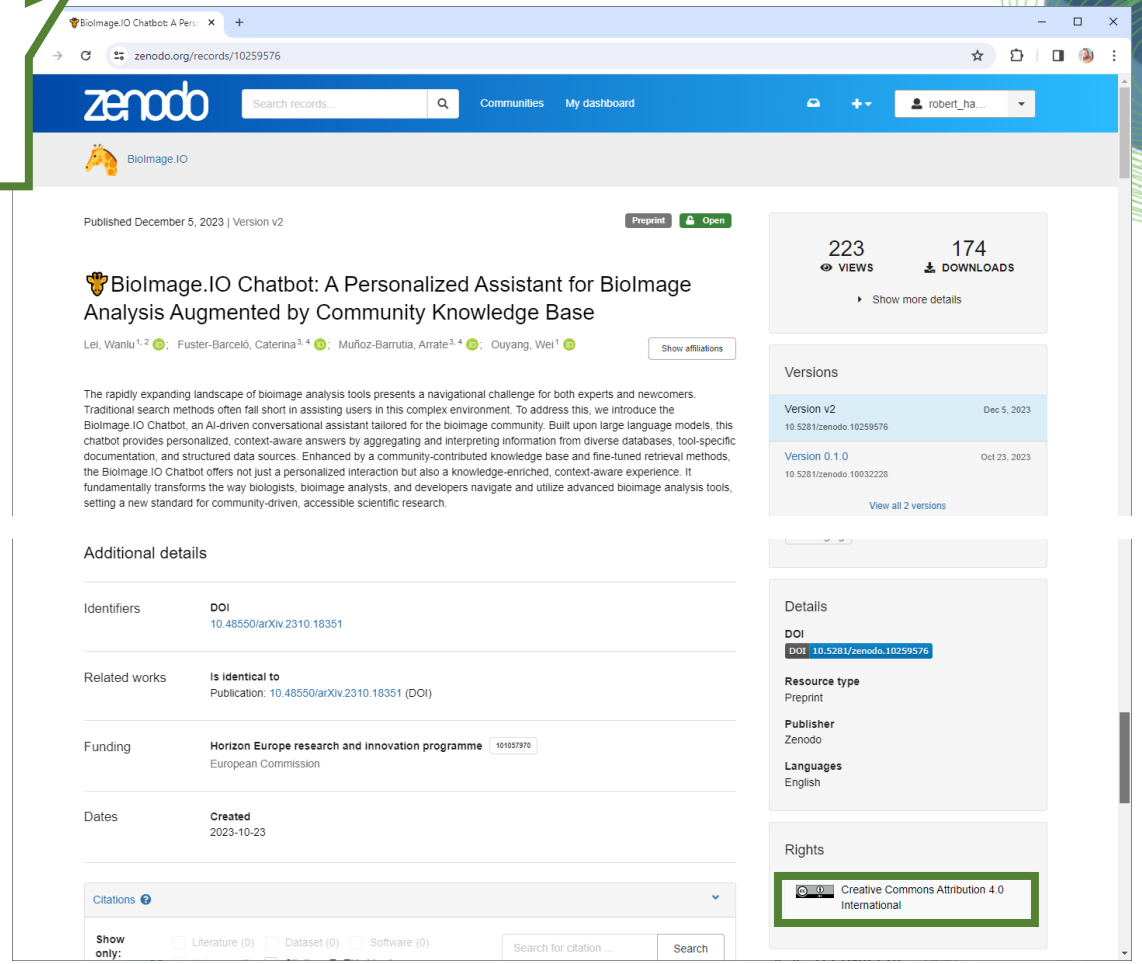

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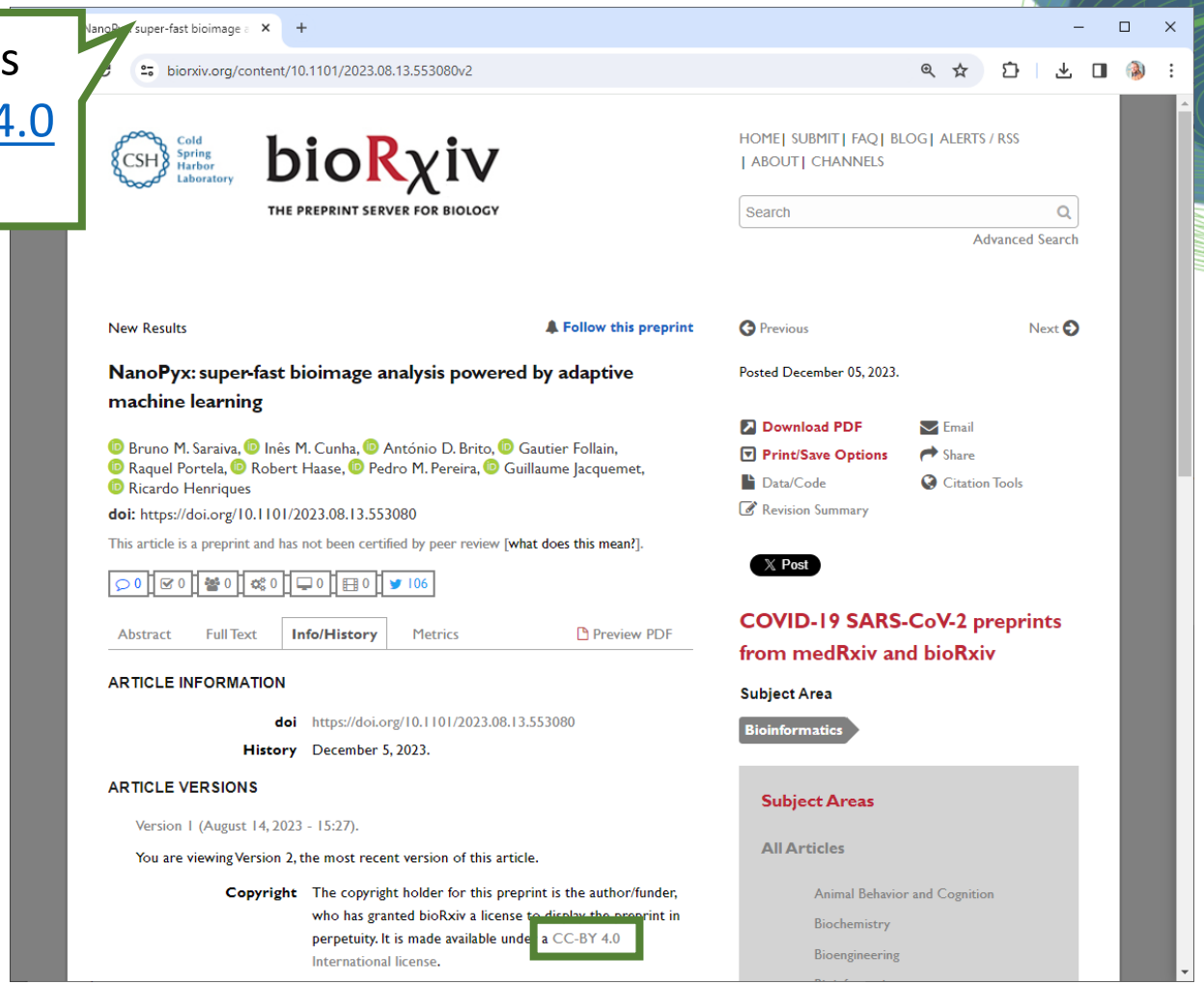

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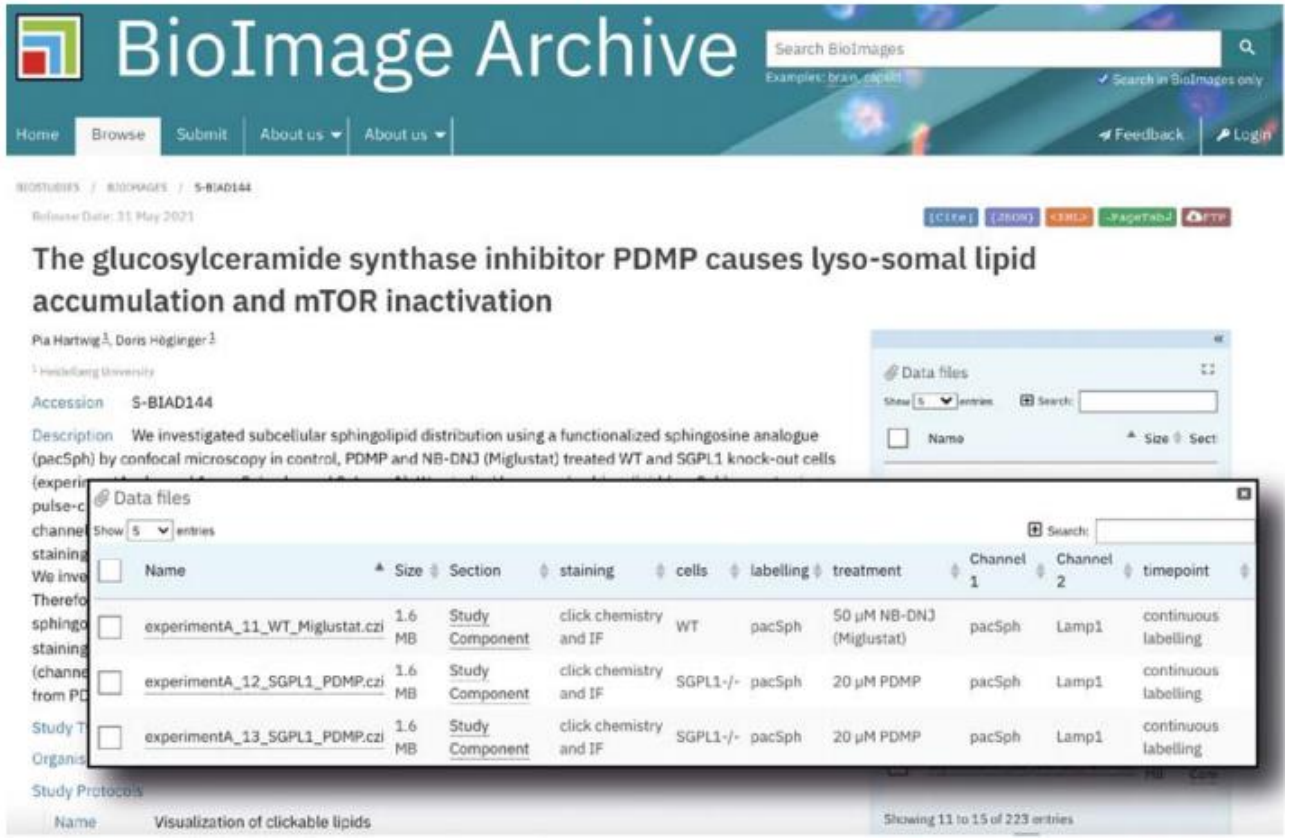

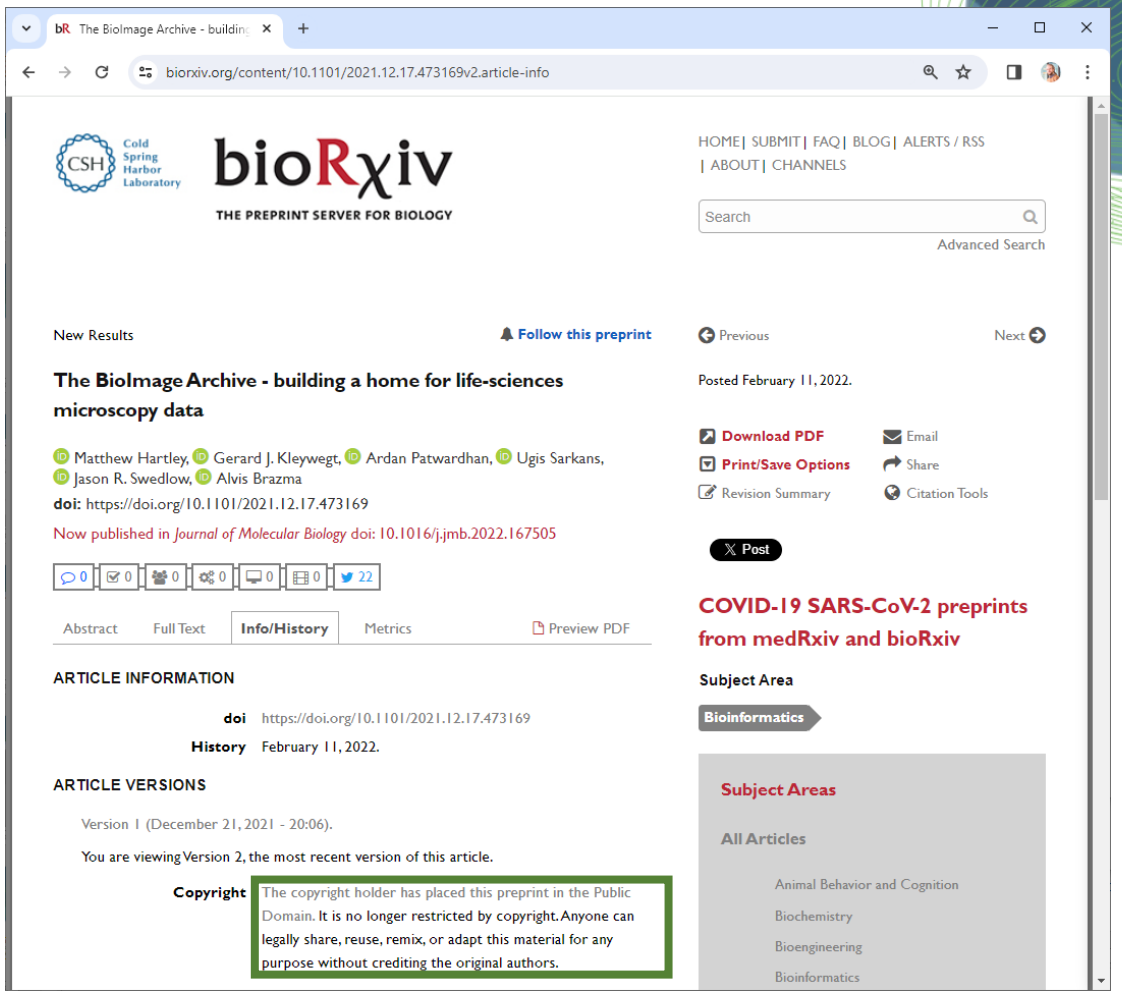

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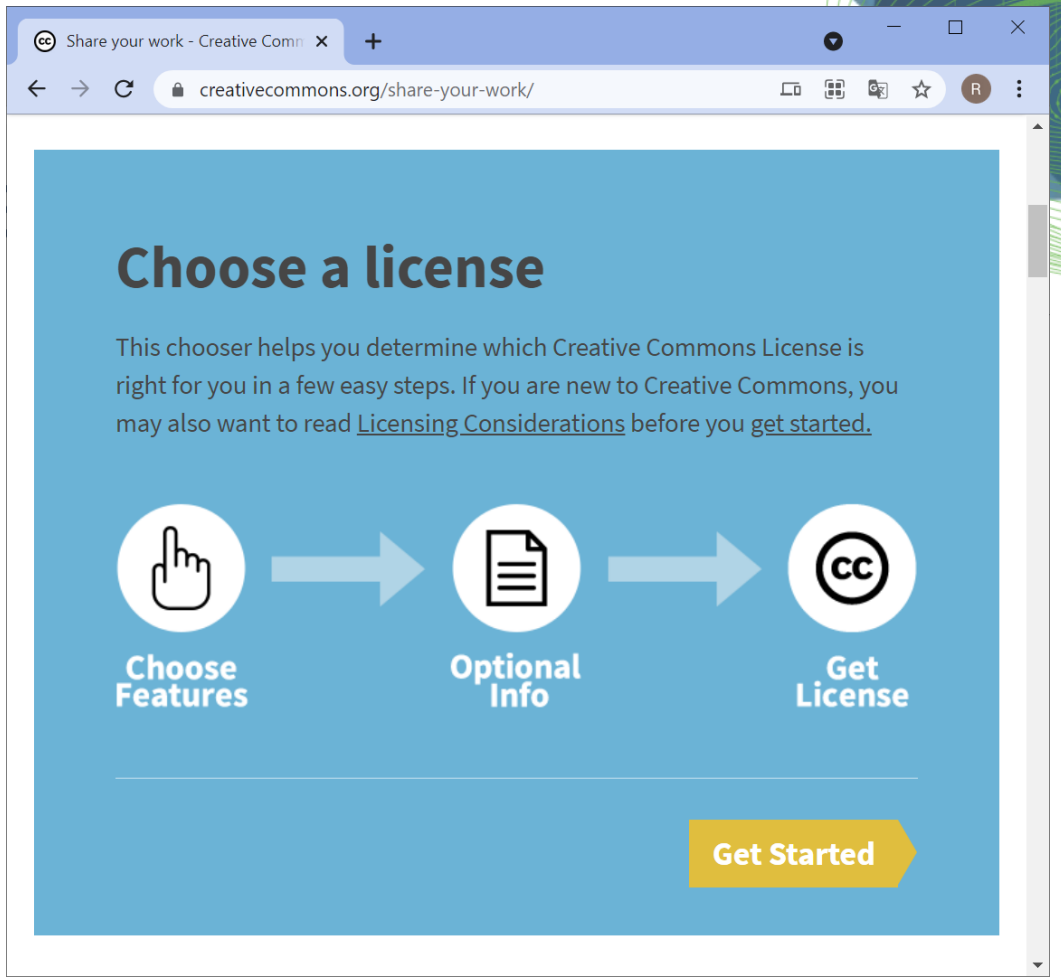

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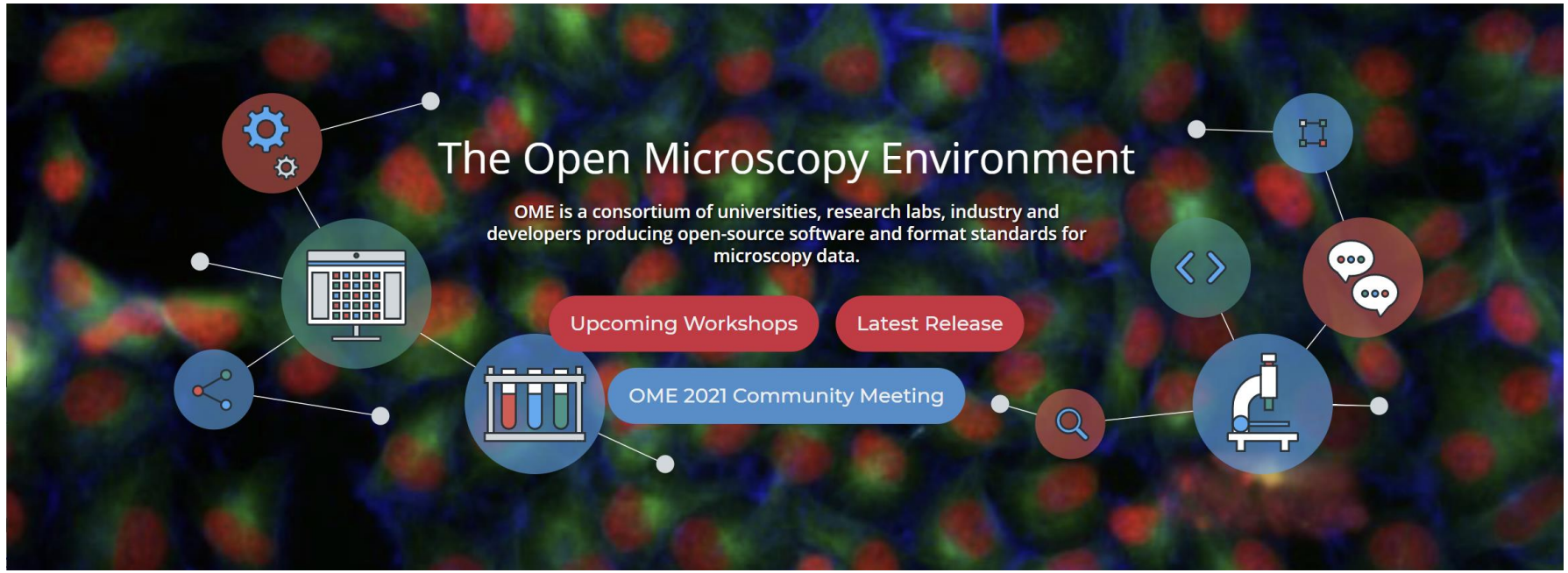

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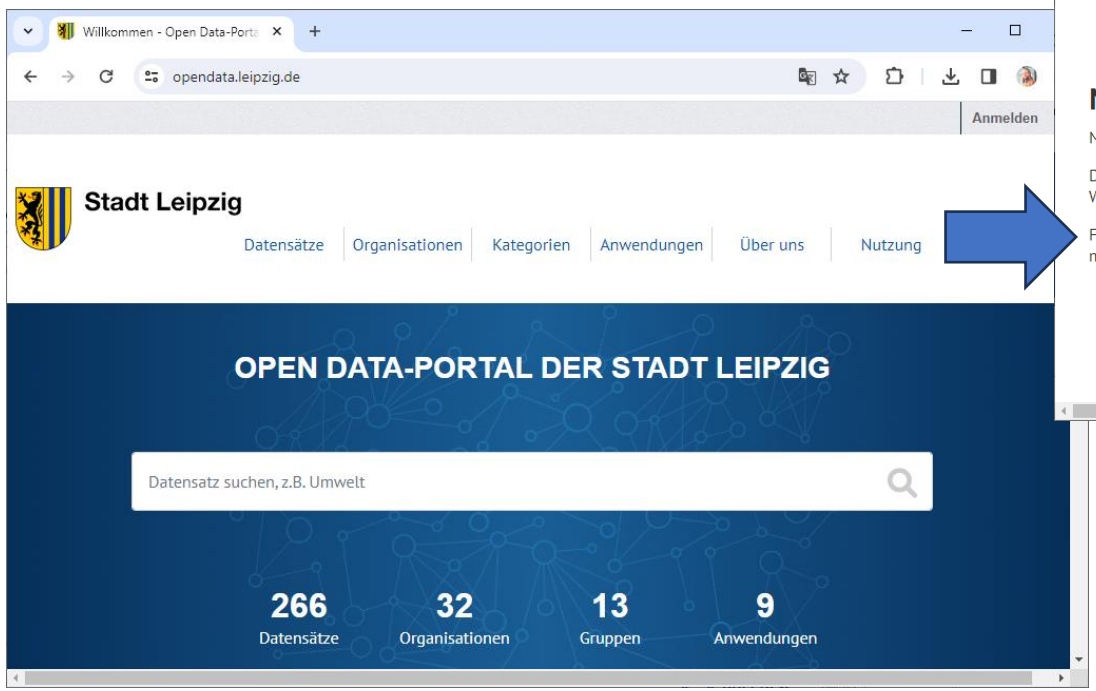

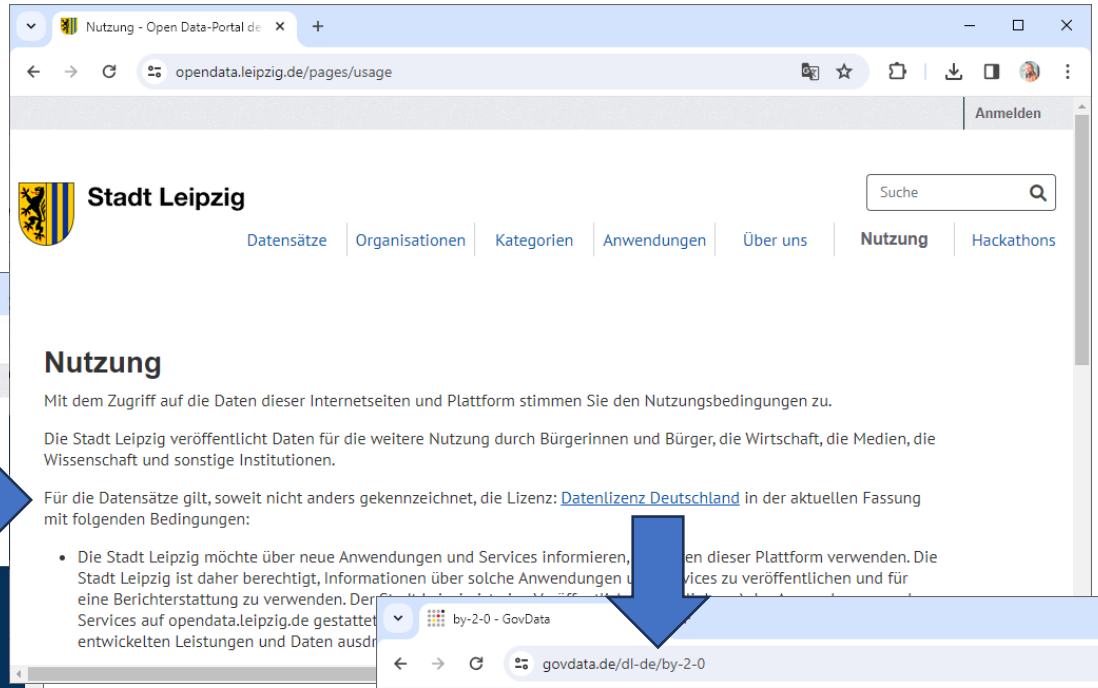

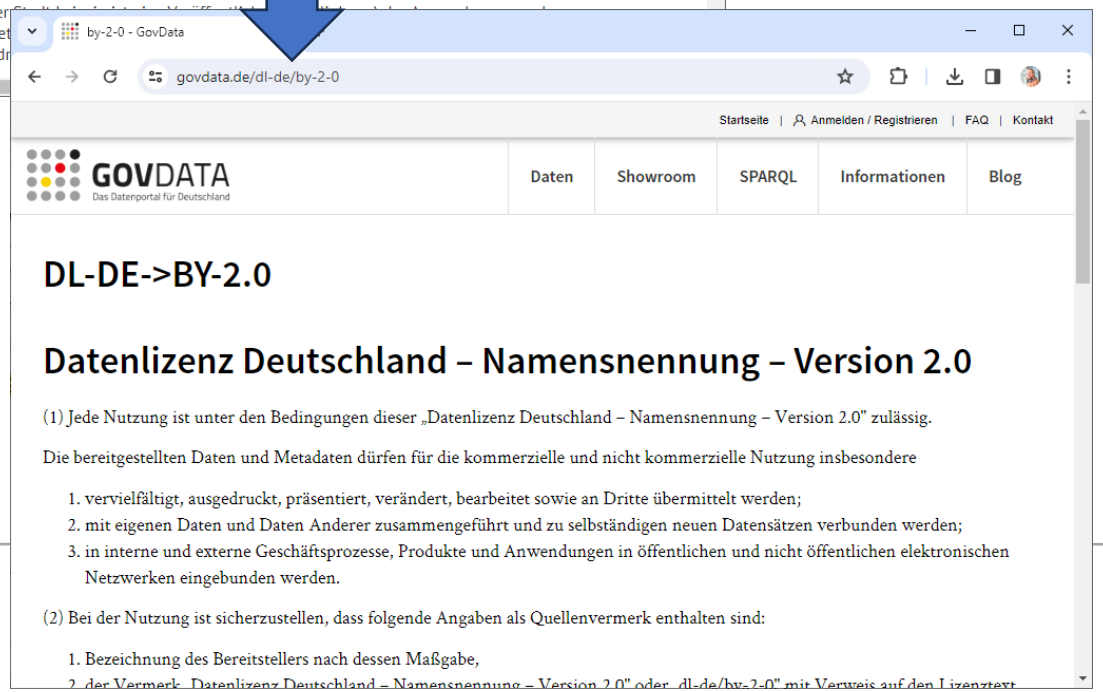

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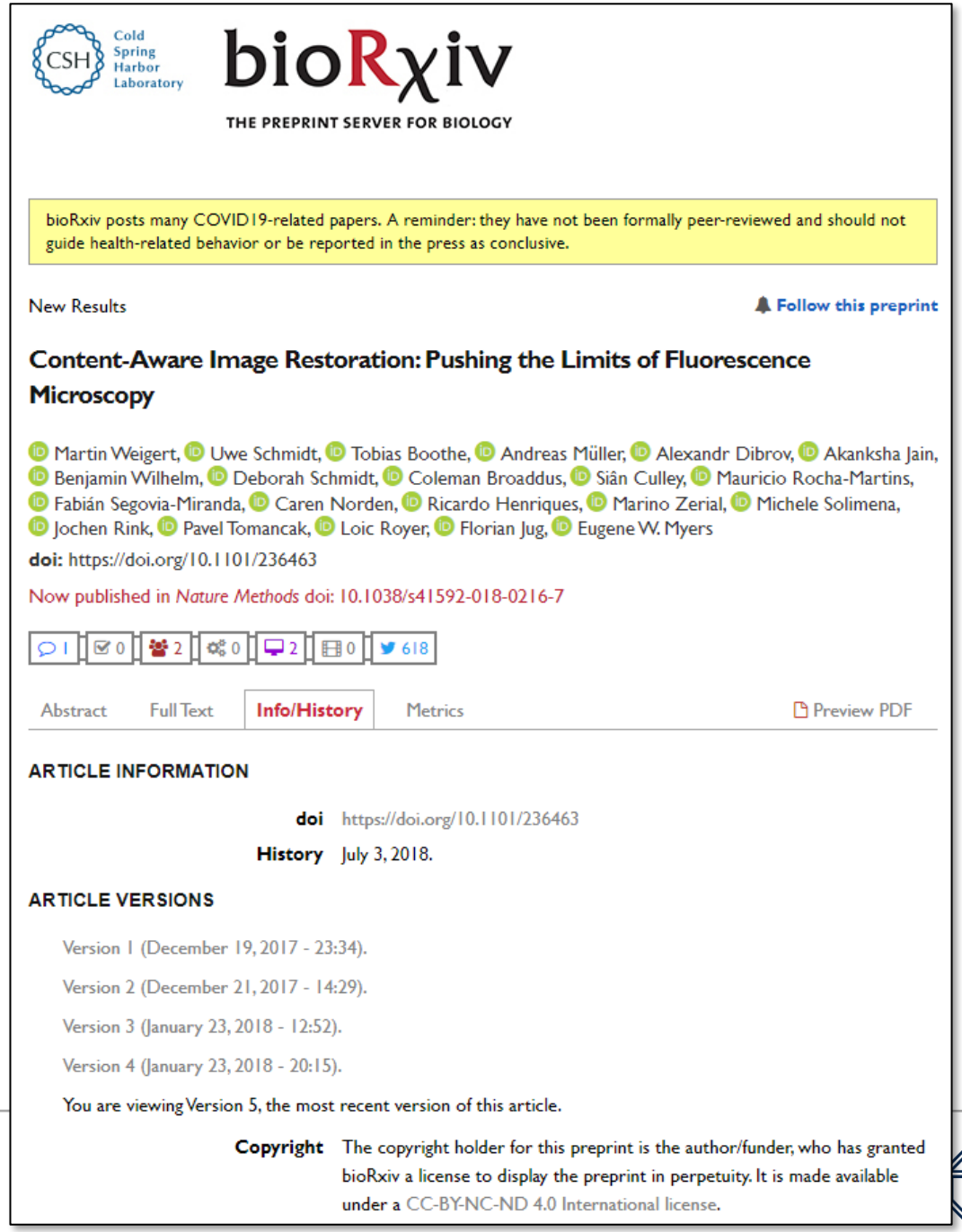

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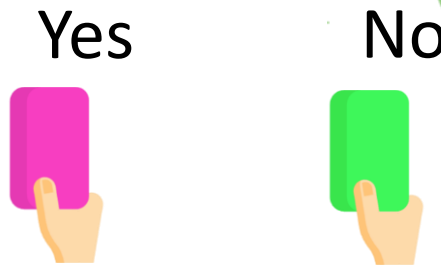

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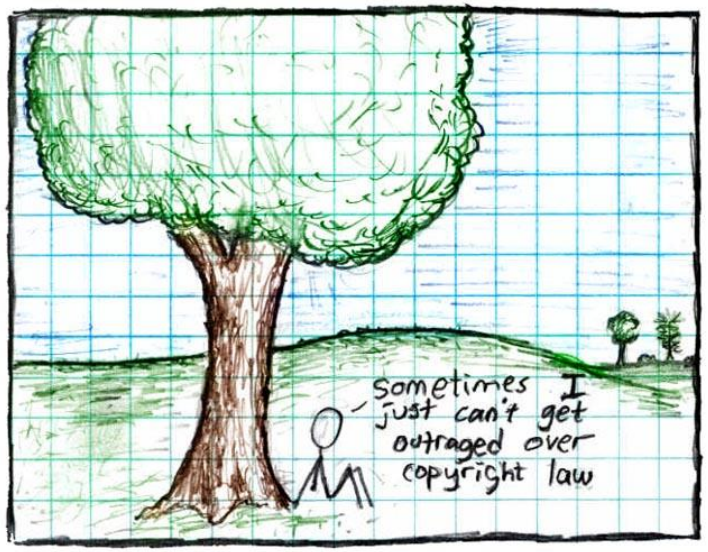

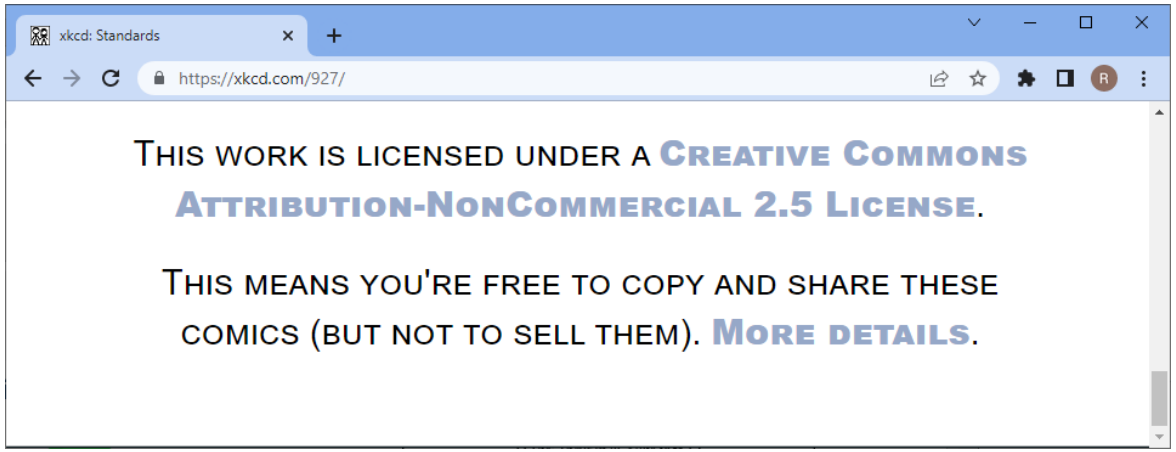

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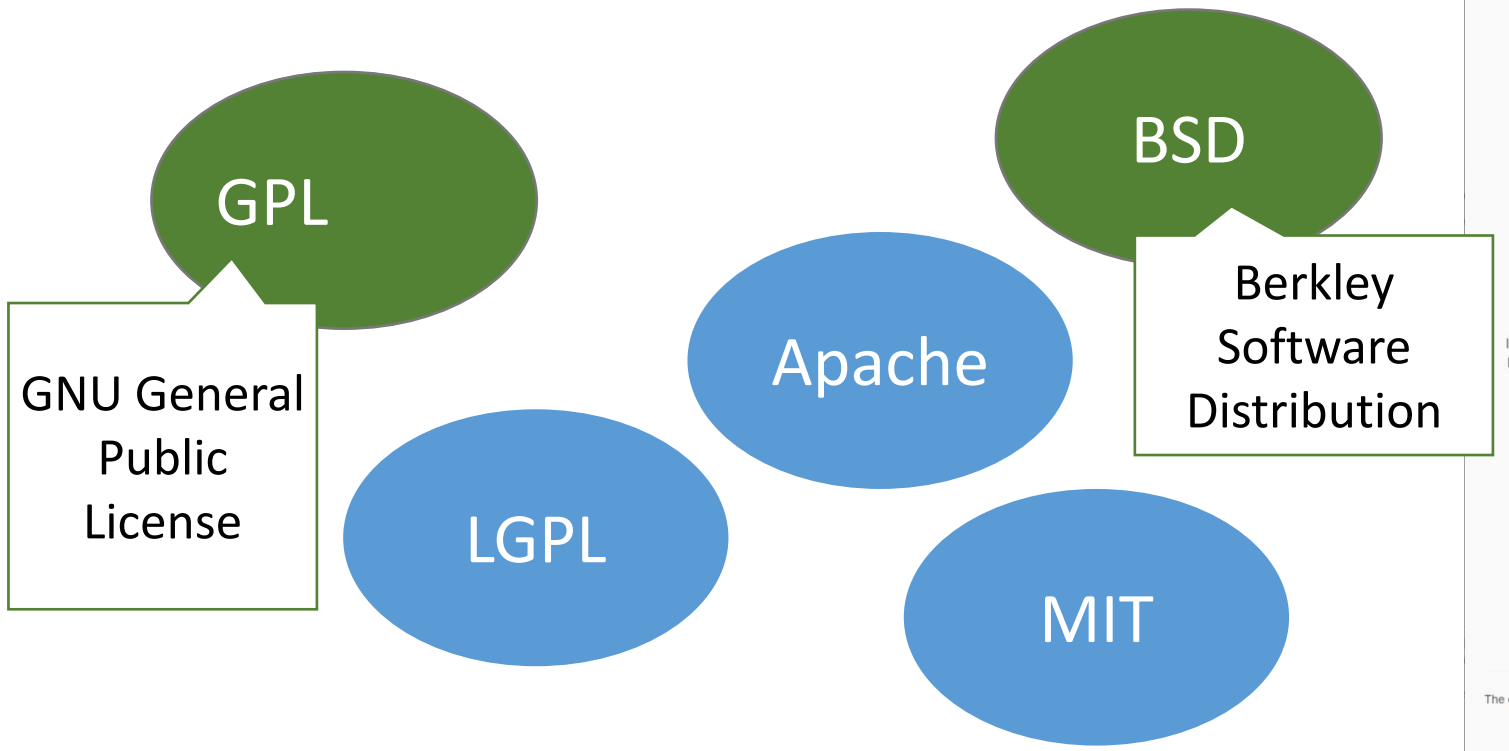

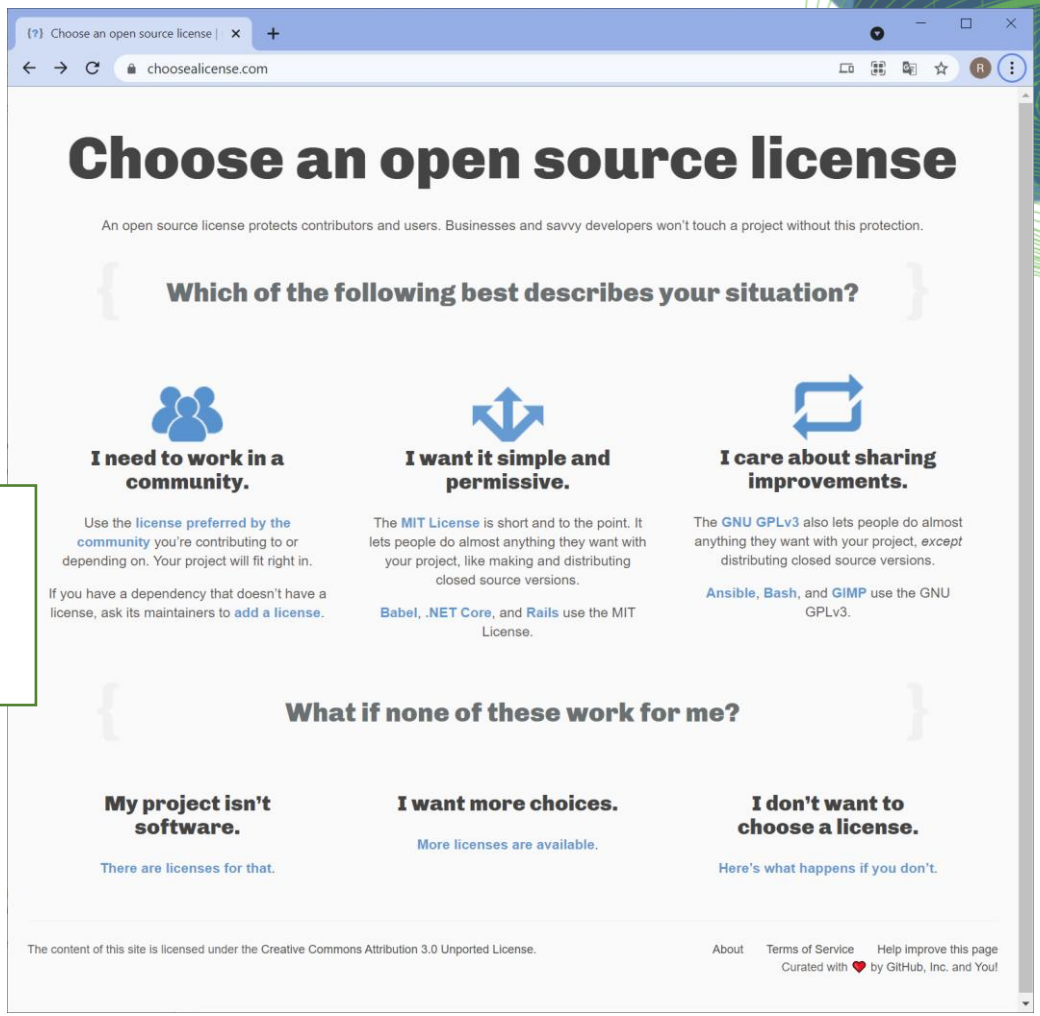

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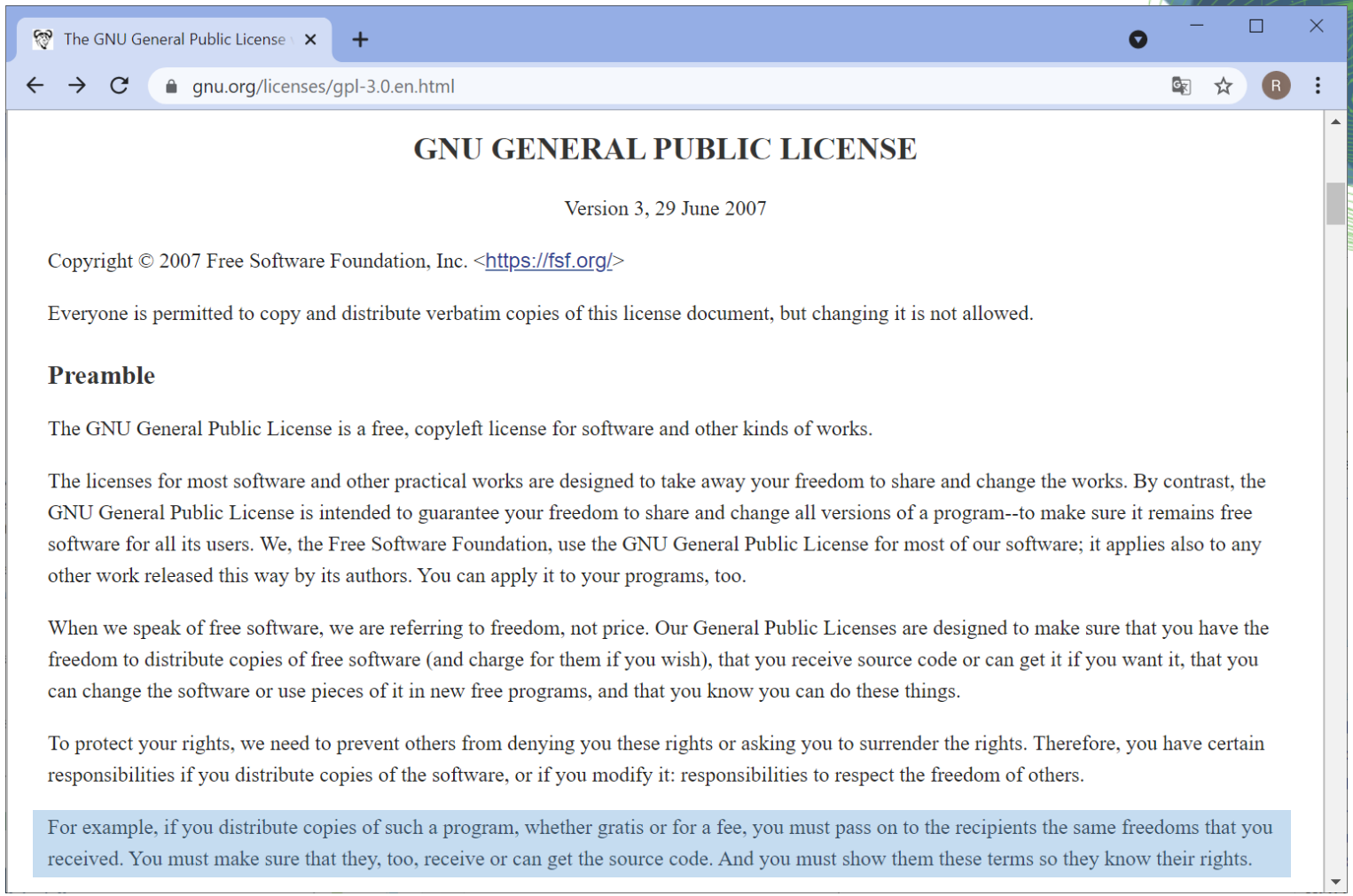

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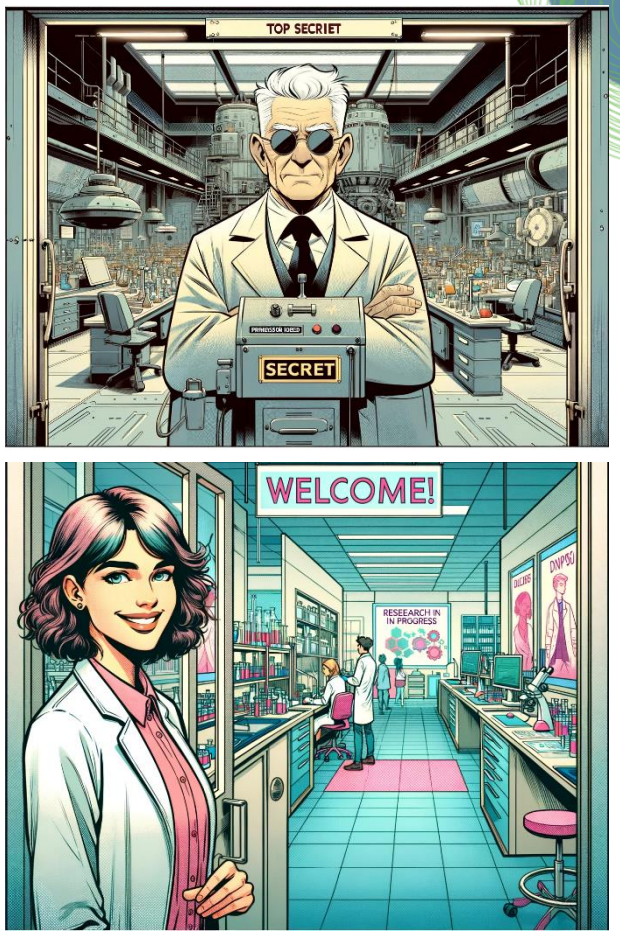

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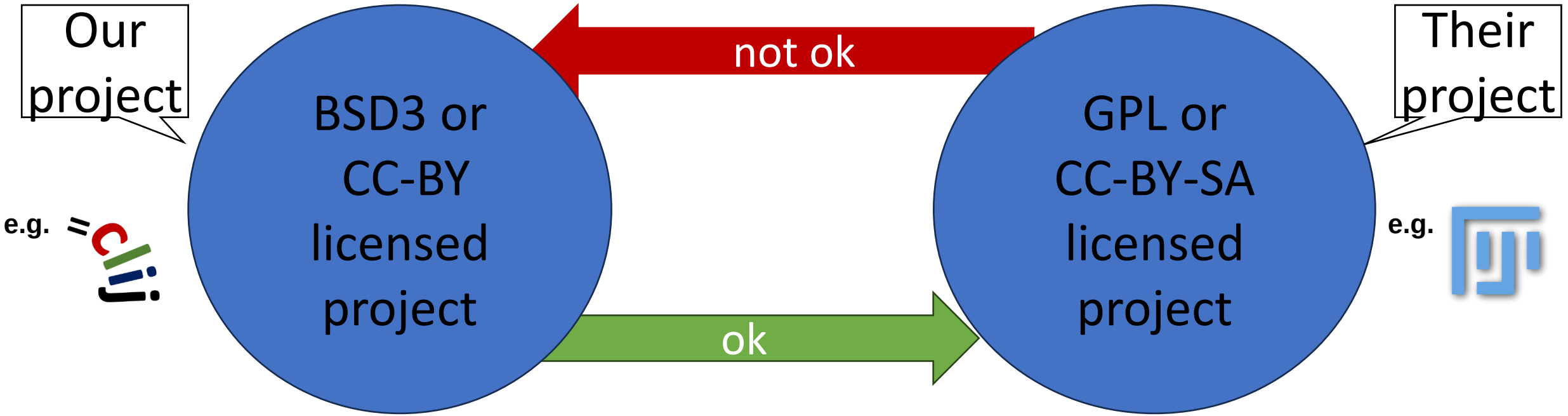

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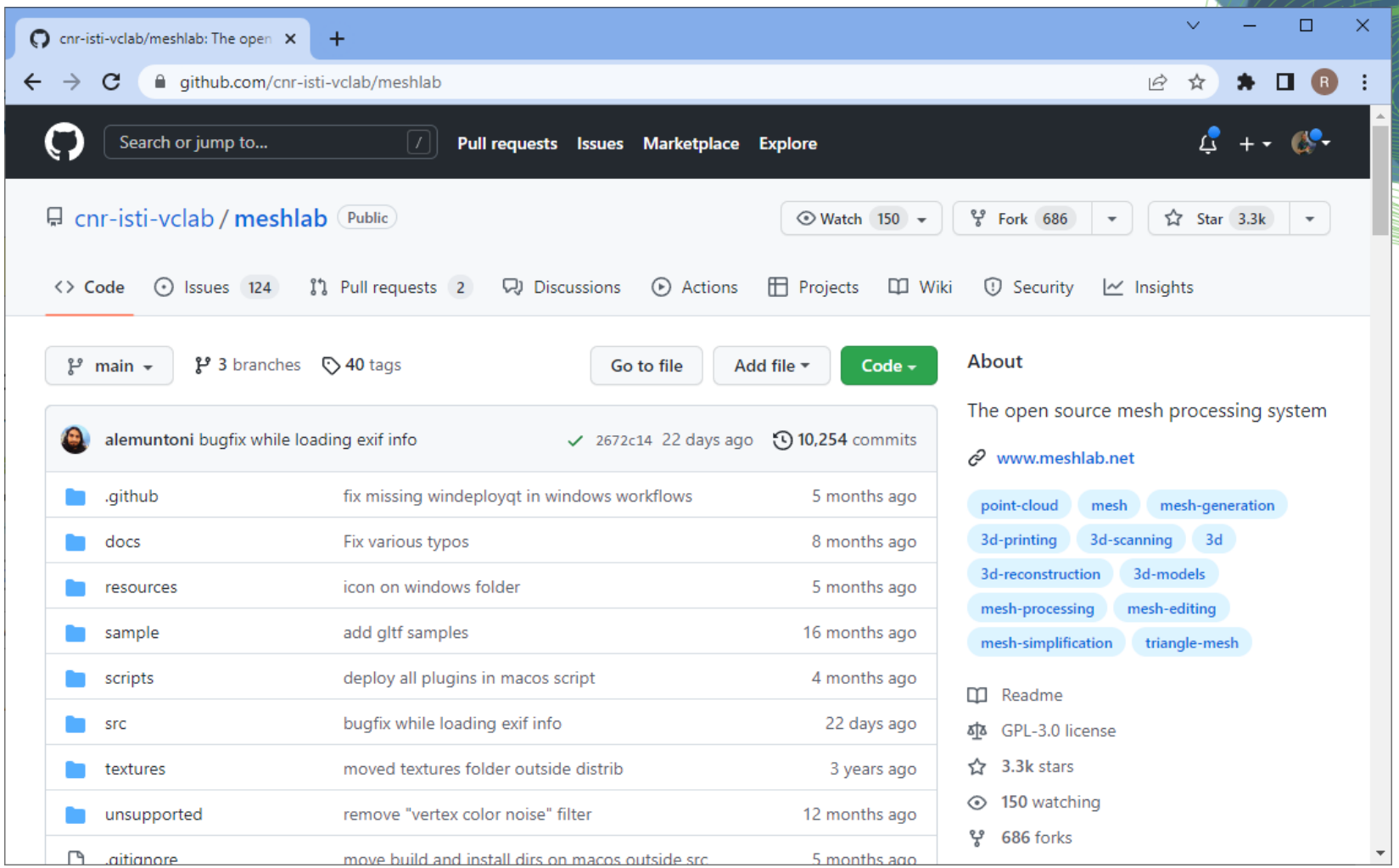

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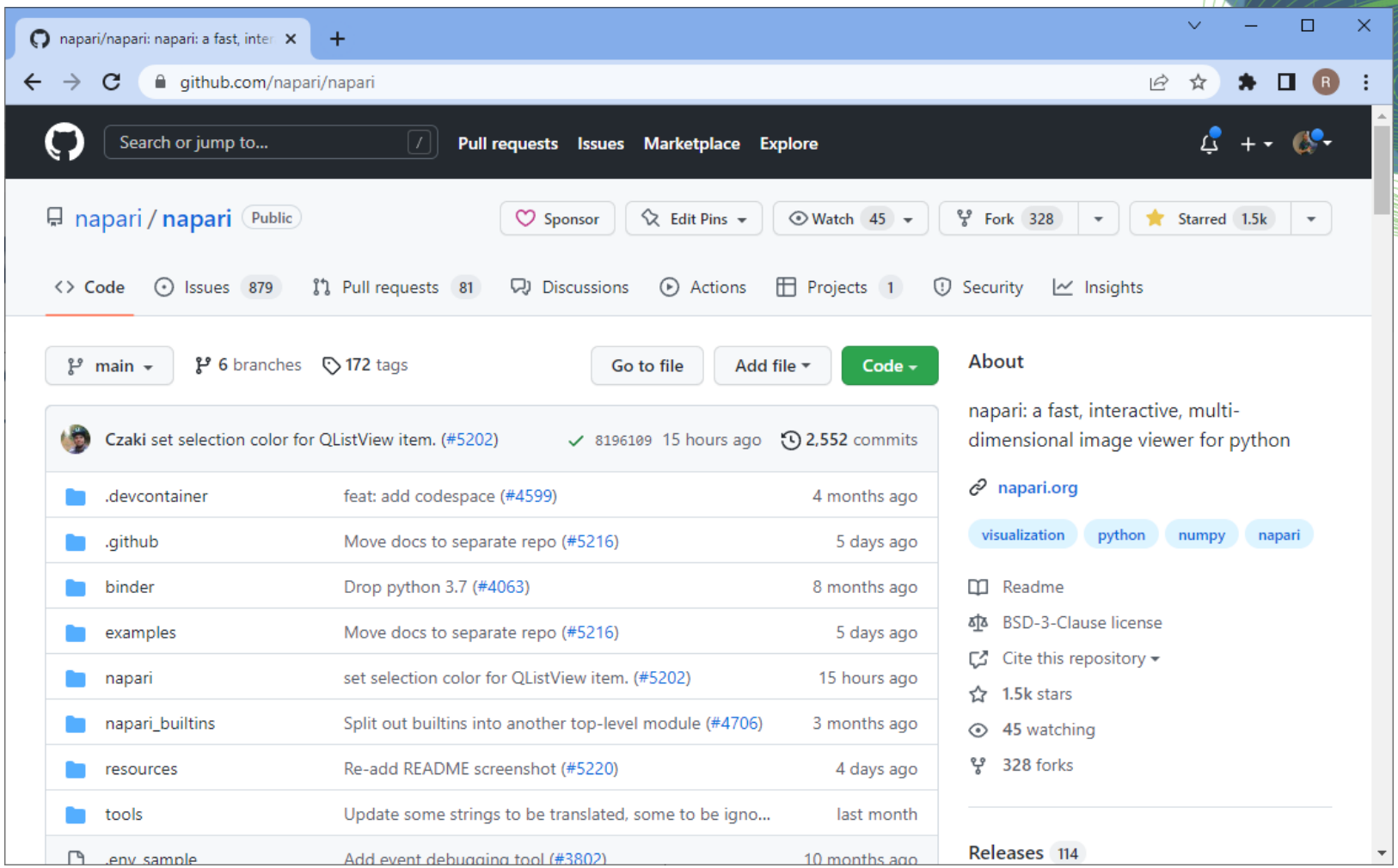

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