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DRESDEN LEIPZIG

CENTER FOR SCALABLE DATA ANALYTICS AND  
ARTIFICIAL INTELLIGENCE



NFDI4  
**BIOIMAGE**

NATIONAL RESEARCH DATA MANAGEMENT INFRASTRUCTURE  
FOR MICROSCOPY AND BIOIMAGE ANALYSIS



GLOBAL BIOIMAGE  
ANALYSTS SOCIETY

# Cultivating Open Training

Robert Haase



<https://doi.org/10.5281/zenodo.10816895>

**ScaDS.AI**  
DRESDEN LEIPZIG

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SaxFDM Digital Kitchen  
March 2024

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1

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# 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.

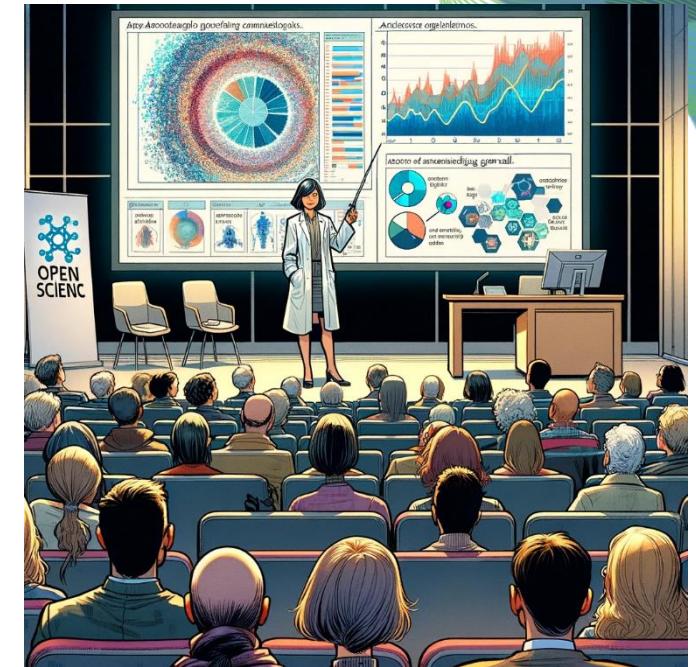


# Open Science

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

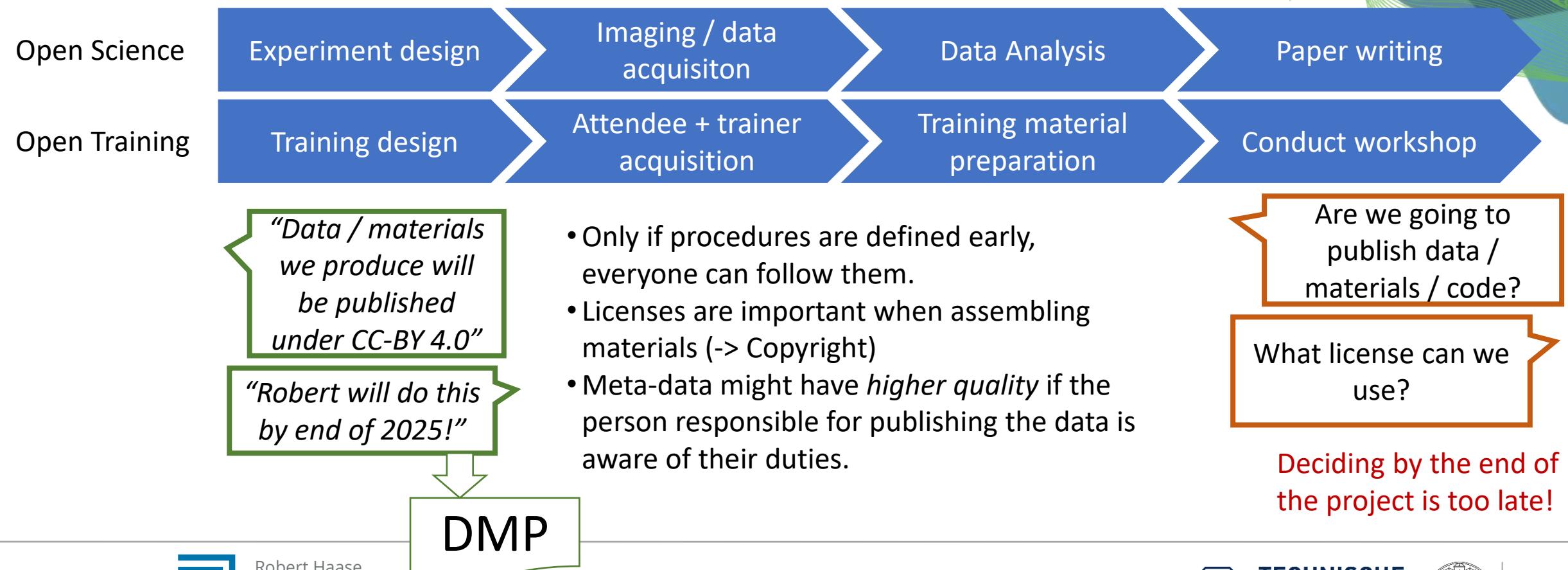
# Open Training

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



# Am I allowed to publish my stuff?

Define responsibilities and procedures early!



# 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)

The collage includes:

- A screenshot of a GitHub repository titled "Image Analysis Training Resources" showing a README file and a "Gitpod ready-to-code" button.
- A screenshot of the F1000Research website showing a slide titled "Sharing and licensing material" by Robert Haase.
- A screenshot of a Jupyter Notebook titled "Prompt Engineering Tutorial" running on ScaDS.AI.
- A screenshot of a Zenodo record for "Train-the-Trainer Concept on Research Data Management" by Robert Haase.

# 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 homepage. At the top, there's a navigation bar with the elixir bio.tools logo, 'Explore', 'Login', and 'Sign-up' buttons. Below the navigation, a message about cookie usage is displayed. The main area features a large 'bio.tools' logo and a search bar with the placeholder 'Search bio.tools'. A sidebar on the right lists categories: 'by content Type' (blog, collection, event, notebook), 'NFDI4BiolImage Training Materials', and a 'Search this book [ctrl + K]' button.

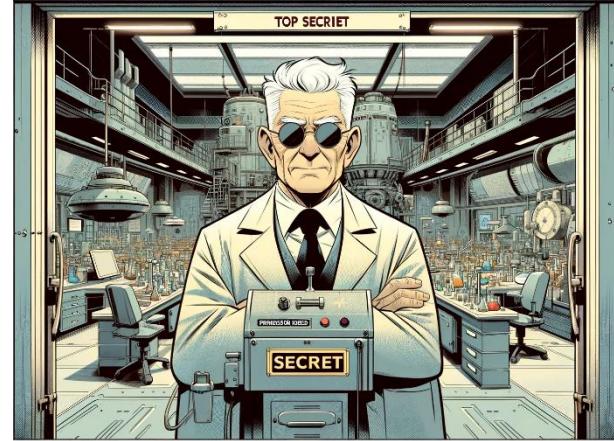
This screenshot shows a Jupyter Book page titled 'How to use this resource'. It includes a search bar and a sidebar with the same categories as the bio.tools site: 'by content Type' (blog, collection, event, notebook) and 'NFDI4BiolImage Training Materials'. The main content area contains text and images related to using the book.

The top part of the image displays three browser windows. The left window shows the 'Biolimage Informatics Index' (Biii) homepage with a logo featuring a microscope and three colored circles, and a search bar. The middle window shows the 'MicroscopyDB' homepage with a sub-header 'A repository of online microscopy resources' and a sidebar for adding resources. The right window shows a specific page from 'NFDI4BioImage Training Materials' with a title 'How to use this resource' and a sidebar with the same categories as the other sites.

# Licensing: Permissive versus restrictive

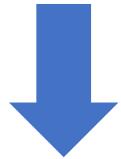
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    - License your work with the same license we do
    - Make your stuff openly available
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  - Examples: **GPL, CC-BY-SA, CC-BY-NC, CC-BY-ND**
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  - 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



# Licensing: Permissive versus restrictive

- Who knows what the ND stands for?



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**“permissive”**

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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.

# Licensing: Permissive versus restrictive

Example

The screenshot shows a bioRxiv preprint page for "Generative interpolation and restoration of images using deep learning for improved 3D tissue mapping" by Saurabh Joshi et al. The page includes the CSHL logo, the bioRxiv header, and various sharing and download options. A red box highlights the copyright notice at the bottom of the page, which states: "The copyright holder for this preprint is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under a CC-BY-NC-ND 4.0 International license."

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## Example

The screenshot shows a bioRxiv preprint page for "BiolImage Model Zoo: A Community-Driven Resource for Accessible Deep Learning in BiolImage Analysis". The page includes the bioRxiv logo, navigation links like HOME, SUBMIT, FAQ, BLOG, ALERTS / RSS, and ABOUT. It displays the posting date (June 08, 2022), download options (PDF, Print/Save Options, Data/Code), and social sharing buttons (Post, Like 0). A red box highlights the "Copyright" section, which states: "The copyright holder for this preprint is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under a CC-BY-ND 4.0 International license." Below this, a sidebar lists "Subject Areas" such as Bioinformatics, Asia & Behavior and Cognition, Biochemistry, and Bioengineering.

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## Example

The screenshot shows a bioRxiv preprint page for "Content-Aware Image Restoration: Pushing the Limits of Fluorescence Microscopy". The page includes author information, a DOI, and social media sharing options. A red box highlights the copyright and license information at the bottom:

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## Example

The screenshot shows a bioRxiv preprint page for "Omnipose: a high-precision morphology-independent solution for bacterial cell segmentation" by Kevin J. Cutler, Carsen Stringer, Paul A. Wiggins, Joseph D. Mougous. The page includes the CSHL logo, search bar, and navigation links. The preprint was posted on July 27, 2022. On the right, there are download options (PDF, Print/Save Options, Data/Code, Revision Summary) and social sharing buttons. A red box highlights the "CC-BY-NC-ND 4.0 International license" link under the copyright notice.

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## Example

The screenshot shows a bioRxiv preprint page for the article "Bridging the Gap: Integrating Cutting-edge Techniques into Biological Imaging with deepImageJ". The page includes the Cold Spring Harbor Laboratory logo, search and navigation bars, and social sharing icons. The main content area displays the article title, authors (Caterina Fuster-Barceló, Carlos García López de Haro, Estibaliz Gómez-de-Mariscal, Wei Ouyang, Jean-Christophe Olivo-Marin, Daniel Sage, Arrate Muñoz-Barrutia), DOI, and a note that it is a preprint. Below the abstract are buttons for "Download PDF", "Print/Save Options", "Email", "Share", "Data/Code", and "Citation Tools". A "Post" button is also present. A red box highlights the copyright notice: "The copyright holder for this preprint is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under a CC-BY-ND 4.0 International license." The page also features sections for COVID-19 SARS-CoV-2 preprints and Subject Areas (Bioinformatics).

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The screenshot shows a web browser displaying a bioRxiv preprint page. The title is "BIAFLows: A collaborative framework to reproducibly deploy and benchmark bioimage analysis workflows". The authors listed are Ulysse Rubens, Romain Mormont, Lassi Paavolainen, Volker Bäcker, Gino Michiels, Benjamin Pavie, Leandro A. Scholz, Martin Maska, Devrim Ünay, Graeme Ball, Renaud Hoyoux, Rémy Vandaele, Ofra Golani, Anatole Chessel, Stefan G. Stanciu, Natasa Sladoje, Perrine Paul-Gilloteaux, Raphaël Marée, Sébastien Tosi. The DOI is <https://doi.org/10.1101/707489>. The preprint was posted on February 06, 2020. On the right side, there is a sidebar with download options: PDF, Print/Save Options (selected), Email, Share, Citation Tools, Supplementary Material, Data/Code, and Revision Summary. Below these are buttons for Post and X Post. A red box highlights the copyright notice: "Copyright: The copyright holder for this preprint is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. All rights reserved. No reuse allowed without permission." At the bottom of the sidebar, there is a "Subject Areas" section with "Bioinformatics" selected, and a list of other areas: All Articles, Animal Behavior and Cognition, Biochemistry, Bioengineering, and Bioinformatics.

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The screenshot shows a bioRxiv preprint page for "ModularImageAnalysis (MIA):Assembly of modularised image and object analysis workflows in ImageJ". The page includes author information (Stephen J. Cross, Jordan D. J. R. Fisher, Mark A. Jepson), a DOI, and a note about publication in the Journal of Microscopy. It features social sharing icons and navigation links for abstract, full text, and metrics. A red box highlights the copyright notice: "The copyright holder for this preprint is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. All rights reserved. No reuse allowed without permission." Below the main content is a sidebar for COVID-19 SARS-CoV-2 preprints and subject area filters for Bioinformatics and Subject Area.

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## Example

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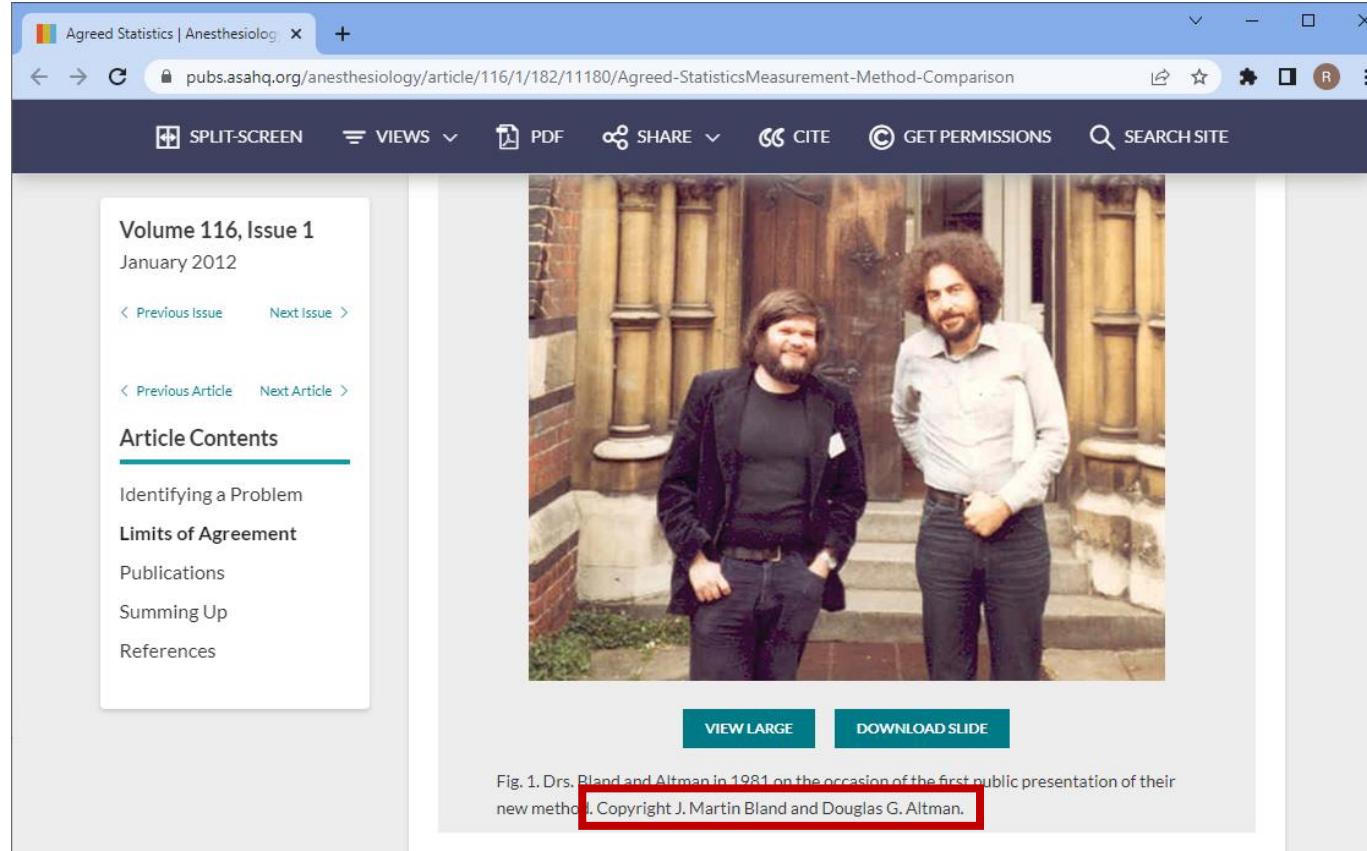
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The issue is not so much paying 100 Eur, but the related administrative effort.

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## Example



Agreed Statistics | Anesthesiology

pubs.asahq.org/anesthesiology/article/116/1/182/11180/Agreed-StatisticsMeasurement-Method-Comparison

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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

VOLUME 116 / NUMBER 1 / JANUARY 2012

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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>

# Licensing: Permissive versus restrictive

Restrictive licensing is  
a community-wide issue.

*I presume due to lack of  
awareness & training*

Train the trainers!

# Licensing: Permissive versus restrictive

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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	✓	✗	✗
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**Bad for the progress of science**

**In particular in the context of training**

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## Example



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A unified framework for versatile bioimage analysis with deep learning

bioRxiv  
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New Results

BiaPy: A unified framework for versatile bioimage analysis with deep learning

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Posted February 05, 2024.

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Subject Area Bioinformatics

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doi: <https://doi.org/10.1101/2024.02.03.576026>

History: February 5, 2024.

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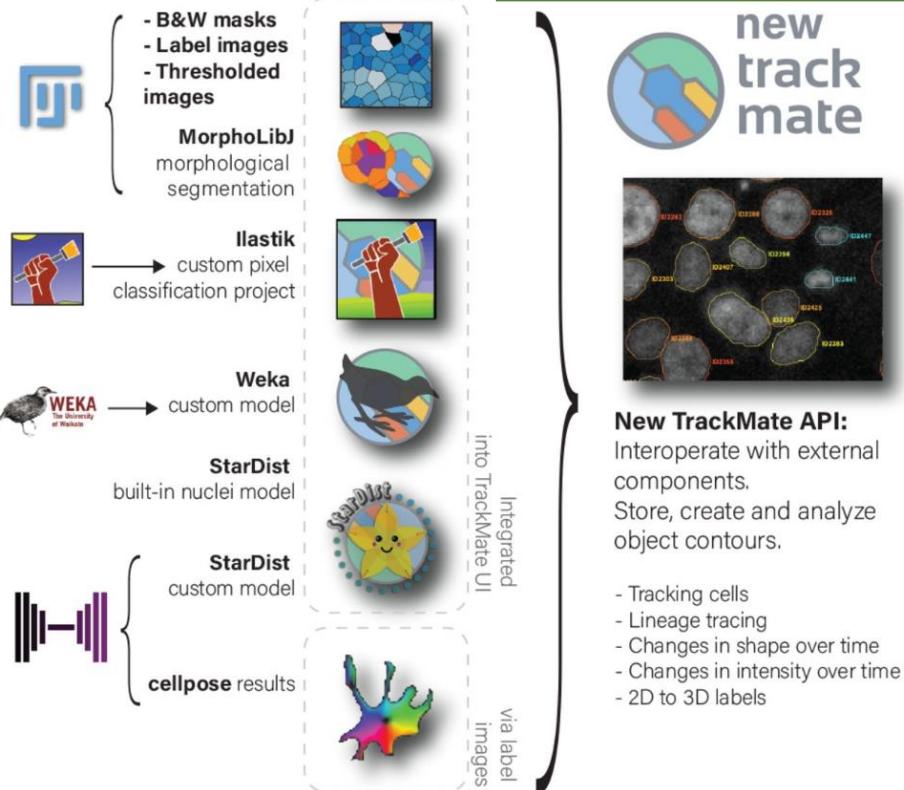
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Subject Areas All Articles

Animal Behavior and Cognition Biochemistry

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## Example



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Screenshot of the bioRxiv preprint page for "Bringing TrackMate into the era of machine-learning and deep-learning" by D. Ershov et al. (September 20, 2021). The page includes the CSHL logo, the bioRxiv header, and the preprint details. A callout box highlights the CC-BY 4.0 license information in the copyright section.

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Dmitry Ershov, Minh-Son Phan, Joanna W. Pylväniemi, Stéphane U. Rigaud, Laure Le Blanc, Arthur Charles-Orszag, James R.W. Conway, Romain F. Laine, Nathan H. Roy, Daria Bonazzi, Guillaume Duménil, Guillaume Jacquemet, Jean-Yves Tinevez  
doi: <https://doi.org/10.1101/2021.09.03.458852>

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Subject Area Bioinformatics

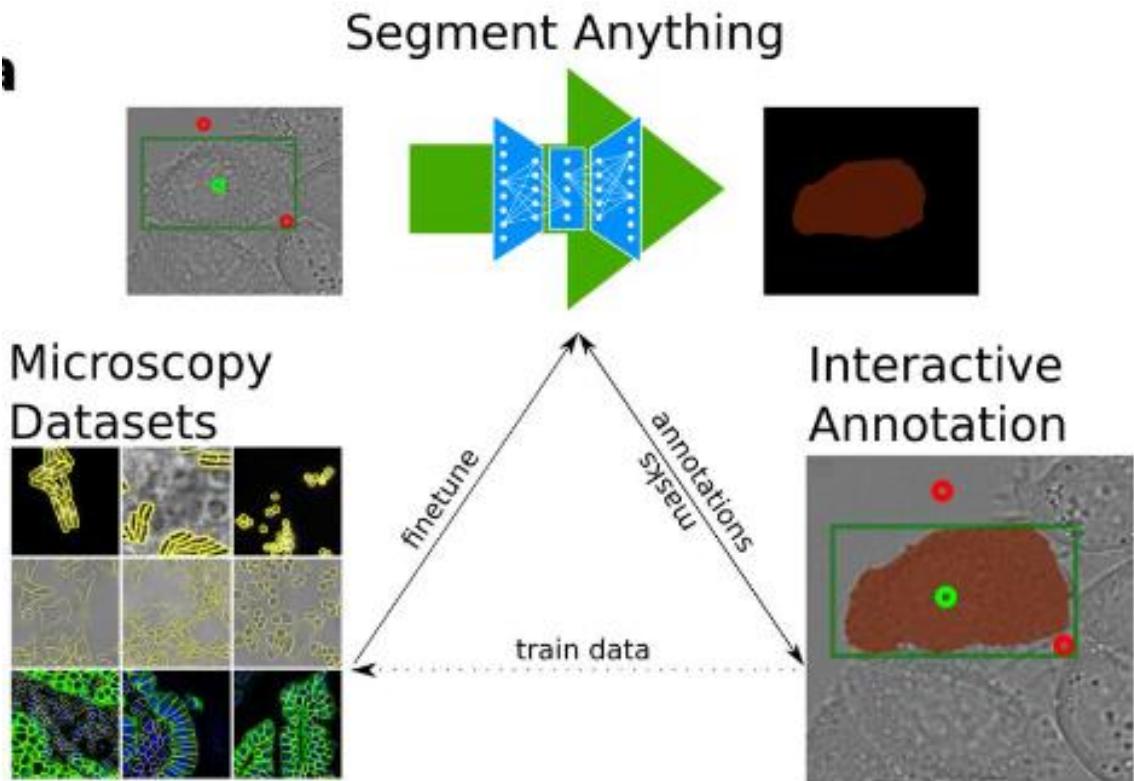
Subject Areas All Articles

Animal Behavior and Cognition  
Biochemistry  
Bioengineering

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## Example

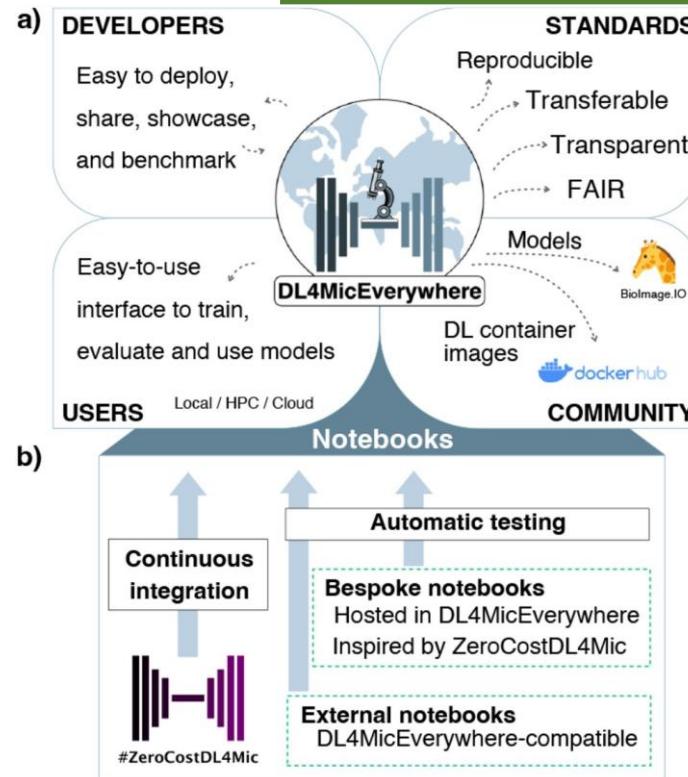
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A screenshot of a web browser window displaying a bioRxiv preprint page. The URL in the address bar is [biorxiv.org/content/10.1101/2023.08.21.554208v1.article-info](https://www.biorxiv.org/content/10.1101/2023.08.21.554208v1.article-info). The page header includes the bioRxiv logo and "THE PREPRINT SERVER FOR BIOLOGY". On the left, there is a sidebar with sections for "New Results", "Follow this preprint", "Previous", "Next", "Posted August 22, 2023.", and links for "Download PDF", "Print/Save Options", "Email", "Share", "Data/Code", and "Citation Tools". The main content area displays the title "Segment Anything for Microscopy" and a list of authors: Anwai Archit, Sushmita Nair, Nabeel Khalid, Paul Hilt, Vikas Rajashekhar, Marei Freitag, Sagnik Gupta, Andreas Dengel, Sheraz Ahmed, Constantin Pape. The DOI is listed as <https://doi.org/10.1101/2023.08.21.554208>. A note states: "This article is a preprint and has not been certified by peer review [what does this mean?].". Below the title, there are social media sharing icons (0 comments, 0 likes, 3 saves, 0 shares, 0 views, 85 tweets). A navigation bar at the bottom includes "Abstract", "Full Text", "Info/History" (which is highlighted), "Metrics", and "Preview PDF". The "Info/History" section contains the DOI, a "History" entry for August 22, 2023, and a "Copyright" notice: "The copyright holder for this preprint is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under a [CC-BY 4.0 International license](#)". To the right, there are sections for "COVID-19 SARS-CoV-2 preprints from medRxiv and bioRxiv", "Subject Area" (Bioinformatics), and "Subject Areas" (with a "All Articles" link).

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## Example



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Screenshot of the bioRxiv preprint page for "DL4MicEverywhere: Deep learning for microscopy made flexible, shareable, and reproducible" (doi: <https://doi.org/10.1101/2023.11.19.567606>) posted on November 19, 2023.

The page includes the following sections:

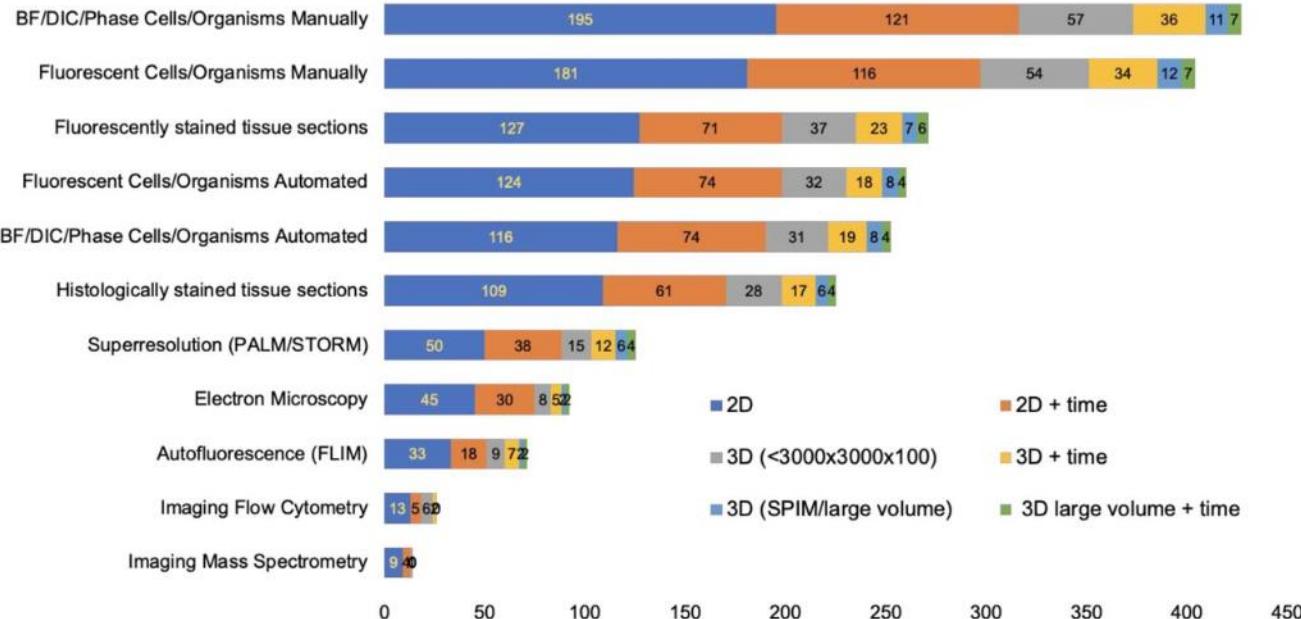
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- Subject Areas**: All Articles, Animal Behavior and Cognition
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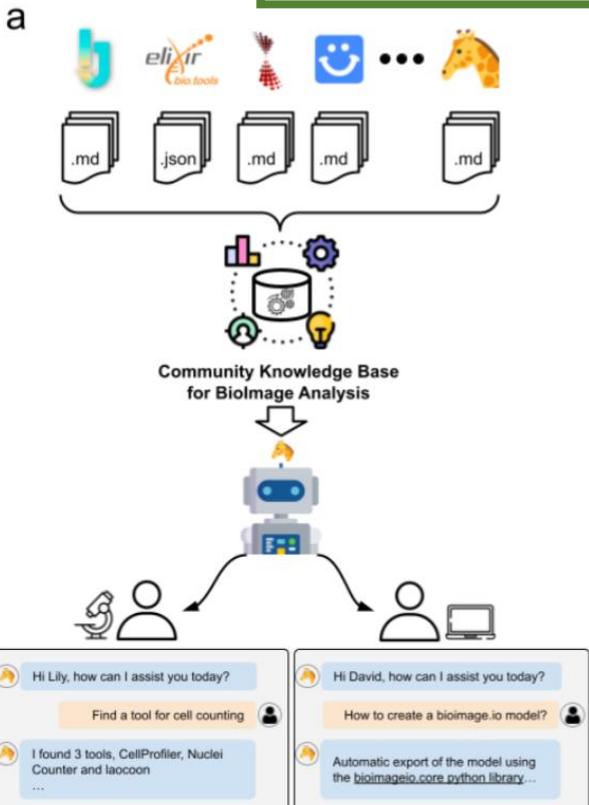
What kinds of images do you commonly want to analyze?



A screenshot of a web browser displaying a bioRxiv preprint page. The URL is <https://www.biorxiv.org/content/10.1101/2021.09.03.458852v2.full>. The page header includes the bioRxiv logo and navigation links for HOME, SUBMIT, FAQ, BLOG, ALERTS / RSS, and ABOUT. The main content area shows the title "2020 BioImage Analysis Survey: Community experiences and needs for the future", authors (Nasim Jamali, Ellen TA Dobson, Kevin W. Eliceiri, Anne E. Carpenter, Beth A. Cimini), and a DOI (<https://doi.org/10.1101/2021.08.16.456498>). It also mentions that the article is now published in *Biological Imaging* with a DOI of [10.1017/S2633903X21000039](https://doi.org/10.1017/S2633903X21000039). The page includes social sharing icons (Twitter, LinkedIn, etc.) and navigation tabs for Abstract, Full Text, Info/History, Metrics, and Preview PDF. A callout box highlights the copyright notice: "The copyright holder for this preprint is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under a CC-BY 4.0 International license." The sidebar on the right lists subject areas such as Bioinformatics, Animal Behavior and Cognition, Biochemistry, Bioengineering, and Bioinformatics.

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zenodo

BiolImage.IO Chatbot: A Personalized Assistant for Biolimage Analysis Augmented by Community Knowledge Base

Published December 5, 2023 | Version v2

Preprint Open

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Version v2 Dec 5, 2023  
10.5281/zenodo.10259576

Version 0.1.0 Oct 23, 2023  
10.5281/zenodo.1003228

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Resource type Preprint

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NanoPyx: super-fast bioimage analysis powered by adaptive machine learning

Bruno M. Saraiva, Inês M. Cunha, António D. Brito, Gautier Follain, Raquel Portela, Robert Haase, Pedro M. Pereira, Guillaume Jacquemet, Ricardo Henriques  
doi: <https://doi.org/10.1101/2023.08.13.553080>

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# Licensing: Permissive versus restrictive

## Example

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

The glucosylceramide synthase inhibitor PDMP causes lyso-somal lipid accumulation and mTOR inactivation

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
experimentA_12_SGPL1_PDMP.cz	1.6 MB	Study Component	click chemistry and IF	SGPL1-/-	pacSph	20 µM PDMP	pacSph	Lamp1	continuous labeling
experimentA_13_SGPL1_PDMP.cz	1.6 MB	Study Component	click chemistry and IF	SGPL1-/-	pacSph	20 µM PDMP	pacSph	Lamp1	continuous labeling

Visualization of clickable lipids.

New Results

The BioImage Archive - building a home for life-sciences microscopy data

Matthew Hartley, Gerard J. Kleywegt, Ardan Patwardhan, Ugis Sarkans, Jason R. Swedlow, Alvis Brazma

doi: <https://doi.org/10.1101/2021.12.17.473169>

Now published in *Journal of Molecular Biology* doi: 10.1016/j.jmb.2022.167505

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COVID-19 SARS-CoV-2 preprints from medRxiv and bioRxiv

Subject Area Bioinformatics

Subject Areas All Articles Animal Behavior and Cognition Biochemistry Bioengineering Bioinformatics

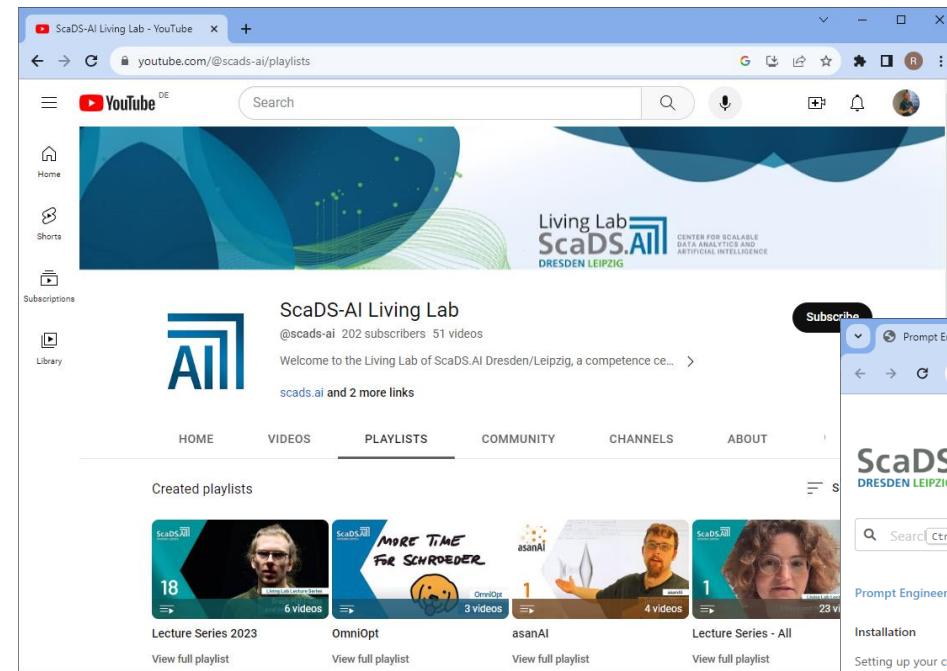
# Incentives: Visibility

YouTube, Github,...

- Findable
- Accessible
- Interoperable
- Reusable

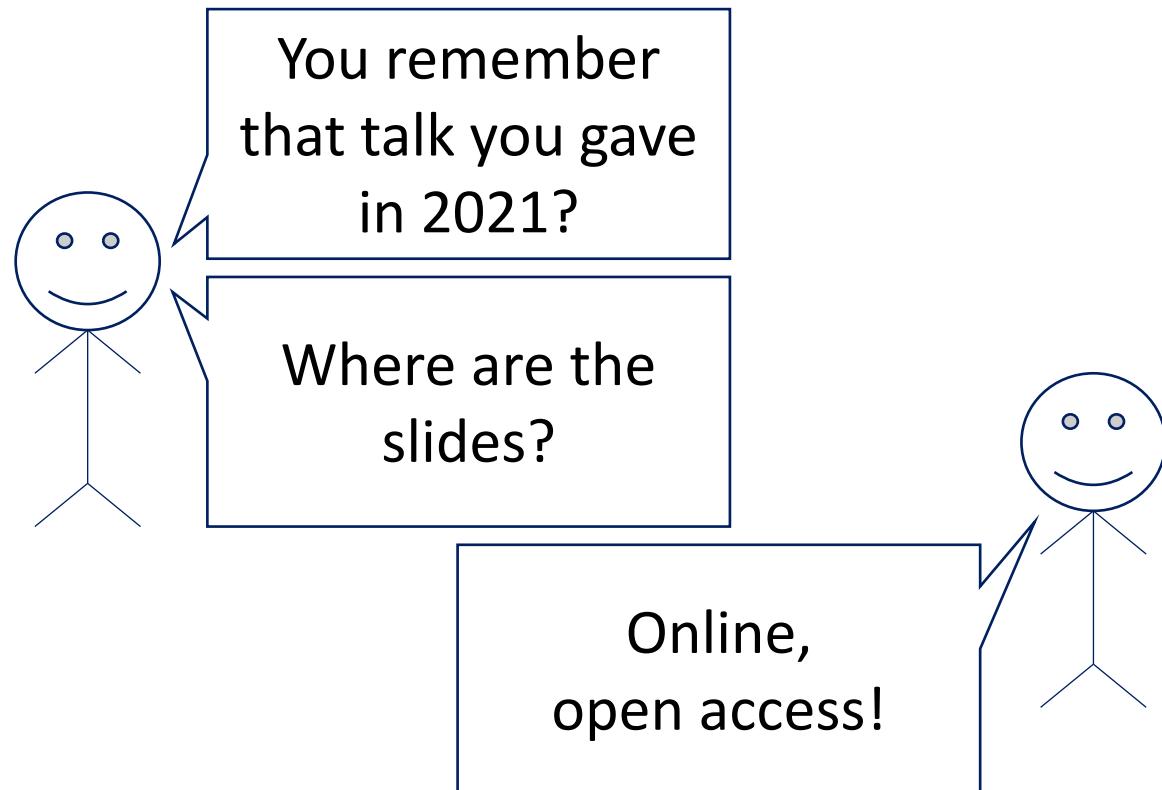
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- ... leading to
- more course attendees
  - new collaborations



# Incentives: Findability

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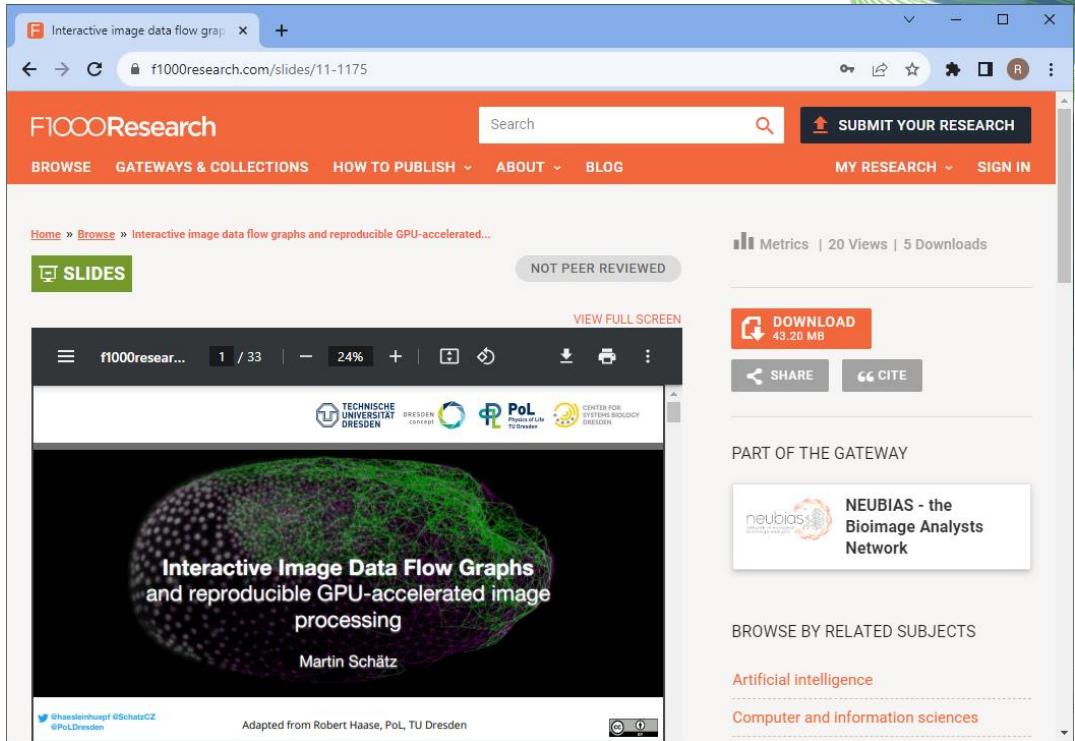
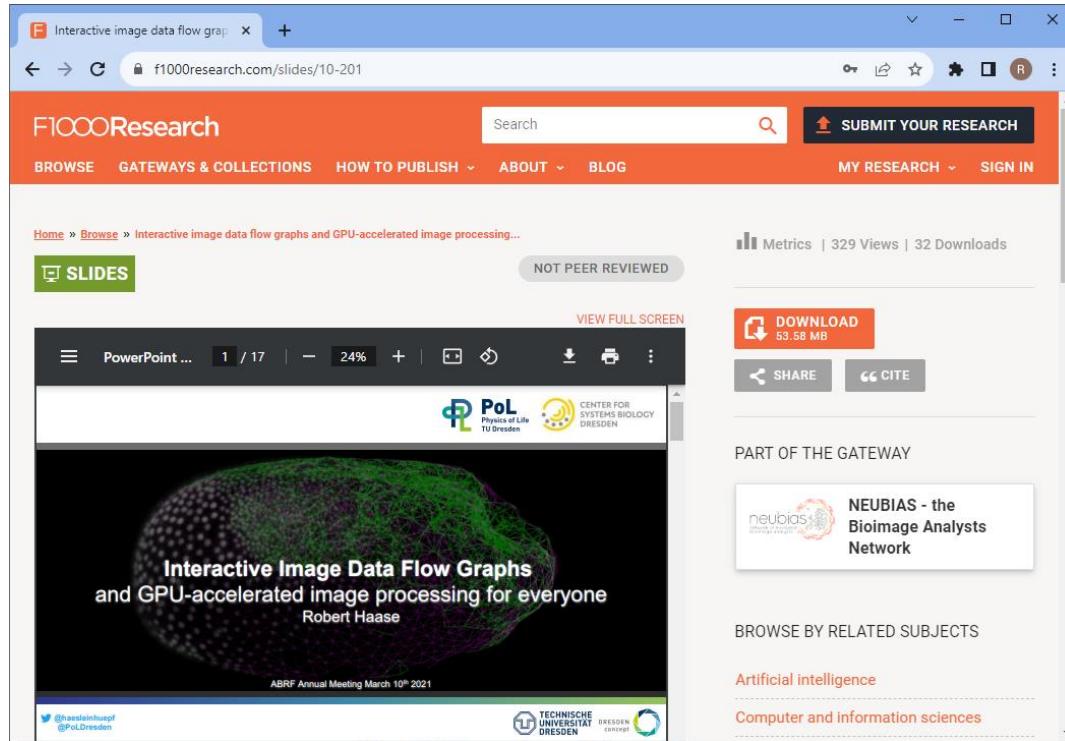
Artificial intelligence

Computer and information sciences

Electrical engineering

# Incentives: Reusability

- Open Access -> Others teach how to use your tools & methods



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as license for your materials to make them reusable.

# 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/>



<https://doi.org/10.5281/zenodo.10816895>

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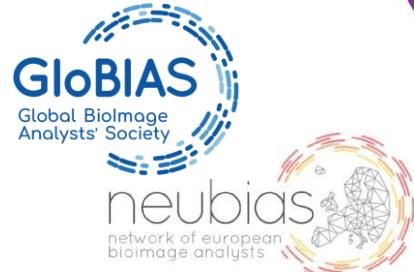
Communities & platforms



NFDI4  
BIOIMAGE



image.sc



Funding



Bundesministerium  
für Bildung  
und Forschung



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