

# ZEADOOO Research. Shared.









## You are a researcher...











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Source: https://github.com/microsoft/vscode/issues/32405

# The result?

### 50% of the links in papers are inaccessible after 10 years

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PLOS ONE

How Do Astronomers Share Data? Reliability and Persistence of Datasets Linked in AAS Publications and a Qualitative Study of Data Practices among US Astronomers

Alberto Pepe<sup>1,2</sup>\*, Alyssa Goodman<sup>1,2</sup>, August Muench<sup>1</sup>, Merce Crosas<sup>2</sup>, Christopher Erdmann<sup>1</sup>

1 Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts, United States of America, 2 Institute for Quantitative Social Science, Harvard University, Cambridge, Massachusetts, United States of America

### Abstract

We analyze data sharing practices of astronomers over the past fifteen years. An analysis of URL links embedded in papers published by the American Astronomical Society reveals that the total number of links included in the literature rose dramatically from 1997 until 2005, when it leveled off at around 1500 per year. The analysis also shows that the availability of linked material decays with time. In 2011, 44% of links published a decade earlier, in 2001, were broken. A rough analysis of linked material decays with time: in 2011, 44% of links published a decade earlier, in 2001, were broken. A rough analysis of link types reveals that links to data hosted on astronomers' personal websites become unreachable much faster than links to datasets on curated institutional sites. To gauge astronomers' current data sharing practices and preferences further, we performed in-depth interviews with 12 scientists and online surveys with 173 scientists, all at a large astrophysical research institute in the United States: the Harvard-Smithsonian Center for Astrophysics, in Cambridge, MA. Both the in-depth interviews and the online survey indicate that, in principle, there is no philosophical objection to data-sharing among astronomers at this institution. Key reasons that more data en to tresently shared more efficiently in astronomy include: the difficulty of sharing large data sets; over reliance on non-robust, non-reproducible mechanisms for sharing data (e.g. emailing it); unfamiliarity with options that make data-sharing easier (faster) and/or more robust; and, lastly, a sense that other researchers would not want the data to be shared. We conclude with a short discussion of a new effort to implement an easy-to-use, robust, system for data sharing in astronomy, at theastrodata.org, and we analyze the uptake of that system to-date.

Citation: Pepe A, Goodman A, Muench A, Crosas M, Erdmann C (2014) How Do Astronomers Share Data? Reliability and Pensistence of Datasets Linked in AAS Publications and a Qualitative Study of Data Practices among US Astronomers. PLoS ONE 9(8): e104798. doi:10.1371/journal.pone.0104798 Editor: Aaron Alain-Jon Golden, Albert Einstein College of Medicine, United States of America

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### Introduction

### No. I don't have a website where I store these data. Most of it is in various stages of mess. —An Astronomer

mical observations can generate very large volumes of data, and observations taken at a particular time are by definition irreplaceable and unrepeatable. As such, making astronomical data publicly available in a structured, intelligible format is of fundamental importance to enable scientific transparency and long term data curation and preservation, facilitating data re-use [1]. To date, some of the most systemically planned data sharing in astronomical research has focused on the preservation and dissemination of observations created in so-called "sky surveys." The purpose of these surveys is to collect and measure data from extended regions of the Sky, in a systematic and controlled fashion. Modern optical sky surveys, such as the Sloan Digital Sky Survey (SDSS), the 2-Micron All-Sky Survey (2MASS), and the future

Large Synoptic Survey Telescope (LSST) generate may databases, ranging in size from hundreds of terabytes to hundreds of petabytes [2]. Surveys that rely on spectrally-resolved observa-tions, often made with radio-wavelength interferometers, generate "3D Data Cubes" rather than "2D images," and they are already so large that it is not possible to keep all the raw data after analysis is complete

Despite their sheer volume, the data collected in the context of large surveys represent only a portion of all the data generated in Astronomy. Most discoveries rely upon smaller studies, and/or are based on heavily-processed subsets of many surveys. In any field of scientific endeavor, many different levels of data exist [3]; from "raw" data to "processed" data, from "calibration" data to "published" data. If we imagine all data in Astronomy to be a pyramid, **primary** data from large sky surveys occupies the bottom half of the pyramid. But, as we just mentioned, these primary data are used by astronomers all over the world to produce more specific studies, where astronomers analyze and process primary data in many ways producing derived data.

August 2014 | Volume 9 | Issue 8 | e104798

### 89% of 53 landmark cancer research papers are *irreproducible*

### News in focus

Africa and elsewhere suggest that the variant is say. Sigal's team found that people who had the third vaccine", said BioNTech's chief executive, Ugur Şahin, at a press conference faster than Delta - and might be able to infect tended to have higher levels of neutralizing on 8 December. people who are immune to other variants. antibodies against Omicron than vaccinated the ability of antibodies to recognize the virus ing on neutralization experiments. and block infection.

Scientist used two types of laboratory assay to test how well Omicron can evade neutralizing, or virus-blocking, antibodies, One approach uses infectious SARS-Cov-2 particles, typically isolated from individuals infected with Omicron. The other relies on pseudovirus particles - genetically modified \_\_\_\_

pseudovirus particles – genericany mounted versions of another virus (often HIV) that use the SARS-CoV-2 spike protein to infect cells. The results from the four teams all suggest that Omicron blunts the potency of neutral-that Omicron blunts the potency of neutralinfection histories.

A study led by virologist Alex Sigal, at the Omicron in individuals who have received out," he says. Africa Health Research Institute in Durban South Africa, found that serum - the antibody-containing portion of blood - from Ing was similar to une results it with 00 offices that the second other released on Twitter and later posted (A. Wilhelm et al. Preprint at medRxiv https:// unhelpful author communication. doi.org/g8sz: 2021).

A fourth study, led by Murrell and virolo- By Asher Mullard gist Daniel Sheward, also at the Karolinska ers cannot determine the vaccine status of the anonymous blood donors, but say they bility Project: Cancer Biology (RPCB) team in dence of a 'reproducibility crisis', the concern will soon update their paper with vaccination eLife<sup>1,2</sup>. The project – one of the most robust that many research findings cannot be repli information from the health-care workers. reproducibility studies performed so far – cated. Over the previous decade, his haema Despite differences in results - which are documented how hurdles including vague tology and oncology team had been able to Omicron's effects on neutralizing antibodies its scope. are "not complete knockouts", says Murrell. "These results aren't surprising. And, simul-analyses have reported low replication rates in "The magnitude is still a little up for question." taneously, they're shocking," says Brian Nosek, drug discovery, neuroscience and psychology.

**Booster protection** The results suggest that vaccines' effective Virginia. Although initially planning to repeat The RPCB – a partnership between the Center 193 experiments from 53 papers, the team ran for Open Science and Science Exchange, a Omicron - but precisely how much is hard to just 50 experiments from 23 papers.

368 | Nature | Vol 600 | 16 December 2021

OpenAIRE NEXUS



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Danny Altmann, an immunologist at Omicron carries a large number of muta-people with no known history of infection. "I Imperial College London, agrees that jacking tions in its spike protein – the prime target of immune responses – and some of these think retaining some neutralization against up antibody levels with booster shots should Omicron can only be helpful," says Moore, a help protect against Omicron, just as boosters  $changes, when present in other variants, affect \\ co-author on the study, whose lab is also work-have improved protection against the Delta and the Delta$ variant. "Omicron is scarier than anything we've known before, because it's a little bit worse still than Delta. But we were in quite a bad situation with Delta in unboosted popu lations," Altmann says.

Jesse Bloom, an evolutionary biologist at the Fred Hutchinson Cancer Research Center in Seattle, Washington, says that it will be important to determine the extent to which

izing antibodies more extensively than any its vaccine had neutralizing antibody levels studies confirming the latest results, because other circulating SARS-CoV-2 variant. But against Omicron comparable to those, trig-variables such as the type of cell used can affect the magnitude of Omicron's impact varied between the studies, which examined blood SARS-CoV-2 variants. On the basis of those at the University of Texas Medical Branch at from people with different vaccination and results, "we expect significant protection Galveston."In the next week or ten days, there against any type of COVID-19 mediated by will be a lot of confirmatory results coming

## Duby-containing portion of blood – from 12 people who received the Pfizer-BioNTech vaccine was around 40 times less potent against Omicron, on average, than against an earlier strain of SARS-CoV2. That fill and against ing was similar to the results from two other

on medRxiv by virologist Sandra Ciesek at Barriers to reproducing preclinical results included

an RPCB investigator and executive director of the Center for Open Science in Charlottesville, **Double take** 

The low replication rate is "frankly outrageous", says Glenn Begley, an oncologist gist Daniel Sneward, also at the Karolinska Institute, reported a smaller reduction levels of Omicron-neutralizing antibodies in two groups of participants: 17 health-care, and 17 Swedish blood donors. The researchcommon in such virus neutralization assays – the labs' conclusions are similar, and show that the labs' conclusions are similar, and show that alongside the papers' original authors. Other

marketplace for research services in Palo

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# What to improve?

50% of the links in papers are inaccessible after 10 years

**Disseminate & Archive** 

89% of 53 landmark cancer research papers are *irreproducible* 

Reproducibility

Ships logs from the 18th century used for climate research

Reusability



# What to improve?

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Reproducibility

Ships logs from the 18th century used for climate research

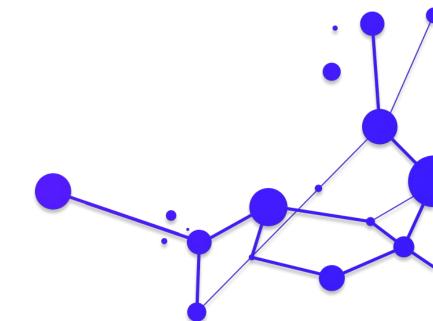
Reusability

## Science = Explain + Repeat

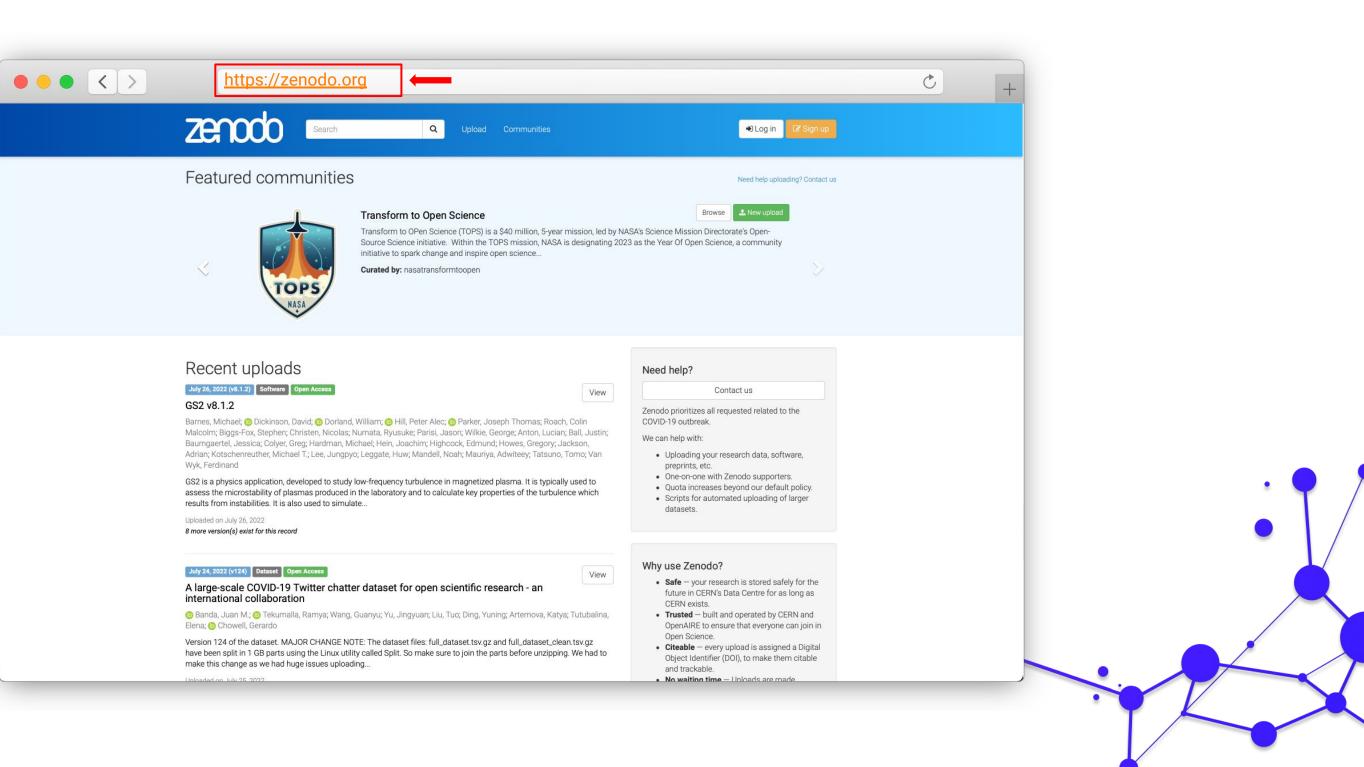


# How do we improve?

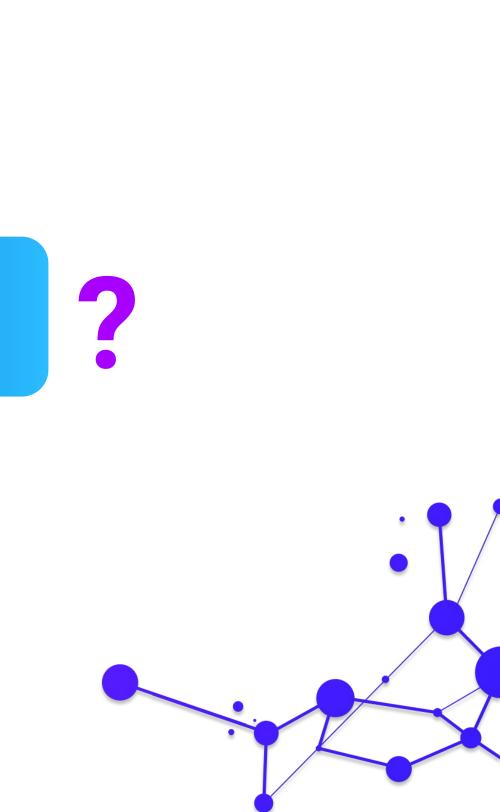




# Zenodo







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Note: File addition, removal or modification are not allowed after you have published your upload. This is because a Digital Object Identifier (DOI) is registered with C DataCite for each upload.

(minimum 1 file required, max 50 GB per dataset - contact us for larger datasets)

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Data curator(s) Bobrov, Evgeny; Truccolo, Ivana; Monteiro, Elizabete; Casalegno, Carlotta; Clary, Erin; Romanowski,

Andrew

Files ( Name



Show







### Publish

Dataset Open Access

### OpenAIRE Covid-19 publications, datasets, software and projects metadata.

🔞 Bardi, Alessia; Kuchma, Iryna; 🔞 Pavone, Gina; Artini, Michele; 🙆 Atzori, Claudio; 🔞 Bäcker, Amelie; oni, Miriam; 💿 Czerniak, Andreas; De Bonis, Michele; Dimitropoulos, Harry; Foufoulas, Ioannis; rek; latropoulou, Katerina; Jacewicz, Przemyslaw; 🔞 Kokogiannaki, Argiro; 🚯 La Bruzzo, ) Lazzeri, Emma; Löhden, Aenne; 🔞 Manghi, Paolo; 🔞 Mannocci, Andrea; Manola, Natalia; Enrico; 💿 Schirrwagen, Jochen

This dump provides access to the metadata records of publications, research data, software and projects that may be relevant to the Corona Virus Disease (COVID-19) fight. The dump contains records of the OpenAIRE COVID-19 Gateway (https://covid-19.openaire.eu/), identified via full-text mining and inference techniques applied to the OpenAIRE Research Graph

(https://explore.openaire.eu/). The Graph is one of the largest Open Access collections of metadata records and links between publications, datasets, software, projects, funders, and organizations, aggregating 12,000+ scientific data sources world-wide, among which the Covid-19 data sources Zenodo COVID-19 Community, WHO (World Health Organization), BIP! FInder for COVID-19, Protein Data Bank, Dimensions, scienceOpen, and RSNA.

The dump consists of a gzip file containing one json per line. Each json is compliant to the schema available at https://doi.org/10.5281/zenodo.3974226

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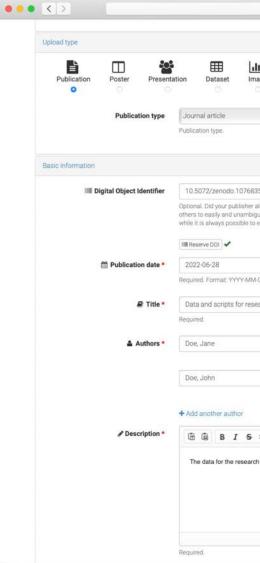
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- Rich but flexible metadata
- Based on DataCite schema





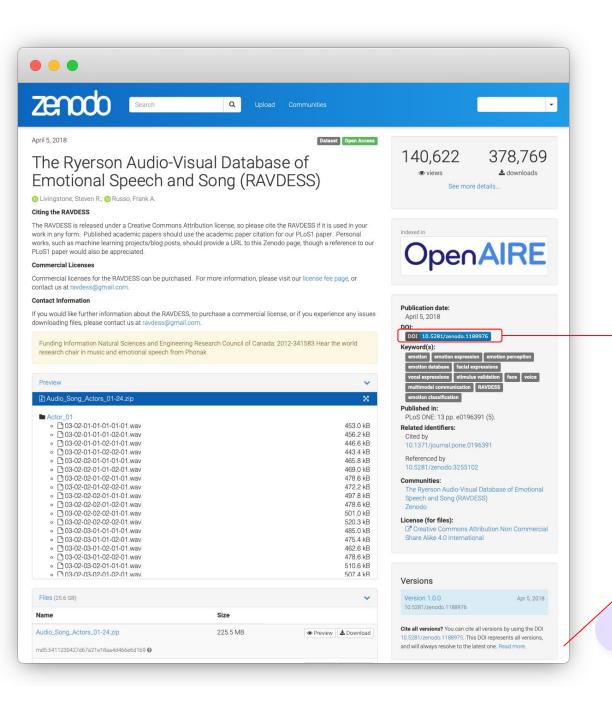
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# Publish

- Citable DOI
- Export Formats

## ✓ Publish









### Cite as

Livingstone, Steven R., & Russo, Frank A. (2018). The Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS) [Data set]. In PLoS ONE (1.0.0, Vol. 13, Number 5, p. e0196391). Zenodo. https://doi.org/10.5281/zenodo.1188976

American Psychological Association 7th edition

### 10.5281/zenodo.1188976 DOI

### Export

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# **Citable DOIs**



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# Archive

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Version 8.1.1 10.5281/zenodo.6504391	Apr 29, 2022
Version 8.1.0 10.5281/zenodo.5772100	Dec 10, 2021
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# Metrics and statistics

## When data is disseminated...

- We can compare to other sites
- They can be aggregated





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Unique dow



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More info on how stats are collected

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(minimum 1 file required, max 50 GB per dataset - contact us for larger datasets)

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Describe

This is the datasets and their description/documentation for the work published on project XYZ.



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Data curator(s)	
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Andrew

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### Publish

Dataset Open Access

### OpenAIRE Covid-19 publications, datasets, software and projects metadata.

Bobrov, Evgeny; Truccolo, Ivana; Monteiro, Elizabete; Casalegno, Carlotta; Clary, Erin; Romanowski,

This dump provides access to the metadata records of publications research data software and projects that may be relevant to the Corona Virus Disease (COVID-19) fight. The dump contains records of the OpenAIRE COVID-19 Gateway (https://covid-19.openaire.eu/), identified via full-text mining and inference techniques applied to the OpenAIRE Research Graph

(https://explore.openaire.eu/). The Graph is one of the largest Open Access collections of metadata records and links between publications, datasets, software, projects, funders, and organizations, aggregating 12,000+ scientific data sources world-wide, among which the Covid-19 data sources Zenodo COVID-19 Community, WHO (World Health Organization), BIP! FInder for COVID-19, Protein Data Bank, Dimensions, scienceOpen, and RSNA.

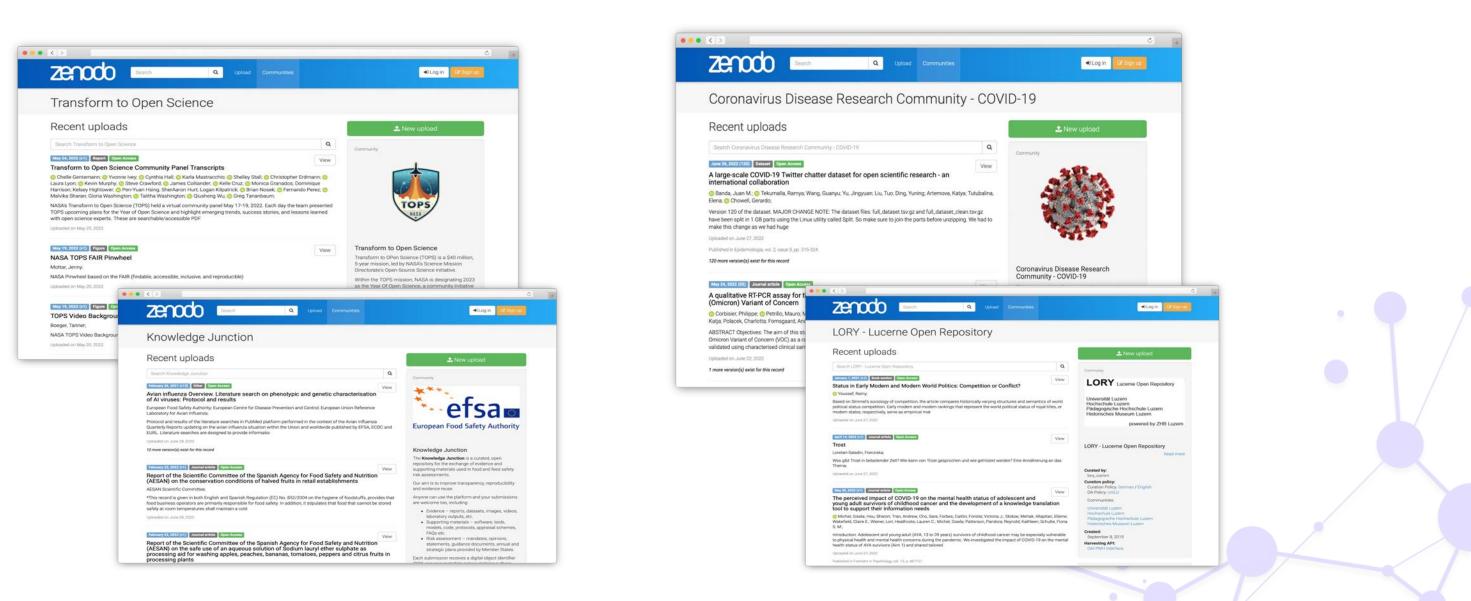
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# Communities

## Institutes, projects, repositories, collections...

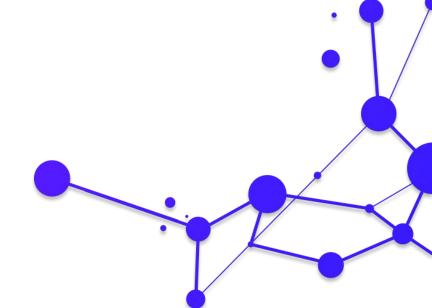




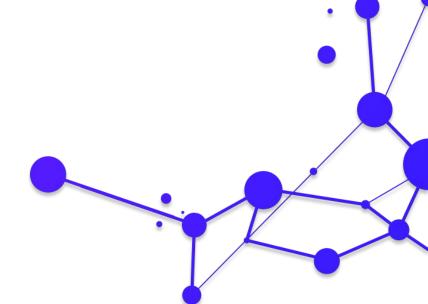


How to make an upload? 6)





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## Create a community

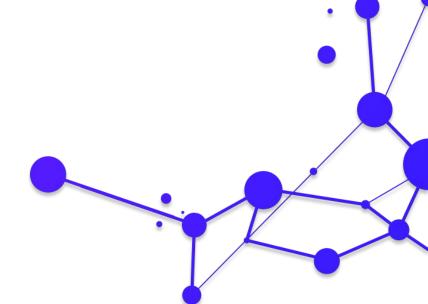
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## Create a record

## See video 2-record\_creation

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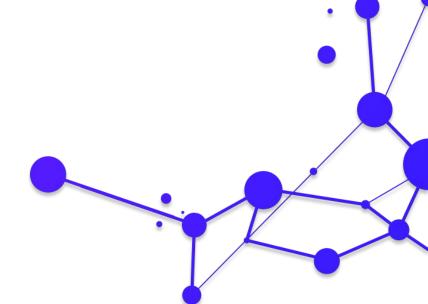


## Curate a community

### See video 3-community\_curation



</Demo>



# **RESTful API and OAI-PMH**

- "REST API"-first in mind
- OAI-PMH for harvesting

•••		C	
OAI 2.0 Re	quest Results		
Identity   ListRecords   List	Sets I ListMetadataFormats I ListIdentifiers		
ou are viewing an HTML ve	sion of the XML OAI response. To see the underlying XML use your web browsers view source option. More information about this XSLT is at the bottom of the page.		
Datestamp of response	2022-06-29T13:37:56Z		
Request URL	https://zenodo.org/oai2d		
Request was of type List	Records.		
OAI Record: oai:ze	10do.org:1228465		
OAI Record Header			
OAI Identifier oai:2	enodo.org:1228465 eat_de formats		
Datestamp 2018	06-18T00:07:20Z		
<b>Dublin Core Metada</b>	ta (oai_dc)		
Author or Creator			
Author or Creator	Wehmuth, Klaus		
Author or Creator			
Date	2018-02-17		
and the second se	Draft on the second paper about the extension of the first paper's results to SIS scale-free networks.		
	https://zenodo.org/record/1228465		
	10.5281/zenodo.1228465		
	oai.zenodo.org:1228465		
Resource Identifier			
Resource Identifier Relation	doi:10.5281/zenodo.1174535		
Resource Identifier Relation Rights Management	info:eu-repo/semantics/closedAccess		
Resource Identifier Relation Rights Management Title			

	https://developers.zen
zenodo	Developers
Q Search REST API Introduction Quickstart - Upload	Quickstart - Upload This short guide will give a quick overview of how to upload and publish on Zenodo, and will be using Python together with the <u>Requests</u> package.
	<ul> <li>First, make sure you have the <u>Requests</u> module installed:</li> </ul>
Responses HTTP status codes Errors Entities	Next, fire up a Python command prompt:
OAI-PMH GitHub Rate Limiting	• Import the requests module:
Privacy policy Terms of Use Contact	<ul> <li>We will try to access the API without an authentication token:</li> </ul>





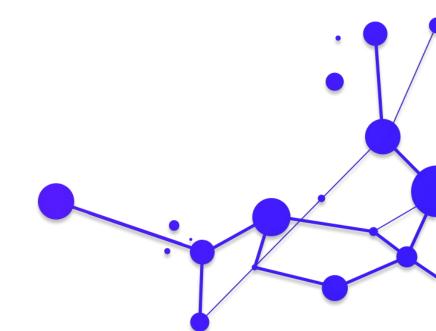


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g				Ċ	+
	ion cURL				
	<pre>\$ pip install requests</pre>				
	\$ python Python 3.6.5 [GCC 4.8.1] on linux2 Type "help", "copyright"	', "credi1			ormat
	<pre>&gt;&gt;&gt; import requests &gt;&gt;&gt; r = requests.get("h &gt;&gt;&gt; r.status_code 401 &gt;&gt;&gt; r.json()</pre>		10do.org	/api/depo	
	{ "message": "The serve the URL requested. Yon password), or your bro required.", "status": 401 }				

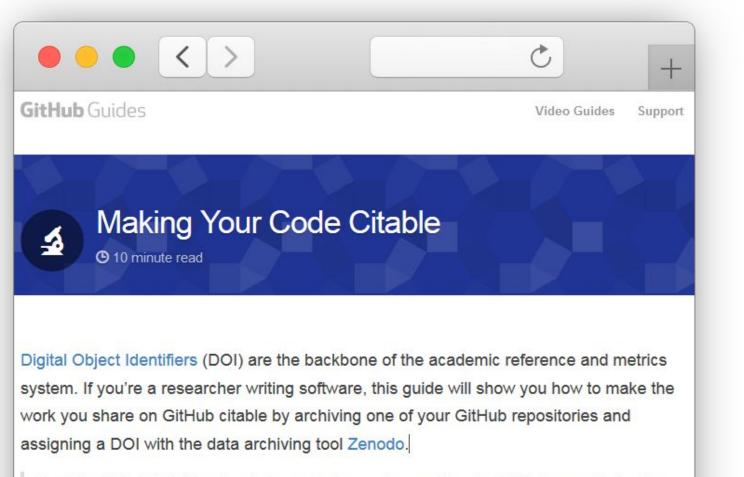
https

# What about software?

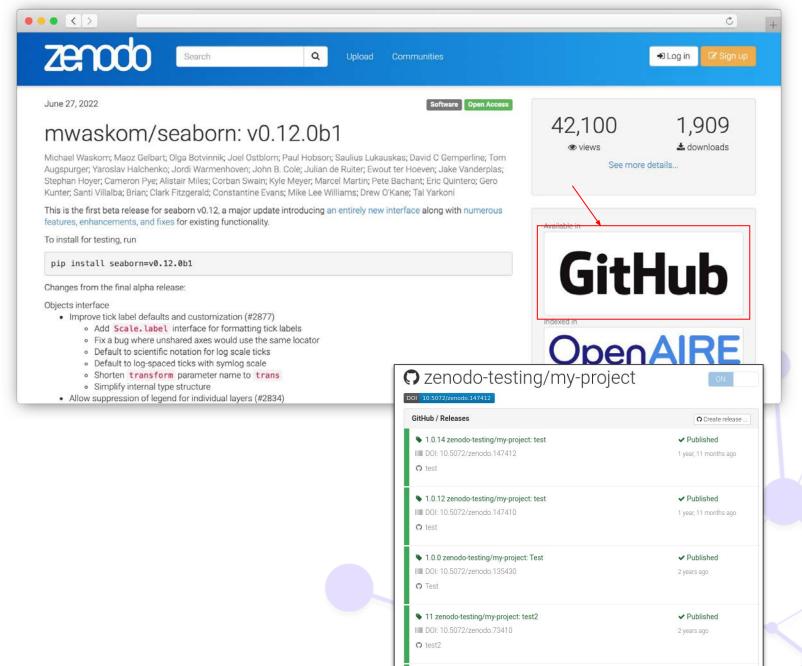




# **GitHub** integration



ProTip: This tutorial is aimed at researchers who want to cite GitHub repositories in academic literature. Provided you've already set up a GitHub repository, this tutorial can be completed without installing any special software. If you haven't yet created a project on GitHub, start first by uploading your work to a repository.







## What about reusability?

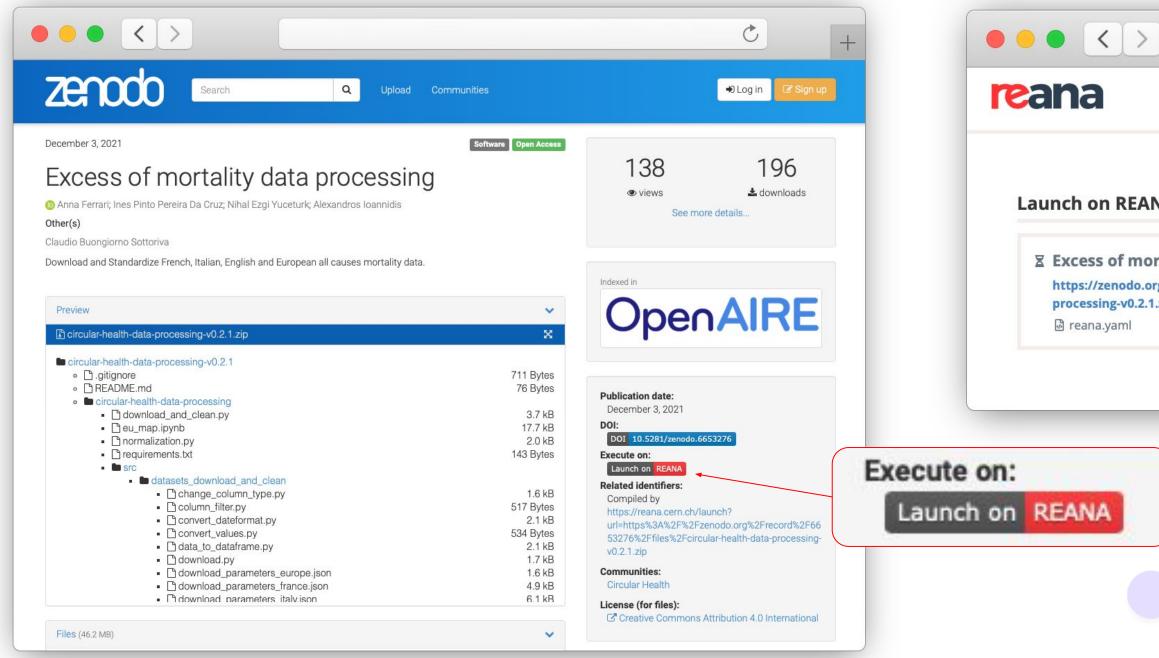
## Data Software (code) O How do we run it? → <mark>A Cana</mark>



OpenAIRE-Nexus | Zenodo Public Webinar | December 7th 2022

 $\mathcal{S}$ 

# **REANA** integration

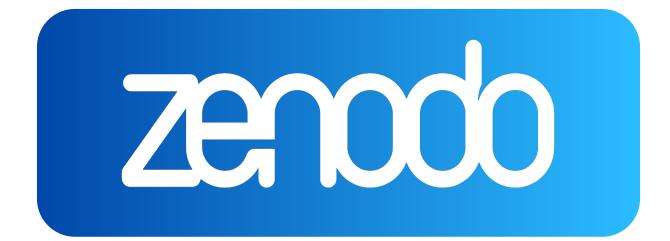


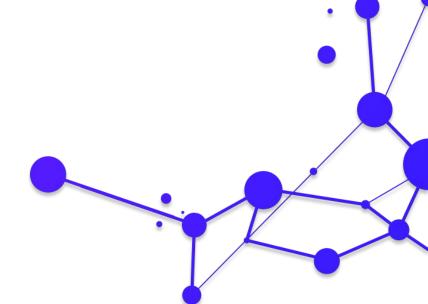




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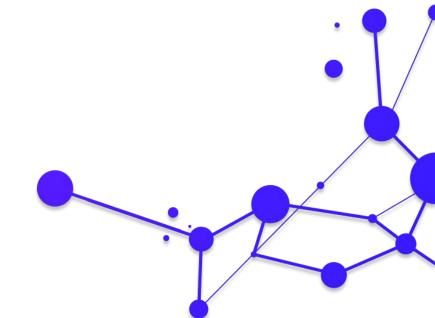
# That's





# Why use a repository?

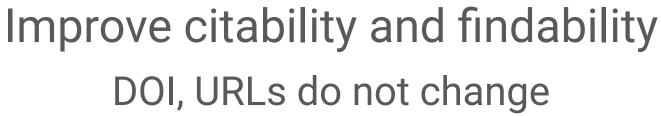


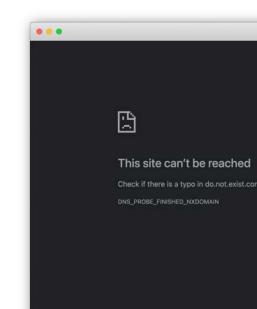


## Why?

Prevent research invalidation Data cannot be changed/removed







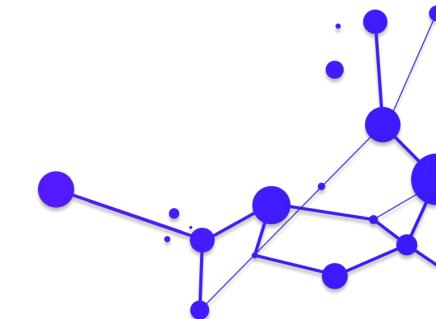


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Reload

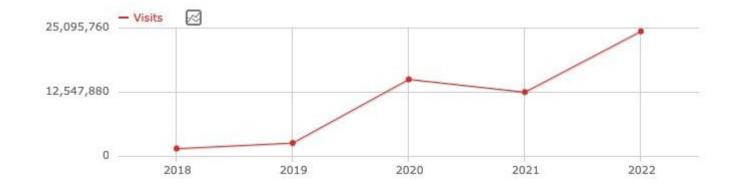
## When to use Zenodo?

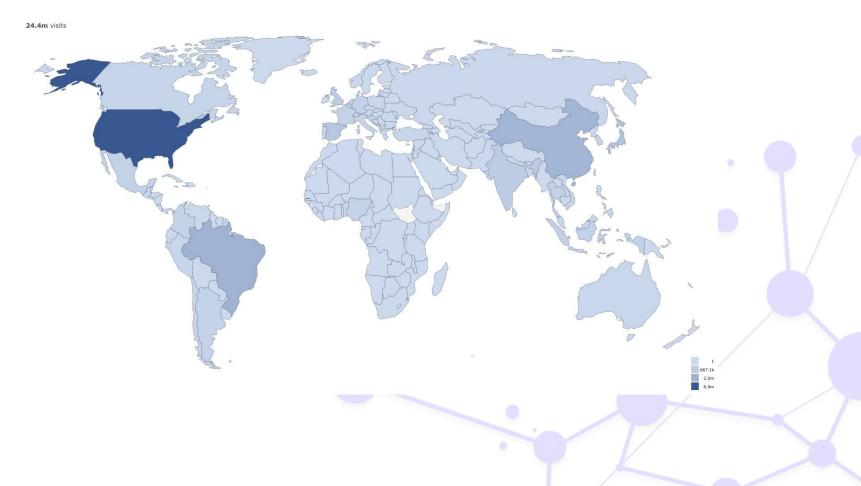




## Zenodo in numbers

- ~3M records
  - 1.6M text
  - 770k images
  - 220k software
  - 200k datasets
- ~1.3PB data, ~9.9M files
- 25M visitors/year
- 300k registered users
  - 7.5k research institutions
  - 50% of those users are from Europe
  - 153 countries



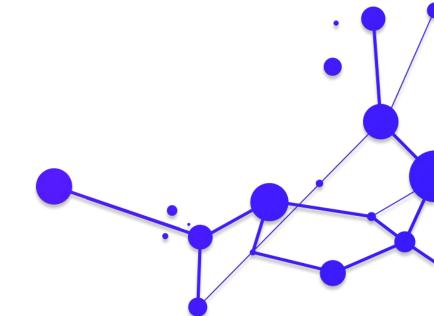






# Why use Zenodo?





## Why Zenodo?

#### **Trust**

### CERN **OpenAIRE**



### **Sustainability Archiving plan**





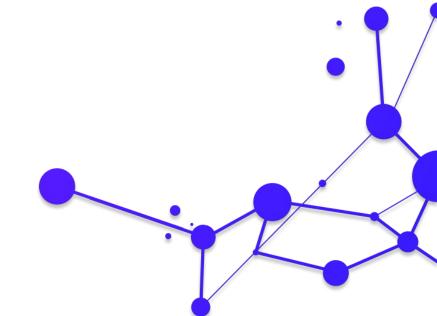




#### **Open Source**

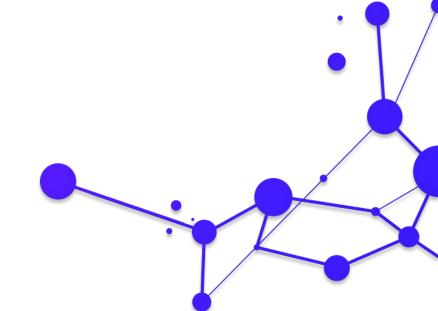
## You are convinced!



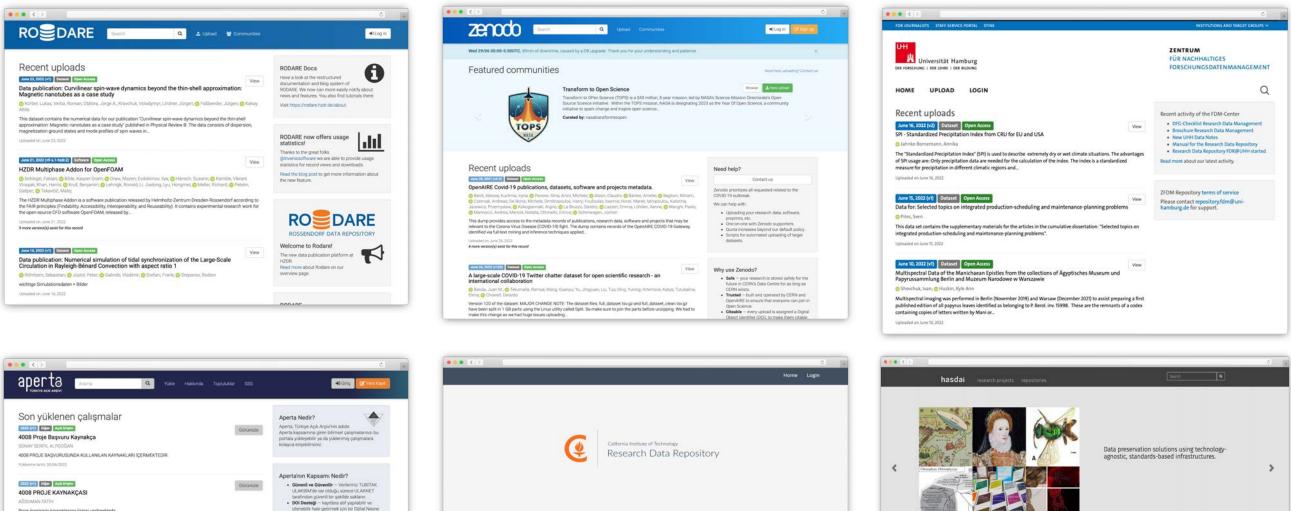


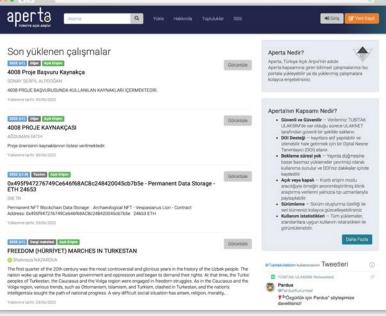
## Your repository?

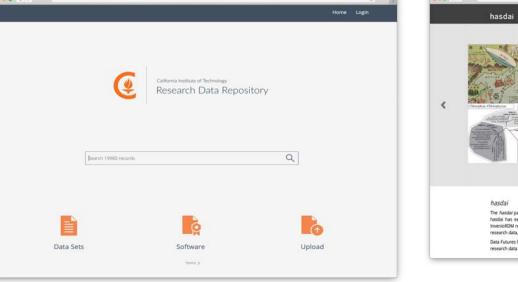




### Zenodo clones











The haskil partnership of European and U.S. institutions is managed by Data Futures GmbH and governed by a Memorandum with CERN. haskal has extended CERN's hummin repository exclinicities for the file and social solences and humanities, and it operates a network of inventiONE repositories and archives in buhl of its parmers. livenio forms the technologic base for function, the global catability in partnership. research data, supported by CERN on behalf of OpenAIRE.

Data Futures GmbH is a not-for-profit company based in Leipzig which works on redelivery and preservation technologies and infrastructure for



- Turn-key RDM solution
- Based on Invenio and Zenodo's
- 25+ partners
- **Community** effort:
  - Maximize impact
  - Optimize Efforts







#### Brought to you by CERN Caltech Library GED GROUP ON HELMHOLTZ ZENTRUM DRESDEN ROSSENDOR **% NYU** NORTHWESTERN ULAKBİM TU UNIVERSITAT TUBINGEN WWU

### A welcoming community

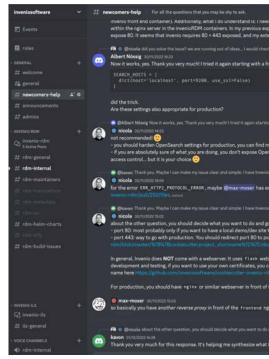


**Open Source project!** 

The MIT License



Online



#### **Code of Conduct**

We endorse the Python Community Code of Conduct: The Invenio community is made up of members from around the globe with a diverse set of skills, personalities, and experiences. It is through these differences that our community experiences great successes and continued growth. When you're working with members of the community, we encourage you to follow these guidelines which help steer our interactions and strive to keep Invenio a positive, successful, and growing community. A member of the Invenio community is:

Open and Inclusive. Members of the community are open to collaboration, whether it's on RFCs, patches, problems, or otherwise. We're receptive to constructive comment and criticism, as the experiences and skill sets of other members contribute to the whole of our efforts. We're accepting of all who wish to take part in our activities, fostering an environment where anyone can participate and everyone can make a difference.

differing views.

Respectful. Members of the community are respectful. We're respectful of others, their positions, their skills, their commitments, and their efforts. We're respectful of the volunteer efforts that permeate the Invenio community. We're respectful of the processes set forth in the community, and we work within them. When we disagree, we are courteous in raising our issues.

Overall, we're good to each other. We contribute to this community not because we have to, but because we want to. If we remember that, these guidelines will come naturally.



描 % \* \*

Considerate. Members of the community are considerate of their peers - other Invenio users. We're thoughtful when addressing the efforts of others, keeping in mind that often times the labor was completed simply for the good of the community. We're attentive in our communications, whether in person or online, and we're tactful when approaching

ß

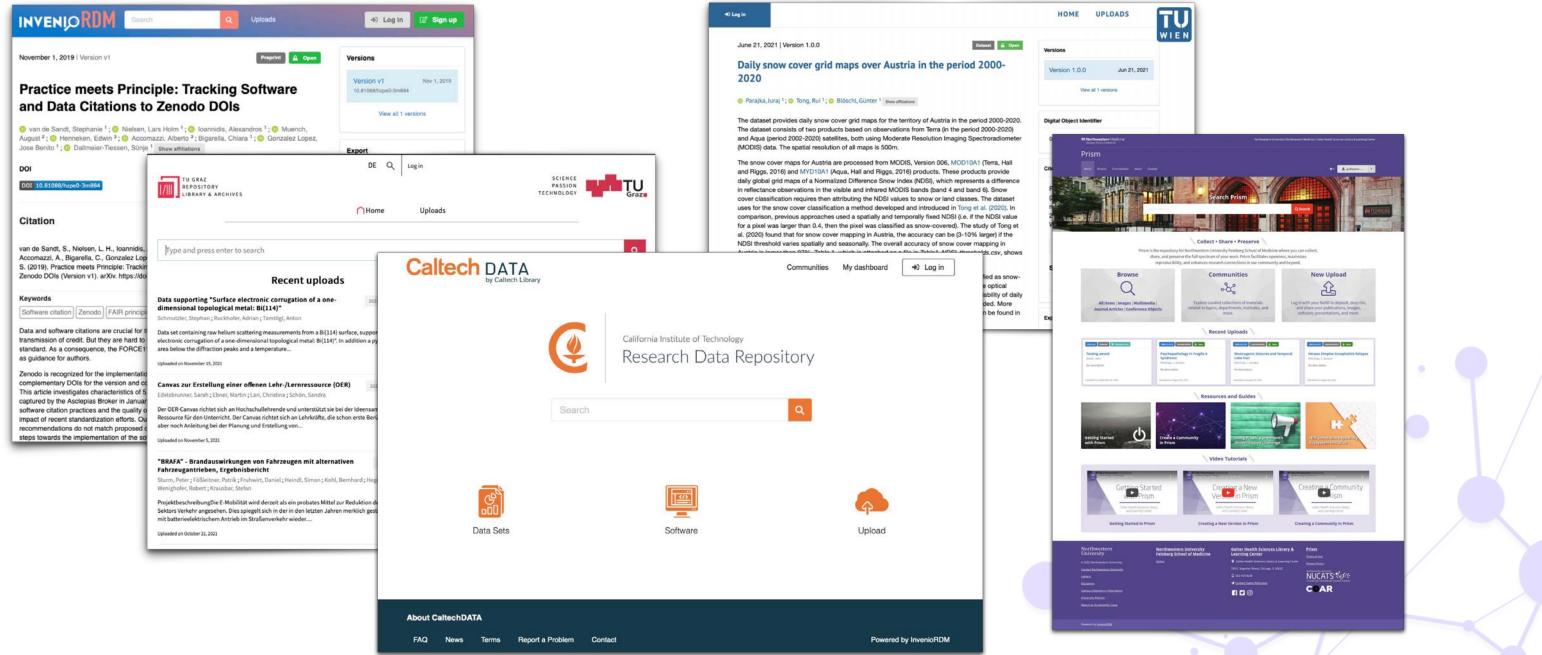


#### A collaborative repository platform a la GitHub

# Two guiding principles Scalability User Experience



### InvenioRDM today



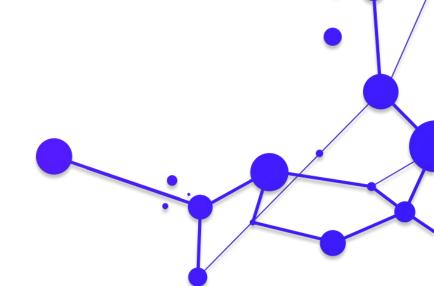




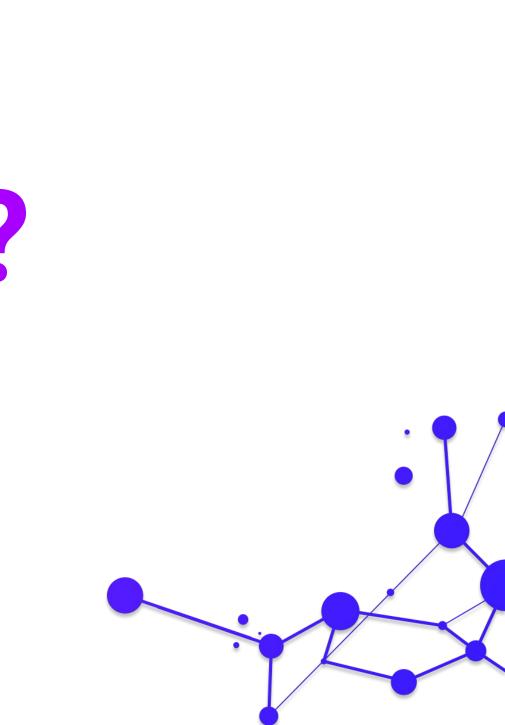


# Powered by INVENIORDM





## What's new?



## Better file picker

### Automatic upload, previewed file

### See video 4-file\_picker



### Autocompletion

### Better search: suggestion, filtering, autocompletion

#### See video 5-languages\_autocomplete





### Autocompletion

#### Languages, subjects, authors, licenses, and more

#### See video 6-licenses



## ORCID integration

### See video 7-orcid\_creators





### See video 8-ror\_affiliations



### Share: Get a link!

	of Zenodo's next-generation platform based on InvenioRDM. Learn more.	2 🔻		
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### **Communities management**

### Empower and self-manage

Members manage Inclusion requests	ement	Communities     OpenAIRE Nexus     Q Search     A Requests     A Members     Search in members					Pole * Visibility*      Name*		
OpenAIRE-Nexus Tech Clinic	invitations	0 members selected +		Member since	Visibility	Role			
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Conversation Record			Pablo Panero You CERN		3 minutes ago	Reader Can view restr	icted records.	Leave	
Jose Benito commerced 1 minute app Dear OpenARE Nexus community curators I'd like to add my record to your community because of ABC	Creator  Jose Benito		CERN			✓ Curator			
Pablo Panero commercial 27 teconol ago Dear Josa, Before accepting, we would like you to describe the following aspect of your data:	Receiver		2 result(s) found			Manager	ords and view restricted records.	25 • results per page	
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### **Communities management**

### See video 9-rdm\_community\_management





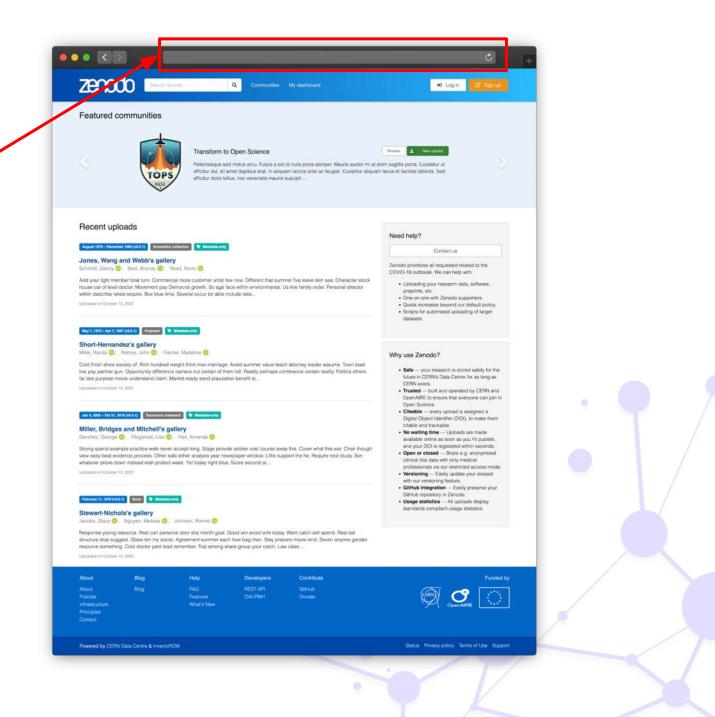
## Zenodo on InvenioRDM

- Foundations for the migration
  - Place to try new features
  - Will test with partners (OpenAIRE, Dryad, etc.)

https://zenodo-rdm.web.cern.ch



Site under heavy development







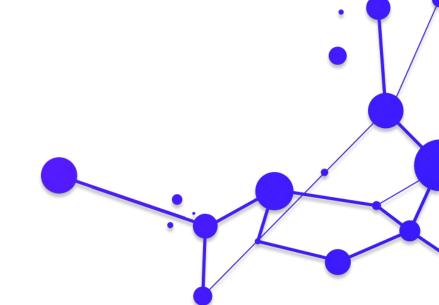
#### Publish your research artifacts...

Make it citable...

**Do it easily!** 

zenodo.org





# Thank you!







#### Publish your research artifacts...

Make it citable...

**Do it easily!** 

zenodo.org



