

# ETD & Open Science: Improving the Discoverability and Impact through Persistent Identifiers (PIDs)

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ETD 2023, Gujarat, India'*



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# **Persistent identifiers (PIDs)**

# PIDs for people, places and things

**PIDs for people (researchers)  
include ISNI and ORCID**



<https://orcid.org/0000-0001-6622-4910>



**PID for places (research  
institutions) include ROR**



<https://ror.org/01y2jtd41>



**PIDs for things (research outputs and  
resources) include DOIs, handles, IGSN,  
ARK and more**



<https://doi.org/10.5061/dryad.708gr>



# PIDs

## What is a persistent identifier (PID)?

<https://doi.org/10.34848/GJO6SY>

Unique alphanumeric string referring to a digital resource.



<https://research-data.urosario.edu.co/dataset.xhtml?persistentId=doi:10.34848/GJO6SY>

*Always points to the same resource (a metadata representation)*

**DOIs** for research outputs and resources

<https://doi.org/10.5281/zenodo.3630248>



**ORCID iDs** for researchers

<https://orcid.org/0000-0001-6622-4910>



**ROR IDs** for research organizations

<https://ror.org/01y2jtd41>



# DataCite DOIs

**We are a global community that shares a common interest:** to ensure that research outputs and resources are openly available and connected so that their reuse can advance knowledge across and between disciplines, now and in the future.

As a community, we make research more effective with metadata that connects research outputs and resources—**from samples and images to data and preprints**. We enable the creation and management of persistent identifiers (PIDs), integrate services to improve research workflows, and facilitate the discovery and reuse of research outputs and resources.

# Our Community



**2900+**

**Repositories**



**280+**

**Members**



**52**

**Countries**



**55m+**

**DOIs**



**1400+**

**Organizations**

# DOIs for research outputs

## Dataset



Who we are

---

### Data from: Towards robust evolutionary inference with integral projection models

Janeiro, M. J., University of St Andrews, University of Aveiro

Coltman, D. W.

Festa-Bianchet, M., University of Alberta

Pelletier, F., University of Alberta

Morrissey, M. B., University of St Andrews

Publication date: December 3, 2021

Publisher: Dryad

<https://doi.org/10.5061/dryad.708gr>

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### Citation

Janeiro, M. J. et al. (2021), Data from: Towards robust evolutionary inference with integral projection models, Dryad, Dataset, <https://doi.org/10.5061/dryad.708gr>






# Types of research outputs

**DataCite DOIs are suitable for a wide range of research outputs:**

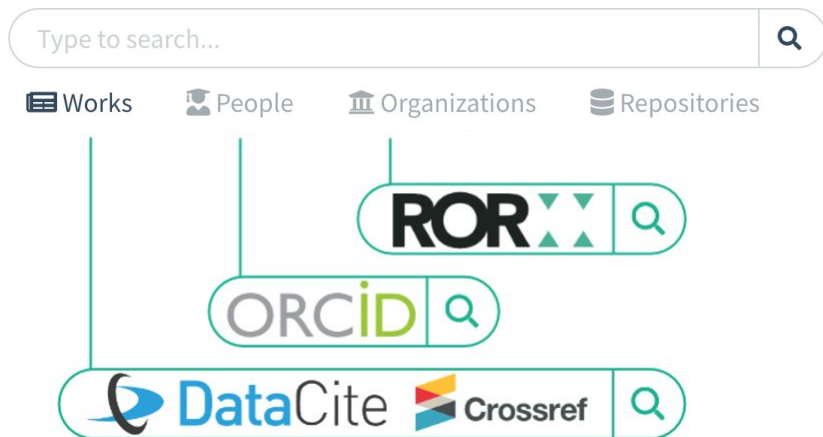
1. Research datasets and collections, associated workflows, software, images, and models
2. Grey literature such as theses, dissertations, reports, unpublished conference papers, newsletters, preprint journal articles, technical standards, and specifications for which the institutional repository is the primary publication point.

# Resource Types in DataCite Registry

Dataset	16,200,197	Dissertation		114,247
Physical Object	14,098,123	Report		113,489
Text	11,966,471	Conference Paper		82,792
Image	4,137,380	Book		82,658
Other	2,396,391	Sound		51,751
Journal Article	1,125,328	Book Chapter		33,303
Preprint	1,115,782	Event		17,604
Collection	977,478	Data Paper		15,437
Software	451,102	Model		7,351
Audiovisual	346,942	Workflow		5,751
Interactive Resource	127,466	Output Management		3,280
		Plan		

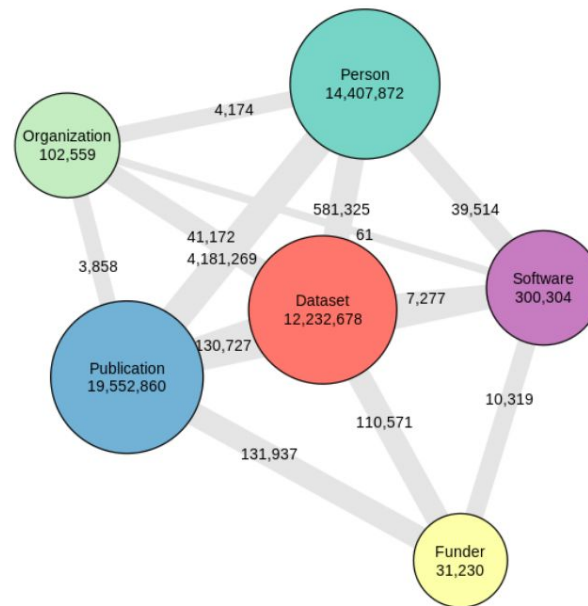
# Find and connect research

Find the research  
with DataCite Commons



## The PID Graph

Number of nodes and connections (August 2022)



**Questions?**

# **DOIs for ETDs**

PIDs such as DOIs, ORCID IDs, and ROR IDs can help identify outputs, contributors and organizations in the research ecosystem. **Theses and dissertations are and should be recognized as part of the scholarly record.**

Benefits of assigning DOIs to ETDs:

- Increasing the discoverability & visibility
- Improving accessibility
- Enabling citability
- Tracking impact

# DataCite DOIs for ETDs

DataCite DOIs can be used to identify ETDs and connect them to their authors, contributors and organizations through other PIDs.



The screenshot shows the Open Publishing LMU website. At the top, there is a blue header with the LMU logo and the text 'LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN' and 'OPEN PUBLISHING LMU'. Below the header, there are navigation links: 'KATALOG', 'REIHEN', 'ÜBER OPEN PUBLISHING LMU', and 'ÜBER UNS'. The main content area displays the title 'Post-Epochen: Die soziale Kreation kultureller Phänomene anhand einer Metasilbe von Petrarca bis Eric Dolphy' by Christopher Jakob Rudoll. A blue arrow points to the author's name, which is followed by a small icon and the URL 'https://orcid.org/0000-0002-7325-8438'. Below the author's name, the DOI is listed as 'DOI: https://doi.org/10.5282/oph.1'. Further down, the keywords 'SCHLAGWORTE: Kulturtheorie, Literaturtheorie, Renaissance, Poststrukturalismus, Jazz' are displayed. To the right of the text is a small image of the book cover, which features a photograph of a person playing a saxophone.

Rudoll, C. J. (2019). *Post-Epochen*  
[Ludwig-Maximilians-Universität München].  
<https://doi.org/10.5282/OPH.1>

# ETDs metadata

DataCite metadata schema includes the **resourceTypeGeneral:Dissertation since 2021.**

Previously organizations could use the **resourceTypeGeneral:Text** and the secondary attribute **resourceType:Dissertation OR Thesis.**

```
{
  "data": {
    "id": "10.25781/kaust-ih30e",
    "type": "dois",
    "attributes": {
      "doi": "10.25781/kaust-ih30e",
      "prefix": "10.25781",
      "suffix": "kaust-ih30e",
      "identifiers": [
        {
          "identifier": "http://hdl.handle.net/10754/691427",
          "identifierType": "Handle"
        }
      ],
      "alternateIdentifiers": [
        {
          "alternateIdentifierType": "Handle",
          "alternateIdentifier": "http://hdl.handle.net/10754/691427"
        }
      ]
    }
  },
  "types": {
    "ris": "THES",
    "bibtex": "phdthesis",
    "citeproc": "thesis",
    "schemaOrg": "Thesis",
    "resourceType": "Thesis",
    "resourceTypeGeneral": "Dissertation"
  }
},
```




# ETDs metadata

The DataCite metadata schema includes properties that facilitate connections between works and other types of entities, such as people and organizations.

These properties enable references to many types of persistent identifiers, representing different types of works, people, and organizations. Including connections to other PIDs in DataCite DOI metadata helps realize the PID Graph and promotes interoperability between systems.

```
<creator>
  <creatorName nameType="Personal">Almushaikeh , Alaa</creatorName>
  <nameIdentifier schemeURI="http://orcid.org" nameIdentifierScheme="ORCID">http://
orcid.org/0009-0003-5703-9563</nameIdentifier>
  <affiliation affiliationIdentifier="https://ror.org/01q3tbs38"
affiliationIdentifierScheme="ROR" schemeURI="https://ror.org">King Abdullah University of
Science and Technology (KAUST), Thuwal, Saudi Arabia</affiliation>
</creator>
```



# Rich Metadata for ETDs

**DataCite Commons**

Type to search...

Pages - Support Mohamad Mostafa

**Works** People Organizations Repositories

### Organometallic Copper(I) Halide for X-ray Imaging Scintillators <https://doi.org/10.25781/kaust-ih30e>

**Description** Other Identifiers Creators Registration

X-ray imaging scintillators and detectors play a critical role in numerous everyday life applications, including medical radiography, high-energy physics research, and security inspections. Despite its importance, current X-ray imaging technologies are not fully equipped to meet the growing demands for flexible, cost-efficient, and environment-friendly solutions. To overcome the limitations associated with traditional imaging scintillators, recent research efforts have focused on developing lead-free luminescent materials. Of particular interest are Cu(I) complexes, which exhibit excellent photoluminescence behavior, a facile synthesis process, and a high atomic number, making them an ideal candidate for X-ray imaging applications. Our work focuses on developing a low-dimensional Cu(I) organometallic halide and utilizing it as an imaging scintillator for real-life X-ray imaging. By utilizing the 0D Cu(I)-based imaging scintillators, we successfully obtained detailed images of both biological and non-biological objects, with a low detection limit of 458.3 mGy/s and high resolution of 16.8 lp/mm. This study not only provides a design roadmap for Cu(I) luminescent materials, but also highlights their potential for high-impact real-life X-ray imaging applications. Overall, our findings represent a significant step forward for X-ray imaging technology and its widespread applications in fields such as medicine and security.

Thesis published 2023 in KAUST Research Repository

[Dissertation](#)

<https://doi.org/10.25781/kaust-ih30e>

### 52 References

**Filter Works**

Type to search...

#### Publication Year

<input type="checkbox"/> 2023	4
<input type="checkbox"/> 2022	13
<input type="checkbox"/> 2021	11
<input type="checkbox"/> 2020	4
<input type="checkbox"/> 2019	5
<input type="checkbox"/> 2018	4
<input type="checkbox"/> 2016	2
<input type="checkbox"/> 2015	3
<input type="checkbox"/> 2014	1
<input type="checkbox"/> 2010	1
<input type="checkbox"/> 2009	1
<input type="checkbox"/> 2004	1
<input type="checkbox"/> 2000	1
<input type="checkbox"/> 1980	1

#### Work Type

<input type="checkbox"/> Journal Article	29
<input type="checkbox"/> Text	21

#### Publication Year

#### Work Types

Journal Article	56%
Book Chapter	
Text	

#### Licenses

Missing	77%
CC-BY 4.0	
CC-BY-NC-ND 4.0	
CC-BY 3.0	

### Blue Emitting Single Crystalline Assembly of Metal Halide Clusters

Chenkun Zhou, Haoran Lin, Michael Worku, Jennifer Neu, Yan Zhou, Yu Tian, Sujin Lee, Peter Djurovich, Theo Siegrist & Biwu Ma  
Journal Article published 2018 in *Journal of the American Chemical Society*

DOI registered via Crossref.

25 Citations

[Journal Article](#)

<https://doi.org/10.1021/jacs.8b07731>

### New luminescent copper(I) halide complexes containing Rb<sup>+</sup> complexes of 18-crown-6 as counter ions prepared from zerovalent copper

Julia A. Rusanova, Konstantin V. Domasevitch, Olga Yu. Vassilyeva, Vladimir N. Kokozay, Eduard B. Rusanov, Sergey G. Nedelko, Oksana V. Chukova, Birte Ahrens & Paul R. Raithby

# Connecting ETDs with research outputs

Plastic Scintillator Detectors for Particle Physics [https://doi.org/10.1007/978-3-030-73488-6\\_15](https://doi.org/10.1007/978-3-030-73488-6_15)

1 Citation

Download Metadata

## Cite as

Cushman, P. B., & Poehlmann, D.-M. (2021). Plastic Scintillator Detectors for Particle Physics. In *Topics in Applied Physics*. Springer Science and Business Media LLC. [https://doi.org/10.1007/978-3-030-73488-6\\_15](https://doi.org/10.1007/978-3-030-73488-6_15)

APA

## Share

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## Creators Registration

Priscilla Brooks Cushman

David-Michael Poehlmann

Book Chapter published 2021 in *Topics in Applied Physics*

Book Chapter

[https://doi.org/10.1007/978-3-030-73488-6\\_15](https://doi.org/10.1007/978-3-030-73488-6_15)

1 Citation

## Filter Works

Type to search... x Q

## Creators & Contributors

Almushaikeh, Alaa 1

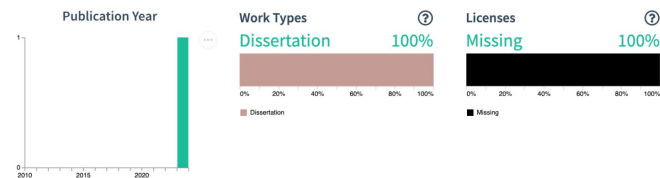
## Publication Year

2023 1

## Work Type

Dissertation 1

## License



Organometallic Copper(I) Halide for X-ray Imaging Scintillators

Alaa Almushaikeh

Thesis published 2023 in [KAUST Research Repository](#)

X-ray imaging scintillators and detectors play a critical role in numerous everyday life applications, including medical radiography, high-energy physics research, and security inspections. Despite its importance, current X-ray imaging technologies are not fully equipped to meet the growing demands for flexible, cost-efficient, and environment-friendly solutions. To overcome the limitations associated with traditional imaging scintillators, recent research efforts have focused on developing lead-free luminescent materials

Mn<sup>4+</sup>-Doped Fluoride Nanocrystals Enable High-Resolution Red-Emitting X-ray Imaging Screens

<https://doi.org/10.1021/acsmaterialslett.2c00746>

1 Citation

Download Metadata

## Cite as

K. E. Yorov et al., "Mn<sup>4+</sup>-Doped Fluoride Nanocrystals Enable High-Resolution Red-Emitting X-ray Imaging Screens," *ACS Materials Letters*, vol. 4, no. 11, pp. 2273–2281, Oct. 2022, doi: 10.1021/ACSMATERIALSLETT.2C00746.

IEEE

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## Creators Funders Registration

DOI registered April 25, 2023 via Crossref

Journal Article published 2022 in *ACS Materials Letters*

Journal Article

<https://doi.org/10.1021/acsmaterialslett.2c00746>

1 Citation

## Filter Works

Type to search... x Q

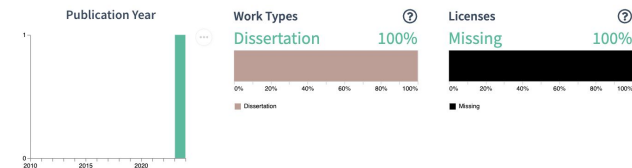
## Creators & Contributors

Almushaikeh, Alaa 1

## Publication Year

2023 1

## Work Type



Organometallic Copper(I) Halide for X-ray Imaging Scintillators

Alaa Almushaikeh

Thesis published 2023 in [KAUST Research Repository](#)

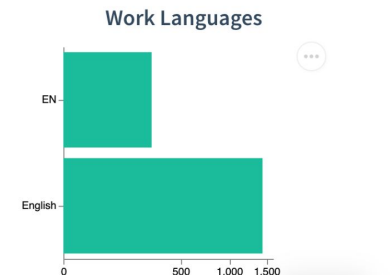
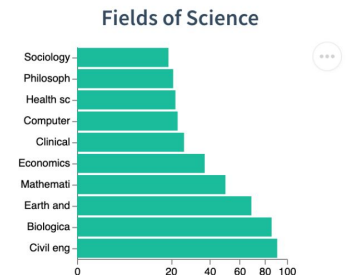
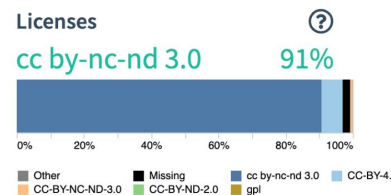
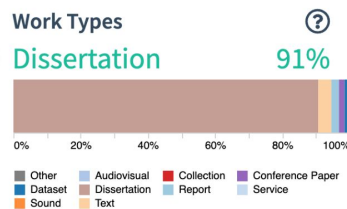
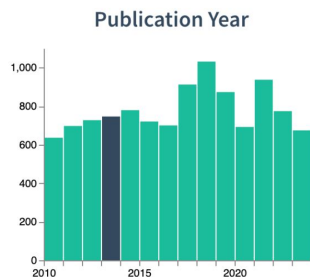
# Rich Metadata for Repositories

University of New South Wales

25,723  
Works

92  
Citations

## 25,723 Works

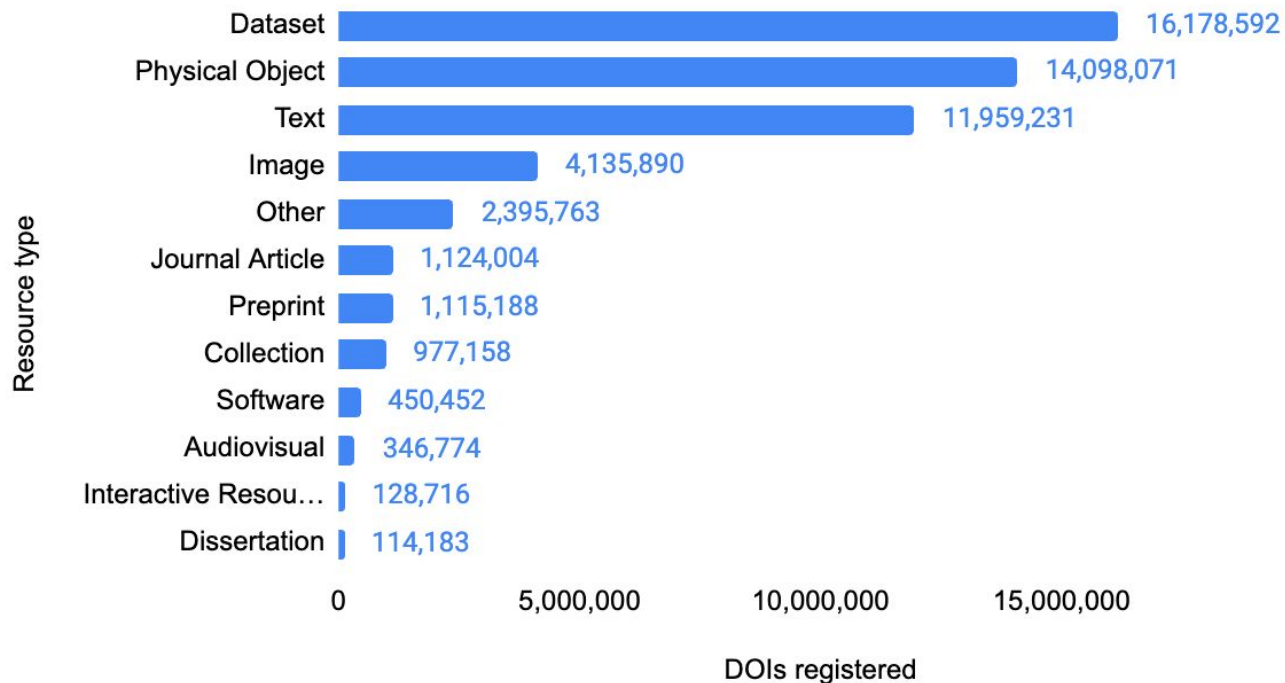


FEEDBACK

**DOIs for ETDS**

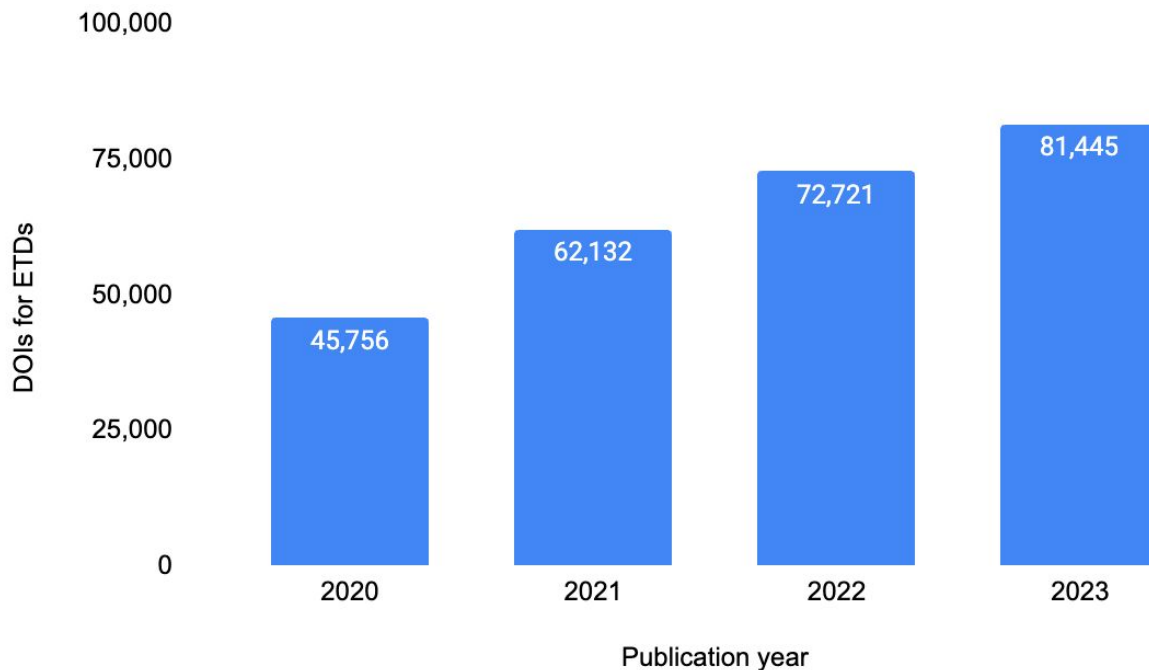
**Progress to date**

## Top 12 resource types in the DataCite Registry



# DataCite DOIs for ETDs

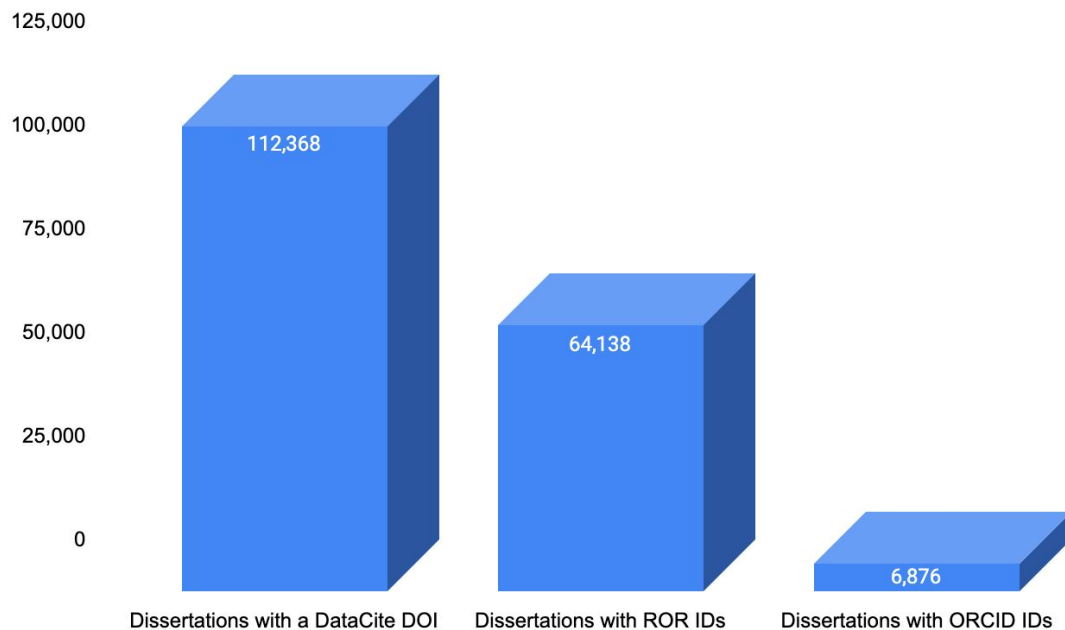
DOIs for ETDs by publication year



*Includes resourceTypeGeneral: Dissertation and resourceType: Dissertation OR Thesis*

# DataCite DOIs for ETDs

ETDs metadata in the DataCite Registry

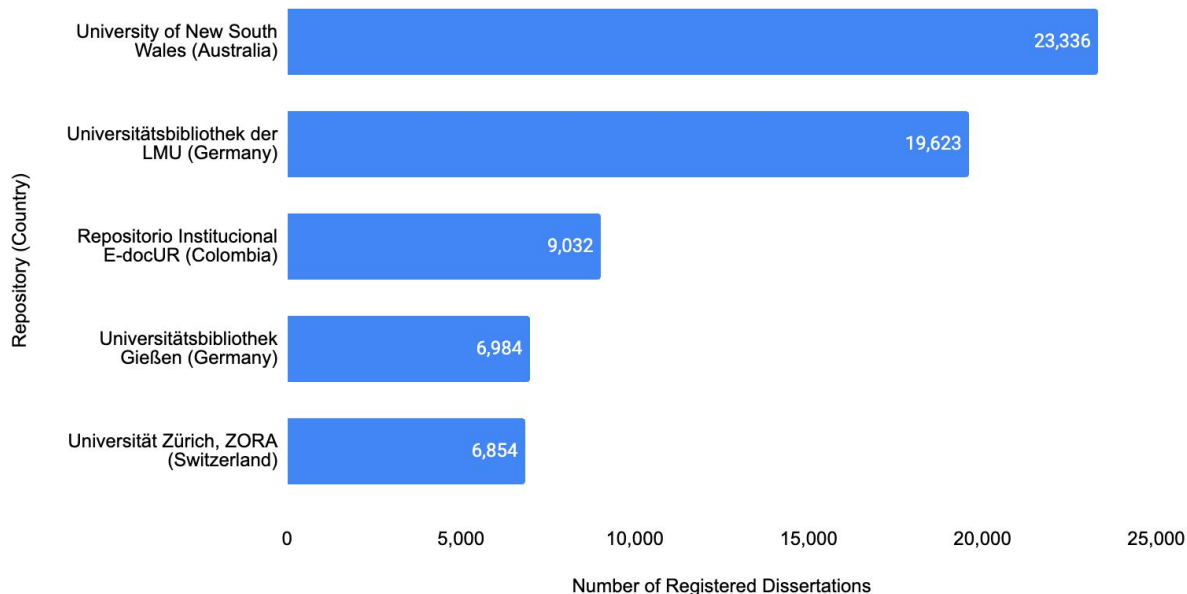


*Includes resourceTypeGeneral: Dissertation*



# DataCite DOIs for ETDs

Top 5 repositories registering DOIs for ETDs



*Includes resourceTypeGeneral: Dissertation*

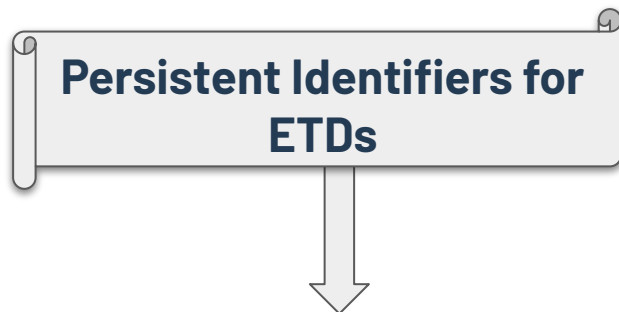
# Analysis for ETDs in DataCite Registry

**Growing community interest** in identifying ETDs with DOIs:

- 12th resource type (out of 28)
- Consistent yearly growth of DOI registration for ETDs in the last four years
- Almost 50% of “Dissertation” DOIs are connected to a ROR ID. Only 6% are connected to ORCID IDs

PIDs and metadata can improve transparency and recognition for ETDs by enabling trustworthy connections between dissertations their authors/contributors and organizations, among others.

Still more **awareness** is needed to encourage **rich metadata** for ETDs (update metadata to use accurate resource type, deposit references, and connect other PIDs in the metadata)



Implementing PIDs for theses and dissertations can help enhance the visibility and accessibility of research outputs within the **Open Science** framework. This practice promotes more transparency, collaboration and **interconnection in the** research ecosystem.



**Questions?**



CONNECTING RESEARCH,  
ADVANCING KNOWLEDGE



[info@datacite.org](mailto:info@datacite.org)



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