



CONNECTING RESEARCH,  
ADVANCING KNOWLEDGE

# DataCite Metadata Training

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[@datacite](https://twitter.com/datacite)



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# Agenda



- The DataCite Metadata Schema
- DataCite metadata journey
- Making connections with DataCite metadata

# **The DataCite Metadata Schema**

## **Context**

# What is metadata?

data that provides information about other data

not the content of the data

metadata helps us understand the structure, nature, and context of the data

# What is DOI metadata?

## Digital Object Identifiers (DOIs) are great all by themselves

- DOI metadata is the information collected during the registration of a DOI
- Provides information about the relevant resource
- Reliably find/cite a resource at the same URL
- Enhances connectedness and FAIRness
- Enable discovery through metadata aggregators

**...But there's so much more that we can do with DOI metadata!**

# What can you do with DOI metadata?

With DOI metadata, we can answer questions like:

- Which/how many **papers** cite a **dataset**? (or other DataCite resource type)
- What **software** was used to create a **dataset**?
- Which **datasets** are associated with a particular research **institution** or **funder**?
- Who are the **creators/contributors** associated with the **datasets**?

# What is a Schema?

“ logical plan showing the relationships between metadata elements, normally through establishing rules for the use and management of metadata specifically as regards the semantics, the syntax and the optionality (obligation level) of values- [ISO 23081-1:2017](#) ”

# What is a Schema?

“ logical plan showing the relationships between metadata elements, normally through establishing rules for the use and management of metadata specifically as regards the semantics, the syntax and the optionality (obligation level) of values- [ISO 23081-1:2017](#) ”

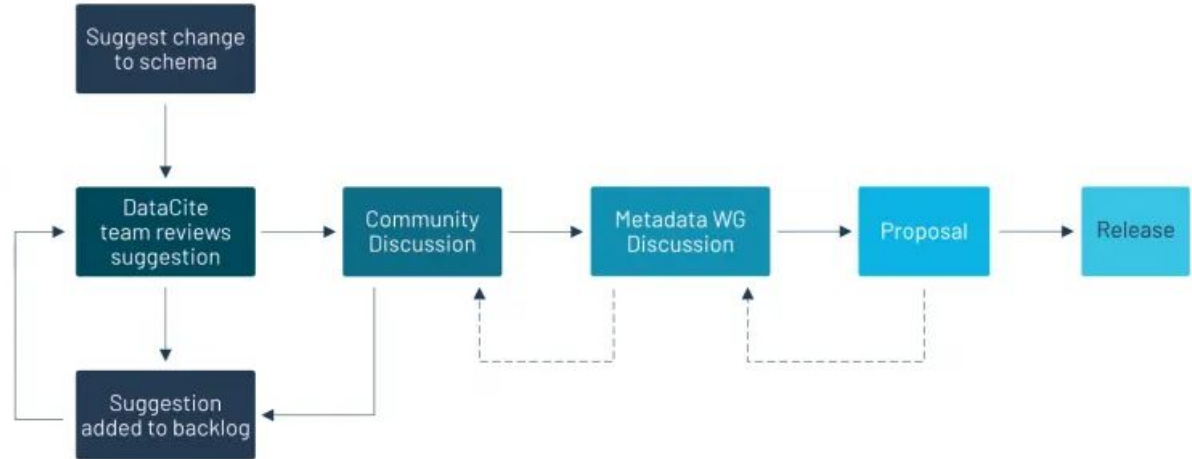
The DataCite Metadata Schema is specifically designed for DataCite DOIs



# Schema changes

## How does the schema change?

- Members contribute suggestions
- DataCite team reviews a assesses priority
- Community discussion
- [DataCite Metadata WG](#) discussion
- Proposal shared with community for feedback



Request For Comments: <https://tinyurl.com/metadata-rfc>

Contribute: <https://schema.datacite.org/contribute.html>

# Schema versions

## How does versioning work?

- Group of changes → new schema version
- Most recent major version: Schema 4
- Supported minor versions: 4.5, 4.4, 4.3, 4.2, 4.1, 4.0

## When is it updated?

- About every 1-2 years

Note:

- Support for schema 3 will be discontinued from January 2025

# Schema availability

- Documentation can be accessed from main site <https://schema.datacite.org>
- Documentation available for export in PDF
- Schema available in XSD
- Change notes available
- Examples available in XML and JSON

## DataCite Metadata Schema 4.5

Released 22 Jan 2024

### Documentation

DataCite Metadata Working Group. (2024). DataCite Metadata Schema Documentation for the Publication and Citation of Research Data and Other Research Outputs. Version 4.5. DataCite e.V. <https://doi.org/10.14454/g8e5-6293>

[Access documentation](#)

[Download PDF](#)

### Schema

DataCite Metadata Working Group. (2024). DataCite Metadata Schema for the Publication and Citation of Research Data and Other Research Outputs. Version 4.5. DataCite e.V. <https://doi.org/10.14454/znvd-6q68>

[View XSD](#)

### Changes

See [Version 4.5 Update](#) for full details.

- Addition of new values to the resourceTypeGeneral property:
  - Instrument
  - StudyRegistration
- Addition of new relationType pair: IsCollectedBy and Collects
- Addition of new sub-properties in the Publisher property:
  - publisherIdentifier
  - publisherIdentifierScheme

# **The DataCite Metadata Schema: Contents**

## What is the DataCite Metadata Schema?

- A list of core metadata properties chosen for an accurate and consistent identification of a resource for citation and retrieval purposes, along with recommended use instructions.
- The schema provides standardization which allows users to search across metadata, and thereby increases interoperability.

For more information:

<https://datacite-metadata-schema.readthedocs.io/en/4.5/>

## What is in the schema?

- The schema consists of 20 metadata **properties** (sometimes called “fields” or “elements”).
- Hierarchical structure: some properties have sub-properties.
- Some are mandatory, some recommended or optional.
- Some can be repeated.
- Some have controlled list values, some allow free text.

# Schema structure

## 20 metadata properties

### 6 Mandatory

ID	Property
1	<a href="#">Identifier</a>
2	<a href="#">Creator</a>
3	<a href="#">Title</a>
4	<a href="#">Publisher</a>
5	<a href="#">PublicationYear</a>
10	<a href="#">ResourceType</a>

# Mandatory properties example

## Metadata is primarily represented in XML

### 6 Mandatory

ID	Property
1	<a href="#">Identifier</a>
2	<a href="#">Creator</a>
3	<a href="#">Title</a>
4	<a href="#">Publisher</a>
5	<a href="#">PublicationYear</a>
10	<a href="#">ResourceType</a>

```
<identifier identifierType="DOI">10.21384/example</identifier>
<creators>
  <creator>
    <creatorName nameType="Personal">Garcia, Sofia</creatorName>
  </creator>
</creators>
<titles>
  <title xml:lang="en-US">Minimal DataCite XML Example</title>
</titles>
<publisher xml:lang="en">DataCite</publisher>
<publicationYear>2023</publicationYear>
<resourceType
resourceTypeGeneral="Other">Example</resourceType>
```



# resourceTypeGeneral

## Controlled list values

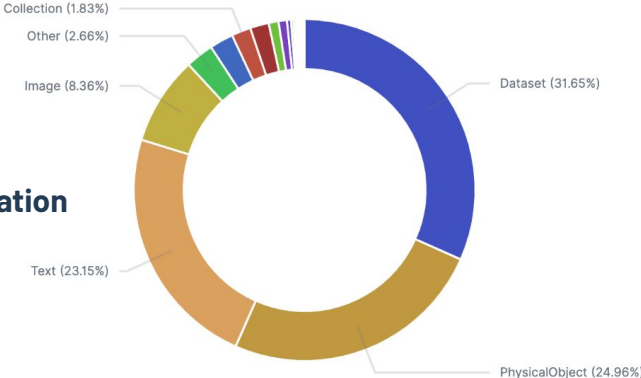
### 6 Mandatory

ID	Property
1	<a href="#">Identifier</a>
2	<a href="#">Creator</a>
3	<a href="#">Title</a>
4	<a href="#">Publisher</a>
5	<a href="#">PublicationYear</a>
10	<a href="#">ResourceType</a>

### Supports a variety of resource types:

Audiovisual  
Book  
BookChapter  
Collection  
ComputationalNotebook  
ConferencePaper  
ConferenceProceeding  
DataPaper  
Dataset  
Dissertation  
Event  
Image  
**Instrument**  
InteractiveResource  
Journal

JournalArticle  
Model  
OutputManagementPlan  
PeerReview  
PhysicalObject  
Preprint  
Report  
Service  
Software  
Sound  
Standard  
**StudyRegistration**  
Text  
Workflow  
Other



# Subproperties & attributes example

## Properties, subproperties & attributes

### 6 Mandatory

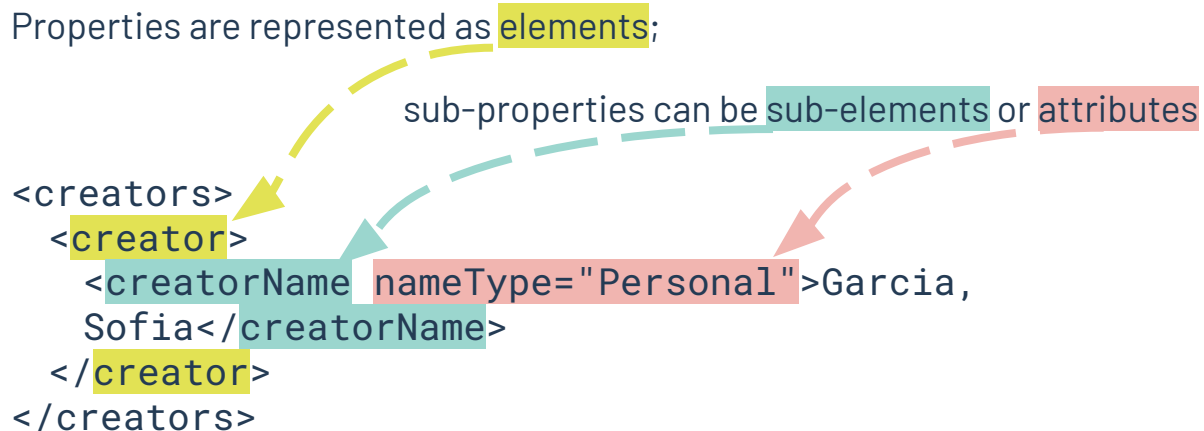
ID	Property
1	<a href="#">Identifier</a>
2	<a href="#">Creator</a>
3	<a href="#">Title</a>
4	<a href="#">Publisher</a>
5	<a href="#">PublicationYear</a>
10	<a href="#">ResourceType</a>

Properties are represented as **elements**;

sub-properties can be **sub-elements** or **attributes**

```

<creators>
  <creator>
    <creatorName nameType="Personal">Garcia,
    Sofia</creatorName>
  </creator>
</creators>
  
```



# Schema structure

## 20 metadata properties

### 6 Mandatory

ID	Property
1	<a href="#">Identifier</a>
2	<a href="#">Creator</a>
3	<a href="#">Title</a>
4	<a href="#">Publisher</a>
5	<a href="#">PublicationYear</a>
10	<a href="#">ResourceType</a>

### 6 Recommended and 8 Optional

ID	Property	Obligation
6	<a href="#">Subject</a>	R
7	<a href="#">Contributor</a>	R
8	<a href="#">Date</a>	R
9	<a href="#">Language</a>	O
11	<a href="#">AlternateIdentifier</a>	O
12	<a href="#">RelatedIdentifier</a>	R
13	<a href="#">Size</a>	O
14	<a href="#">Format</a>	O
15	<a href="#">Version</a>	O
16	<a href="#">Rights</a>	O
17	<a href="#">Description</a>	R
18	<a href="#">GeoLocation</a>	R
19	<a href="#">FundingReference</a>	O
20	<a href="#">RelatedItem</a>	O

# Summary: DataCite Metadata Schema

- Metadata helps us understand the structure, nature, and context of the resource
- Schema is a logical plan that shows how different parts of the metadata relate to each other
- Digital Object Identifier metadata, is the information collected during the registration of a DOI
- The DataCite Metadata Schema is community-driven.
- There are 20 properties (6 mandatory) with various sub-properties and attributes
- Include metadata that is *as complete as possible*
- Use the Recommended and Optional properties
  - Especially Subject, Description, Date, Contributor, Rights

# **DataCite metadata journey**

# The Journey Begins - DOI Registration

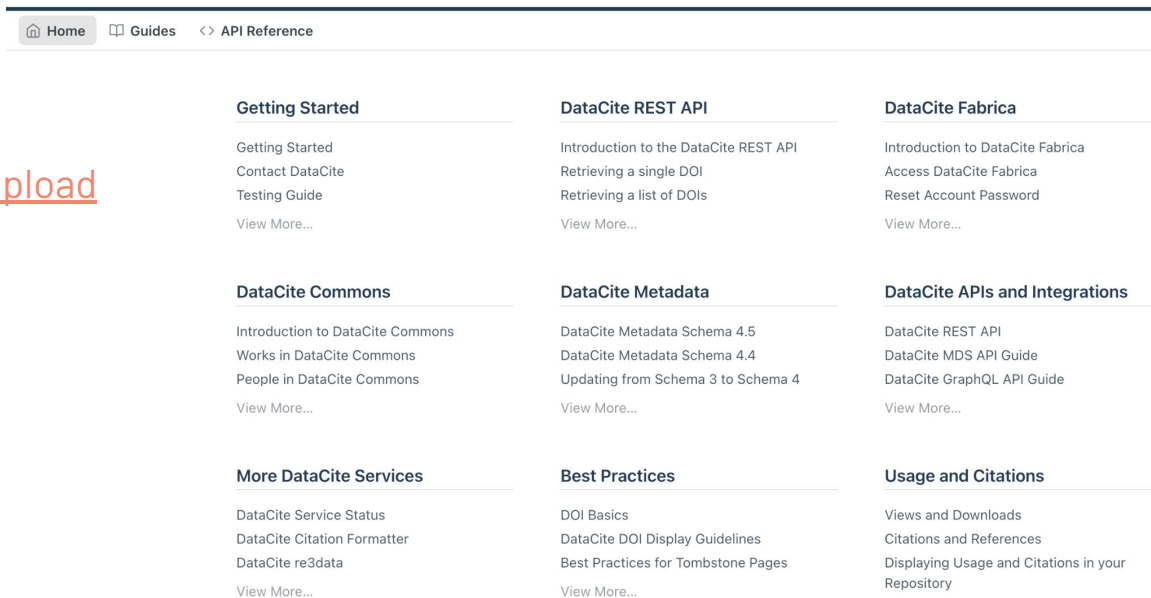


- Registration methods:

- [DataCite Fabrica - Form](#)
- [DataCite Fabrica - File Upload](#)
- [DataCite REST API](#)
- [DataCite MDS API](#)

- Formats:

- JSON
- XML
- [Other formats](#)



The screenshot shows the navigation menu of the DataCite support website. At the top, there are links for Home, Guides, and API Reference. Below this, the menu is organized into several categories, each with a list of links and a 'View More...' option.

- Getting Started**
  - Getting Started
  - Contact DataCite
  - Testing Guide
  - View More...
- DataCite REST API**
  - Introduction to the DataCite REST API
  - Retrieving a single DOI
  - Retrieving a list of DOIs
  - View More...
- DataCite Fabrica**
  - Introduction to DataCite Fabrica
  - Access DataCite Fabrica
  - Reset Account Password
  - View More...
- DataCite Commons**
  - Introduction to DataCite Commons
  - Works in DataCite Commons
  - People in DataCite Commons
  - View More...
- DataCite Metadata**
  - DataCite Metadata Schema 4.5
  - DataCite Metadata Schema 4.4
  - Updating from Schema 3 to Schema 4
  - View More...
- DataCite APIs and Integrations**
  - DataCite REST API
  - DataCite MDS API Guide
  - DataCite GraphQL API Guide
  - View More...
- More DataCite Services**
  - DataCite Service Status
  - DataCite Citation Formatter
  - DataCite re3data
  - View More...
- Best Practices**
  - DOI Basics
  - DataCite DOI Display Guidelines
  - Best Practices for Tombstone Pages
  - View More...
- Usage and Citations**
  - Views and Downloads
  - Citations and References
  - Displaying Usage and Citations in your Repository

<https://support.datacite.org/>

# Metadata Storage, Indexing & Processing



- When you register a DOI, metadata is included in the **DataCite Metadata Store**
- Metadata for findable DOIs is indexed for retrieval
- When a findable DOI is created or updated, it is processed to reveal links between with research outputs i.e.:
  - Related identifiers (DOIs and URLs)
  - Creators with ORCID iDs
  - Creators with affiliations with ROR IDs
  - Funders with Crossref Funder IDs/ROR IDs
  - Publishers with ROR IDs

# Accessing DataCite Metadata

- [DataCite REST API](#)
- [DataCite OAI-PMH service](#)
- [Content Negotiation](#)
- [DataCite GraphQL API](#)

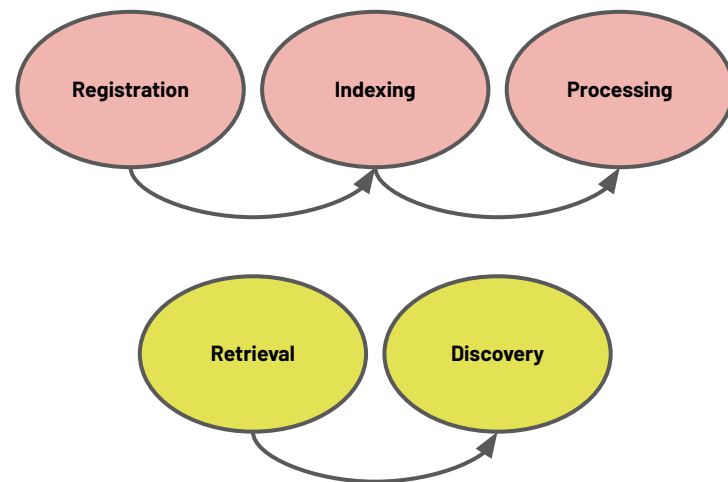


<https://commons.datacite.org>



# Summary: DataCite metadata journey

- When DataCite DOI metadata is registered, it is indexed in DataCite's Metadata Store and undergoes processing for services like Event Data.
- Metadata is made available for retrieval through DataCite's APIs, which are used for discovery services—including DataCite Commons and various metadata aggregators.



# **Making connections with DataCite metadata**

# Agenda

- Introduction to Connection metadata
- Connecting **Objects** to **Objects**
  - Citation counting in event data
- Connecting **Objects** to **Organizations**
  - Research Organization Registry (ROR)
- Connecting **Objects** to **People**
  - ORCID auto-update

## **DOIs are great all by themselves**

- Reliably find/cite a resource at the same URL
- Enable discovery through metadata aggregators

**...But there's so much more that we can do with DOI metadata!**

## With DOI metadata, we can answer questions like:

- Which/how many **papers** cite a **dataset**? (or other DataCite resource type)
- Which **software** was used to create a **dataset**?
- Which **datasets** are associated with a particular research **institution** or **funder**?
- Which **datasets** are associated with a particular **creator/contributor**?

# How do we do this?

## Connection metadata + persistent identifiers

```
<creator>
  <creatorName nameType="Personal">Garcia, Sofia</creatorName>
  <givenName>Sofia</givenName>
  <familyName>Garcia</familyName>
  <nameIdentifier schemeURI="https://orcid.org/"
  nameIdentifierScheme="ORCID">0000-0001-5727-2427</nameIdentifier>
  <affiliation affiliationIdentifier="https://ror.org/03efmqc40"
  affiliationIdentifierScheme="ROR" SchemeURI="https://ror.org">Arizona State
  University</affiliation>
</creator>

<relatedIdentifier relatedIdentifierType="DOI"
relationType="IsCitedBy">10.5438/ExampleArticle</relatedIdentifier>

<fundingReference>
  <funderName>European Commission</funderName>
  <funderIdentifier funderIdentifierType="Crossref Funder
  ID">https://doi.org/10.13039/501100000780</funderIdentifier>
</fundingReference>
```

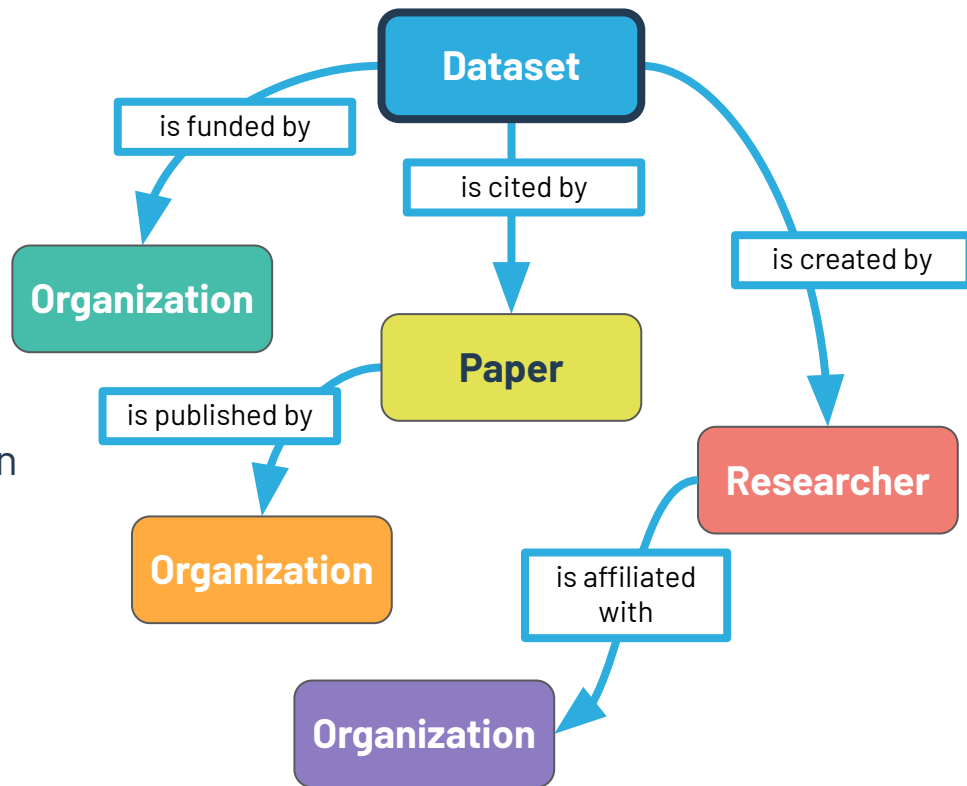


# What is connection metadata?









**Metadata that represents relationships—connections—between entities**

## Examples:

- A paper cites a dataset
- A person authors a paper
- A person is affiliated with an institution
- An institution funds a research output
- A dataset is compiled/created by software



# Connection metadata in the DataCite Schema

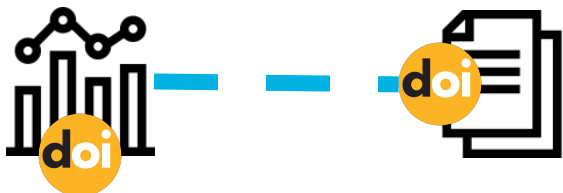
DataCite Metadata Schema property	Used for connections to...	Typical identifiers
relatedIdentifier	related research outputs - citations, versions...	DOIs  URLs, handles...
nameIdentifier <i>for Creators and Contributors</i>	authors and contributors	ORCID iDs (for people)  ROR IDs (for organizations) 
affiliationIdentifier <i>for institutions and organizations</i>	affiliated organizations	ROR IDs 
publisherIdentifier <i>for Publisher</i>	publishing organizations or platforms	ROR IDs  DOIs 
funderIdentifier <i>for FundingReferences</i>	funding organizations	Crossref Funder IDs  ROR IDs 



Connecting objects to objects

# Related Identifier

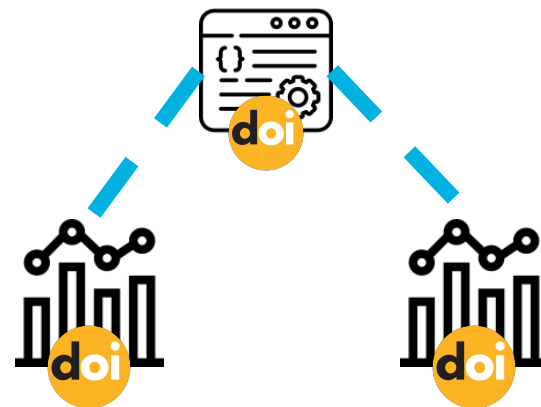
Represents a relationship between a DOI and another identifier—usually for a research output.



**Dataset to publication**



**Dataset to another dataset  
(ex, a new version)**



**Code/software to datasets  
generated using that code**

# Example: relatedIdentifier (xml)

**Value:** The related identifier  
(preferably full URI)

## Required attributes

- relatedIdentifierType
- relationType

## Optional attributes

- resourceTypeGeneral
- relatedMetadataScheme,  
schemeURI, schemeType  
(HasMetadata/ IsMetadataFor  
relation types only)


```
<relatedIdentifiers>
  <relatedIdentifier
    relatedIdentifierType="DOI"
    relationType="IsReferencedBy" >
    https://doi.org/10.1111/jeb.13000
  </relatedIdentifier>
  <relatedIdentifier
    relatedIdentifierType="DOI"
    relationType="References"
    resourceTypeGeneral="Software">
    https://doi.org/10.1234/abc.10000
  </relatedIdentifier>
</relatedIdentifiers>
```

...

# Example: Related identifier

Related IDs can also be added in Fabrica

**Related Identifiers** Identifiers of related resources.

10.1111/jeb.13000 

Must be a globally unique identifier. Visit our support website for [the list of supported unique identifiers](#).

\* Related Identifier Type

DOI ▼

The type of the Related Identifier.

\* Relation Type

Is referenced by ▼

The type of the Relation.

# Relation types

Citation	<ul style="list-style-type: none"><li>● IsCitedBy / Cites</li><li>● IsReferencedBy / References</li><li>● IsSupplementTo / IsSupplementedBy</li></ul>
Versioning	<ul style="list-style-type: none"><li>● IsNewVersionOf / IsPreviousVersionOf</li><li>● HasVersion / IsVersionOf</li><li>● IsObsoletedBy / Obsoletes</li><li>● IsIdenticalTo</li></ul>
Contextualization	<ul style="list-style-type: none"><li>● IsDescribedBy / Describes</li><li>● HasMetadata / IsMetadataFor</li><li>● IsDocumentedBy / Documents</li><li>● IsReviewedBy / Reviews</li></ul>

Whole / Part	<ul style="list-style-type: none"><li>● IsPartOf / HasPart</li><li>● IsPublishedIn</li></ul>
Generation / Dependencies	<ul style="list-style-type: none"><li>● IsCompiledBy / Compiles</li><li>● IsVariantFormOf / IsOriginalFormOf</li><li>● IsDerivedFrom / IsSourceOf</li><li>● IsRequiredBy / Requires</li><li>● IsContinuedBy / Continues</li></ul>

# Relation types and citation counts

- Citations and references are links between research outputs.
- You can add citations and references to DOI metadata when you create the DOI initially and with subsequent updates to the metadata.

<b>relationType in metadata for DOI "A"</b>	<b>Relationship between A and B</b>	<b>Equivalent to</b>	<b>Counts as citation for</b>	<b>Counts as reference for</b>
IsCitedBy	A is cited by B	B cites A	A	B
IsReferencedBy	A is referenced by B	B references A	A	B
IsSupplementTo	A is supplement to B	B is supplemented by A	A	B
Cites	A cites B	B is cited by A	B	A
References	A references B	B is referenced by A	B	A
IsSupplementedBy	A is supplemented by B	B is supplement to A	B	A

# Finding connections between objects

## Event Data API

The Event Data API contains a list of events in the “data” section.

```
▼ data:
  ▼ 0:
    id: "297c9886-5f6b-4638-82bd-b67973677117"
    type: "events"
  ▼ attributes:
    subj-id: "https://doi.org/10.5061/dryad.qjq2bvqhq"
    obj-id: "https://doi.org/10.1007/s10336-022-01988-z"
    source-id: "datacite-crossref"
    relation-type-id: "is-cited-by"
    total: 1
    message-action: "create"
    source-token: "28276d12-b320-41ba-9272-bb0ad3466ff"
    license: "https://creativecommons.org/publicdomain/zero/1.0/"
    occurred-at: "2022-05-30T05:37:36.000Z"
    timestamp: "2022-05-30T05:37:37.828Z"
  ▼ relationships:
    ▼ subj:
      ▼ data:
        id: "https://doi.org/10.5061/dryad.qjq2bvqhq"
        type: "objects"
    ▼ obj:
      ▼ data:
        id: "https://doi.org/10.1007/s10336-022-01988-z"
        type: "objects"
```

<https://api.datacite.org/events?doi=10.5061/dryad.qjq2bvqhq>

## REST API

The DataCite REST API /dois endpoint can be used to query DOI connection metadata.

Citations and references are summarized in the `relationships` section of the response.

<https://support.datacite.org/docs/consuming-citations-and-references>

```
▼ data:
  id: "10.5061/dryad.qjq2bvqhq"
  type: "dois"
  ▶ attributes: (-)
  ▼ relationships:
    ▼ client:
      ▼ data:
        id: "dryad.dryad"
        type: "clients"
    ▼ provider:
      ▼ data:
        id: "dryad"
        type: "providers"
    ▼ media:
      ▼ data:
        id: "10.5061/dryad.qjq2bvqhq"
        type: "media"
    ▼ references:
      data: []
    ▼ citations:
      ▼ data:
        ▼ 0:
          id: "10.1007/s10336-022-01988-z"
          type: "dois"
```

<https://api.datacite.org/dois/10.5061/dryad.qjq2bvqhq>

```
▼ relatedIdentifiers:
  ▼ 0:
    relationType: "IsCitedBy"
    relatedIdentifier: "10.1007/s10336-022-01988-z"
    relatedIdentifierType: "DOI"
```

# Finding connections between objects

<https://commons.datacite.org/doi.org/10.1594/pangaea.183918>

DataCite Commons

pe to search...

Works People Organizations Repositories



<https://doi.org/10.1594/pangaea.183918>


**(Table 1) Distribution and numerical abundance of foraminifera of sediment core CRP-3, supplement to: Strong, C Percy; Webb, Peter-Noel (2001): Lower Oligocene foraminiferal fauna from CRP-3 drillhole, Victoria Land Basin, Antarctica. Terra Antarctica, 8(4), 347-358**

C Percy Strong & Peter-Noel Webb  
Supplementary Dataset published 2001 in PANGAEA

A foraminiferal fauna comprising c. 33 genera and c. 53 species was recovered from a suite of 156 Lower Oligocene sediment samples, mostly muddy sandstone and siltstone, selected over the 2.80 - 823.11 mbsf depth range in the CRP-3 drillhole. All foraminifers, except for 2 isolated specimens, occurred above 340 mbsf, with 54 of 103 samples from above this depth being fossiliferous. At a generic and even a specific level, the fauna contains many components for the present-day Antarctic foraminiferal biota, indicating that its origin is at least as old as early Oligocene. Foraminiferal assemblages represent a single biofacies which is characterised by low diversity, and by dominant and persistent occurrences of *Cassidulinoides-chapmani*, other *Cassidulinoides* species, and *Globocassidulina* species, and *Stainforthia* sp. These taxa and commonly accompanied by *Cibicides lobatulus*, *Epistominella exigna*, *Fissurina* spp. *Nonionella* spp., and *Oolina* spp. Large miliolids occur as isolated specimens at various levels. Planktic species are absent, and agglutinated taxa occur only rarely and sporadically. Preservation generally is fair good, while absolute abundance is very low, with a maximum of c. 6 specimens/gram, and most samples containing <1 specimen/gram. These assemblages probably represent mid to outer shelf depth (50-200 m) in glacially influenced environments with a high sedimentation rate and poor oceanic connections. Although the CRP-3 fauna closely resembles the one from Foraminiferal Unit III as defined in CRP-2/2A (CRP-2/2A Science Team, 1999; Strong & Webb, 2000, hdi:10013/epic.28260.d001), absence of some species, and the first records of others in the uppermost CRP-3 section, is consistent with an interpretation of minimal overlap between the CRP-2/2A and CRP-3 sediments. The fauna also appears correlative with the *Globocassidulina* + *Cassidulinoides*-*Trochophidiella* Assemblage Zone from lower OSDP-270, and with faunas from the lower but not lowermost, section at CIROS-1.

DOI registered February 6, 2005 via DataCite.

 328 Citations

[Dataset](#) [English](#)

<https://doi.org/10.1594/pangaea.183918>

**Creators**

<b>C Percy Strong</b>	<b>Peter-Noel Webb</b>
-----------------------	------------------------

**Download**

<b>Full Metadata</b>	<b>Citation Metadata</b>
<a href="#">DataCite XML</a>	<a href="#">Citeproc JSON</a>
<a href="#">DataCite JSON</a>	<a href="#">BIBTeX</a>
<a href="#">Schema.org JSON-LD</a>	<a href="#">RIS</a>

**ORCID Claim**

[Claim DO](#)

**Share**

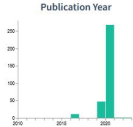
[Email](#)  
[Twitter](#)  
[Facebook](#)

**Cite** APA

Strong, C. P., & Webb, P.-N. (2001). (Table 1) Distribution and numerical abundance of foraminifera of sediment core CRP-3, supplement to: Strong, C Percy; Webb, Peter-Noel (2001): Lower Oligocene foraminiferal fauna from CRP-3 drillhole, Victoria Land Basin, Antarctica. Terra Antarctica, 8(4), 347-358 [Data set]. PANGAEA - Data Publisher for Earth & Environmental Science. <https://doi.org/10.1594/pangaea.183918>

**328 Citations**

**Publication Year**



Year	Citations
2016	~10
2019	~40
2022	~250

**Work Type**

**License**

**GBIF Occurrence Download**

Occurrence Download Gbif.org  
Content published 2016 in Global Biodiversity Information Facility

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# Finding connections between objects

When using the DataCite REST API to query the metadata of a DOI, all existing connections to this work are listed under the relationships tag by relation type.

<https://support.datacite.org/reference/introduction>

```
data:
  id: "10.60581/zaev-6p15"
  type: "dois"
  attributes:
    doi: "10.60581/zaev-6p15"
    prefix: "10.60581"
    suffix: "zaev-6p15"
    identifiers: []
    alternateIdentifiers: []
    creators: [...]
    titles: [...]
    publisher: "DataCite"
    container: {}
    publicationYear: 2021
    subjects: [...]
    contributors: [...]
    dates: [...]
    language: "en"
    types: [...]
  relatedIdentifiers:
    0: {}
    1: {}
    2: {}
    3: {}
    4: {}
    5: {}
    6: {}
    7: {}
    8: {}
```

finding all related works based on the DOI of one work

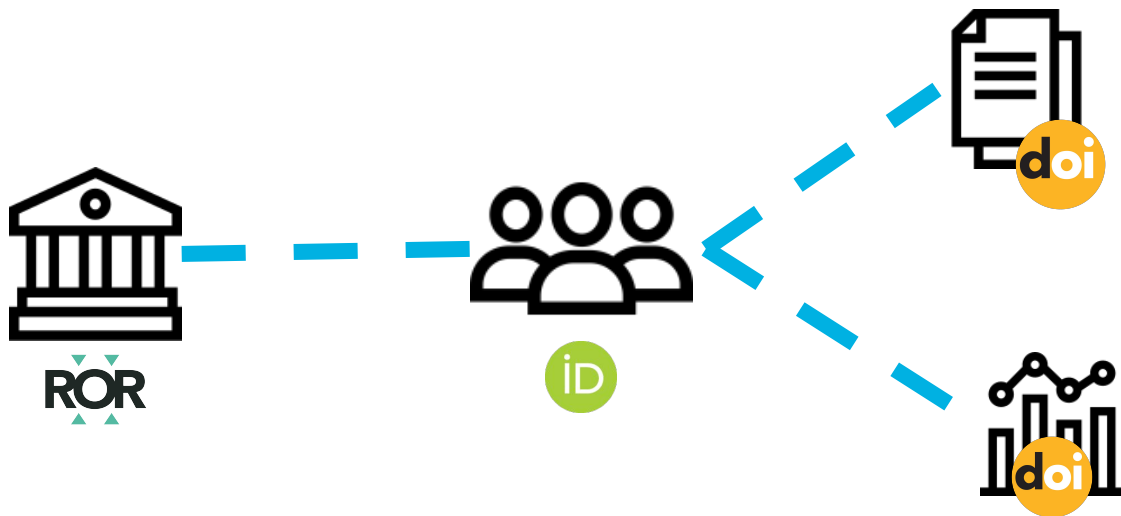
<https://api.datacite.org/doi/10.60581/zaev-6p15>

```
relatedIdentifiers:
  0:
    relationType: "IsReferencedBy"
    relatedIdentifier: "10.48321/d1mk72"
    resourceTypeGeneral: "OutputManagementPlan"
    relatedIdentifierType: "DOI"
  1:
    relationType: "HasPart"
    relatedIdentifier: "10.17605/osf.io/s2ujw"
    resourceTypeGeneral: "Text"
    relatedIdentifierType: "DOI"
  2:
    relationType: "HasPart"
    relatedIdentifier: "10.17605/osf.io/2p9c6"
    relatedIdentifierType: "DOI"
  3:
    relationType: "HasPart"
    relatedIdentifier: "10.17605/osf.io/4nf7q"
    relatedIdentifierType: "DOI"
```

Connecting objects to organizations

# Affiliation

Represents a relationship between a **Creator** or **Contributor** (which can be people or organizations) and their **affiliation** (which is an organization). Affiliation identifiers make it easier to find research outputs associated with a particular institution.



# Example metadata: Affiliation

**\*Sub-element of Creator or Contributor\***

**Value** The name of the institution

## Optional attributes

- affiliationIdentifier (ROR, ISNI, etc)
- affiliationIdentifierScheme, schemeUri (required if affiliationIdentifier is used)

```
<creator>
  <creatorName nameType="Personal">Miller,
  Elizabeth</creatorName>
  <givenName>Elizabeth</givenName>
  <familyName>Miller</familyName>
  <nameIdentifier schemeURI="https://orcid.org/"
  nameIdentifierScheme="ORCID">0000-0001-5000-0007</name
  Identifier>
  <affiliation
  affiliationIdentifier="https://ror.org/04wxnsj81"
  affiliationIdentifierScheme="ROR">
    DataCite
  </affiliation>
</creator>
```

Schema docs for affiliation:

<https://support.datacite.org/docs/datacite-metadata-schema-v44-mandatory-properties#25-affiliation>

# Example metadata: Affiliation

Affiliations can also be added in Fabrica. Type-ahead is powered by ROR!

Family Name

The surname or last name of the creator.

\* Name (from Given Name and Family Name)

Affiliation

- University of Wisconsin|
- University of Wisconsin–Whitewater
- University of Wisconsin–Stout
- University of Wisconsin System
- University of Wisconsin Health
- University of Wisconsin–Milwaukee

Family Name

The surname or last name of the creator.

\* Name (from Given Name and Family Name)

Affiliation

Affiliation names and identifiers are provided by the Research Organization Registry (ROR).

# Affiliation identifiers

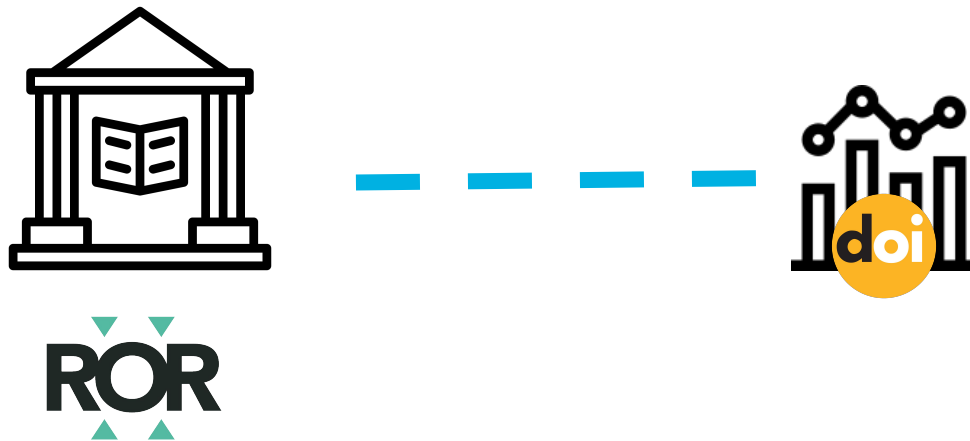
- In the DataCite schema, affiliationIdentifier = organization identifier
- Several registries of organization IDs are available (note: GRID has been discontinued)



- We recommend [ROR](#), as it's open and community-led, and DataCite is one of ROR's 3 operating organizations (along with Crossref and California Digital Library)

# Publisher

Represents a relationship between a **DOI** and an entity, usually an organization, that holds, archives, publishes, prints, distributes, releases, issues, or produces the resource.



# Example metadata: publisherIdentifier

**Value** The name of the publishing organization

## optional attributes

- publisherIdentifier
- publisherIdentifierScheme  
(required if publisherIdentifier is used)
- schemeURI

```
<publisher
publisherIdentifier="https://ror.org/04xw4m193"
publisherIdentifierScheme="ROR"
schemeURI="https://ror.org/">NERC
Environmental Information Data
Centre</publisher>
```

<https://support.datacite.org/docs/can-i-see-more-detailed-affiliation-information-in-the-rest-api>



# Example metadata: publisherIdentifier

Publisher identifier can also be added in Fabrica. Type-ahead is powered by ROR

**\* Publisher** The name of the entity that holds, archives, publishes prints, distribute

Select publisher

**\* Publication Year** Type to search...

Type to search

Publication Year

Must be a year between 1000 and 2020

**\* Publisher** The name of the entity that holds, archives, publishes prints, dis

Deutsche Nationalbibliothek

<https://ror.org/01n7gem85>

Publisher names and identifiers are provided by the Research Organizati

# Publisher identifiers

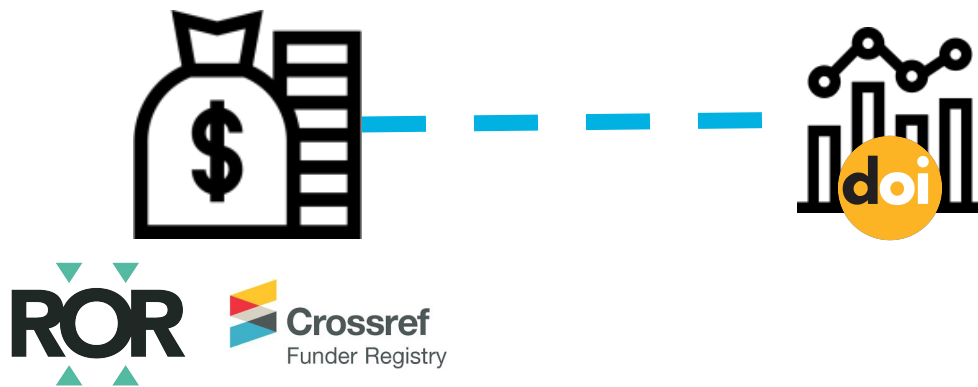
- the publisher identifier uniquely identifies the publisher, according to various schemes.
- Several registries of organization IDs are available



- We recommend [ROR](#), as it's open and community-led, and DataCite is one of ROR's 3 operating organizations (along with Crossref and California Digital Library)

# Funding reference

Represents a relationship between a **DOI** and a **funding organization** that financially supported the work that resulted in the research output represented by the DOI.



# Example metadata: fundingReference (xml) DataCite

## Required elements/attributes

- funderName

## Optional elements/attributes

- funderIdentifier (ROR, Crossref Funder ID, etc)
- funderIdentifierType [cl], schemeUri (if funderIdentifier is used)
- awardNumber, awardUri, awardTitle

```
<fundingReferences>
  <fundingReference>
    <funderName>European Commission</funderName>
    <funderIdentifier funderIdentifierType="Crossref
Funder ID">
      https://doi.org/10.13039/501100000780
    </funderIdentifier>
    <awardNumber
awardURI="https://cordis.europa.eu/project/rcn/100180
en.html">
      282625
    </awardNumber>
    <awardTitle>MOTivational strength of ecosystem
services and alternative ways to express the value of
BIOdiversity</awardTitle>
  </fundingReference>
</fundingReferences>
```

Schema docs for fundingReference

<https://support.datacite.org/docs/datacite-metadata-schema-v44-recommended-and-optional-properties#19-fundingreference>

# Example metadata: fundingReference

Funding references can also be added in Fabrica. Type-ahead is powered by Crossref Funder Registry.

**Funding References** Information about financial support (funding) for the resource being registered.

Funder Name

- Edvard Welanders Stiftelse
- Wellspect
- WellPoint
- AGE-WELL
- Welch Foundation
- WellChild
- Ministerie van Volksgezondheid, Welzijn en Sport
- Rob and Bessie Welder Wildlife Foundation
- WellChild
- Welleslev College

Award Number

**Funding References** Information about financial support (funding) for the resource being registered.

Funder Name

Funder names and identifiers are provided by the [Crossref Funder Registry](#).

Funder Identifier

Uniquely identifies a funding entity.

Funder Identifier Type

The type of funder identifier, one of Crossref Funder ID, GRID, ISNI, or ROR.

# Finding connections between objects & organizations

<https://commons.datacite.org/ror.org/02e2c7k09>

**DataCite Commons**

Type to search...

Works People Organizations Repositories

**https://ror.org/02e2c7k09**  
**Delft University of Technology**  
TU Delft

**Links**  
Homepage  
Wikipedia  
Twitter

**Other Identifiers**  
GRID grid.5292.c  
Crossref Funder ID 10.13039/501100001831  
Crossref Funder ID 10.13039/501100002984  
ISNI 0000000120974740  
Wikidata Q752663  
Wikidata Q6379334

**Geolocation**  
52° 00' 06.0" N, 4° 22' 21.0" W

Netherlands Education DataCite Consortium

https://ror.org/02e2c7k09

**Share**  
Email  
Twitter  
Facebook

**Aggregated Citations, Views and Downloads**

235 Citations 3,151 Views 816 Downloads

**486 Works**

**Filter Works**

Type to search...

**Publication Year**

<input type="checkbox"/> 2022	29
<input type="checkbox"/> 2021	86
<input type="checkbox"/> 2020	147
<input type="checkbox"/> 2019	74
<input type="checkbox"/> 2018	73
<input type="checkbox"/> 2017	39
<input type="checkbox"/> 2016	19
<input type="checkbox"/> 2015	8
<input type="checkbox"/> 2014	6
<input type="checkbox"/> 2012	2
<input type="checkbox"/> 2010	2
<input type="checkbox"/> 1994	1

**Work Type**

<input type="checkbox"/> Text	272
<input type="checkbox"/> Journal Article	166
<input type="checkbox"/> Book	16

**Publication Year** **Work Type** **License**

**Data from: Charting the complete elastic properties of inorganic crystalline compounds**  
Maarten De Jong, Wei Chen, Thomas Angsten, Anubhav Jain, Randy Notestine, Anthony Gamst, Marcel Sluiter, Chaitanya Krishna Arde, Sybrand Van Der Zwaag, Jose J. Plata, Cormac Toher, Stefano Curtarolo, Gerbrand Ceder, Kristin A. Persson & Mark Asta  
Version 1 of Dataset published 2016 in *DRYAD*

The elastic constant tensor of an inorganic compound provides a complete description of the response of the material to external stresses in the elastic limit. It thus provides fundamental insight into the nature of the bonding in the material, and it is known to correlate with many mechanical properties. Despite the importance of the elastic constant tensor, it has been measured for a very small fraction of all known inorganic compounds, a situation that limits the ability of materials scientists to develop new materials with targeted mechanical responses. To address this deficiency, we present here the largest database of calculated elastic properties for inorganic compounds to date. The database currently contains full elastic information for 1,181 inorganic compounds, and this number is growing steadily. The methods used to develop the database are described, as are results of tests that establish the accuracy of the data. In addition, we document the database format and describe the different ways it can be accessed and analyzed in efforts related to materials discovery and design.

DOI registered March 3, 2015 via DataCite.



# Finding connections between objects & organizations

REST API:

<https://support.datacite.org/reference/introduction>

```
▼ data:
  ▼ 0:
    id: "10.5285/5060cc27-0b5b-471b-86eb-71f96da0c80f"
    type: "dois"
    ▶ attributes: {...}
    ▶ relationships: {...}
  ▼ 1:
    id: "10.5285/399ed9b1-bf59-4d85-9832-ee4d29f49bfb"
    type: "dois"
    ▶ attributes: {...}
    ▶ relationships: {...}
  ▼ 2:
    id: "10.5285/bcec9c33-f863-464e-ac28-73b981bd40a4"
    type: "dois"
    ▶ attributes: {...}
    ▶ relationships: {...}
  ▼ 3:
    id: "10.5285/e040ff39-2176-4ed4-9e5d-861bdae8a030"
    type: "dois"
    ▶ attributes: {...}
    ▶ relationships: {...}
  ▼ 4:
    id: "10.5285/f03806fa-3596-4119-90c5-70254f39cfc0"
    type: "dois"
    ▶ attributes: {...}
    ▶ relationships: {...}
  ▶ 5: {...}
  ▶ 6: {...}
  ▶ 7: {...}
  ▶ 8: {...}
```



```
▼ data:
  ▼ 0:
    id: "10.5285/ea641367-dc35-4695-97b8-63f7d6fa9105"
    type: "dois"
    ▼ attributes:
      doi: "10.5285/ea641367-dc35-4695-97b8-63f7d6fa9105"
      identifiers: []
      ▶ creators: [...]
      ▶ titles: [...]
    ▼ publisher:
      name: "NERC EDS Environmental Information Data Centre"
      schemeUri: "https://ror.org/"
      publisherIdentifier: "https://ror.org/04xw4m193"
      publisherIdentifierScheme: "ROR"
      container: {}
      publicationYear: 2024
      ▶ subjects: [...]
      ▶ contributors: [...]
      ▶ dates: [...]
      language: "en"
```

Finding all works published by the NERC Environmental Data Service based on their publisher identifier

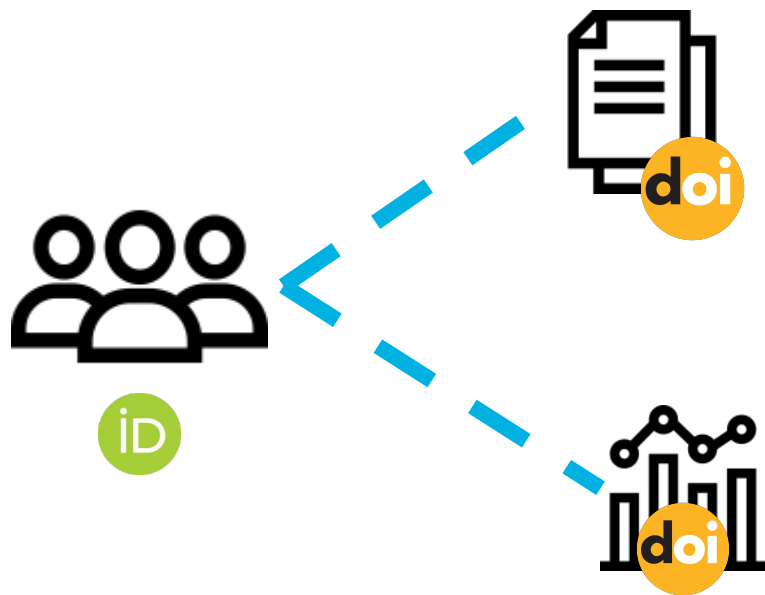
<https://api.datacite.org/does?query=publisher.publisherIdentifier%3A%22https%3A%2F%2Fror.org%2F04xw4m193%22>

**Connecting objects to people**



# Name Identifier

Represents a relationship between a **DOI** and a **Creator** or **Contributor**, identified unambiguously by their ORCID iD.



# Example metadata: nameIdentifier (xml)

**Value** The ORCID iD or other person identifier (ex, ISNI) for the creator/contributor

## Attributes

- nameIdentifierScheme
- schemeUri

```
<creator>
  <creatorName nameType="Personal">Miller,
  Elizabeth</creatorName>
  <givenName>Elizabeth</givenName>
  <familyName>Miller</familyName>
  <nameIdentifier schemeURI="https://orcid.org/"
  nameIdentifierScheme="ORCID">0000-0001-5000-0007<
  /nameIdentifier>
  <affiliation
  affiliationIdentifier="https://ror.org/04wxnsj81"
  affiliationIdentifierScheme="ROR">DataCite</affil
  iation>
</creator>
...
```

Schema docs for nameIdentifier:

<https://support.datacite.org/docs/datacite-metadata-schema-v44-mandatory-properties#24-nameidentifier>

# Example metadata: nameIdentifier (xml)

Name identifiers can also be added in Fabrica. If an ORCID iD or ROR ID is entered, name fields will be populated automatically. **Note! Only authenticated ORCID iDs collected via OAuth should be included in DOI metadata.**

**\* Creators** The main researchers or organizations involved in producing the resource, in priority order.

Name Identifier

Uniquely identifies an individual or legal entity, according to various schemas, e.g. ORCID, ROR or ISNI. Use name identifier expressed as URL. The Given Name, Family Name and Name will automatically be filled out for ORCID and ROR identifiers.

[+ Add another name identifier](#)

Person  Organization  Unknown

Given Name

The personal or first name of the creator.

Family Name

The surname or last name of the creator.

**\* Name (from Given Name and Family Name)**

# Finding connections between objects & people

[https://commons.datacite.org/  
orcid.org/0000-0001-6660-6214](https://commons.datacite.org/orcid.org/0000-0001-6660-6214)

DataCite Commons

Type to search...

Works **People** Organizations Repositories

Pages - Support Xiaoili Chen

---

<https://orcid.org/0000-0001-6660-6214>

**Helena Cousijn**

Helena Cousijn is DataCite's Community Engagement and Communications Director. Helena is responsible for all DataCite's outreach activities. She's committed to DataCite's mission of enabling data sharing and reuse and is especially passionate about data citation. Her main goal is to communicate in a way that makes DataCite's services accessible to everyone. Before joining DataCite, Helena worked as Senior Product Manager for Research Data Management Solutions at Elsevier. She holds a DPhil in Neuroscience from the University of Oxford.

Other Identifiers  
GitHub: [hcousijn](#)

Other Profiles  
ORCID  
Impactstory  
Europe PMC  
**Netherlands**

<https://orcid.org/0000-0001-6660-6214>

**Share**

Email  
Twitter  
Facebook

**Employment**


**DataCite**  
Director of Community Engagement  
Since July 2018

**Elsevier BV**  
Senior Product Manager  
March 2015 to June 2018

**Aggregated Citations, Views and Downloads**

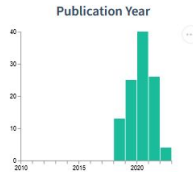
15 Citations 11 Views

**Accessibility Achievements**

 59% of the researcher's associated DOIs have metadata with rights as CC-BY, CC0 or public domain license.

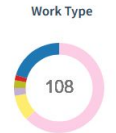
**108 Works**

**Publication Year**



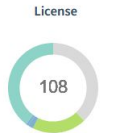
Year	Count
2010	0
2015	0
2020	40

**Work Type**



108

**License**



108

**Filter Works**

Type to search...

**Publication Year**

2022 4

2021 26

2020 40

# Finding connections between objects & people

GraphQL playground:

<https://api.datacite.org/graphql>

GraphQL docs:

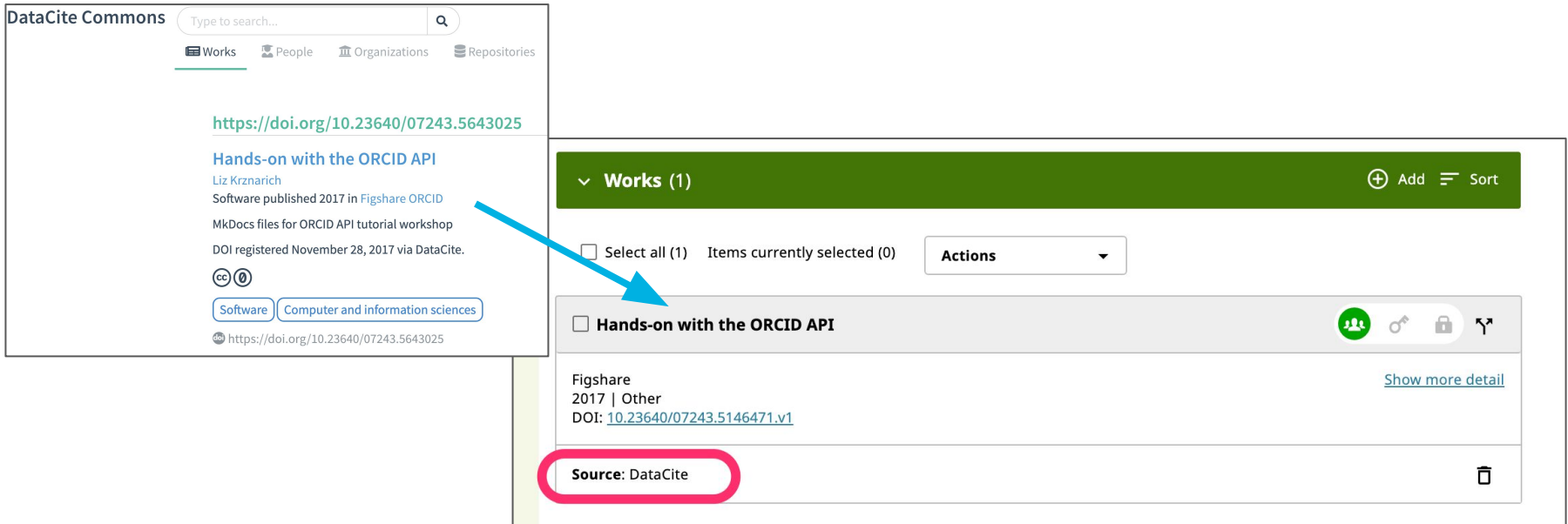
<https://support.datacite.org/docs/datacite-graphql-api-guide>

```
{
  person (id: "https://orcid.org/0000-0001-5934-7525") {
    id
    name
    givenName
    familyName
    citationCount
    works(hasFunder: true) {
      totalCount
      published {
        title
        count
      }
      resourceTypes {
        title
        count
      }
      nodes {
        id
        type
        titles {
          title
        }
        rights {
          rights
        }
        citationCount
      }
    }
  }
}
```

```
{
  "data": {
    "person": {
      "id": "https://orcid.org/0000-0001-5934-7525",
      "name": "Daniel S. Katz",
      "givenName": "Daniel S.",
      "familyName": "Katz",
      "citationCount": 55,
      "works": {
        "totalCount": 31,
        "published": [↔],
        "resourceTypes": [↔],
        "nodes": [
          {
            "id": "https://doi.org/10.5281/zenodo.1477847",
            "type": "Software",
            "titles": [
              {
                "title": "LiberTEM/LiberTEM: 0.10.0"
              }
            ],
            "rights": [
              {
                "rights": "GNU General Public License v3.0 only"
              },
              {
                "rights": "Open Access"
              }
            ],
            "citationCount": 8
          },
          {
            "id": "https://doi.org/10.12688/f1000research.12037.2",
            "type": "Text",
            "titles": [
              {
                "title": "A multi-disciplinary perspective on emergent and
future innovations in peer review"
              }
            ],
            "rights": [
```

# ORCID auto-update

DOIs can be automatically added to ORCID records when the **nameIdentifier** metadata for **creators** includes an ORCID iD. This makes the **ORCID iD (person) to DOI (object)** connection available not only in DataCite metadata, but in ORCID metadata as well.

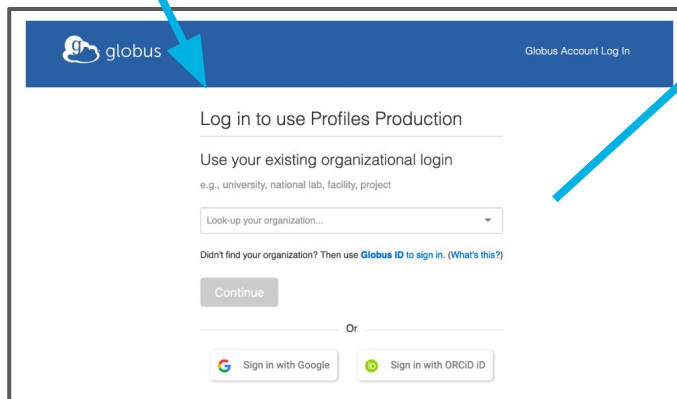
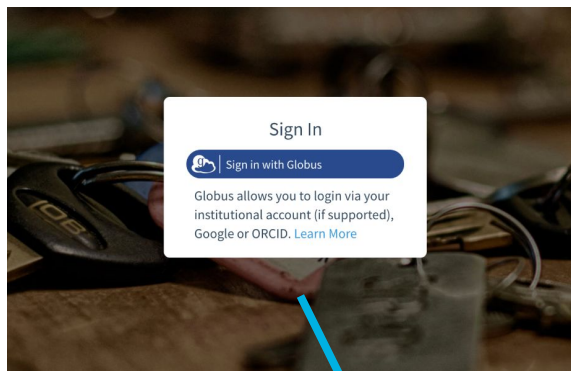


The screenshot displays the DataCite Commons interface. On the left, a search results card for the DOI <https://doi.org/10.23640/07243.5643025> is shown, titled "Hands-on with the ORCID API" by Liz Krznarich. A blue arrow points from this card to a list view on the right. The list view shows a table of works with a green header "Works (1)". The first entry is "Hands-on with the ORCID API" by Figshare, 2017. The "Source: DataCite" field at the bottom of this entry is circled in pink.

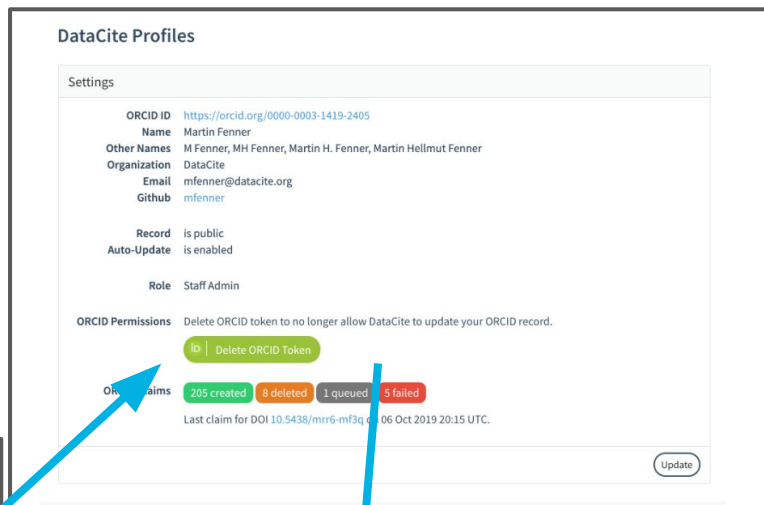
Works (1)	Actions
<input type="checkbox"/> Hands-on with the ORCID API Figshare 2017   Other DOI: <a href="https://doi.org/10.23640/07243.5146471.v1">10.23640/07243.5146471.v1</a> <b>Source: DataCite</b>	<input type="checkbox"/> Select all (1) Items currently selected (0) Actions

# Enabling ORCID auto-update

## 1. Set up DataCite Profile



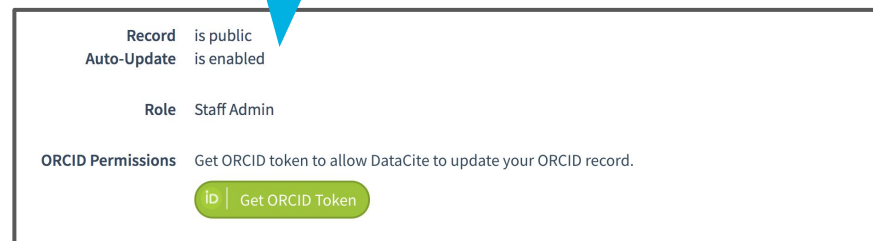
The Globus Account Log In page. At the top is the Globus logo and "Globus Account Log In". The main heading is "Log in to use Profiles Production". Below it, text says "Use your existing organizational login" with an example "e.g., university, national lab, facility, project". There is a dropdown menu "Look-up your organization...". Below that, text says "Didn't find your organization? Then use **Globus ID** to sign in. (What's this?)". There is a "Continue" button. Below that, "Or" is shown. At the bottom are two buttons: "Sign in with Google" and "Sign in with ORCID ID". A blue arrow points from the "Sign in with ORCID ID" button to the DataCite Profiles page below.



The DataCite Profiles Settings page. The title is "DataCite Profiles". Under "Settings", the following information is displayed:

- ORCID ID:** <https://orcid.org/0000-0003-1419-2405>
- Name:** Martin Fenner
- Other Names:** M Fenner, MH Fenner, Martin H. Fenner, Martin Hellmut Fenner
- Organization:** DataCite
- Email:** mfenner@datacite.org
- GitHub:** mfenner
- Record Auto-Update:** is public, is enabled
- Role:** Staff Admin
- ORCID Permissions:** Delete ORCID token to no longer allow DataCite to update your ORCID record. A green button "Delete ORCID Token" is visible.
- ORCID Claims:** 205 created, 8 deleted, 1 queued, 5 failed. Last claim for DOI 10.5438/mrr6-m3q... 06 Oct 2019 20:15 UTC. An "Update" button is at the bottom right.

A blue arrow points from the "Delete ORCID Token" button to the "Get ORCID Token" button in the summary box below.



A summary box containing the following information:

- Record Auto-Update:** is public, is enabled
- Role:** Staff Admin
- ORCID Permissions:** Get ORCID token to allow DataCite to update your ORCID record. A green button "Get ORCID Token" is visible.

A blue arrow points from the "Get ORCID Token" button in this box to the "Get ORCID Token" button in the DataCite Profiles page above.

# Enabling ORCID auto-update

## 2. Authorize access

Works (0) Add Sort

Add your research outputs such as publications, data sets, conference presentations and more.  
[Learn more about adding works to your ORCID record](#)

Search & link

Add DOI

Link works

Enables users to import metadata from Airiti, including journal papers, proceedings, dissertations, and books. Scholars can e... [Show more](#)

**BASE - Bielefeld Academic Search Engine**  
BASE is one of the world's most voluminous academic search engines. It searches metadata about more than 100 million document... [Show more](#)

**Crossref Metadata Search**  
Import your publications from Crossref's authoritative, publisher-supplied metadata on over 70 million scholarly journal and ... [Show more](#)

**DOE / OSTI**  
Search over 3 million energy and basic science research result records from the US Department of Energy (DOE) and predecessor... [Show more](#)

**DataCite**  
Enable the DataCite Search & Link and Auto-Update services. Search the DataCite Metadata Store to find your research datasets... [Show more](#)

**Deutsche Nationalbibliothek (DNB)**  
Search the catalogue of the German National Library (DNB) by your name and link your publications to your ORCID record. The G... [Show more](#)

**Europe PubMed Central**

ORCID Authorize access

You are currently signed in as:

**Lizbert Jane**  
<https://orcid.org/0000-0001-5156-1535>  
[Sign out](#)

**DataCite** ?  
has asked for the following access to your ORCID record:

- Add/update your research activities (works, affiliations, etc)
- Add/update other information about you (country, keywords, etc.)
- Read your information with visibility set to Trusted Organizations

**Authorize access**

**Deny access**

If authorized, this organization will have access to your ORCID record, as outlined above and described in further detail in [ORCID's privacy policy](#).

You can manage access permissions for this and other Trusted Organizations in your [account settings](#).



# Summary: Making connections with DataCite metadata

- DataCite metadata schema support connection metadata through the related identifier, name identifier, affiliation identifier and funder identifier.
- Connections can be established between objects and objects, objects to organization, and objects and people.
- Connections enable services like Event Data and ORCID Claiming.
- Connections can be found via DataCite Commons, the REST API, and the GraphQL API.



CONNECTING RESEARCH,  
ADVANCING KNOWLEDGE



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



[pidforum.org](http://pidforum.org)



[datacite.org](http://datacite.org)  
[datacite.org/blog](http://datacite.org/blog)



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



[@datacite](https://twitter.com/datacite)



[@datacite](https://x.com/datacite)



[@datacite](https://www.linkedin.com/company/datacite)



[DataCite](https://www.youtube.com/DataCite)