

# Importance of Open Science, Quality Metadata, and Persistent Identifiers

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U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science

Office of Scientific and  
Technical Information

# Importance of Open Science and Quality Metadata

## **Open Science allows for better research reproducibility**

- “...the sharing of code is as important as the sharing of data for scientific transparency and reproducibility.”  
<https://doi.org/10.1101/039354>

## **Open Science allows for others to participate in scientific discovery and connect to new areas of study**

- “...international open science genomics projects play an important role in genomics capacity building in developing countries.” <https://doi.org/10.3389/fgene.2019.00095>

## **Open Science increases visibility and discovery of research results increasing the pace of scientific discovery**

- “...open access (OA) option were twice as likely to be cited within 4–10 months and nearly three times as likely to be cited 10–16 months after publication than non-OA articles published in the same journal”  
<https://doi.org/10.1371/journal.pbio.0040157>

- **Quality metadata for research results and objects is key to enable discovery and increased visibility.**
- **Quality metadata is need for connecting research objects through research lifecycle – funding to researchers to instruments to peer review to research results to research organizations.**
- **Quality metadata should include persistent identifiers (PIDs).**

# Metadata Quality and Curation

## Factors of metadata quality:

### Completeness:

Is all the available metadata included? (e.g. missing abstracts, funding, etc.)

Dependent on metadata schema being used.

### Availability:

Is all the metadata openly available?

### Conformance:

Are metadata fields within the schema being applied consistently? (e.g. is same version of name used for different research result records.)

### Credibility:

Are the metadata provided or curated by a trustworthy source?

***When organizations using metadata do not find it to be high enough quality for their purposes, they often chose to enhance or curate the metadata to meet their needs.***

# PIDs in Quality Metadata

## What is a Persistent Identifier (PID)?

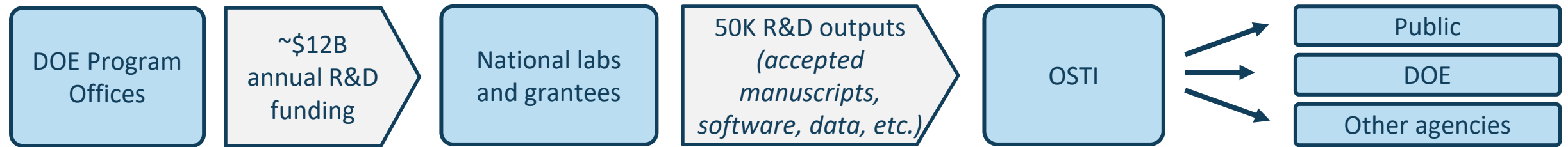
A digital identifier that is globally unique, persistent, machine resolvable, has an associated metadata schema, identifies an entity (e.g., individual researcher, publication, awards, digital research output) and is frequently used to disambiguate between entities.

## Benefits of assigning/using PIDs?

- PIDs enable research to be more open, discoverable, and accessible – metadata associated with PIDs is openly available.
- PIDs are stable, persistent links that allow for metadata to be updated as needed.
- By linking PIDs in metadata, you can create connections throughout the research lifecycle and create higher quality metadata.



# DOE OSTI Mission and Services



**Mission:** The Office of Scientific and Technical Information (OSTI) collects, preserves, and disseminates DOE-funded research and development results.

**Required by several laws:** Energy Policy Act of 2005, P.L. 109-58, Section 982: “The Secretary, through the Office of Scientific and Technical Information, shall maintain within the Department publicly available collections of scientific and technical information resulting from research, development, demonstration, and commercial applications activities supported by the Department.”



## **Relevant Core Functions:**

- Provide and use persistent identifier services to make DOE-funded research more discoverable and include higher quality metadata.
- Provide high quality metadata associated with DOE-funded research results through metadata curation.



# OSTI PID Services

Service Name	Research Object	Service Partner
PIDs for Research Results		
E-Link (research output ingest system)	Technical/Workshop Reports Conference Posters Presentations	Crossref
DOE Data ID Service	Data	DataCite
Interagency Data ID Service (IAD)	Data/Research Outputs	DataCite
DOE CODE	Software	DataCite
PIDs for Awards		
Award DOI Service	Awards	Crossref Grant ID
PIDs for People		
US Government ORCID Consortium	Researchers	ORCID
PIDs for Organizations		
Organization Authority	Research/Funding Organizations	ROR
Open Funder Registry	Funding Organizations	Crossref/Elsevier

Data ID Services

<https://www.osti.gov/data-services>

DOE **CODE**

<https://www.osti.gov/doecode/>

*E*  *Link*

<https://www.osti.gov/elink/>

Award **DOI** Service

<https://www.osti.gov/award-doi-service/>

US Government  
**ORCID Consortium**

<https://www.osti.gov/orcid-consortium/>

# Curating Research Result Metadata



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#### Record Information

OSTI ID: 465023

Site Code: OSTI

DOI: (10.NNNNN/XXXXXXXXXXXXXXXXXXXX)

[View Live Link](#) [Auto Populate Metadata](#) [Lookup DOIs](#) [Duplicate DOIs?](#) [Duplicate Titles?](#)

Product CO

Product Type Other:

Product Size: pp. 1389-1394

Type:

Journal

Type:

Last Saved on 03/23/2011 23:30:14

Last Saved Using:

By:

File Format:

File Format Other:

Audiovisual Content:

Language: English

Country: US

Record Type: 241.1 Web Form

Availability: IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854-4

Publication Date: 1995

Title: The engineering development program of RFX

Comments:

Historical

Comments:

Access Unlimited Announcement  
Limitation:

Workflow Status: Completed

#### Subject Fields +

Click the title above to view this section.

#### Journal Fields +

Click the title above to view this section.

#### Number/Organization Fields +

Click the title above to view this section.

#### Author Fields +

<https://www.osti.gov/elink>

# Curating Research Result Metadata

## Subject Fields

Subject Complete?: ☐

Title: The engineering development program of RFX

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<sup>

<sub>

Highlight problematic characters

Preview Title

Description: A review of the engineering developments of RFX, relevant to its plasma performances, is presented. In particular the actions already taken or under way to achieve a better

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<sub>

Highlight problematic characters

Preview Description

Description Override?: ☐

Subject Category: Select Primary First

Codes: 70 PLASMA PHYSICS AND FUSION

Keywords:

Selected for INIS: Yes -- select

Descriptors: RFX DEVICE; ENGINEERING; PERFORMANCE; CONTROL THEORY; PLASMA DENSITY; WALL EFFECTS; MAGNETIC FIELDS

Descriptors Complete?: ☐



# Adding Relationships Between Research Results

## Add/Remove Related Identifiers/DOIs

You may add DOIs to reference other papers, datasets, or software that relate to the STI product you are submitting/announcing with this record. The STI product you are currently submitting/describing/announcing with this record is always considered Item A. The related DOI is always considered Item B. When cross-referencing with the "how related" controlled vocabulary, the virtual sentence structure you want to create is "Item A (is related in this way to) Item B".

### This STI product (Item A)

IsSupplementTo ▼

- IsSourceOf
- IsVariantFormOf
- IsVersionOf
- IsContinuedBy
- IsDescribedBy
- Documents
- IsRequiredBy
- IsOriginalFormOf
- IsReferencedBy
- Requires
- IsDerivedFrom
- IsDocumentedBy
- Compiles
- References
- IsCompiledBy
- IsMetadataFor
- HasMetadata
- Cites
- Reviews
- IsSupplementTo

+ Add Another

10.3334/CDIAC/spruce.045

✕ Delete

10.25581/spruce.073/1557

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10.25581/spruce.073/1557

✕ Delete

10.3334/CDIAC/spruce.044

✕ Delete

10.1038/s41586-018-0399-

✕ Delete

10.3334/cdiac/spruce.045

✕ Delete

10.1038/s41586-018-0399-

✕ Delete

# Curating Relationships Between Research Results

Related Identifier

Q

Date Type: 

Date Type

From: 

MM/DD/YYYY

 To: 

MM/DD/YYYY

Click box to select date

Oldest Newest

Product Type: 

Product Type

Identifier Type: 

Identifier Type

Curated: 

No

Show 

10

 entries

Showing 1 to 10 of 1,235,675 entries

Identifier Type	Identifier Value	Associated OSTI ID's	Curated?	
DOI	10.1016/j.matdes.2016.12.089	1409495, 1416535, 1496824	No	<div>Curate</div>
DOI	10.1016/j.triboint.2014.03.012	1416535, 1496824	No	<div>Curate</div>
DOI	10.1080/02670836.2015.1133022	1409495, 1416535, 1496824	No	<div>Curate</div>
DOI	10.1080/02670836.2016.1155842	1416535	No	<div>Curate</div>
DOI	10.1080/10402004.2014.942938	1416535, 1496824	No	<div>Curate</div>
DOI	10.1080/10402004.2015.1118582	1416535, 1496824	No	<div>Curate</div>
DOI	10.1108/00368791211249629	1416535	No	<div>Curate</div>
DOI	10.1177/1350650114525363	1416535	No	<div>Curate</div>
DOI	10.1177/1350650116648058	1416535	No	<div>Curate</div>
DOI	10.1179/030716981803275415	1416535	No	<div>Curate</div>

Showing 1 to 10 of 1,235,675 entries

Previous 

1

 2 3 4 5 ... 123568 Next

curator 1.5.0-master-333d6e55

DOI: 10.17182/hepdata.47282

Is Invalid? In Progress?

Title

<sup></sup> <sub></sub>

Search for dark matter candidates and large extra dimensions in events with a photon and missing transverse momentum in  $pp$  collision data at  $\sqrt{s}=75$  TeV with the ATLAS detector [Supplementary Data]

Search for dark matter candidates and large extra dimensions in events with a photon and missing transverse momentum in  $pp$  collision data at  $\sqrt{s}=7$  TeV with the ATLAS detector [Supplementary Data]

Identifier Product Type

Authors/Editors

Dataset

First Name

Last Name

Creator Role

Georges

Aad

Tatevik

Abajyan

Brad

Abbott

The ATLAS collaboration

Corporate Author

Publication Date

Click box to choose date

Journal / Source Title

Journal Volume

Journal Issue

Page Range

Report / Patent Number

HEPData-Supplementary information for journal article at DOI: 10.1103/PhysRevLett.110.011802

10 data tables

Special Characters Keyboard

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# Curated Metadata in Search Tools

## SPRUCES Ground Observations of Phenology in Experimental Plots, 2016-2017

[Full Record](#)[References \(2\)](#)[Cited by \(2\)](#)[Other Related Research](#)

### DATASET:

[View Dataset](#)

<https://doi.org/10.3334/CDIAC/SPRUCES.044>

### SAVE / SHARE:

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### Abstract

This data set consists of phenological transition dates, as derived from direct observations of vegetative and reproductive phenology recorded by a human observer, from the SPRUCE experiment during the 2+ years (August 2015 through December 2017) of whole-ecosystem warming. For 2016, only springtime (April - June) phenological events are included. For 2017 (April - December), spring and autumn events are included. Beginning in April 2016, human observers have been directly tracking the phenology of both woody and herbaceous species on a weekly schedule within the SPRUCE experimental chambers. The observed date reported here is the first survey date on which an event/phenophase was definitively observed. User note: Ground observations of phenology from 2016-2020 are available. See SPRUCE Ground Observations of Phenology in Experimental Plots, 2020 <https://doi.org/10.25581/spruce.094/1824175> for the most recent data as well as links to all other ground phenology datasets.

Authors: [Richardson, Andrew D.](#); [Latimer, John M.](#); [Nettles, W. Robert](#); [Heiderman, Ryan R.](#); [Warren, Jeffrey M.](#); [Hanson, Paul J.](#)

Publication Date: 2018-01-01

Research Org.: ORNLTESSFA (Oak Ridge National Lab's Terrestrial Ecosystem Science Scientific Focus Area (ORNL TES SFA))

Sponsoring Org.: Office of Science (SC), Biological and Environmental Research (BER). Earth and Environmental Systems Science Division

OSTI Identifier: 1438376

DOE Contract Number: AC05-00OR227

Resource Type: Data

Country of Publication: United States

<https://www.osti.gov/>

# Questions?



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