



Persistent Identification of Instruments

The RDA WG PIDINST

ENVRI-FAIR Training - February 4, 2021





A bit of history ...

- PIDapalooza, Reykjavik, November 2016
 - First presentation of Persistent Identification of Instruments
 - <https://doi.org/10.6084/m9.figshare.4246100.v1>
 - Yay! ... Y-A-PID or <http://yapid.org/>
- FREYA proposal
 - Included effort to develop a concept for persistent identification of instruments
- THOR-ENVRIplus Bootcamp, Helsinki, March 2017
 - ORCID Integrations in Environmental Research Infrastructures
 - Met Louise Darroch and Alessandro Oggioni, mulling over the idea of RDA WG PIDINST

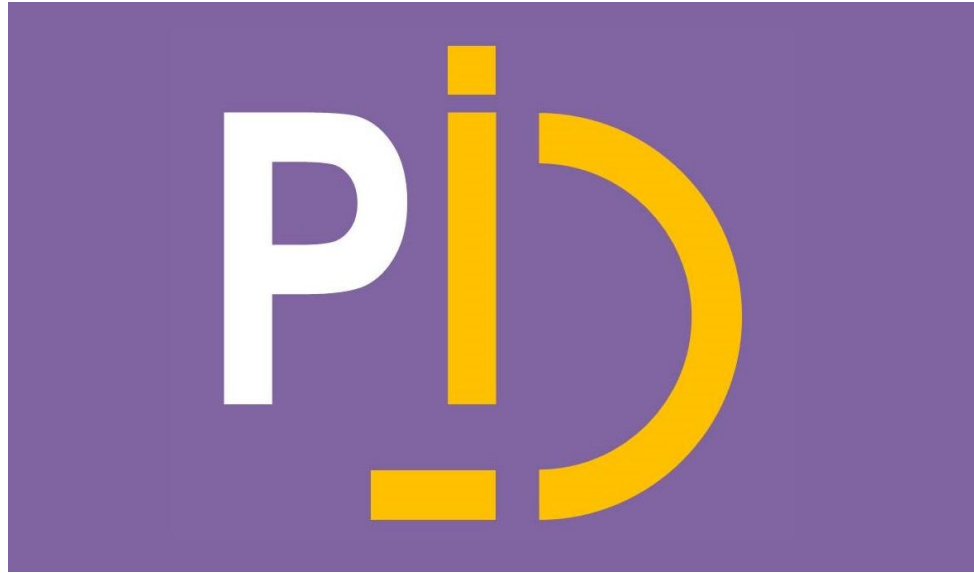


A bit of history ...

- September 2017: BoF at P10, Montreal
- December 2017: Case statement submission
- March 2018: RDA endorsement and kick-off at P11, Berlin
- October 2019: Wrap-up at P14, Helsinki
- December 2019: Submitted DSJ manuscript (WG Deliverable)
- May 2020: Published DSJ article
- July 2020: DSJ article is RDA Supporting Outputs
- August 2020: Published RTD Living Document (WG Deliverable)
- November 2020: RDA vP16

What begins in Finland ends in Finland!

About the logo ...





Why PID of instruments matters

- Instruments play an essential role in creating research data
- Instrument metadata needed to assess data quality and reuse
 - Borgman (*): “To interpret a digital dataset, much must be known about the hardware used to generate the data, whether sensor networks or laboratory machines.”
- Persistent linking of research data and instruments
- Instrument models typical mentioned in literature: could be cited
- Inventory, funding, etc.

(*) Borgman, CL. 2015. Big Data, Little Data, No Data. MIT Press. <https://doi.org/10.7551/mitpress/9963.001.0001>



What PIDINST did

- Collect use cases
- Identify common metadata about instrument *instances*
- Develop and publish the schema
- Implement community feedback to schema versions
- Catalyse schema implementation by *existing* PID infrastructure
- Prototype adoption by existing institutional instrument providers
- Engage the wider community at RDA Plenaries
- Hold regular biweekly virtual meetings



Use cases, metadata analysis and schema

- 15 use cases collected between November 2017 and February 2019
- 60% in Earth Sciences
- Of 15 were 14 complete and 10 timely for October 2018 metadata analysis
- Metadata analysis resulted in first version of the schema
- <https://github.com/rdawg-pidinst/schema/blob/master/schema.rst>
- Schema was revised to account for community feedback



PIDINST Schema essentials

Owner	Institution(s) responsible for the management of the instrument
Manufacturer	The instrument's manufacturer(s) or developer
Model	Name of the model or type of device as attributed by the manufacturer
MeasuredVariable	The variable(s) that this instrument measures or observes
Date	Dates relevant to the instrument (e.g., commissioned, de-commissioned)
RelatedIdentifier	Identifiers of related resources
AlternateIdentifier	Other identifiers pertaining to the same instrument instance



Schema implementations

- DataCite
 - Based on a PIDINST-DataCite Schema mapping
 - Only partial, e.g. no measured variable, model name not included
 - Bending of terminology needed, e.g. creator for manufacturer, publisher, publication year, ...
 - Sure advantage, globally known PID infrastructure
- ePIC
 - Full PIDINST schema implementation (not in sync with the most recent schema changes)
 - Less well-known, more European-centric PID provider
- EUDAT (the new kid on the block)
 - B2INST service for registration and cataloguing
 - Particularly interesting for those lacking DataCite/ePIC membership
 - Result of a recent DataCite-ePIC-EUDAT collaboration
 - More about this later in this training ...

First (documented) tests

- Helmholtz-Zentrum Berlin (HZB)
 - Tested the DataCite implementation
 - <https://doi.org/10.5442/NI000001>
 - <https://search.datacite.org/works?query=doi%3A10.5442%2FNI000001>
 - <https://commons.datacite.org/doi.org/10.5442/NI000001>
 - <https://api.datacite.org/does/10.5442/NI000001>
- British Oceanographic Data Centre (BODC)
 - Tested the ePIC implementation
 - <https://doi.org/21.T11998/0000-001A-3905-F>
 - <http://hdl.handle.net/21.T11998/0000-001A-3905-F?noredirect>

DataCite approach

DataCite Search

doi:10.5442/Nl000001


E2 - Flat-Cone Diffractometer

Instrument published via Helmholtz-Zentrum Berlin für Materialien und Energie

A 3-dimensional part of the reciprocal space can be scanned in less than five steps by combining the "off-plane Bragg-scattering" and the flat-cone layer concept while using a new computer-controlled tilting axis of the detector bank. Parasitic scattering from cryostat or furnace walls is reduced by an oscillating "radial" collimator. The datasets and all connected information is stored in one independent NeXus file format for each measurement and can be easily archived. The software package TVneXus deals with the raw data sets, the transformed physical spaces and the usual data analysis tools (e.g. MatLab). TVneXus can convert to various data sets e.g. into powder diffractograms, linear detector projections, rotation crystal pictures or the 2D/3D reciprocal space.

i No citations were reported. No usage information was reported.

<https://doi.org/10.5442/nl000001> **🗨️** Cite

Where am I? 

E2

Flat-Cone Diffractometer

Instrument description

A 3-dimensional part of the reciprocal space can be scanned in less than five steps by combining the "off-plane Bragg-scattering" and the flat-cone layer concept while using a new computer-controlled tilting axis of the detector bank. Parasitic scattering from cryostat or furnace walls is reduced by an oscillating "radial" collimator. The datasets and all connected information is stored in one independent NeXus file format for each measurement and can be easily archived. The software package TVneXus deals with the raw data sets, the transformed physical spaces and the usual data analysis tools (e.g. MatLab). TVneXus can convert to various data sets e.g. into powder diffractograms, linear detector projections, rotation crystal pictures or the 2D/3D reciprocal space.

For **single crystal** work the multi detector bank (four 2D detectors 300x300 mm²) and the sample table can be tilted around an axis perpendicular to the monochromatic beam to investigate upper layers in reciprocal space (Flat-Cone technique). For **powder studies**, the multi detector bank set on only two positions for a measure the a powder diffractogram of 80° or every detector can be set on an individual position (with gaps between the detectors) for in-situ measurements.

DataCite Commons

DataCite Commons

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<https://doi.org/10.5442/ni000001>

E2 - Flat-Cone Diffractometer

Helmholtz-Zentrum Berlin Für Materialien Und Energie

Instrument published 2019 in [Helmholtz-Zentrum Berlin für Materialien und Energie GmbH](#)

A 3-dimensional part of the reciprocal space can be scanned in less than five steps by combining the “off-plane Bragg-scattering” and the flat-cone layer concept while using a new computer-controlled tilting axis of the detector bank. Parasitic scattering from cryostat or furnace walls is reduced by an oscillating “radial” collimator. The datasets and all connected information is stored in one independent NeXus file format for each measurement and can be easily archived. The software package TVneXus deals with the raw data sets, the transformed physical spaces and the usual data analysis tools (e.g. MatLab). TVneXus can convert to various data sets e.g. into powder diffractograms, linear detector projections, rotation crystal pictures or the 2D/3D reciprocal space.

DOI registered October 16, 2019 via DataCite.

[Other](#)

<https://doi.org/10.5442/ni000001>

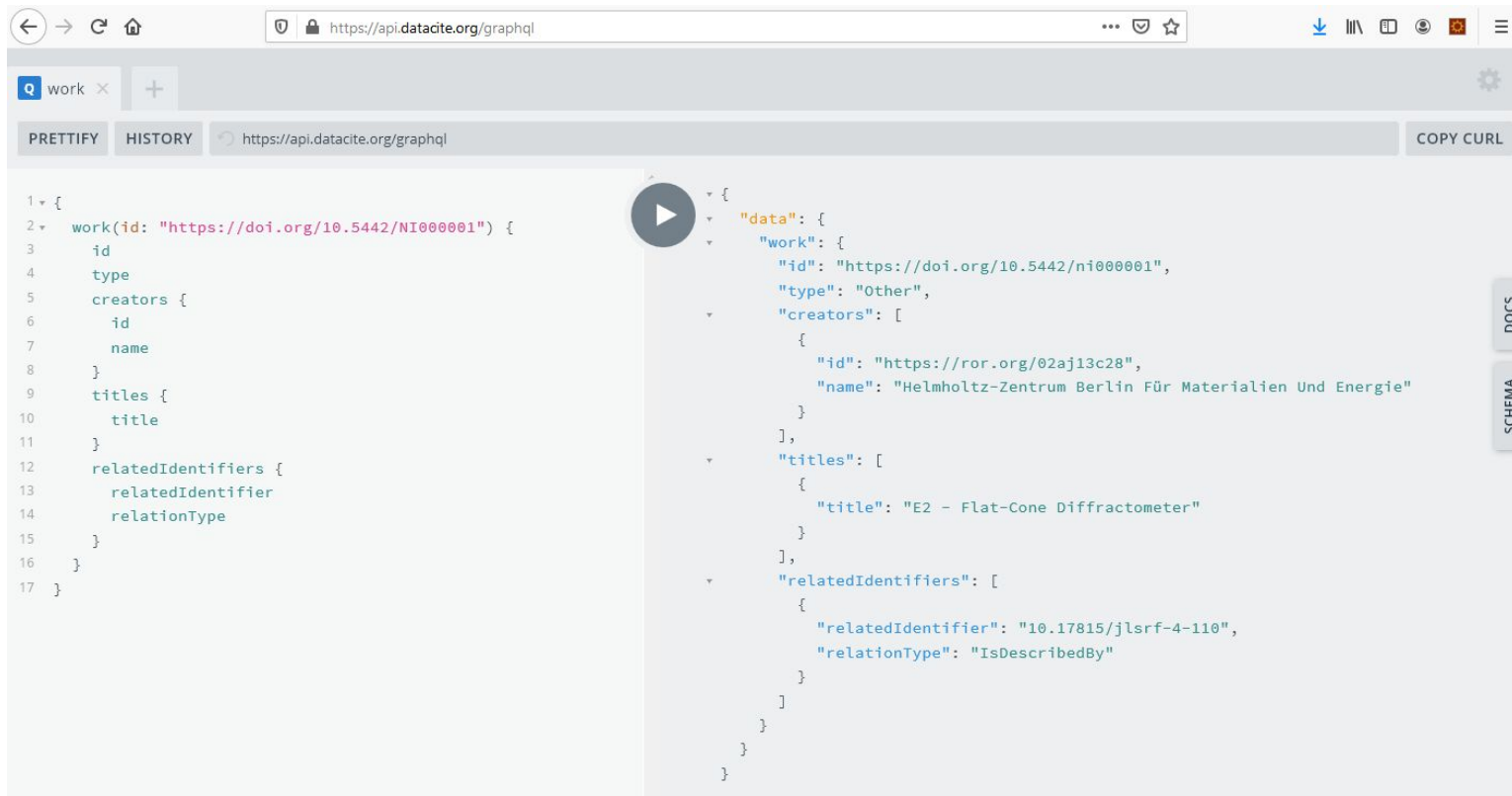
Creators

[Helmholtz-Zentrum Berlin Für
Materialien Und Energie](#)

Contributors

[Helmholtz-Zentrum Berlin Für
Materialien Und Energie](#)
Hosting Institution

DataCite PID Graph



The screenshot shows a web browser window with the URL `https://api.datacite.org/graphql`. The browser's address bar includes navigation icons and a search bar. The page has a header with a search bar containing the text "work" and a plus sign. Below the header, there are tabs for "PRETTIFY" and "HISTORY", and a "COPY CURL" button. The main content area is split into two panels. The left panel shows a GraphQL query with line numbers 1 through 17. The right panel shows the JSON response, which is a tree view of the query results. A play button icon is overlaid on the right panel. On the far right, there are vertical buttons for "DOCS" and "SCHEMA".

```
1 {
2   work(id: "https://doi.org/10.5442/NI000001") {
3     id
4     type
5     creators {
6       id
7       name
8     }
9     titles {
10      title
11    }
12    relatedIdentifiers {
13      relatedIdentifier
14      relationType
15    }
16  }
17 }
```

```
{
  "data": {
    "work": {
      "id": "https://doi.org/10.5442/ni000001",
      "type": "Other",
      "creators": [
        {
          "id": "https://ror.org/02aj13c28",
          "name": "Helmholtz-Zentrum Berlin Für Materialien Und Energie"
        }
      ],
      "titles": [
        {
          "title": "E2 - Flat-Cone Diffractometer"
        }
      ],
      "relatedIdentifiers": [
        {
          "relatedIdentifier": "10.17815/jlsrf-4-110",
          "relationType": "IsDescribedBy"
        }
      ]
    }
  }
}
```

DataCite PID Graph

The screenshot shows a web browser at <https://api.datacite.org/graphql>. The browser's developer tools are open, displaying a GraphQL query and its corresponding JSON response. A callout box highlights the value of the 'id' field in the response.

```
1 {
2   work(id: "https://doi.org/10.5442/NI00001") {
3     id
4     type
5     creators {
6       id
7       name
8     }
9     titles {
10      title
11    }
12    relatedIdentifiers {
13      relatedIdentifier
14      relationType
15    }
16  }
17 }
```

```
{
  "data": {
    "work": {
      "id": "https://ror.org/02aj13c28",
      "type": "Organization",
      "creators": [
        {
          "id": "https://ror.org/02aj13c28",
          "name": "Helmholtz-Zentrum Berlin F\u00fcr Materialien Und Energie"
        }
      ],
      "titles": [
        {
          "title": "E2 - Flat-Cone Diffractometer"
        }
      ],
      "relatedIdentifiers": [
        {
          "relatedIdentifier": "10.17815/jlsrf-4-110",
          "relationType": "IsDescribedBy"
        }
      ]
    }
  }
}
```

"id": "https://ror.org/02aj13c28",

SCHEMA

DataCite PID Graph

The screenshot shows a web browser at `https://api.datacite.org/graphql`. The interface includes a search bar with the text "work", tabs for "PRETTIFY" and "HISTORY", and a "COPY CURL" button. The query on the left is:

```
1 {
2   work(id: "https://doi.org/10.5442/NI000001") {
3     id
4     type
5     creators {
6       id
7       name
8     }
9     titles {
10      title
11    }
12    relatedIdentifiers {
13      relatedIdentifier
14      relationType
15    }
16  }
17 }
```

The JSON response on the right is partially visible, showing the structure of the data returned for the query. A callout box highlights the following relationship:

```
"relatedIdentifier": "10.17815/jlsrf-4-110",
"relationType": "IsDescribedBy"
```

The callout box is a semi-transparent grey rectangle with a white border, containing the highlighted JSON snippet in a blue monospace font. The background of the callout box is slightly blurred to show the underlying JSON response.

ePIC approach

Handle.Net®

Handle Values for: 21.T11998/0000-001A-3905-F

Index	Type	Timestamp	Data
1	URL	2019-12-10 12:27:48Z	https://linkedsystems.uk/system/instance
2	21.T11148/8eb858ee0b12e8e463a5	2019-12-10 12:27:48Z	{"identifierValue": "http://hdl.handle.net/21.11148/8eb858ee0b12e8e463a5"}
3	21.T11148/9a15a4735d4bda329d80	2019-12-10 12:27:48Z	https://linkedsystems.uk/system/instance
4	21.T11148/709a23220f2c3d64d1e1	2019-12-10 12:27:48Z	Sea-Bird SBE 37-IM MicroCAT C-T Sensor
5	21.T11148/4eac4bc0f1df68ab2a7	2019-12-10 12:27:48Z	[{"Owner": {"ownerName": "National Oceanic and Atmospheric Administration", "ownerIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0006/"}, {"VariableMeasured": {"variableName": "Salinity", "variableIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}}]
6	21.T11148/1f3e82ddf0697a497432	2019-12-10 12:27:48Z	[{"Manufacturer": {"manufacturerName": "Sea-Bird Scientific", "manufacturerIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}, {"VariableMeasured": {"variableName": "Salinity", "variableIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}}]
7	21.T11148/55f8ebc805e65b5b71dd	2019-12-10 12:27:48Z	A high accuracy conductivity and temperature sensor with an inductive modem for remote data transfer.
8	21.T11148/f76ad9d0324302fc47dd	2019-12-10 12:27:48Z	http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/
9	21.T11148/72928b84e060d491ee41	2019-12-10 12:27:48Z	[{"MeasuredVariable": {"variableName": "Salinity", "variableIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}, {"VariableMeasured": {"variableName": "Salinity", "variableIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}}]
10	21.T11148/22c62082a4d2d9ae2602	2019-12-10 12:27:48Z	[{"date": {"date": "1999-11-01", "dateType": "Text"}, {"VariableMeasured": {"variableName": "Salinity", "variableIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}}]
11	21.T11148/eb3c713572f681e6c4c3	2019-12-10 12:27:48Z	[{"AlternateIdentifier": {"alternateIdentifier": "http://hdl.handle.net/21.11148/eb3c713572f681e6c4c3", "alternateIdentifierType": "URL"}, {"VariableMeasured": {"variableName": "Salinity", "variableIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}}]
12	21.T11148/178fb558abc755ca7046	2019-12-10 12:27:48Z	[{"RelatedIdentifier": {"relatedIdentifier": "http://hdl.handle.net/21.11148/178fb558abc755ca7046", "relatedIdentifierType": "URL"}, {"VariableMeasured": {"variableName": "Salinity", "variableIdentifierValue": "http://vocab.nerc.ac.uk/collection/L22/current/IDEN0002/"}}]
100	HS_ADMIN	2019-10-14 16:31:53Z	handle=21.T11998/USER30; index=300; admin]

[Handle Proxy Server Documentation](#)
[Handle.net Web Site](#)

Please contact hlladmin@cnri.reston.va.us for your handle questions and comments.

```
-<sml:PhysicalSystem xsi:schemaLocation="http://www.opengis.net/swes/2.0 http://schemas.opengis.net/swes/2.0/swesDescribeSensor.xsd http://www.opengis.net/sensorml/2.0 http://schemas.opengis.net/sensorML/2.0/sensorML.xsd http://www.isotc211.org/2005/gmd http://schemas.opengis.net/iso/19139/20070417/gmd/gmd.xsd http://www.isotc211.org/2005/gco http://schemas.opengis.net/iso/19139/20070417/gco/gco.xsd http://www.opengis.net/gml/3.2 http://schemas.opengis.net/gml/3.2.1/gml.xsd" gml:id="TOOL0022_2490">
  <gml:description>SBE 37-IM MicroCAT-2490</gml:description>
  <gml:identifier codeSpace="uniqueID">TOOL0022_2490</gml:identifier>
  -<sml:keywords>
    -<sml:KeywordList>
      <sml:keyword>salinity sensor</sml:keyword>
      <sml:keyword>water temperature sensor</sml:keyword>
      <sml:keyword>Temp</sml:keyword>
      <sml:keyword>P_sal</sml:keyword>
      <sml:keyword>InSituCond</sml:keyword>
      <sml:keyword>Pres_MCat</sml:keyword>
    </sml:KeywordList>
  </sml:keywords>
  -<sml:identification>
    -<sml:IdentifierList>
      -<sml:identifier>
        -<sml:Term definition="TOOL0022_2490">
          <sml:label>UUID</sml:label>
          <sml:value>TOOL0022_2490</sml:value>
        </sml:Term>
      </sml:identifier>
      -<sml:identifier>
        -<sml:Term definition="http://vocab.nerc.ac.uk/collection/W07/current/IDEN0006/">
          <sml:label>Short Name</sml:label>
          <sml:value>SBE 37-IM MicroCAT 2490</sml:value>
        </sml:Term>
      </sml:identifier>
      -<sml:identifier>
        -<sml:Term definition="http://vocab.nerc.ac.uk/collection/W07/current/IDEN0002/">
          <sml:label>Long Name</sml:label>
          <sml:value>Sea-Bird SBE 37-IM MicroCAT C-T Sensor 2490</sml:value>
        </sml:Term>
      </sml:identifier>
      -<sml:identifier>
        -<sml:Term definition="http://vocab.nerc.ac.uk/collection/W07/current/IDEN0005/">
          <sml:label>Serial Number</sml:label>
          <sml:value>2490</sml:value>
        </sml:Term>
      </sml:identifier>
    </sml:IdentifierList>
  </sml:identification>

```

Deliverables



Special Collection: [Research Data Alliance Results](#)

Research Papers

Persistent Identification of Instruments

Authors: [Markus Stocker](#) , [Louise Darroch](#), [Rolf Krahl](#), [Ted Habermann](#),
[Anusuriya Devaraju](#), [Ulrich Schwardmann](#), [Claudio D'Onofrio](#),
[Ingemar Häggström](#)

Abstract

Instruments play an essential role in research. The identification of instruments and associated metadata is crucial. The Research Data Alliance (RDA) has developed the Persistent Identification of Instruments (PIDINST) schema implementation with DataCite, the European Research Identifier infrastructures and with HZB (Helmholtz-Zentrum Berlin für Materialien und Energie) and BODC (British Oceanographic Data Centre) as representative institutional instrument providers. These implementations demonstrate the viability of the proposed solution in practice. Moving forward, PIDINST will further catalyse adoption and consolidate the schema by addressing new stakeholder requirements.

Keywords: [Persistent Identification](#), [Instruments](#), [Metadata](#), [DOI](#), [Handle](#)

Markus Stocker, Louise Darroch, Rolf Krahl, Ted Habermann, Anusuriya Devaraju, Ulrich Schwardmann, Claudio D'Onofrio, and Ingemar Häggström (2020). **Persistent Identification of Instruments.** *Data Science Journal*, 19:18.

<https://doi.org/10.5334/dsj-2020-018>



Special Collection: [Research Data Alliance Results](#)

Research Papers

Persistent Identification of Instruments

Authors: [Markus Stocker](#) , [Louise Darroch](#), [Rolf Krahl](#), [Ted Habermann](#), [Anusuriya Devaraju](#), [Ulrich Schwardmann](#), [Claudio D'Onofrio](#), [Ingemar Häggström](#)

Abstract

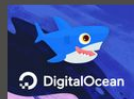
Instruments play an essential role in research data management, and associated metadata are crucial for data reuse, globally unique, persistent identifiers are crucial. The Research Data Alliance (RDA) has developed the Persistent Identification of Instruments (PIDINST) developed for the identification of instruments which are used in the analysis of 10 use cases, PIDINST is a schema implementation with DataCite identifiers and with HZB (Helmholtz-Zentrum für Materialien und Energie) and BODC (British Oceanographic Data Centre) institutional instrument providers. These identifiers will further catalyse adoption and consolidate the schema by addressing stakeholder requirements.

Markus Stocker, Louise Darroch, Rolf Krahl, Ted Habermann, Anusuriya Devaraju, Ulrich Schwardmann, Claudio D'Onofrio, and Ingemar Häggström. **Persistent Identification of Instruments.** *Data Science Journal*, 19:18.

<https://doi.org/10.21203/rs.3.rs-4/dsj-2020-018>

Keywords: [Persistent Identification](#), [Instruments](#), [Metadata](#), [DOI](#), [Handle](#)

RDA Supporting Outputs
<https://www.rda-alliance.org/group/persistent-identification-instruments-wg/outcomes/persistent-identification-instruments>



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Persistent Identification of Instruments



The [Persistent Identification of Instruments WG \(PIDINST\)](#) seeks to explore a community-driven solution for globally unique identification of measuring instruments operated in the sciences.

Measuring instruments, such as sensors used in environmental science, DNA sequencers used in life sciences or laboratory engines used for medical domains, are widespread in most fields of applied sciences. The ability to link an active instrument (instance) with an instrument type and with the broader context in which the instrument operates, including generated data, other instruments and platforms, people and manufacturers, etc., is critical, especially for automated processing of such contextual information and for the interpretation of generated data.

PIDINST is a working group in the [Research Data Alliance \(RDA\)](#). It aims to establish a cross-discipline, operational solution for the unique and lasting identification of measuring instruments actively operated in the sciences.

The group produced the following outputs:

- [Stocker, M, Darroch, L, Krahl, R, Habermann, Haggström, I. 2020. Persistent Identification 1–12. DOI: <https://doi.org/10.5334/dsj-2020-001>](#)
This paper provides an overview of the work.
- [PIDINST White Paper](#)
This white paper provides recommendations for the use of instrument PIDs and gives technical details that go beyond the overview provided in the Data Science Journal paper. It is expected to evolve with new user requirements and working group activities.
- [ePIC Cookbook](#)
Detailed instructions on how to create instrument PIDs using the ePIC infrastructure.

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<https://rda-pidinst.readthedocs.io/>

Adoption



HZB Helmholtz
Zentrum Berlin

ICOS

INTEGRATED
CARBON
OBSERVATION
SYSTEM



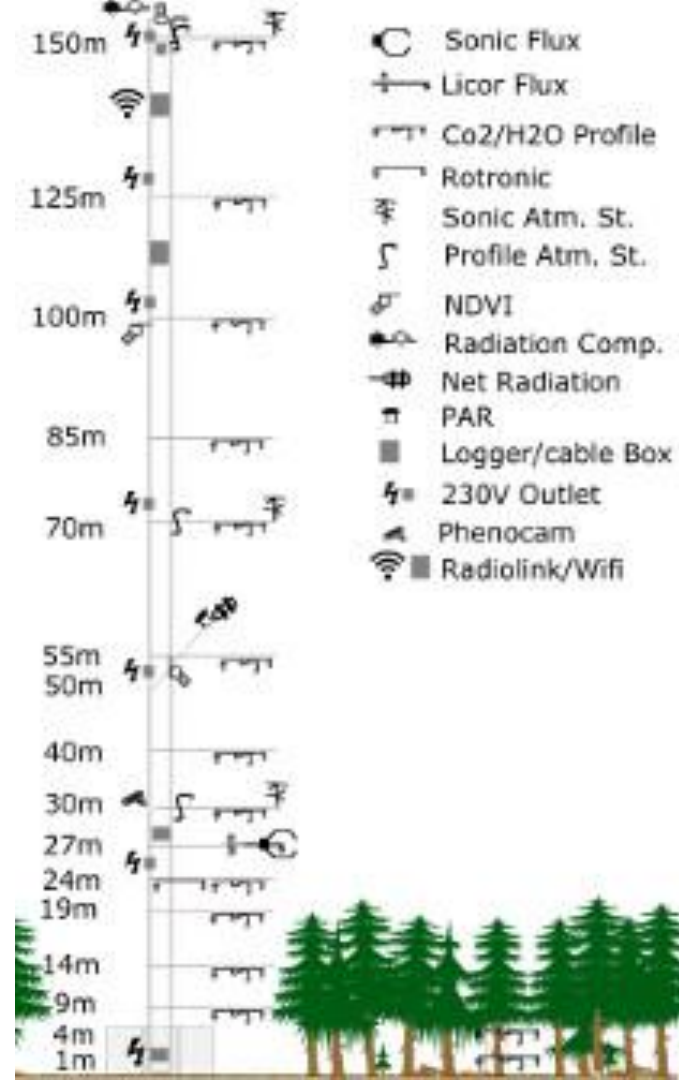
SENSOR.COMMUNITY



ICOS

Carbon
Portal

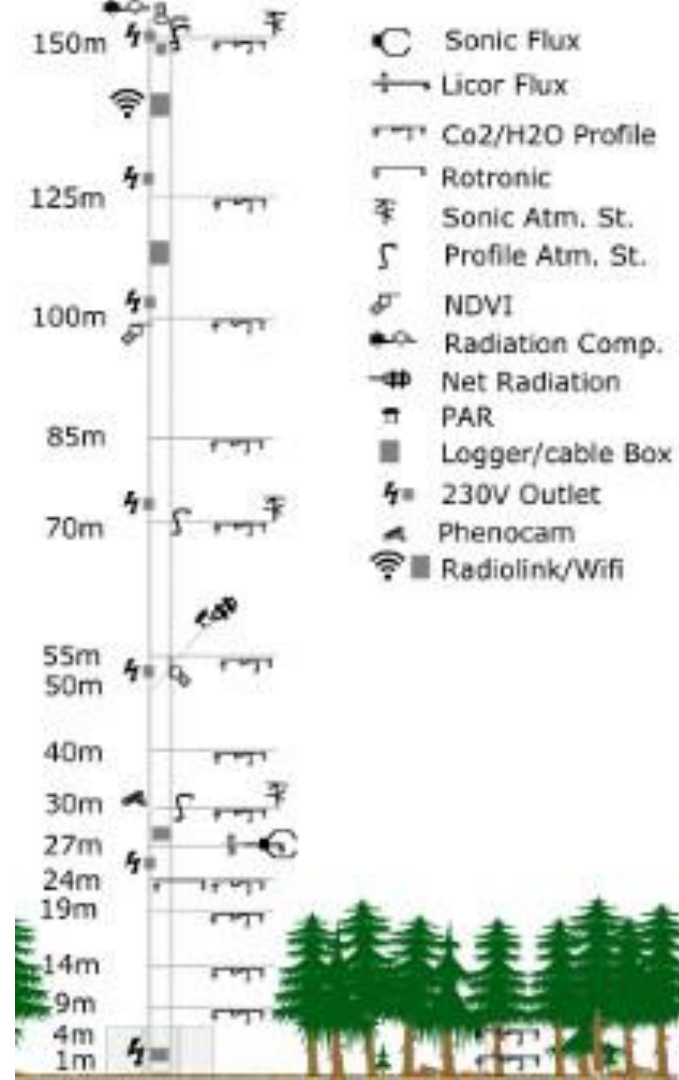
- ICOS operates ca 150 measurement stations in 12 countries
- GHG concentrations & fluxes, meteo, environmental monitoring
- Atmosphere, Ecosystem, Marine domains
- Instrument metadata include type, serial number, settings, location, calibration coefficients, ...



ICOS

Carbon
Portal

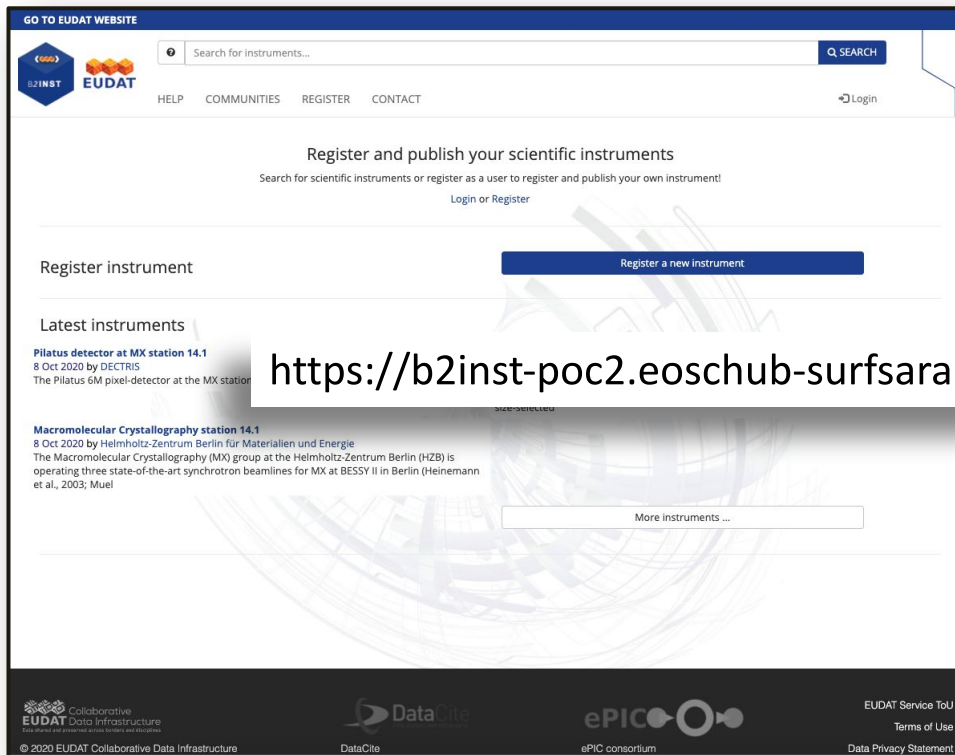
- Ensure PIDINST schema compatibility
- Mint PIDs with suitable and *operational* service
- Create informative Landing Pages







PANGAEA.

- PIDINST is relevant also for data publication
- PANGAEA is including PIDs for instruments in metadata
- Will be sharing links between data publications and instruments



GO TO EUDAT WEBSITE

  Search for instruments...

HELP COMMUNITIES REGISTER CONTACT

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Register instrument


Latest instruments

Pilatus detector at MX station 14.1
8 Oct 2020 by DECTRIS
The Pilatus 6M pixel-detector at the MX station

Macromolecular Crystallography station 14.1
8 Oct 2020 by Helmholtz-Zentrum Berlin für Materialien und Energie
The Macromolecular Crystallography (MX) group at the Helmholtz-Zentrum Berlin (HZB) is operating three state-of-the-art synchrotron beamlines for MX at BESSY II in Berlin (Heinemann et al., 2003; Muel

 Collaborative
EUDAT Data Infrastructure
Data Infrastructure for Research and Education

 DataCite

 ePIC consortium

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<https://b2inst-poc2.eoschub-surfsara.surf-hosted.nl/>

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Search for instruments... Q, SEARCH

HELP COMMUNITIES REGISTER CONTACT mark.vandesanden@surfsara.nl

RECORDS - 47077E3C4B9F4852A40709E338AD4622 Latest Version - Oct 8, 2020

Name → Macromolecular Crystallography station 14.1

Description → Oct 8, 2020
 The Macromolecular Crystallography (MX) group at the Helmholtz-Zentrum Berlin (HZB) is operating three state-of-the-art synchrotron beamlines for MX at BESSY II in Berlin (Heinemann et al., 2003; Mueller et al., 2012, 2015). The radiation source for all three beamlines BL14.1-3 is a superconducting 7T-wavelength shifter. Currently, the three beam lines are the most productive stations for MX in Germany, with about 250 PDB depositions per year and over 1500 PDB depositions in total (Status 10/2015). BL14.1 and BL14.2 are energy tuneable in the range 5.5-15.5 keV, while beam line BL14.3 is a fixed-energy side station operated at 13.8 keV. The HZB-MX beamlines are in regular user operation providing close to 200 beam days per year and about 600 user shifts to approximately 100 research groups across Europe. Additional user facilities include office space adjacent to the beam lines, a sample preparation laboratory, a biology laboratory (safety level 1) and high-end computing resources.

PID → DOI: 10.21945/b2share.47077e3c4b9f4852a40709e338ad4622
 PID: 21.T12996/4e23c1b0-9031-411f-8f1a-bf52d42905b6

Annotate in B2Note

Basic Metadata →

Basic metadata																	
Owners	Name Helmholtz-Zentrum Berlin für Materialien und Energie																
Manufacturers	Manufacturer Helmholtz-Zentrum Berlin für Materialien und Energie																
Instrument Type	Experimental station for Macromolecular Crystallography (MX)																
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Resources

Name	Size
> myfile	9B

Versioning

Community Domain

Basic Metadata

Optional Files

Remarks

- RDA PIDINST WG has created a first schema for PIDs for instruments
- Remember: Instrument *instances* not models, instruments used in research
- With DataCite, ePIC and EUDAT several implementation choices
- There are first signs of schema adoption and field testing
- We need more of this; hence, also this ENVRI training