**Recommendation 3.0 **

# Recommendation to use PIDINST as the standard reference in technical infrastructures to measuring devices or instruments where appropriate

## Description

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## Motivation for this Recommendation:

To be able to identify the exact instrument or sensor, data has been obtained with, is crucial to be able to define what exactly has been measuered, repeat an experiment or measure, as well as to evaluate the precision and reliability of a measurement.

So far, this information has not been recorded by default in most cases, as the PIDINST system is still relatively ‘young’. With our recommendation, we would like to support its dissemination and further development.

We therefore recommend to assign PIDs to all instruments, sensors or other devices producing measurements, whether they are in laboratories, on field stations, platforms, like ships or airplanes, or other places. The process to register PIDs may be subject to the disciplinary culture, however, it may be connected to the acquisition of the instrument or device, as well as to the operation, e.g. in electronic lab notebooks (ELN) or other protocol tools.

## Recommendation

It is recommended that everyone in the Helmholtz Association use PIDInst to identify instruments in data infrastructures wherever and whenever possible.

For organizations this means:

- employ measures and incentives to register instruments with PIDINST at acquisition.
- make a person responsible to maintain the PIDINST for each instrument (e.g. lab technicians).

For technicians this means:

- register a PIDINST for instruments which weren’t registered yet.

- keep the PIDINST related metadata of your instruments current.
- Keep a written record of the PIDINST on every instrument, where possible
- share the PIDINST with the customer with any measurement data you deliver.

For researchers it means:

- record an PIDINST with any measurement. You should find it on the instrument.

For data infrastructures:

- record a PIDINST with instruments registered in data infrastructures.
- treat PIDINST metadata as the primary source of truth and update your own metadata accordingly.
- inform the responsible person if you think the PIDINST metadata is not accurate.

# Binding Convention:

| | **mandatory** | **conditional** | **optional** |
|---|---|---|---|
| **Helmholtz FAIR Principle** | | mandatory if PIDINST is available | |

# Precondition for Implementation:

# Related Recommendations

Parent:

Dependent: timeseries, projects

Other:

# Contributors

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# Content

## 1. Explanation of the Background and Benefits of the Recommendation

In today's data-driven world, effective data management is crucial for organizational success. One key aspect of this is the deployment of Persistent Identifiers for Instruments (PIDINST), which can significantly enhance data management infrastructures and workflows.

Enhanced Data Traceability and Integrity:

- PIDINST provides a unique and persistent identifier for each instrument, ensuring that data generated by these can be accurately traced and verified. This enhances the integrity and reliability of data, which is essential for research, compliance, and decision-making processes.

Improved Data Sharing and Collaboration:

- By implementing PIDINST, organizations can facilitate better data sharing and collaboration both internally and externally. PIDINST make it easier to reference and share the provenence of the data, fostering a more collaborative environment and enhancing the overall efficiency of data management workflows.

Streamlined Data Management Processes:

- PIDINST deployment allows for the registration of instruments by personnel, ensuring that all instruments are accounted for and properly managed. This streamlines data management processes, reducing the risk of data loss or misplacement and ensuring that data is always accessible when needed.

Accountability and Maintenance:

- Assigning a person or unit to be responsible for maintaining the organization's PIDINST ensures accountability and ongoing management. This dedicated oversight helps in keeping the data management infrastructure up-to-date and functioning optimally, thereby supporting the organization's long-term data management goals.

Compliance and Standardization:

- Supporting PIDINST deployment helps organizations comply with industry standards and regulations related to data management. It ensures that data is managed in a standardized manner, which is crucial for meeting regulatory requirements and maintaining the organization's reputation.

## 2. Possible alternative solutions

DataCite can also be used to identify instruments by assigning DOIs to them. This allows for the unique identification and citation of instruments in research publications .

electronic Persistent Identifier for eResearch (ePIC) is a PID service that provides persistent identifiers for various types of research objects, including instruments. It is designed to support the unique identification of instruments and other research entities, facilitating better data management and sharing. The ePIC infrastructure has been used for prototypical implementation of PIDINST metadata properties.

International Geo Sample Number (IGSN) is a persistent identifier for physical samples, particularly in the geosciences. While primarily focused on samples, the IGSN framework can be adapted to identify instruments used in geological and environmental research. This helps in tracking the provenance and usage of instruments in field studies.

Open Researcher and Contributor ID (ORCID) is primarily used to uniquely identify researchers and contributors, it can be part of a broader ecosystem of persistent identifiers that includes instruments.

By linking instruments to the researchers who use them, ORCID can help in creating a more comprehensive and interconnected research data management system.

The Handle System is a widely used persistent identifier system that provides unique identifiers for digital objects. It can be used to assign persistent identifiers to instruments, ensuring that they can be uniquely identified and referenced in research data and publications. The Handle System is highly customizable and can be adapted to various use cases, including instrument identification.

[Andrea: Dieser Inhalt ist Mistral AI erzeugt - zu prüfen und zu kürzen.]

## 3. Consideration of the advantages and disadvantages of implementing the recommendation

Quality of Content:

- While PIDINST enhances data traceability, the quality of the content being traced is still dependent on the accuracy and reliability of the data entered. Organizations must ensure that data entry processes are robust to maintain high-quality content.

Limitations:

- Implementing PIDINST may require significant initial investment in terms of time, resources, and training. Organizations need to be prepared for this initial outlay and ensure that personnel are adequately trained to use the new system effectively.

Interoperability:

- PIDINST must be compatible with existing data management systems and workflows. Organizations need to assess the interoperability of PIDINST with their current infrastructure and make necessary adjustments to ensure seamless integration.

Sustainability:

- The long-term sustainability of PIDINST deployment depends on several factors, including expected future dissemination, technical availability, and funding. Organizations must consider the ongoing costs and resources required to maintain and update the PIDINST system. Ensuring continuous funding and technical support is crucial for the sustained success of PIDINST deployment.

## 4. The Recommendation

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## 5. Naming of communities that have already implemented the recommendation

PIDINST (Persistent Identification of Instruments) https://docs.pidinst.org/en/1.0a2/ is being adopted and utilized by various communities, particularly in scientific and research domains. Here are some key communities and contexts where PIDINST is in use:

Research Data Alliance (RDA):

- RDA has endorsed the PIDINST Metadata Schema as a recommendation. This community-driven solution aims at the globally unique identification of measuring instruments used in various scientific fields.
- The WG continues to maintain the metadata schema and support its adoption in communities such as the German National Research Data Infrastructure (NFDI).
- https://www.rd-alliance.org/groups/persistent-identification-instruments-wg/members/all-members/

German National Research Data Infrastructure (NFDI):

- The German National Research Data Infrastructure is one of the communities adopting PIDINST. This adoption is supported by the Persistent Identification of Instruments Working Group, which continues to maintain the metadata schema and promote its use.

Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen (GWDG):

- Aligned with the PIDINST metadata schema, GWDG developed an instrument registry, which you may consider using to describe your instruments and obtain a PID for them, see: https://b2inst.gwdg.de

Environmental Science:

- Instruments such as sensors used in environmental science are widespread in this field. PIDINST provides a way to uniquely identify these instruments, facilitating better data management and sharing.
- GFZ Helmholtz Centre for Geosciences has developed an application is to help scientists and technicians to manage sensors, measurement setups and campaigns, see: https://sensors.gfz-potsdam.de

Life Sciences:

- DNA sequencers and other laboratory instruments used in life sciences are also covered by PIDINST. This helps in maintaining consistent and accurate identification of instruments across different research projects and institutions.

Medical Domains:

- Laboratory engines and other medical instruments benefit from the unique identification provided by PIDINST, ensuring that data generated from these instruments can be reliably tracked and referenced.

## 6. Documentation of the test to validate correct implementation

## 7. Examples of Instances

## 8. Further Information

Research Data Alliance (RDA) Persistent Identification of Instruments (PIDINST) working group output report, Version: 1.0a2, 19 April 2021
https://docs.pidinst.org/en/1.0a2/white-paper/index.html#white-paper

RDAs 24th Plenary - Persistent Identification of Instruments WG: Working with PIDs in Tools IG, recording: https://youtu.be/CjgnGKJ_XEc

## 9. History of this document

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