Data Discoverability and Persistent Identifiers

EUDAT Summer School, Herkalion, 2017

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EUDAT Summer School, Heraklion, 2017

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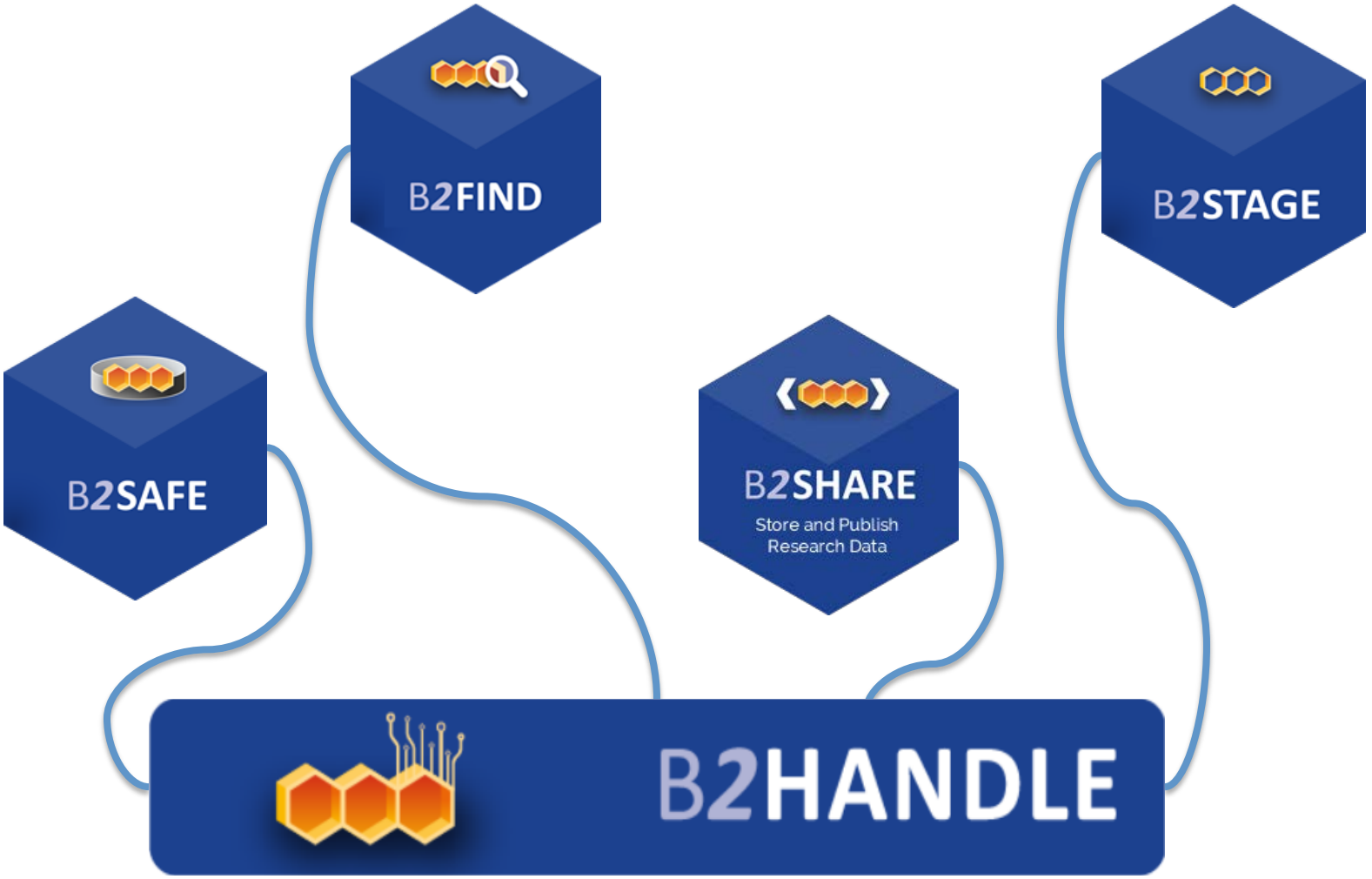
Outline

- What are PIDs?
- Use cases
- PID providers and systems
- PID usage in EUDAT

- The Handle system
  - The handle resolution system
  - The relation between Handle and ePIC
  - Hands-on tutorial

PIDs in EUDAT



PIDs in EUDAT – Why?

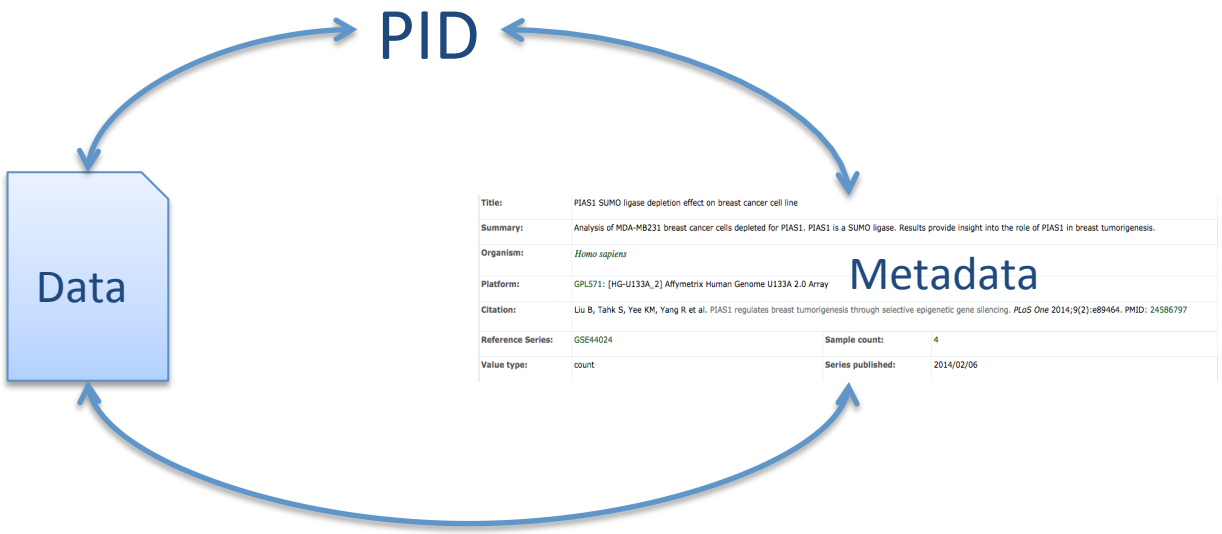
- Managing **increasing numbers of data objects**
- **Sharing data from different sources** amongst researchers
- Data needs to be **(globally) identifiable and addressable** → reuse of data
- Data citation
- Linking data from different sources

  → Pooling datasets
- Challenges
  - Object locations change over time
  - Object migration between repositories

What do we want from data?

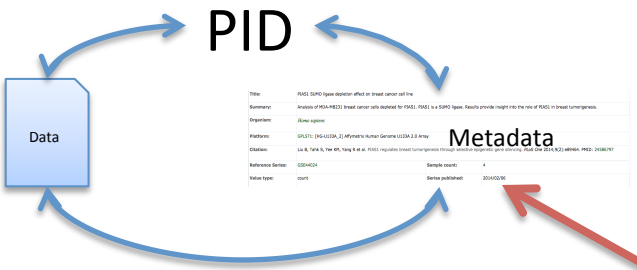
- **Findable** – Easy to find by both humans and computer systems → Metadata
- **Accessible** – Stored for long term, accessed and/or downloaded with well-defined license and access
- **Interoperable** – Ready to be combined with other datasets by humans as well as computer systems;
- **Reusable** – Ready to be used for future research and to be processed further using computational methods.
- The FAIR guiding Principles for scientific data management and stewardship, doi:10.1038/sdata.2016.18

What do we need?

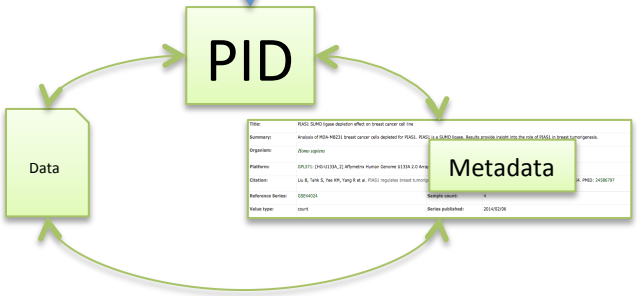


- Persistent Identifier: reference and identify object, either metadata or data object
- Synchronise PID, Data and Metadata during creation, maintenance, update and deletion of a digital object!

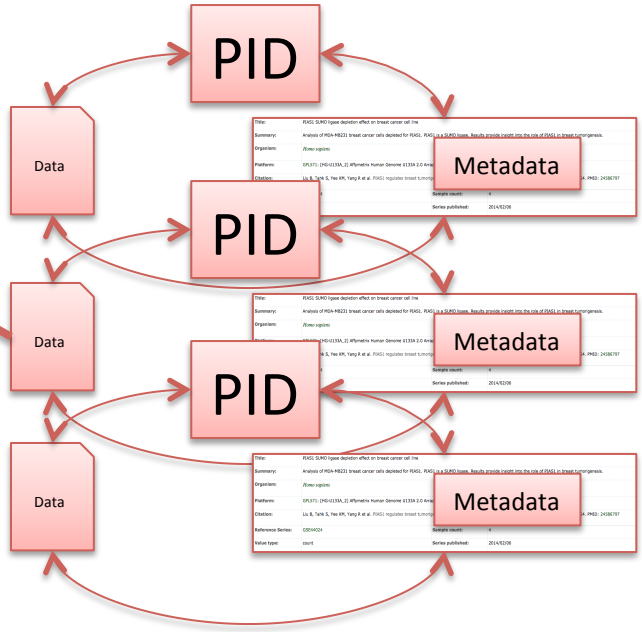
What do we need?



Analysed data



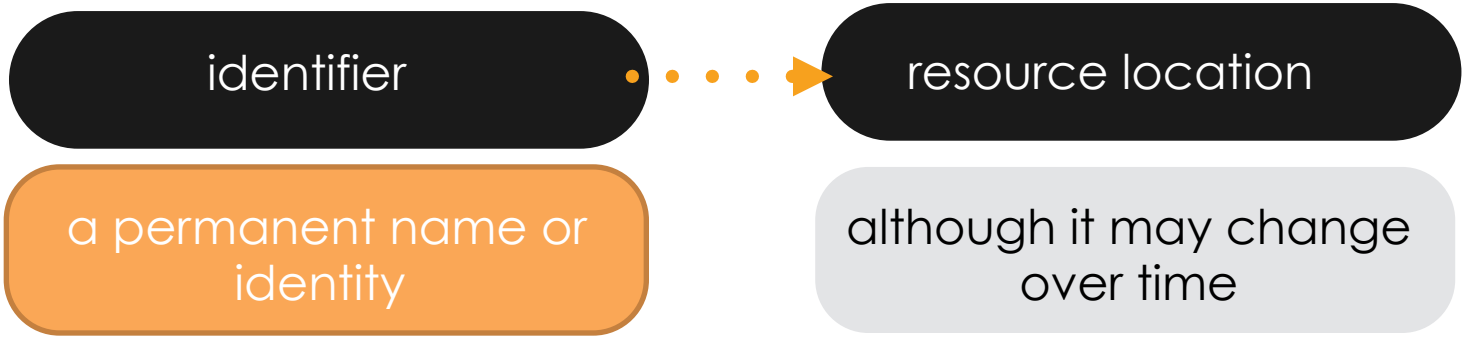
Published data



Raw data

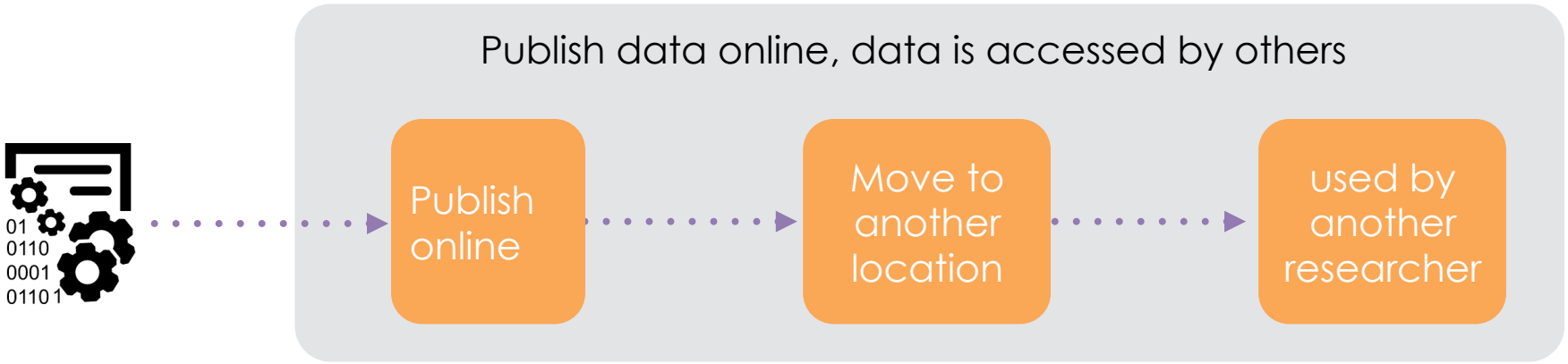
What do we know about Persistent Identifiers?

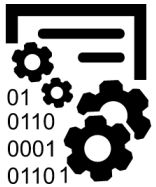
- A Persistent Identifier (PID) is an identifier that is effectively permanently assigned to a resource.



- Pointers to data resources
- Globally unique
- Exist infinitely long (the PID, not necessarily the data)

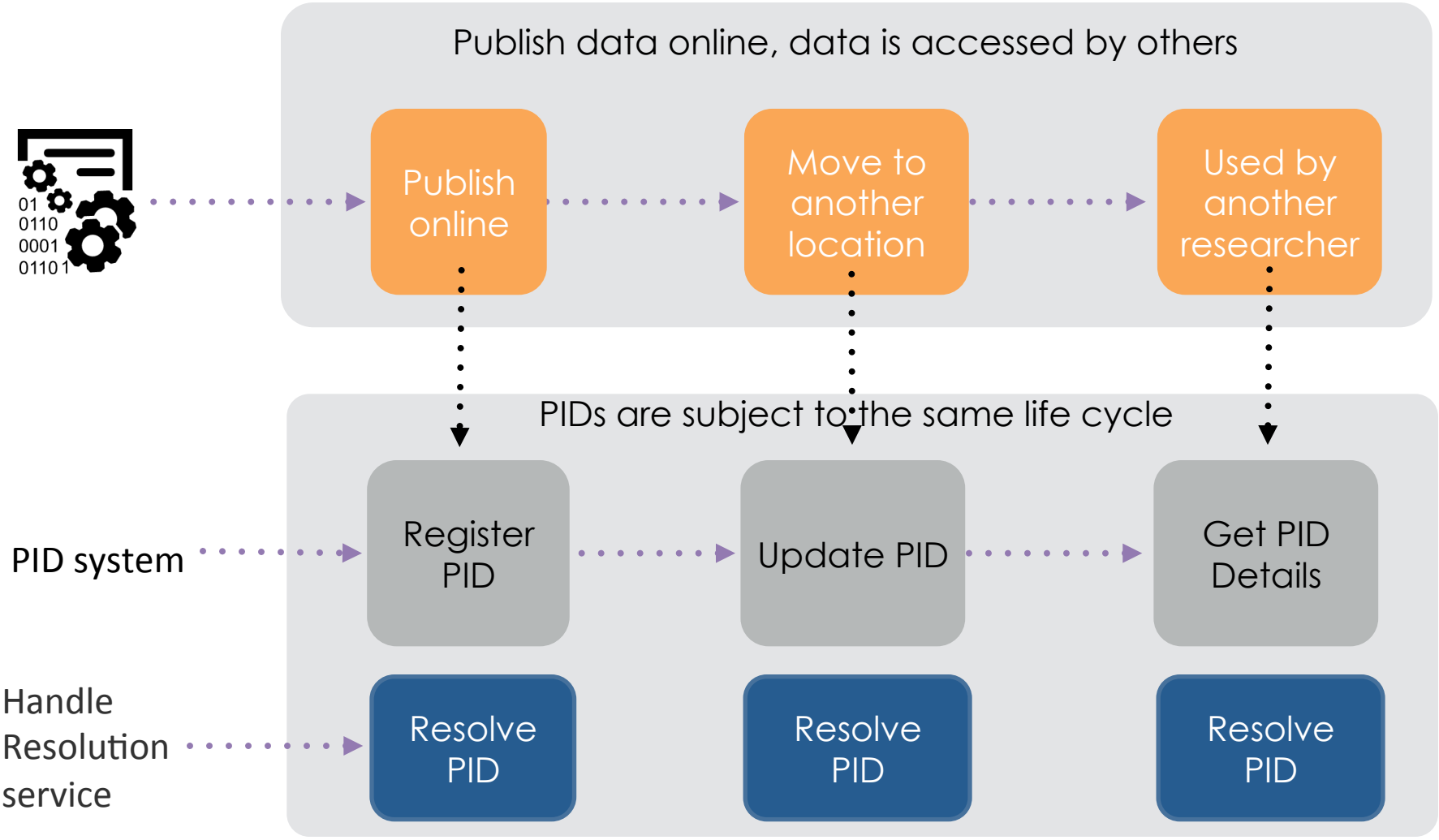
Simple data life cycle, linearised





- Published online: http://www.test.com/test.html
- Other users may cite, access, re-use this url
- Relocate the resource at http://www.example.com/
- Other users are not informed -> 404

Data Life Cycle with PID system



Advantages and Disadvantages

Pro:

- Static reference,
  even if data moves or changes
- Network of persistent links
  Data – metadata relations
  Provenance chains

Con:

- Extra effort
  - What to identify?
  - Coordination across organisations and people
- Organisational discipline to ensure persistence

Use cases

Use Case 1: Data publication

- PIDs point to landing page of the digital repository showing metadata
- "Real" data can be downloaded from this page with another link
- E.g. B2SHARE, FigShare, Zenodo, …
- PID

http://hdl.handle.net/11304/3265434c-4b34-11e4-81ac-dcbd1b51435e

resolves to landing page

https://b2share.eudat.eu/records/feafb12e810c489b9e878949c6c35345

EUDAT

B2SHARE
Store and Share Research Data

The persistent identifier for the **collection**

Climate station Waldhaeuser

by [Unknown]

Apr 12, 2017

Description: Climate data

DOI: 10.23728/b2share.7a70f943dcdd48a0822f0f135b3ac2bc Copy

PID: 11304/8220b208-b61b-4a05-bf36-df5d56b6247a Copy

LTER

Files

Name

Metadata_Meteodata WaldhÑuser LTER database.xlsx

Checksum: md5:3cdeaba5f3e9d99cb228161578699668

PID: 11304/f7...

doi®

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Resolve a DOI Name

doi: 10.23728/b2share.7a70f943dcdd48a0822f0f135b3ac2bc

Go

Handle.Net®

Handle Values for: 11304/8220b208-b61b-4a05-bf36-df5d56b6247a

Index	Type	Timestamp	Data
1	URL	2017-04-12 11:59:52Z	https://b2share.eudat.eu/records/7a70f943dcdd48a0822f0f135b3ac2bc

EUDAT

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The persistent identifier for **files**

LTER

Files

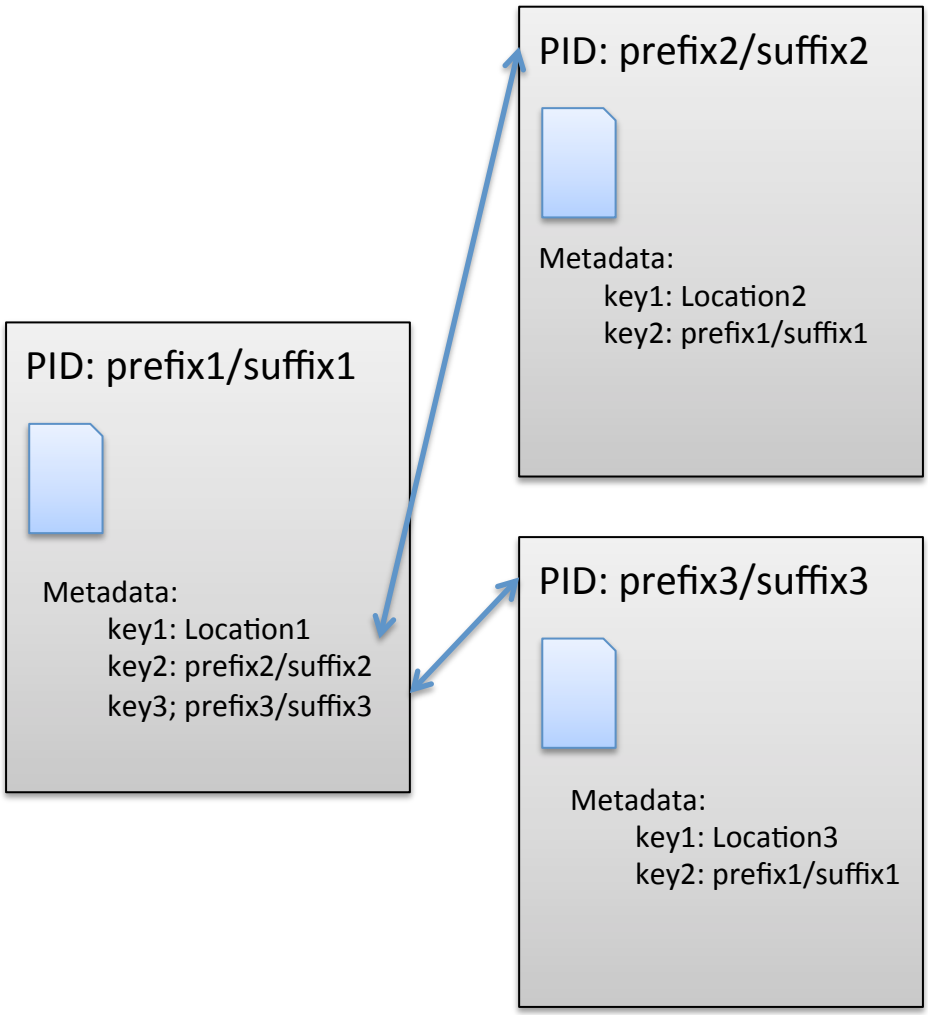
Name	Size
Metadata_Meteodata WaldhÑuser LTER database.xlsx Checksum: md5:3cdeaba5f3e9d99cb228161578699668 PID: 11304/f73726bb-fade-45aa-9700-bdb3a07ff692 Copy	9.24KB

Handle.Net®

Handle Values for: 11304/f73726bb-fade-45aa-9700-bdb3a07ff692

Index	Type	Timestamp	Data
1	URL	2017-04-12 11:59:54Z	https://b2share.eudat.eu/api/files/3d82b14b-8bbc-4bb3-b3b9-aaff408516cb/Metadata_Meteodata%20WaldhN%CC%83user%20LTER%20database.xlsx
2	CHECKSUM	2017-04-12 11:59:54Z	md5:3cdeaba5f3e9d99cb228161578699668

Use case 2: Modeling Relationships

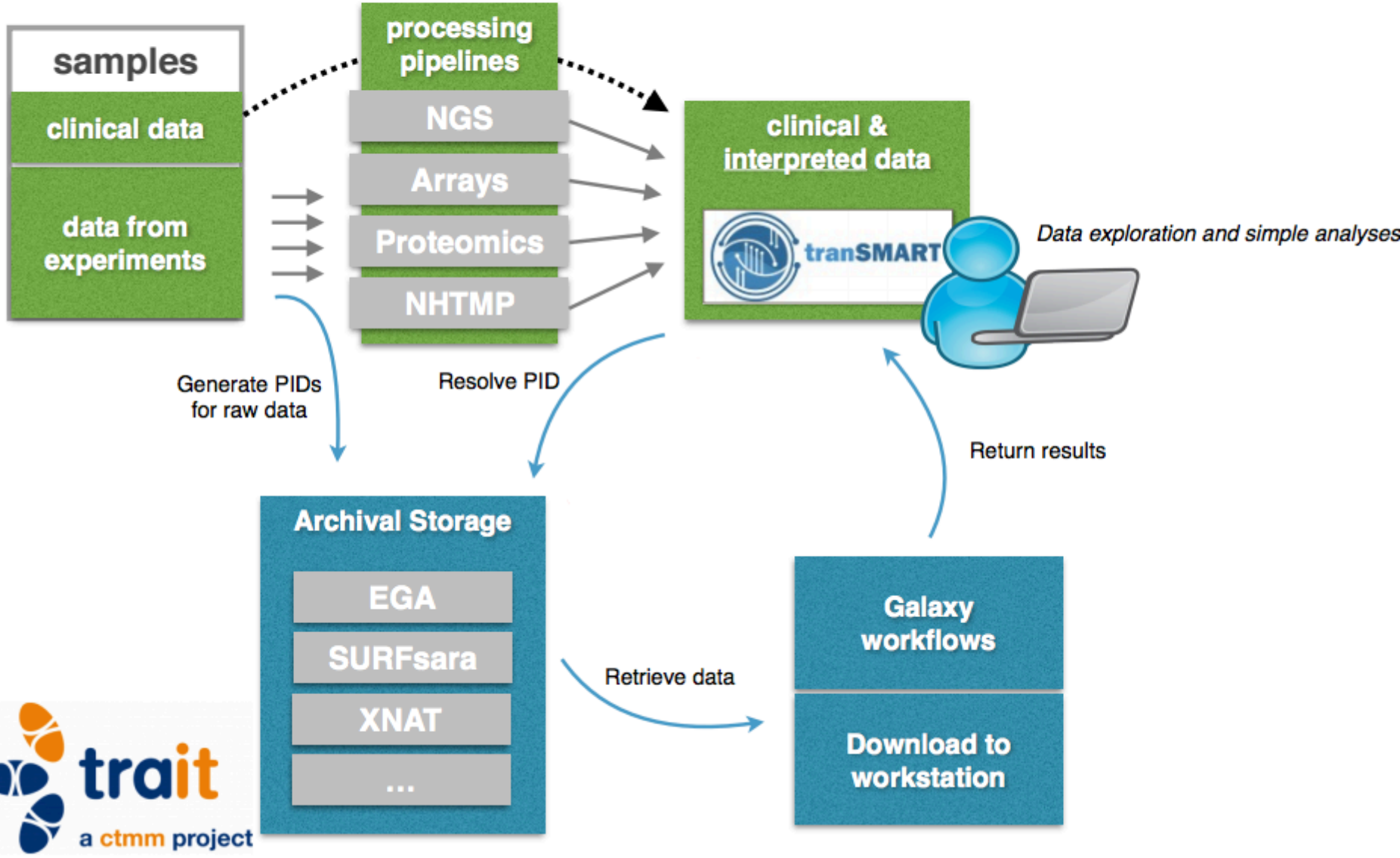


- Use tightly coupled metadata
- Part of/has part relationships
- Model cohort-patient relationship
- Model patient-samples relationship

Which metadata to store with the PID and which in an extra catalogue ?

Use case 3: Enabling data workflows

Molecular profiling dataflow in TraIT



TraIT data ontology

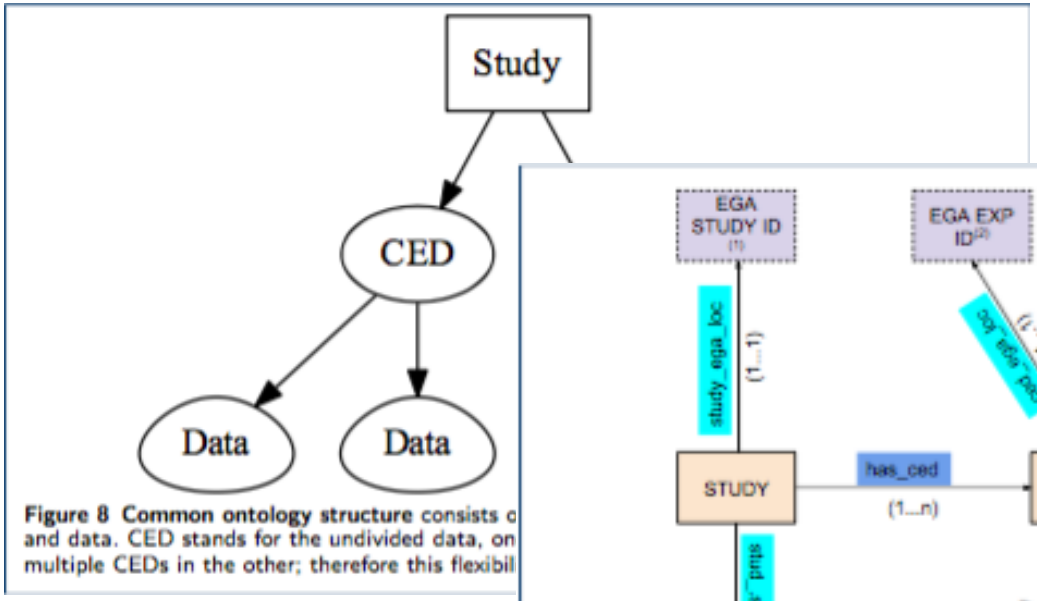


Figure 8 Common ontology structure consists o
and data. CED stands for the undivided data, on
multiple CEDs in the other; therefore this flexibil

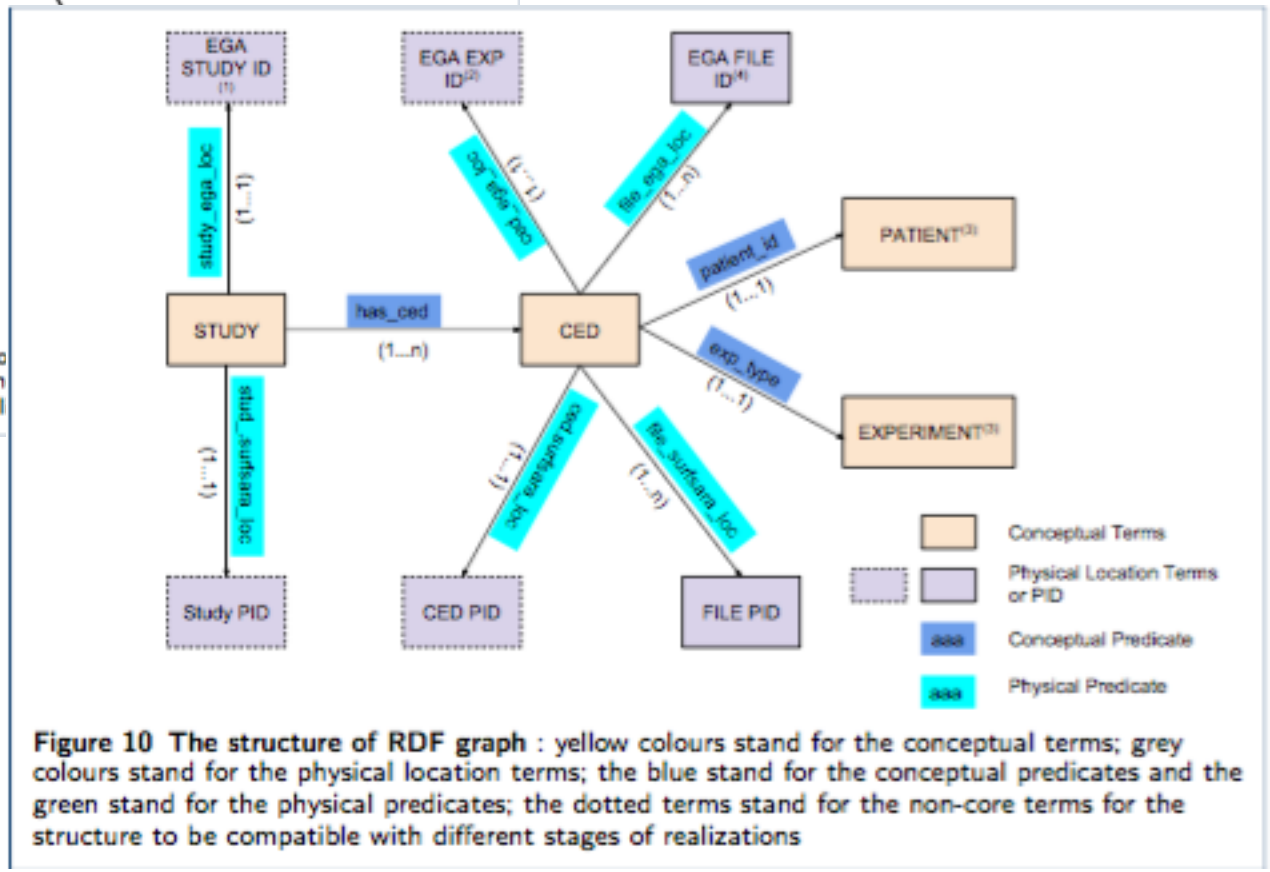
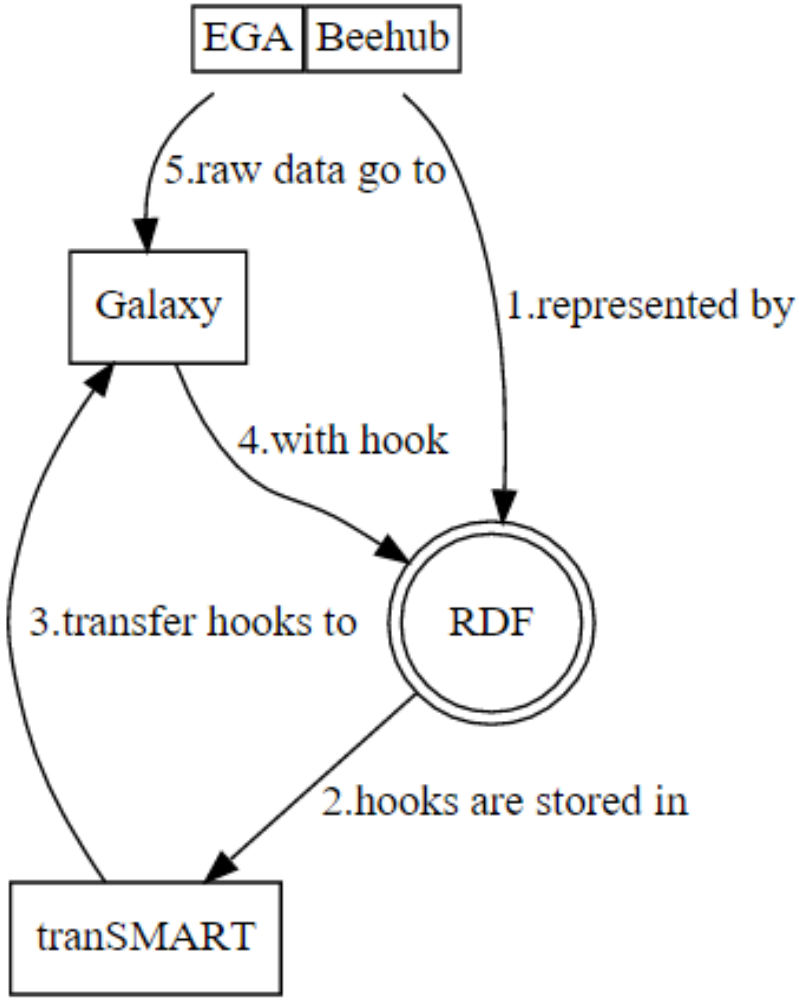


Figure 10 The structure of RDF graph : yellow colours stand for the conceptual terms; grey colours stand for the physical location terms; the blue stand for the conceptual predicates and the green stand for the physical predicates; the dotted terms stand for the non-core terms for the structure to be compatible with different stages of realizations

TraIT data infrastructure



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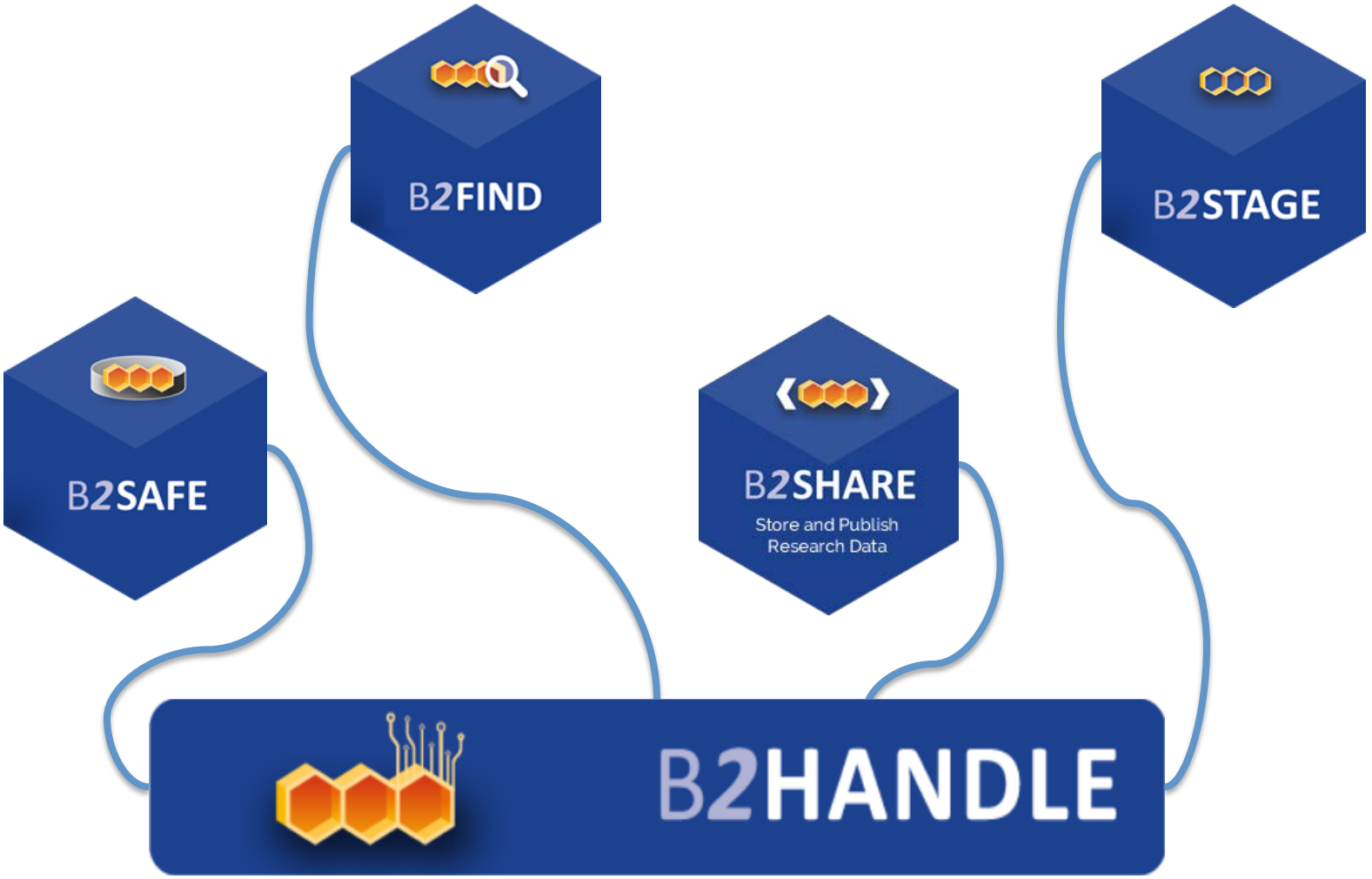
Use Case 4: Enabling workflows

- Execute program hidden behind a PID
- Way to refer to workflows → reproducibility

```
In [16]: prefix = "841"

In [17]: suffix = "/5f6fb451-5841-11e4-9665-14109fe83170"

In [18]: ec.getValueFromHandle(prefix, "URL", suffix)
Out[18]: '/Users/christines/PIDs/helloWorld.py'

In [19]: pid = subprocess.Popen([sys.executable, ec.getValueFromHandle(prefix, "URL", suffix)])

In [20]: Hello World!
```

PIDs in EUDAT – Why?



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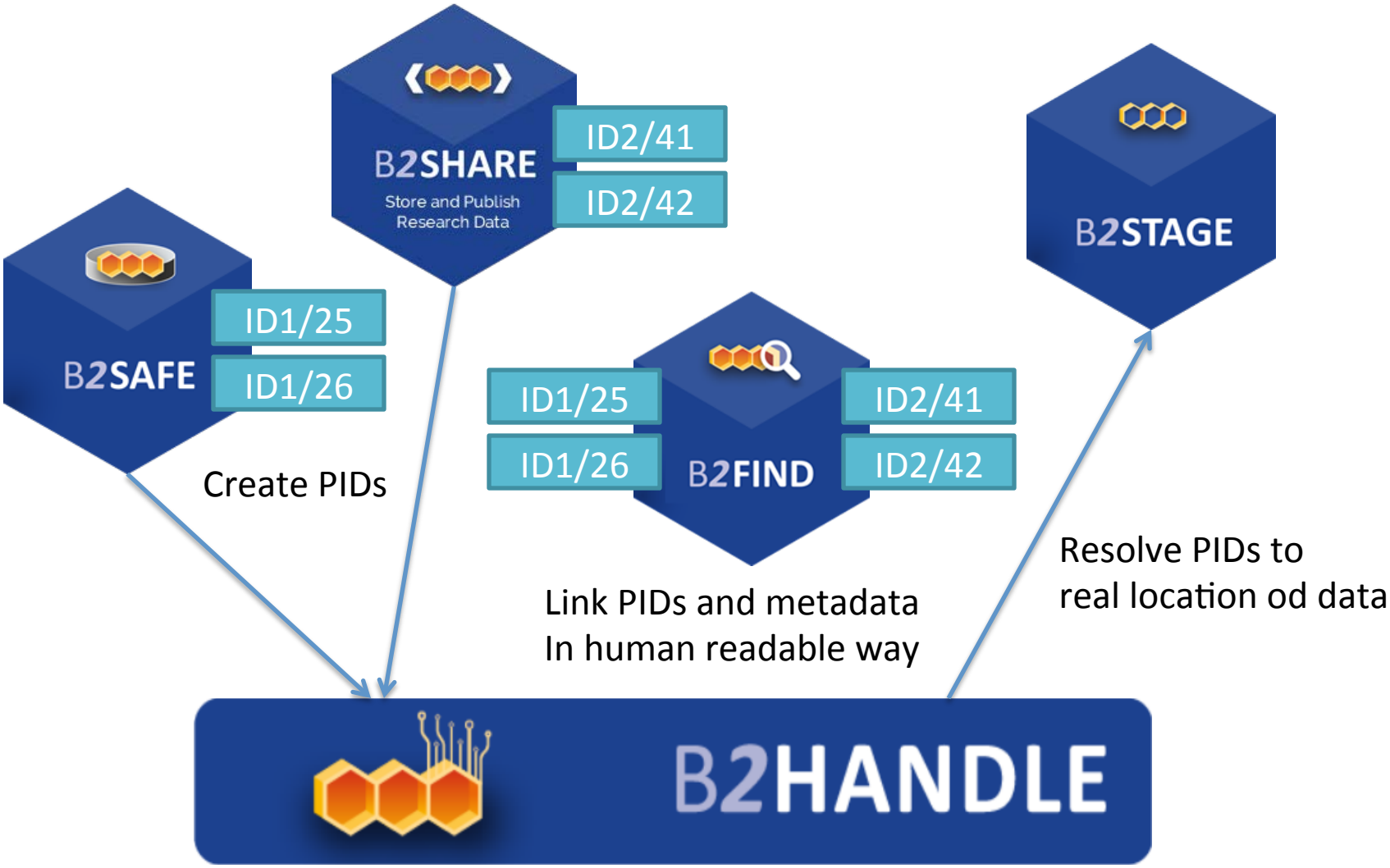
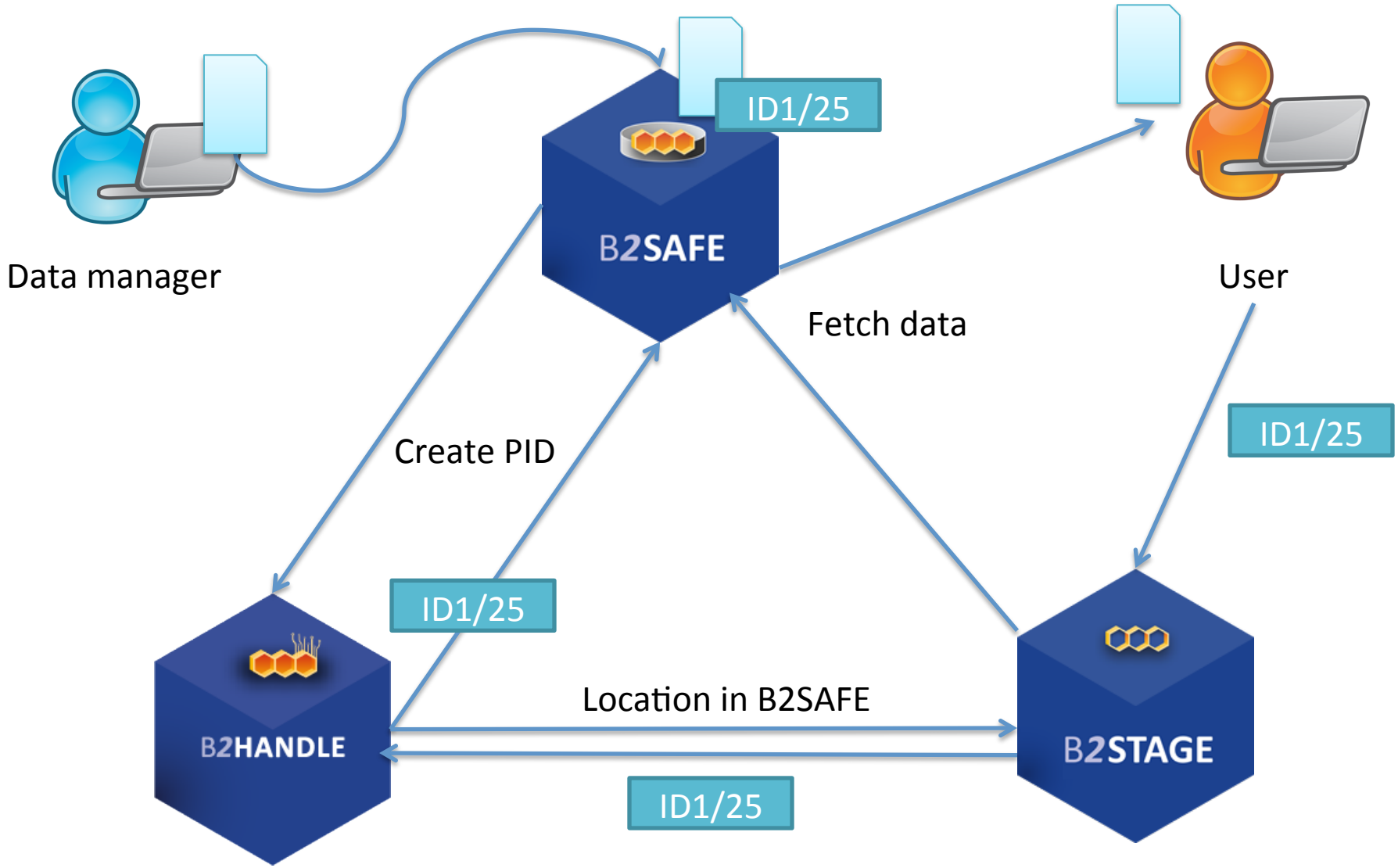


The data managers' workflow



PID systems

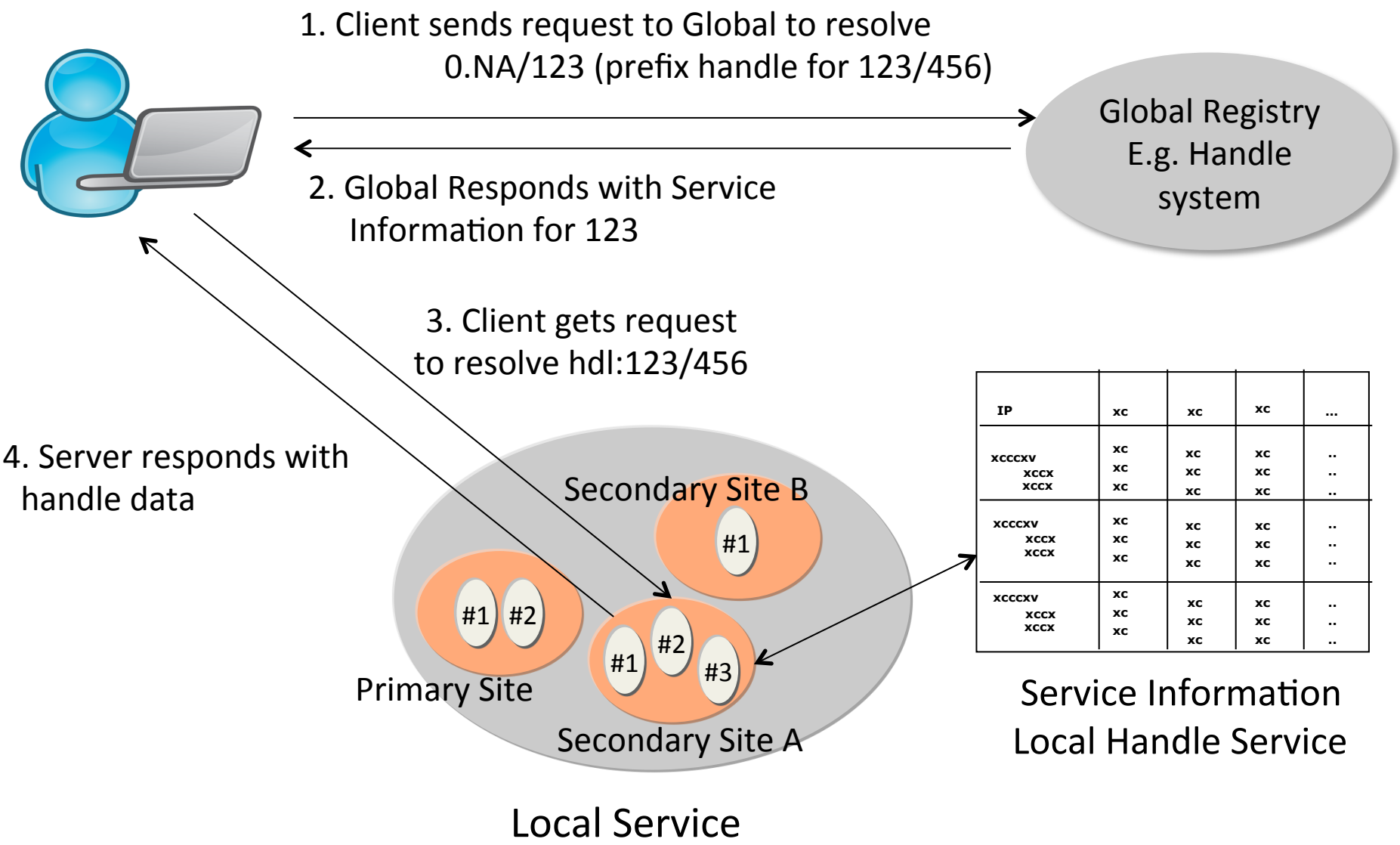
Resolution and the PID pattern

Exercise

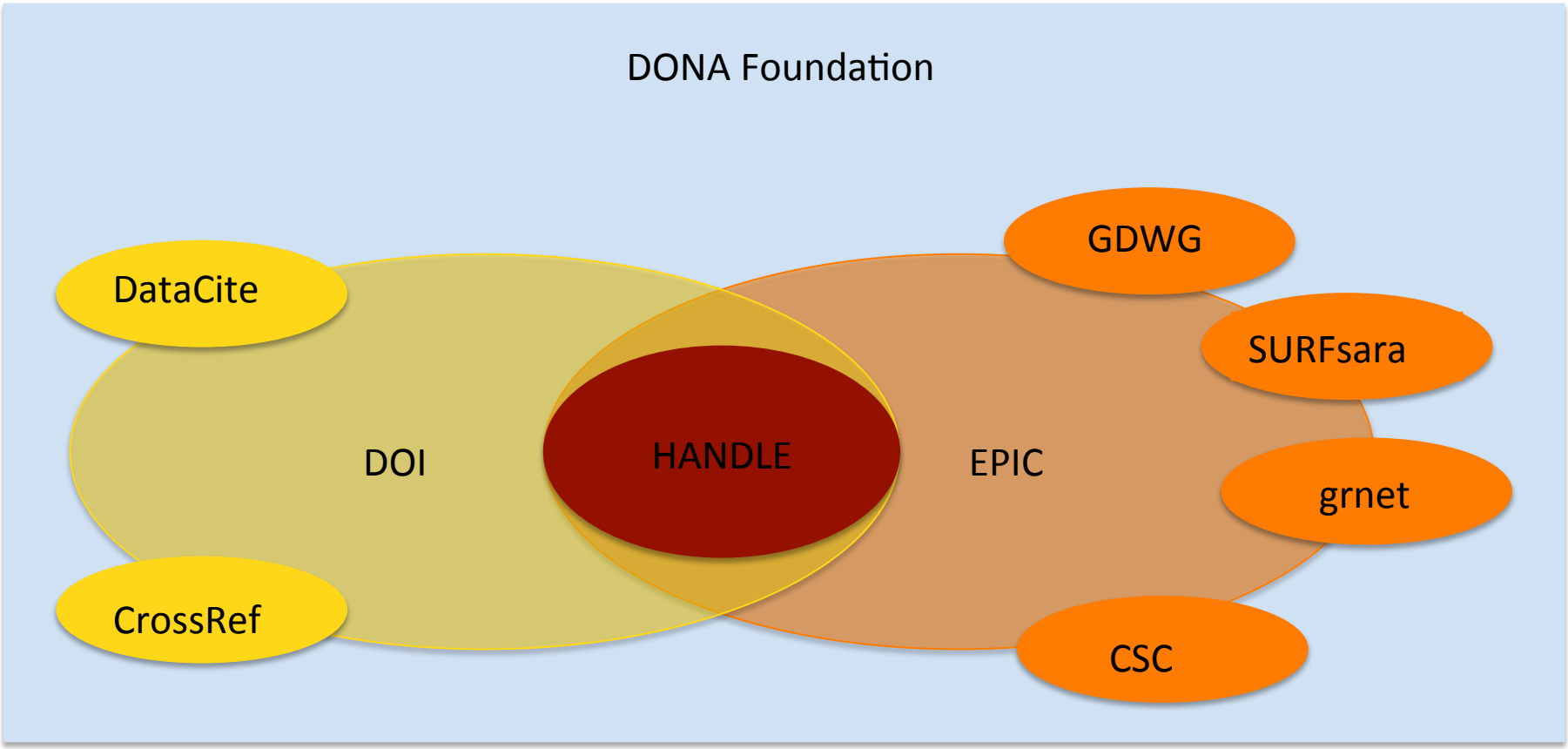
- Resolve the PIDs
- What happens if you resolve a PID with a foreign resolver?

http://hdl.handle.net/21.T12995/PID-training

Resolving PIDs



PID systems and issuing authorities



PID systems and issuing authorities

- **URN:NBN**
  - Policies: PID is persistent and the data it is dereferenced to
  - Wants to be independent from transfer protocols
    → Currently all identifiers start with *http*
    Might change in the future

- **DOI**
  - Policies: PID is persistent, data not
  - Based on the handle system
  - Datacite, Crossref are prefix issuing authorities
  - Requires extra metadata, stored in another database

- **Both:**
  - PIDs **point to a landing page**, not the file itself
    → **Taylored towards data citation**
  - User needs to provide **a minimum set of metadata (Dublin Core)**

PID systems and issuing authorities

- **ePIC (European PID consortium)**
  - Policies: PID is persistent, data is not
  - PIDs can point to anything
  - Based on the handle system
  - **Taylored towards data identification and resolving**

- **DONA foundation (www.dona.net)**
  - Maintains global handle registry
  - Partners:
    - CNRI (developer of the handle system)
    - GDWG (main partner in ePIC)
    - International DOI foundation (IDF)

The Handle system

- Metadata: You can create your **own keyword-value pairs** and store them with the PID

- EUDAT Policies:
  - Handles to be maintained beyond project life time
  - Enforce stability of PIDs to justify trust in them
  - Handles can point to anything
  - Handles can also be removed, they are not per se persistent

  …

  → Great flexibility for adjusting the system towards your own needs

  → EUDAT provides implementations for replica tracking

  → You have to think even more carefully about how you want to facilitate data management

For whom?

- PIDs allow to make a **distinction between data users and data managers**
  - Data users get a PID and can directly access the data, or the metadata stored with the PID
  - Pipelines can programmatically access the metadata and start specific applications

- Requires some serious thoughts about **data organisation** and developing the **code to put data policies into practice**, including code **maintenance**

  → For **bigger research groups or consortia** working in a **distributed data environment**

  → For **repositories** who are in need of a host for their PIDs

Step by Step:
Using the B2HANDLE python library

- Register data with a Handle
- GET the details of a Handle
- Modify a Handle record
- Link two files on PID level
- Reverse look-up (not possible via normal Handle API)

www.eudat.eu

Thank you

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