

Full Integrated Research Data Lifecycle – The Project HELIPORT

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Our Research Facility and our Large Scale Research Infrastructures

The Helmholtz-Zentrum Dresden - Rossendorf

— Employees approx. 1,200. Thereof 600 scientists.

— **HELMHOLTZ**

RESEARCH FOR GRAND CHALLENGES

Research Fields

— Energy, Health and **Matter**.

ELBE – Center for High-Power Radiation Sources

— Electron accelerator, free-electron lasers & THz source.

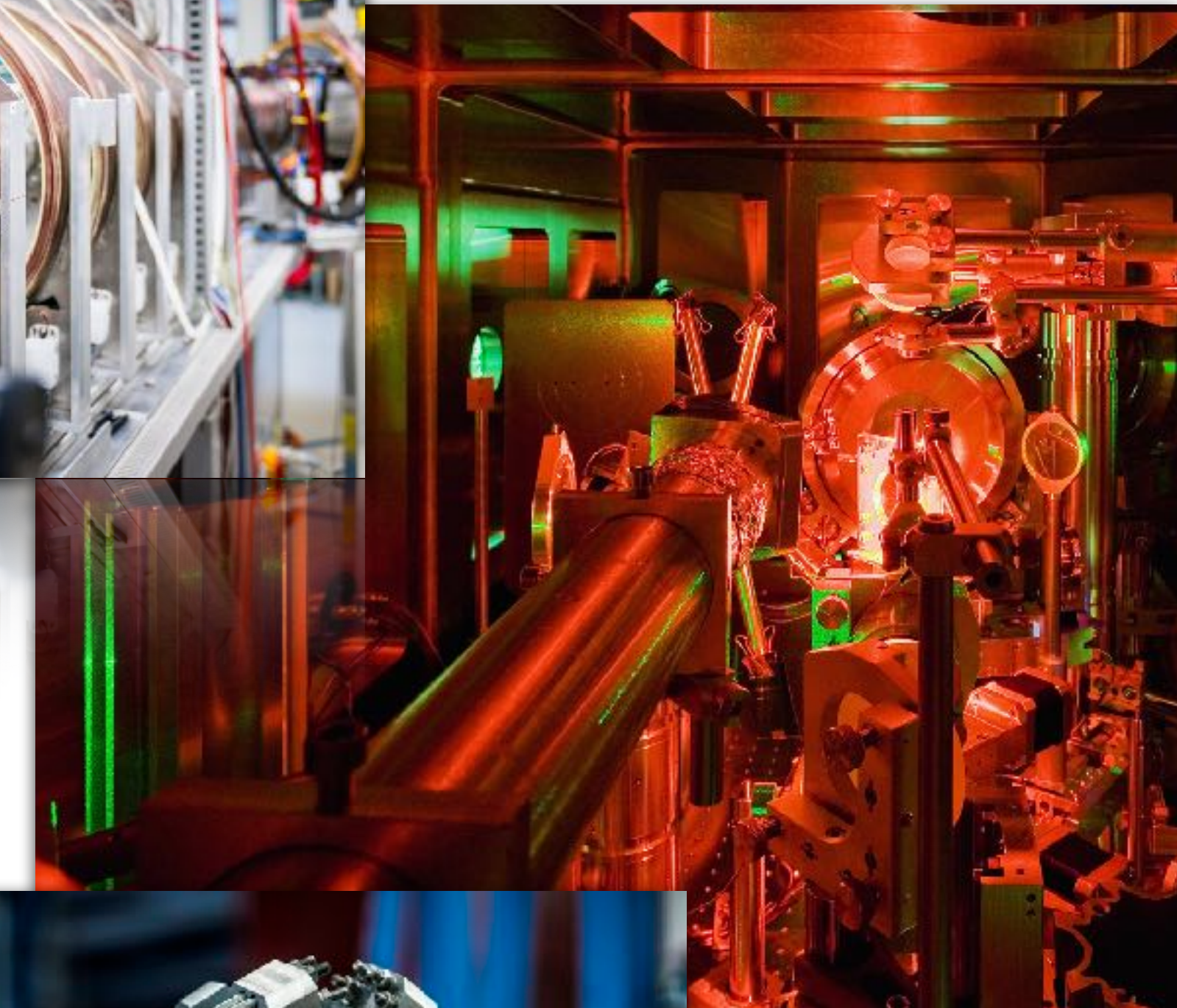
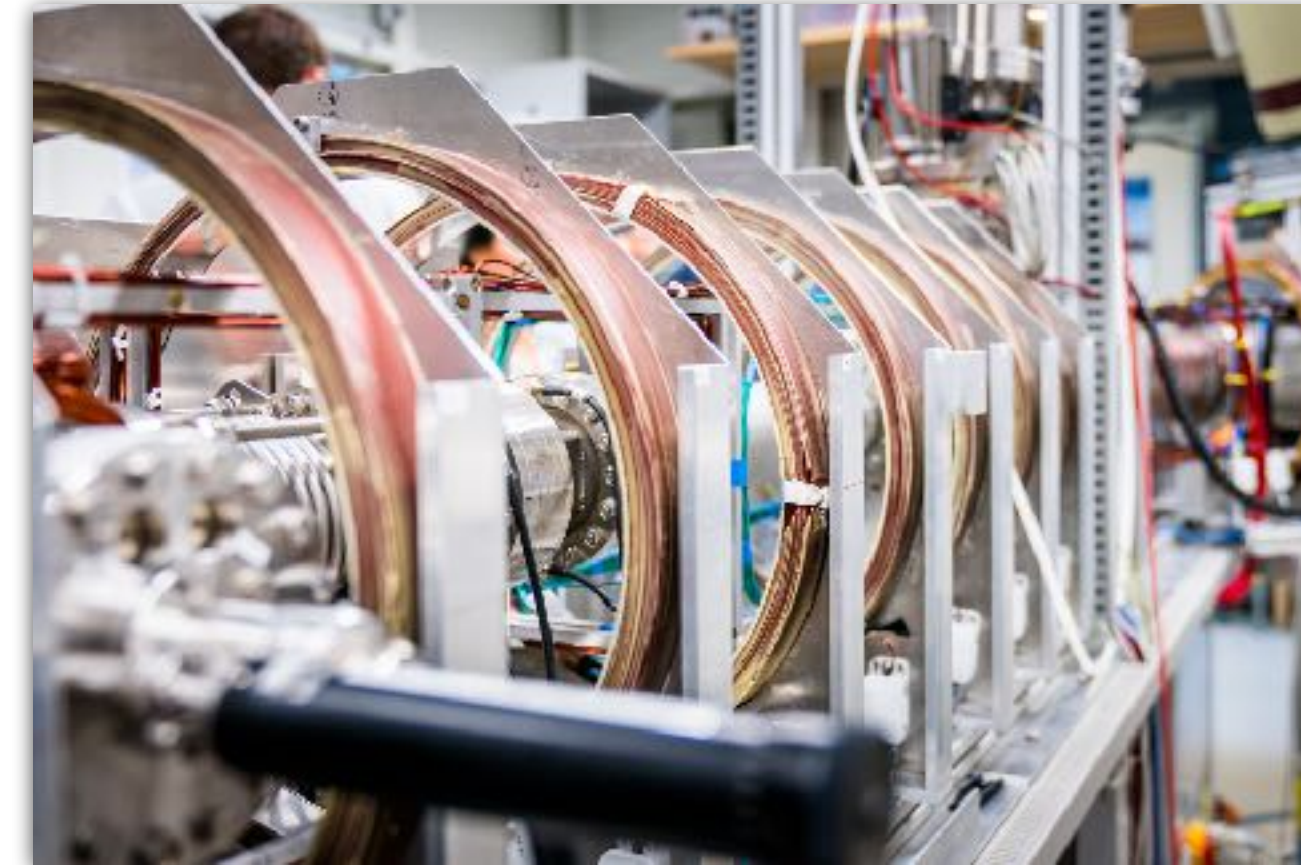
— Positrons, protons, neutrons as well as X-ray and gamma radiation.

Dresden High Magnetic Field Laboratory (HLD)

— Europe's highest pulsed magnetic fields.

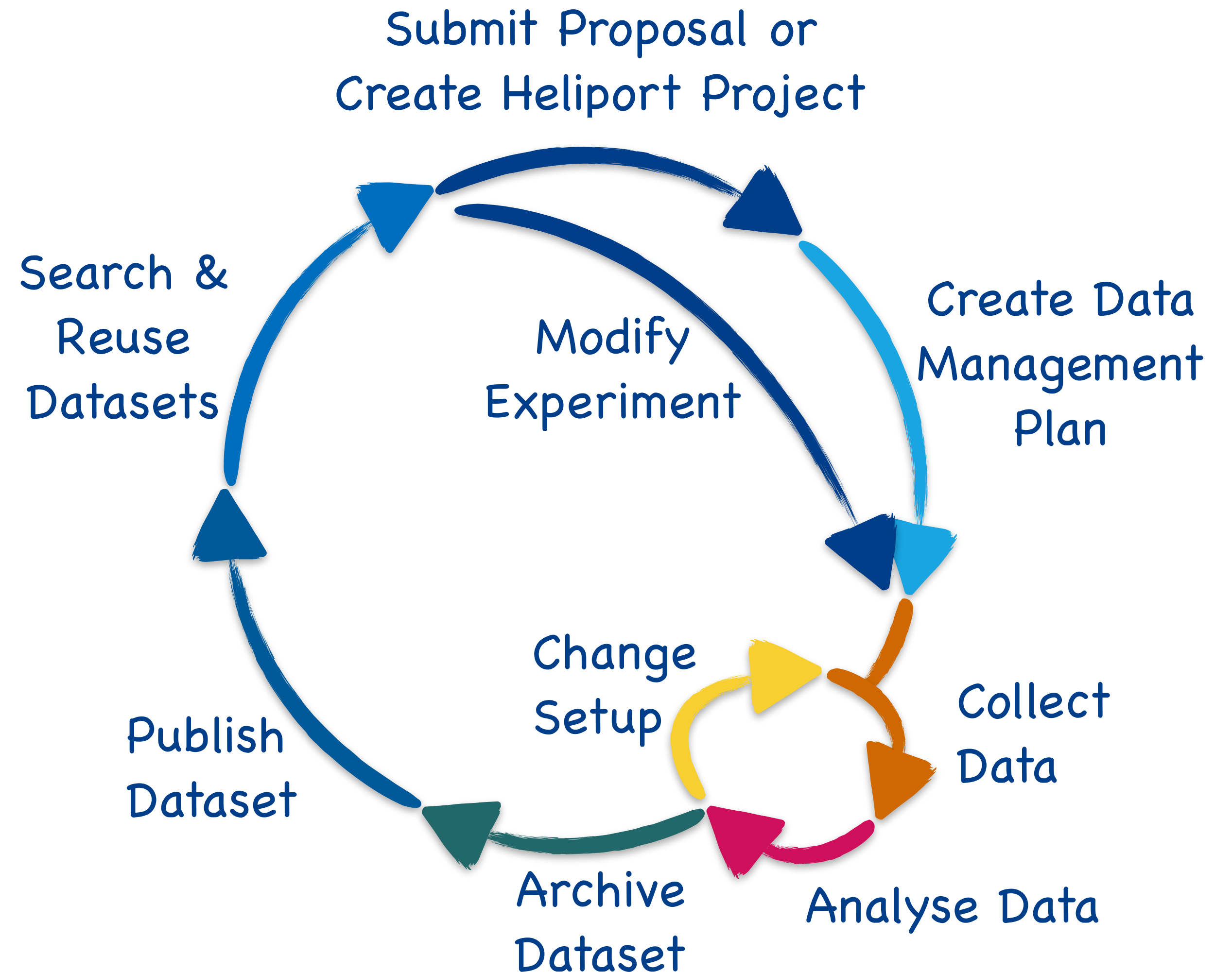
Ion Beam Center (IBC)

— Nanoscale surface analysis and modification.



Our Challenge: An End-to-End Digital Data Lifecycle

- We support many steps of a research experiment with tools:
 - electronic lab books,
 - interactive analysis,
 - publication of datasets,
 - scientific workflow management,
 - Handle generation and management.
- A uniform access to all services and systems is necessary.
- The documentation of all these linked resources is essential to create a comprehensible and FAIR data lifecycle.



...and is Your Research Data Usable?

Make your data

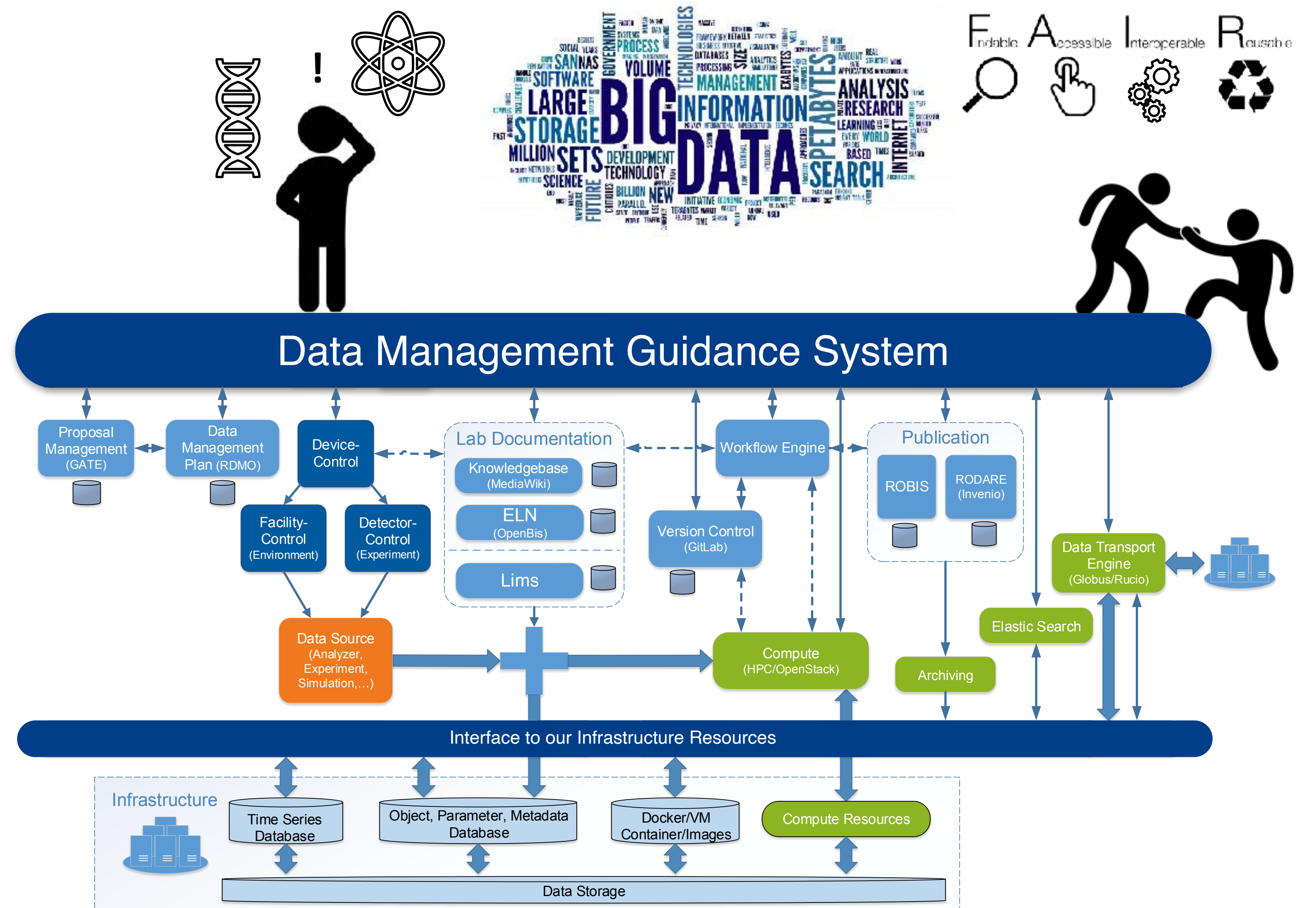
Findable, **A**ccessible, **I**nteroperable and **R**e-usable

FAIR data principles

Wilkinson, M. D. et al. The FAIR Guiding Principles for scientific data management and stewardship. Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016).

Our Observations and Experiences

- Our HZDR IT infrastructure can support various experiments, but it is complex...
- Scientists often don't know which services are available and how to use them.
- An overarching system guiding our scientists (and visitors) through the lifecycle of their research project (and our services) is inevitable.
- The concept of FAIR research becomes an important topic for our scientists.



The Requirements and Conditions

- Our guidance system was originally intended to provide only the **proposal's metadata**, from internal and external scientists, to allow the assignment of resources.
- Over the time we decided to use the guidance system to answer the most important questions of our scientists:

And how we can support them?!



What are the necessary steps towards a full comprehensible and FAIR research experiment ensuring data provenance?

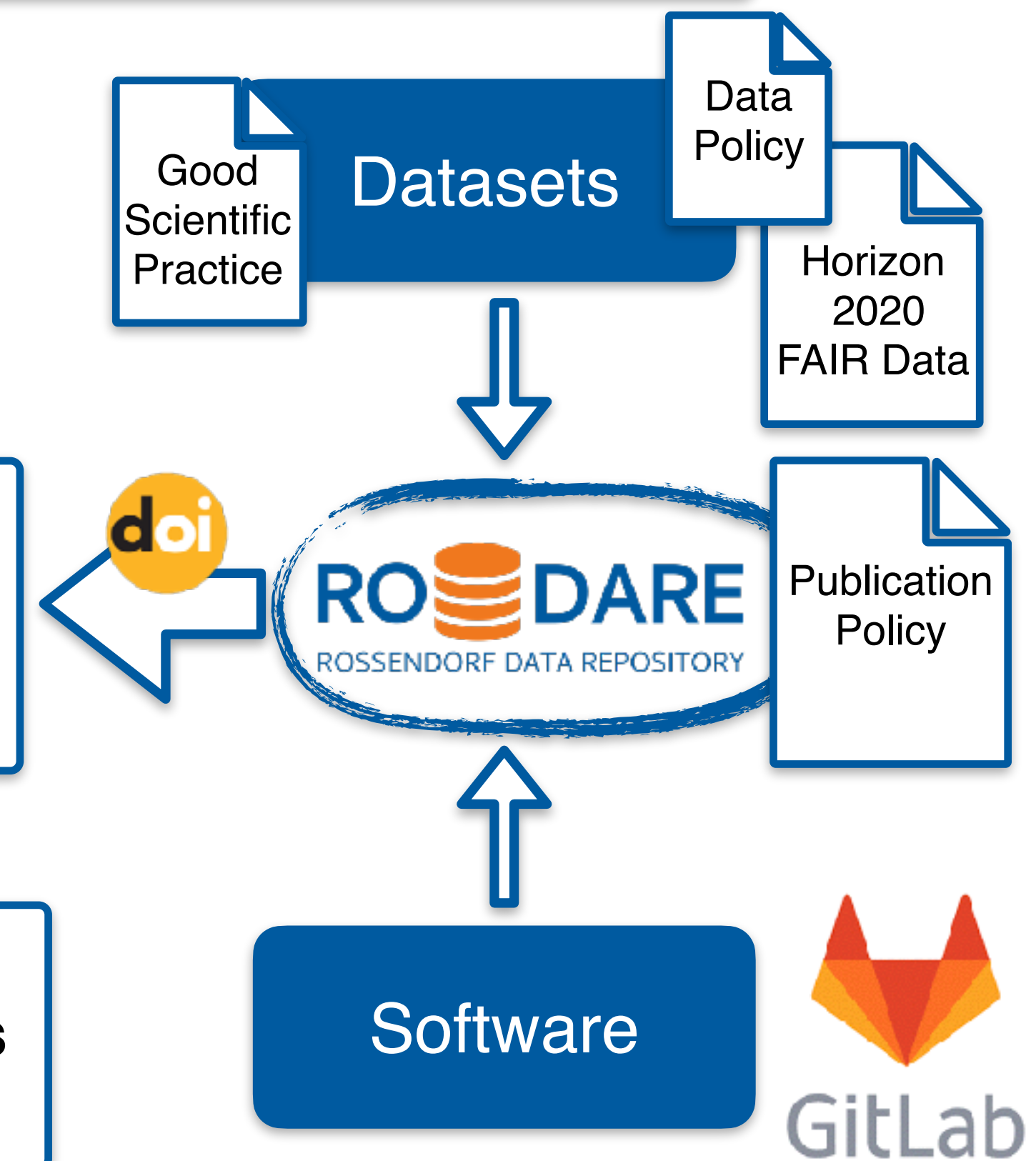
How can we **automate recurring processes** and keep track of status and data products?



Which datasets or software can be **published** (and how)?

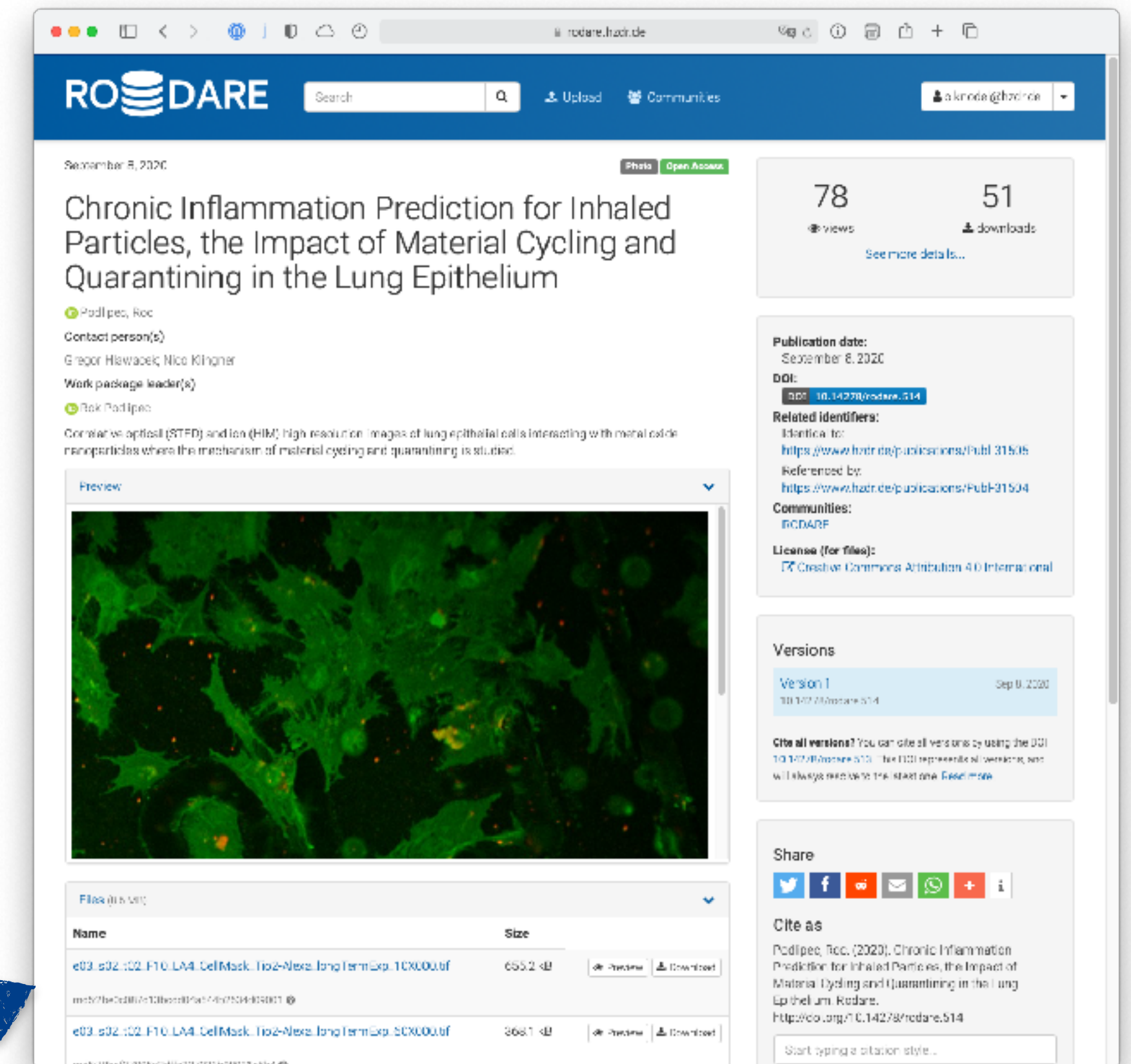
How can we bring **new team members** or external scientists into our project lifecycle and all associated tools?

Where are data, software and how can I gain **access** to both of them?

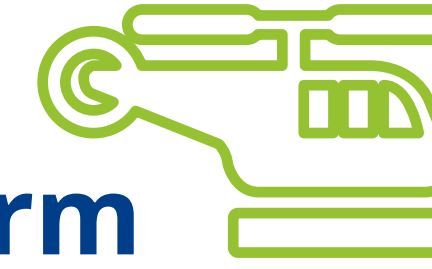


How we went on with our “Data Management Guidance System”

- We required a management environment supporting our project lifecycles.
- Based on our observations and experiences in the field we started developing Heliport:
 - Metadata becomes important in modern research to make every founded project comprehensible and FAIR,
 - The publication of all data products and the Data Management Plan (DMP) becomes inevitable.
 - The abstraction from all underlying services with the use of REST APIs and workflows is a key concept of Heliport.
- Heliport can fill the gap between all **data products** stored in our various systems and the **final publications** of these products in our data repository RODARE.



HELIPORT HELmholtz Scientific Project WORKflow PlaTform

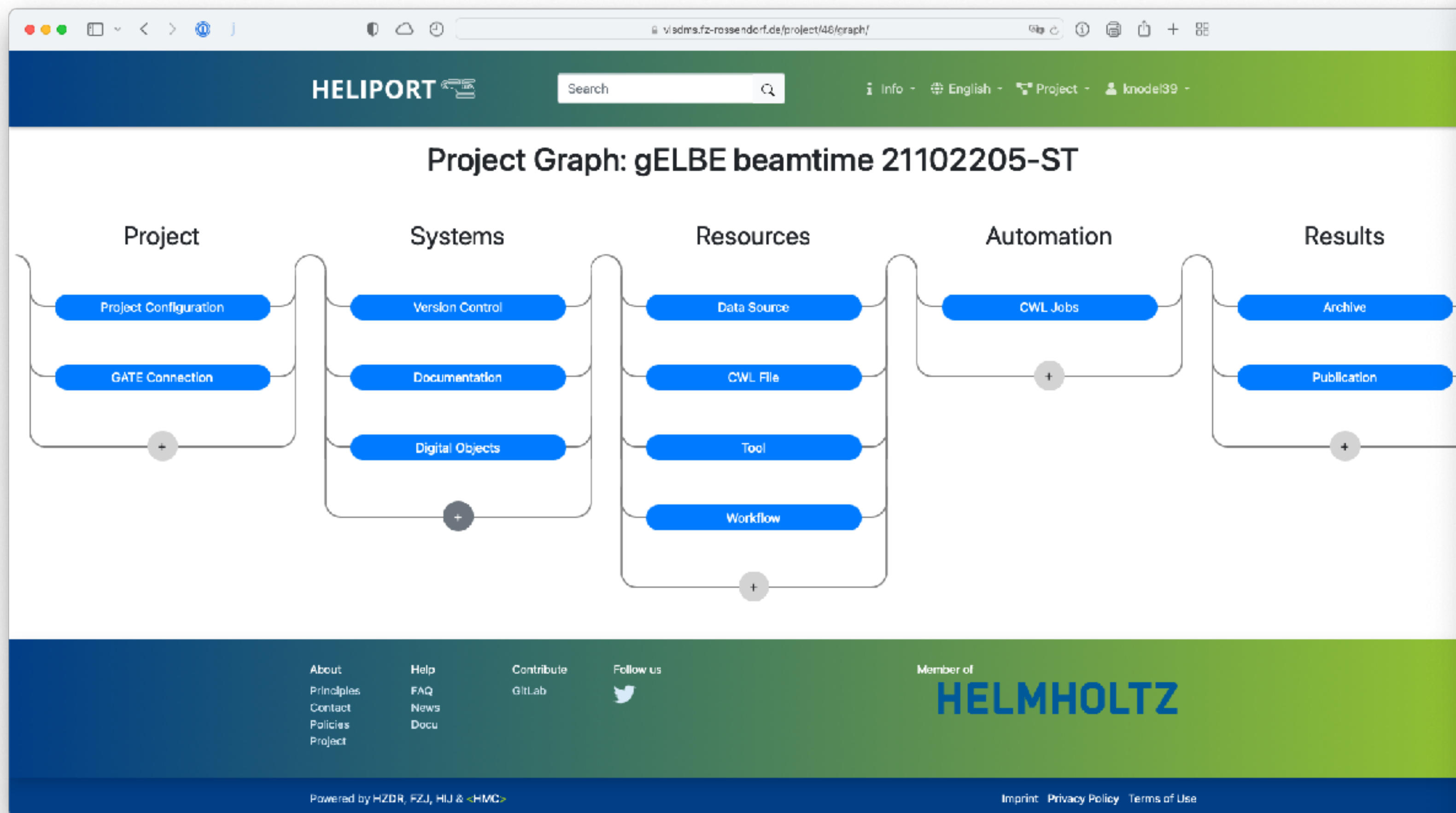


“ The HELIPORT project aims at developing a platform which accommodates the **complete life cycle** of a scientific project and links all corresponding programs, systems and workflows to create a more **FAIR** and comprehensible project description.

Project Members:



Founded by:



```

{
  "namespaces": {
    "datacite": "http://purl.org/spar/datacite/",
    "rdfs": "http://www.w3.org/2000/01/rdf-schema#",
    "heliport": "https://heliport/schema/",
    "time": "http://www.w3.org/2006/time#",
    "dc": "http://purl.org/dc/terms/"
  },
  "heliport:project_id": 28,
  "datacite:hasIdentifier": "HZDR.FWCC.2021.84769",
  "heliport:uuid": "09779261-200c-48c4-be9c-f298369d6a1c",
  "datacite:handle": "https://hdl.handle.net/None",
  "heliport:project_name": "PaN Research Project",
  "time:hasBeginning": "2021-04-01 09:14:34.295524+00:00",
  "datacite:hasDescription": "",
  "heliport:group": "FWCC",
  "heliport:owner": {
    "datacite:hasIdentifier": "132739",
    "datacite:orcid": null,
    "rdfs:label": "Knodel, Dr. Oliver (FWCC) - 132739"
  },
  "heliport:has_VersionControl": [
    {
      "heliport:version_control_id": 15,
      "datacite:uri": "https://ddd",
      "rdfs:label": "Test"
    }
  ],
  "heliport:has_DataManagementPlan": [
    {
      "heliport:data_management_plan_id": 6,
      "datacite:uri": "https://ddd",
      "datacite:hasDescription": "ddd"
    }
  ],
  "heliport:has_Documentation": [
    {
      "heliport:documentation_id": 7,
      "datacite:uri": "https://ddd",
      "heliport:documentation_system": "MediaWiki1",
      "datacite:hasDescription": "ddd"
    }
  ],
  "heliport:has_DataSource": [
    {
      "heliport:data_source_id": 11,
      "datacite:uri": "http://ddd",
      "heliport:use_computer": null,
      "rdfs:label": "ddd",
      "datacite:hasDescription": ""
    }
  ]
}

```


The Project Metadata Scheme

```
{
  "namespaces": {
    "datacite": "http://purl.org/spar/datacite/",
    "rdfs": "http://www.w3.org/2000/01/rdf-schema",
    "heliport": "https://heliport/schema/",
    "time": "http://www.w3.org/2006/time#",
    "dc": "http://purl.org/dc/terms/"
  },
  "heliport:project_id": 9,
  "datacite:hasIdentifier": "HZDR.FWCC.2021.95018",
  "heliport:uuid": "8fab8a14-0f2f-414d-bbe0-747c38129bc4",
  "datacite:handle": "https://hdl.handle.net/20.500.12865/HZDR.FWCC.2021.95018",
  "heliport:label": "An Example Project",
  "time:hasBeginning": "2021-05-18 13:03:34.378458+00:00",
  "datacite:hasDescription": "This Project has the sole purpose of demonstrating the functionality of HELIPOINT",
  "heliport:group": "FWCC",
  "heliport:owner": {
    "datacite:hasIdentifier": "141575",
    "datacite:orcid": "https://orcid.org/0000-0001-5556-838X",
    "rdfs:label": "Voigt, Martin (FWCC) - 141575"
  },
  "heliport:co_owners": [
    {
      "datacite:hasIdentifier": "132739",
      "datacite:orcid": "https://orcid.org/0000-0001-8174-7795",
      "rdfs:label": "Knodel, Dr. Oliver (FWCC) - 132739"
    },
    ...
  ],
  "heliport:has_GATEProject": [
    {
      "heliport:gate_id": 283747364,
      "dc:title": "An Example GATE Project",
      "heliport:status": "Continuesly Improving",
      "dc:abstract": "There is an urgent need to ... (ref.: 10.1038/sdata.2016.18)",
      "datacite:hasIdentifier": "sdata.2016.18",
      "dc:accessRights": true,
      "dc:creator": {
        "datacite:hasIdentifier": "141575",
        "datacite:orcid": "https://orcid.org/0000-0001-5556-838X",
        "rdfs:label": "Voigt, Martin (FWCC) - 141575"
      },
      "heliport:responsible_experimentalist": {
        ...
      }
    },
    ...
  ]
}
```



The screenshot shows the HELIPOINT web interface. The header includes the HELIPOINT logo, a search bar, and an 'Info' dropdown. The breadcrumb trail is 'Projects > gELBE beamtime 21102205-ST > Properties'. The main content area is titled 'Project Properties' and displays a table of metadata:

HZDR-ID	HZDR.FWCC.2021.762294
Handle	20.500.12865/HZDR.Projects.2021.FWCC.Project.48
Digital Object ID	2017
uuid	aaaffbb5-00d5-499d-acfb-f805647e9bf4
serialization url	https://vlsdms.fz-rossendorf.de/project/48/serialize/
Owner	Mueller, Dr. Stefan (FWCC) - 7394
Created	Aug. 20, 2021, 9:16 a.m.
Department	FWK
Title	gELBE beamtime 21102205-ST
Description	Tests of the detector system for the Stopping Target Monitor of the MU2E experiment in a high flux pulsed gamma beam (Resubmission of 20101909-ST due to COVID pandemic).

Below the table, there is an 'Edit' button and a 'Members' section with the following entry:

Name
Ferrari, Dr. Anna (FWKH) - 5161

Available Proposal Metadata

Proposal Metadata

- Title, abstract, status
- Internal ID
- Proposer, experimentalist, local contact, experimental team and
- Experiment schedule.

Additional Metadata within HELIPORT

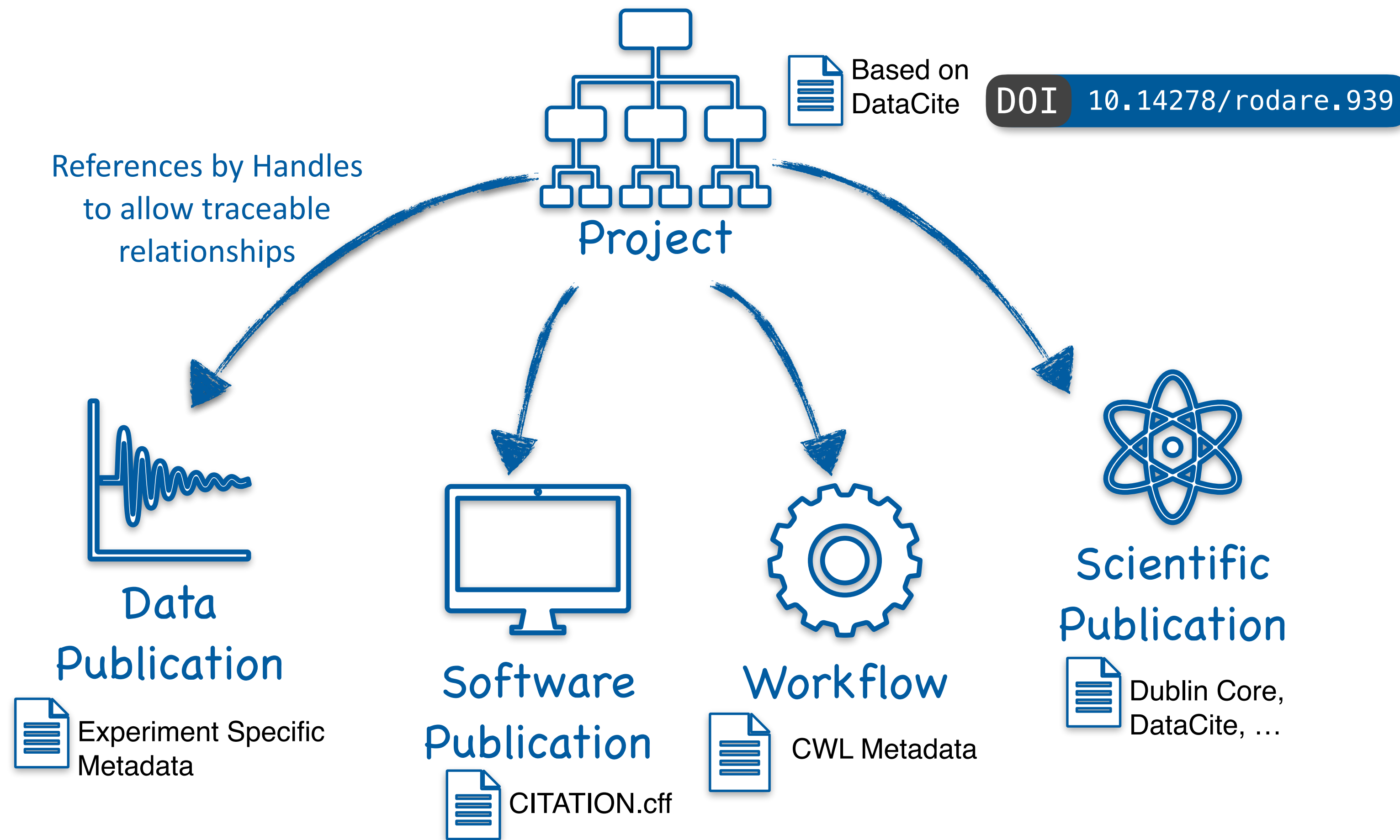
- Extended user information (name, mail, OrcID)
- HZDR ID (Heliport Handle)
- Additional members with contributions,
- And: datasets, workflows, systems (infrastructure), software repositories, publications, ...

Future Metadata Fields

- Instrument or beam-line,
- Funding,
- Scientific method,
-

The screenshot displays the HELIPORT web interface. The top navigation bar includes the HELIPORT logo, a search bar, and language/project selection options. The main content area shows the breadcrumb path: Projects > gELBE beamtime 21102205-ST > GATE. Below this, the 'Gate Project' section provides details for GATE-ID 2205, including the title 'Tests of the detector system for the Stopping Target Monitor of the MU2E experiment in a high flux pulsed gamma (Resubmission of 20101909-ST due to COVID pandemic)', proposer 'Mueller, Dr. Stefan (FWCC) - 7394 (Owner of Project "gELBE beamtime 21102205-ST")', and an abstract. A 'Settings' sidebar is open, showing 'User Information' with fields for Backend (LDAP), User-ID (knodel39), Surname (Knodel), Givenname (Oliver), E-Mail (o.knodel@hzdr.de), Group (FWCC), Institute (FZR), and ORCID (https://orcid.org/0000-0000-0000-0000), with an 'Edit' button. Below the main project details, sections for 'Co-Proposers' and 'Experimentalists' are visible, listing individuals like Ferrari, Dr. Anna (FWKH) - 5161 and Knodel, Dr. Oliver (FWCC) - 132739.

Heliport Metadata Ecosystem



Our Concept

- In all stages of an experiment Heliport combines information about involved services with PIDs.
- Metadata (stored *near* the PID) is used to transfer information between different systems and a documentation of the project-level workflow is possible.
- The project-level metadata is distributed over all linked third-party systems.

Integration in an Overall Data Management

HELIPORT Project Graph: gELBE beamtime 21102205-ST

- Project: Project Configuration
- Systems: Version Control, Documentation, Digital Objects
- Resources: Data Source, CWL File, Tool, Workflow
- Automation: CWL Jobs

HELIPORT Gate Project

Gate Project

GATE-ID 2205

Title Tests of the detector system for the Stopping Target Monitor of the MU2E experiment in a high flux pulsed gamma beam (Resubmission of 20101909-ST due to COVID pandemic)

Proposer Mueller, Dr. Stefan (FWCC) - 7394 (Owner of Project "gELBE beamtime 21102205-ST")

Abstract The gELBE pulsed gamma beam, with narrow pulses set to about 600 kHz repetition rate - the choice of the ELBE CW mode with micropulses at 406 kHz or 812.5 kHz is ideal in our case- is the unique facility in the world suited to study the performance of the Stopping Target Monitor detector of the Mu2e Experiment. The STM monitor has the crucial role to normalize the charged lepton flavor muon conversion rate in the Mu2e experiment. The ability to operate at high rate in presence of background is crucial. We have at ELBE the unique possibility to validate the final methodology that will be employed by the STM detector.

Proposal 21102205-ST

Restricted no

Responsible Experimentalist Mueller, Dr. Stefan (FWCC) - 7394

Local Contact Schwengner, Dr. Ronald (FWKK) - 938

Co-Proposers

Person	Status in Project
Ferrari, Dr. Anna (FWKH) - 5161	Member

Experimentalists

Person	Status in Project
Ferrari, Dr. Anna (FWKH) - 5161	Member
Knodel, Dr. Oliver (FWCC) - 132739	Member
Rachemin, Dr. Reuven (FWOR) - 7214	Member
Voigt, Martin (FWCA) - 141575	Member

RODARE Dataset: Restricted Access

December 20, 2021

Tests of the detector system for the Stopping Target Monitor of the MU2E experiment in a high flux pulsed gamma beam

171 views, 66 downloads

Publication date: December 20, 2021

DOI: DOI: 10.14270/rodare.1143

Keyword(s): dataset, detector, Stopping Target Monitor (STM), MU2E, gELBE, Data Management, DAQ, muon conversion

Related identifiers: Identical to: <https://www.hzdr.de/publications/Publ35129>

Communities: Helmholtz-Zentrum Dresden-Resendort, RODARE

Versions

Version	Date
Version 1.1.1 10.14270/rodare.1143	Dec 20, 2021
Version 1.1.0 10.14270/rodare.1109	Sep 20, 2021

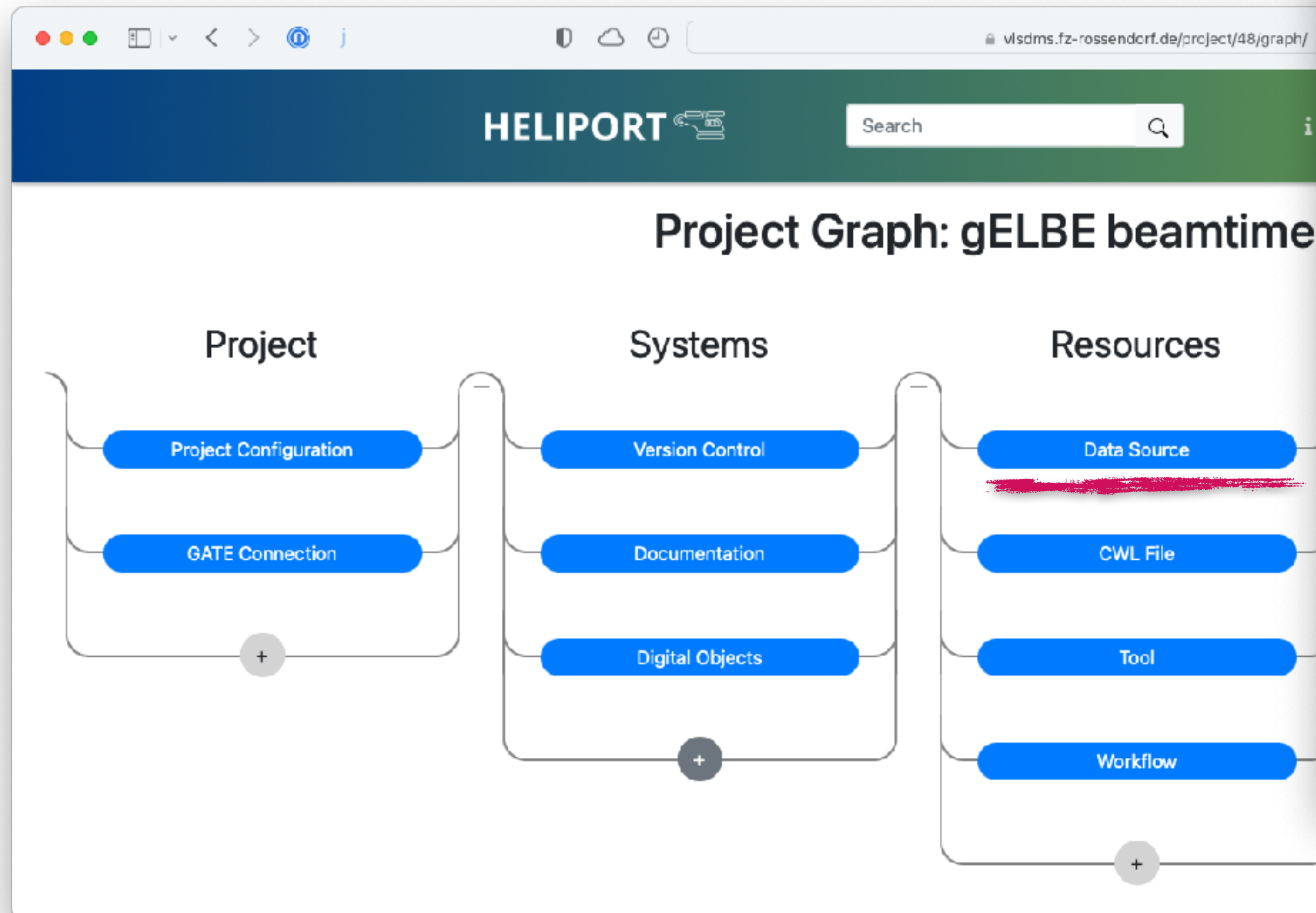
Required access...

Automated data publication with:

- Metadata from Proposal System
- Data sources registered and selected in Heliport

Data Sources

..and files (selected for publication) can be transferred directly to the data publication (development in progress).

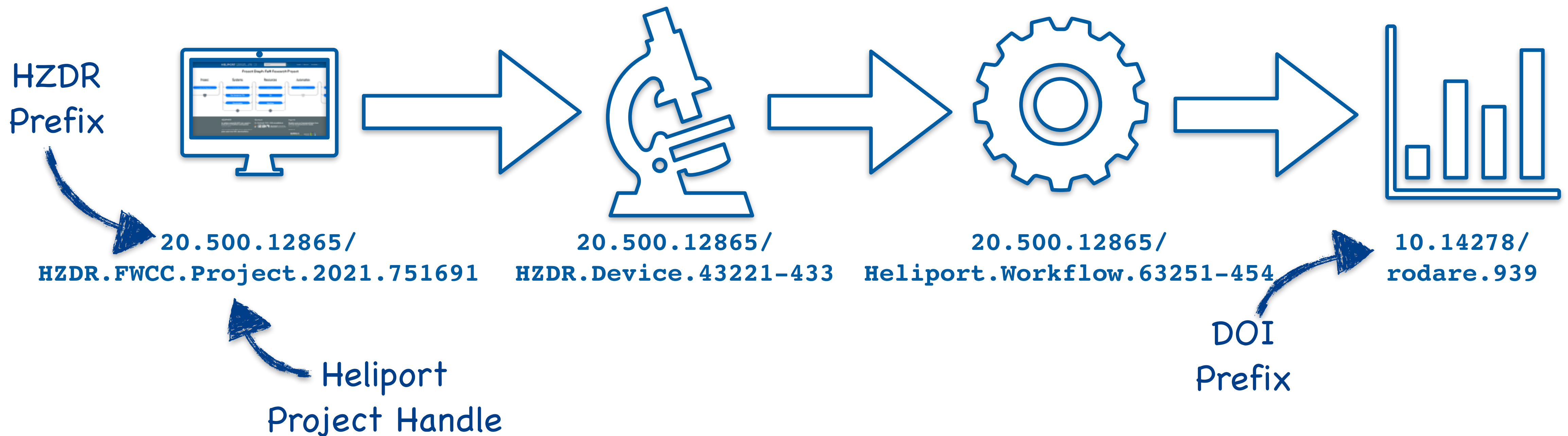


The screenshot shows the HELIPOINT web interface. The breadcrumb path is: Projects > gELBE beamtime 21102205-ST > Data Sources > Mu2e on bigdata > Co60. The main content area displays a table of data sources for publication.

Co60	Publication	Size	Action
C10801_co60_2_50mv00000.txt	X	15 KiB	Open
C10801_co60_2_50mv00001.txt	X	15 KiB	Open
C10801_co60_2_50mv00002.txt		15 KiB	Open
C10801_co60_2_50mv00003.txt	X	15 KiB	Open
C10801_co60_2_50mv00004.txt		15 KiB	Open
C10801_co60_2_50mv00005.txt		14 KiB	Open
C10801_co60_2_50mv00006.txt		15 KiB	Open
C10801_co60_2_50mv00007.txt		14 KiB	Open
C10801_co60_2_50mv00008.txt		15 KiB	Open
C10801_co60_2_50mv00009.txt		15 KiB	Open

Persistent Identifiers (Handles) in Heliport

Heliport is linked with our local Handle-Server (handle.hzdr.de) **hdlenabled** and generates uniform PIDs (resolvable using hdl.handle.net) from and for various systems and services. Associated information can be changed as needed without changing the identifier.



(Future) Handle Management Infrastructure in Heliport

- Every *digital object* in HELIPOINT is registered at our public available Handle server: handle.hzdr.de
- For ever Handle we provide a landing page with the associated public metadata.
- A link to the object in the HELIPOINT project is available when the user has access to the project and the internal HZDR network.

The screenshot shows the Heliport landing page for a digital object. The page title is "detector" and it is described as "an automatically generated landing page". A QR code is displayed on the left, and to its right, the handle information is shown: "Handle 20.500.12865/HELIPOINT.Namespace.2044", "Category: HELIPOINT/namespace", and "Label: detector". Below this information is a "Download" link. Under the heading "Metadata Formats:", there are several buttons: "JSON-LD", "Datacite JSON", "Basic JSON", "Legacy JSON", "RDF XML", "N-Triples", "Turtle", "Specific Landing Page", and "Default Landing Page". The page is part of the Heliport website, as indicated by the logo and search bar at the top.

The screenshot shows the HZDR Handle Server interface. The page title is "HZDR Handle Server" and it features the "Handle.Net" logo. The main heading is "Resolve a Handle and View the Values". Below this, there is a text box for entering a handle, followed by three checkboxes: "Authoritative Query", "Don't Redirect to URLs", and "Don't Follow Aliases". A "Submit" button is located below the checkboxes. The page also includes a footer with navigation links such as "About", "Help", "Contribute", and "Follow us", along with the Heliport logo and the text "Member of HELMHOLTZ".

Relations Between Digital Objects

- The relations between digital objects is visualized to provide an additional view on the scientific project with dependencies.
- With the graphical representation, the objects and also the processes on our computing infrastructure can be understood more clearly.

The screenshot shows the HELIPORT web interface. The top navigation bar includes the HELIPORT logo, a search bar, and user information for 'knodel39'. The breadcrumb trail indicates the current view is 'Simple Visualization' under 'Digital Twin Showcase' and 'Graphs'. Three configuration panels are visible, each with a table of property paths, IDs, and reverse flags. Below these panels are 'Save', 'Cancel', and 'Add Edge' buttons. The bottom part of the image shows a graph visualization with nodes in blue ovals and edges in red and grey arrows.

Configuration Panel 1:

Property Path	ID	Reverse
derived_from	2364	<input checked="" type="checkbox"/>

Configuration Panel 2:

Property Path	ID	Reverse
has_input	2374	<input checked="" type="checkbox"/>
result_of	2375	<input checked="" type="checkbox"/>

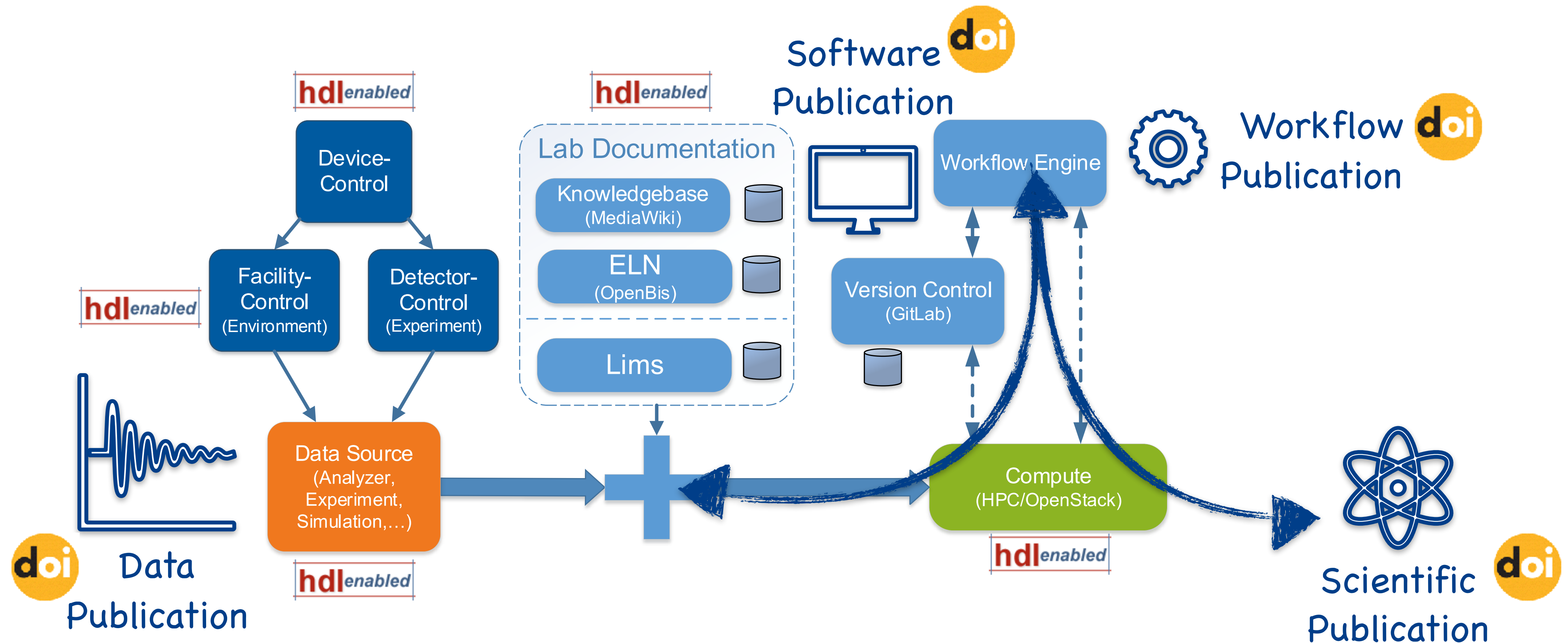
Configuration Panel 3:

Property Path	ID	Reverse
simulation_of	2365	<input checked="" type="checkbox"/>

Graph Visualization:

```
graph TD; SP1[Simulation Parameters] --> FS[Feasibility Study (Simulation)]; SP2[Setup Parameters] --> FS; FS --> IS[Initial Simulation]; IS --> SR[Simulation Results]; IS --> ER1[Experiment Run 1]; ER1 --> ER2[Experiment Run 2]; ER2 --> ER3[Experiment Run 3]; ER2 --> SR; SR --> SG[Simulation (fine granular)]; SG --> P[Publication];
```

Different Types of (Data) Publications and Data Provenance



Scientific Software Development and Reproducible Workflows

ID	Name	Cluster Login	Directory on Cluster	Status
46	cat stdin	ferreira	~/helport_jobs	✓
44	echo cat sleep	Choose a Login	~/helport_jobs	✓
44	echo cat sleep	ferreira	~/helport_jobs	✓
51	one bad decac per work	Choose a Login	~/helport_jobs	✗
51	one bad decac per work	ferreira	~/helport_jobs	✗
41	sleep 5 seconds	Choose a Login	~/helport_jobs	⚠
41	sleep 5 seconds	ferreira	~/helport_jobs	⚠

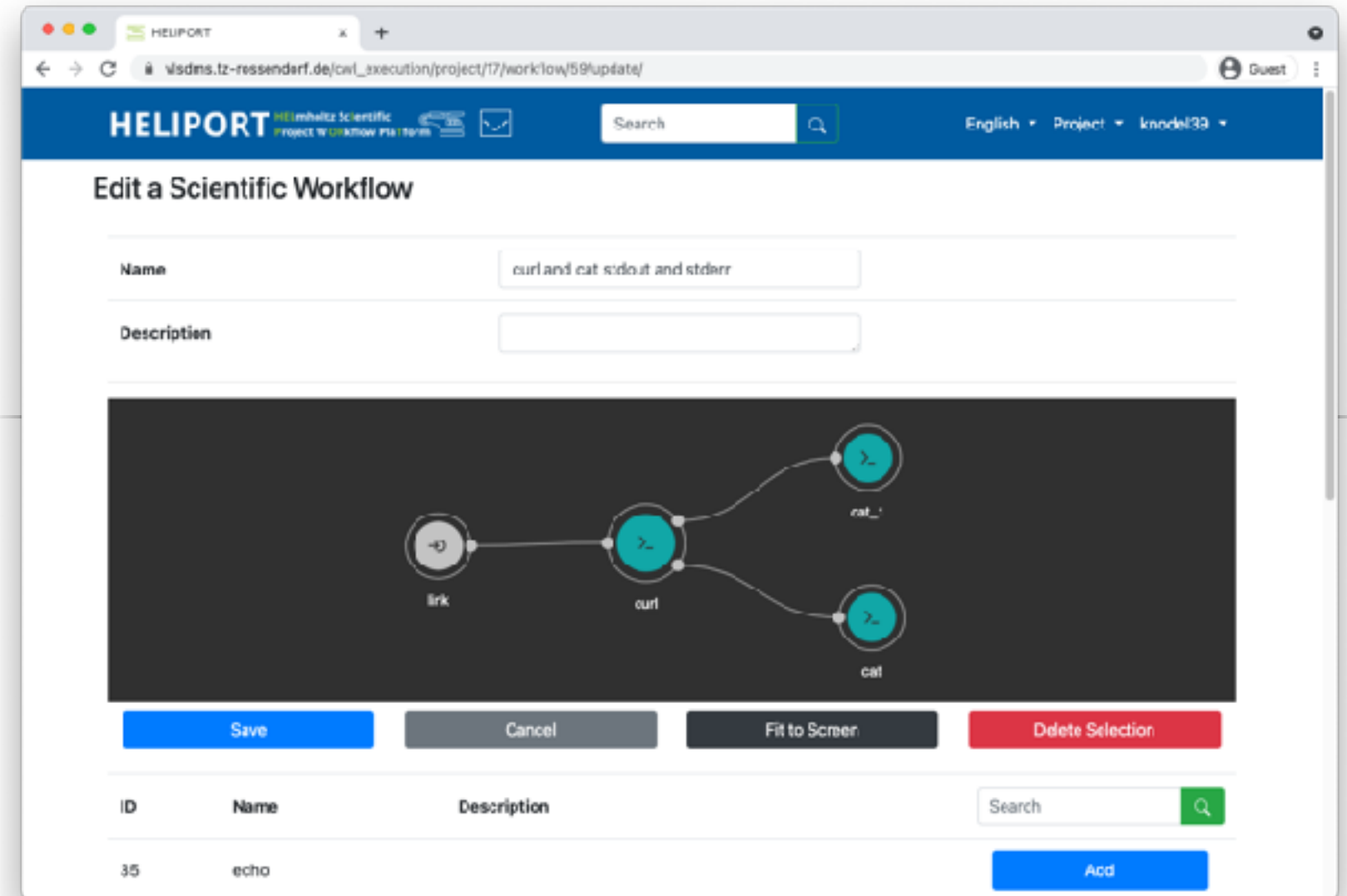
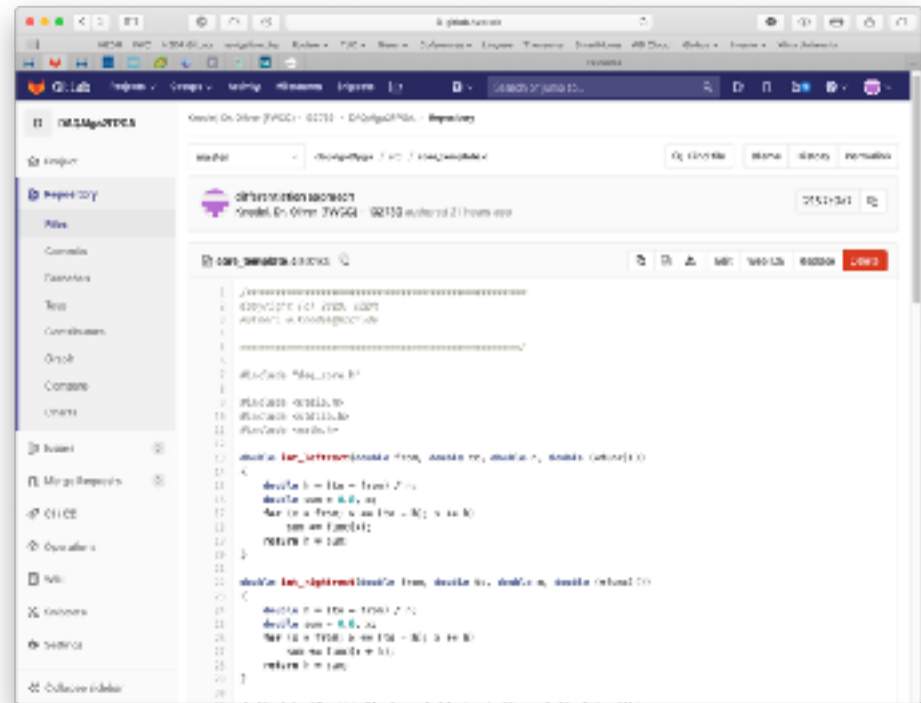
Workflow Engine

Version Control

Compute (HPC, OpenStack)

UNICORE

- Analysis and Pre-/Postprocessing steps needs to be:
 - Documented and
 - Reproducible
- Capsuling every step in a workflow adapts the **FAIR** principles.



Scientific Workflows are Managed in the back-end by UNICORE

- We need access to our computing infrastructure at HZDR, the Jülich Supercomputing Center (JSC) and also at ZIH for our users from the Center for Advanced Systems Understanding (CASUS).
- UNICORE makes distributed computing and data resources available in a seamless and secure way in intranets and the internet.
- We integrated UNICORE in our backend to decouple HELIPOINT from the different HPC infrastructures.

UNICORE



Heliport Manages Workflows, their Execution and the Metadata

Jobs

ID	Name	Cluster Login	Directory on Cluster	Status
46	cat chain	hemera	~/heliport_jobs	✓
44	echo cat sleep	Choose a Login	~/heliport_jobs	
44	echo cat sleep	hemera	~/heliport_jobs	
51	one bad deed per week	Choose a Login	~/heliport_jobs	
51	one bad deed per week	hemera	~/heliport_jobs	
41	sleep 5 seconds	Choose a Login	~/heliport_jobs	
41	sleep 5 seconds	hemera	~/heliport_jobs	

Edit a Scientific Workflow

Name: Create supercell from element and structure

Description: Given the full name of an element, the structure description from the MaterialsProject and a number of atoms, create a supercell in VASP POSCAR format.

Workflow Diagram:

```
graph LR; full_name((full_name)) --> new_step((new_step)); mp_name((mp_name)) --> new_step; new_step --> new_step_1((new_step_1)); new_step_1 --> natoms((natoms)); natoms --> supercell((supercell))
```

Test job Run

```
95% | 1.1MB 9.0MB/s eta 0:00:01
93% | 1.1MB 11.2MB/s eta 0:00:01
94% | 1.1MB 11.5MB/s eta 0:00:01
95% | 1.1MB 10.1MB/s eta 0:00:01
96% | 1.1MB 11.5MB/s eta 0:00:01
97% | 1.1MB 12.5MB/s eta 0:00:01
98% | 1.2MB 10.7MB/s eta 0:00:01
99% | 1.2MB 11.9MB/s eta 0:00:01
99% | 1.2MB 11.9MB/s eta 0:00:01
100% | 1.2MB 650kB/s
[725hCollecting mpy-extensions (from cwltool)
Downloading
https://files.pythonhosted.org/packages/5c/eb/975c7c080f3223a5cdaff09612f3a5221e4ba534f7039db34c35d95fa6a5
/mpy_extensions-0.4.3-py2.py3-none-any.whl
Collecting requests>=2.6.1 (from cwltool)
Cache entry deserialization failed, entry ignored
Downloading
https://files.pythonhosted.org/packages/29/c1/24014557f1d22c56d50280771a17307e6bf87b70727d975fd6b2ce6b014a
/requests-2.25.1-py2.py3-none-any.whl (61kB)
[725l
16% | 10kB 27.2MB/s eta 0:00:01
33% | 20kB 25.3MB/s eta 0:00:01
50% | 30kB 25.5MB/s eta 0:00:01
66% | 40kB 26.3MB/s eta 0:00:01
83% | 51kB 23.9MB/s eta 0:00:01
100% | 61kB 994kB/s
[725hCollecting shellescape<3.5,>=3.4.1 (from cwltool)
Downloading
https://files.pythonhosted.org/packages/51/b6/986c99a10040beaaefca1ad6c93bd7738cb8e4f52f6caed13d3ed1cas7e4
/shellescape-3.4.1-py2.py3-none-any.whl
Collecting psutil (from cwltool)
Cache entry deserialization failed, entry ignored
Downloading
https://files.pythonhosted.org/packages/e1/b0/7276de53321c12981717490516b7e612364f2cb372ee8901bd4a66a000d7
/psutil-5.8.0.tar.gz (470kB)
[725l
2% | 10kB 11.5MB/s eta 0:00:01
4% | 20kB 14.2MB/s eta 0:00:01
6% | 30kB 16.6MB/s eta 0:00:01
8% | 40kB 18.4MB/s eta 0:00:01
10% | 51kB 19.5MB/s eta 0:00:01
13% | 61kB 20.7MB/s eta 0:00:01
```

Heliport REST API

- The API provides access to our full Heliport infrastructure:
 - Proposal access (GATE),
 - Handle management,
 - CWL execution and monitoring,
 - Project metadata export,
 - Digital Object and
 - Lifecycle management.
- API documentation (ReDOC) available.
- Essential to integrate the Heliport Infrastructure in Experiments.
- Everything can be documented with less user interaction.

The screenshot displays the Heliport REST API documentation interface. The browser address bar shows the URL: `vlsdms.fz-rossendorf.de/redoc/#operation/createDigitalObject`. The interface is divided into several sections:

- Left Sidebar:** A search bar and a list of API endpoints. The `createDigitalObject` endpoint is highlighted in blue.
- Main Content Area:**
 - Endpoint:** `createDigitalObject` (POST) under the `Digital Objects` group.
 - Request Body Schema:** A table defining the required fields for the request body (application/json):

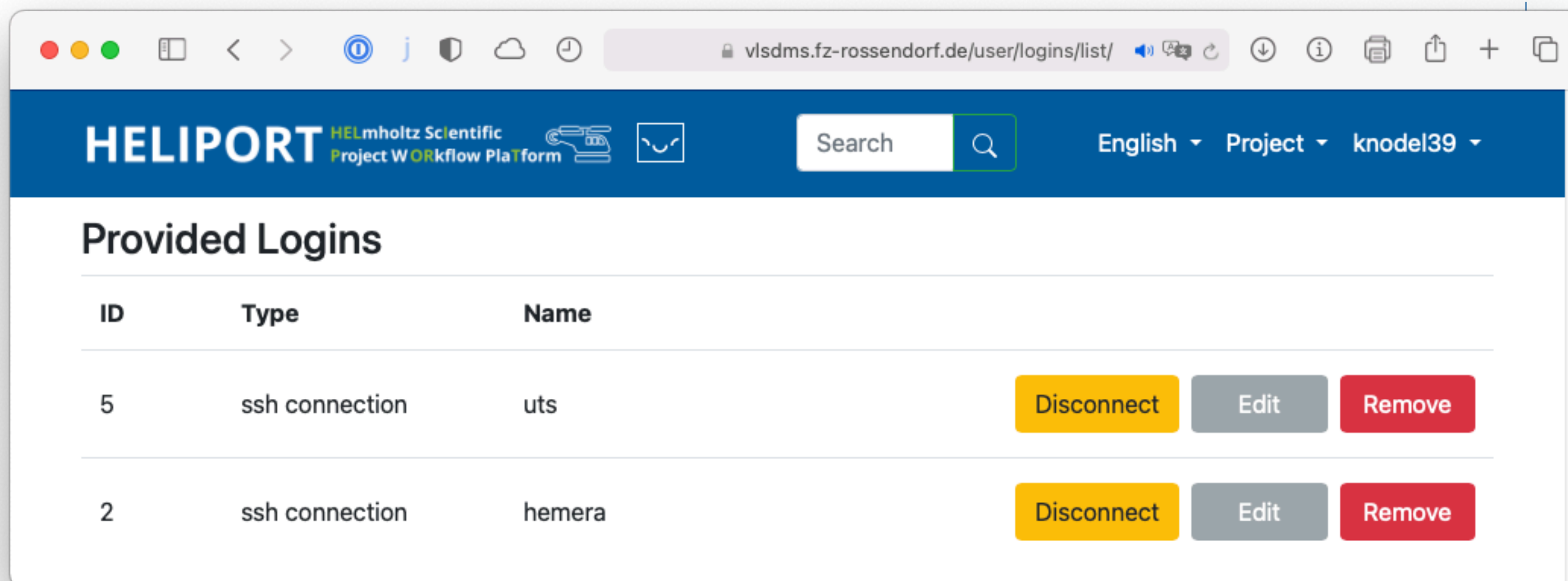
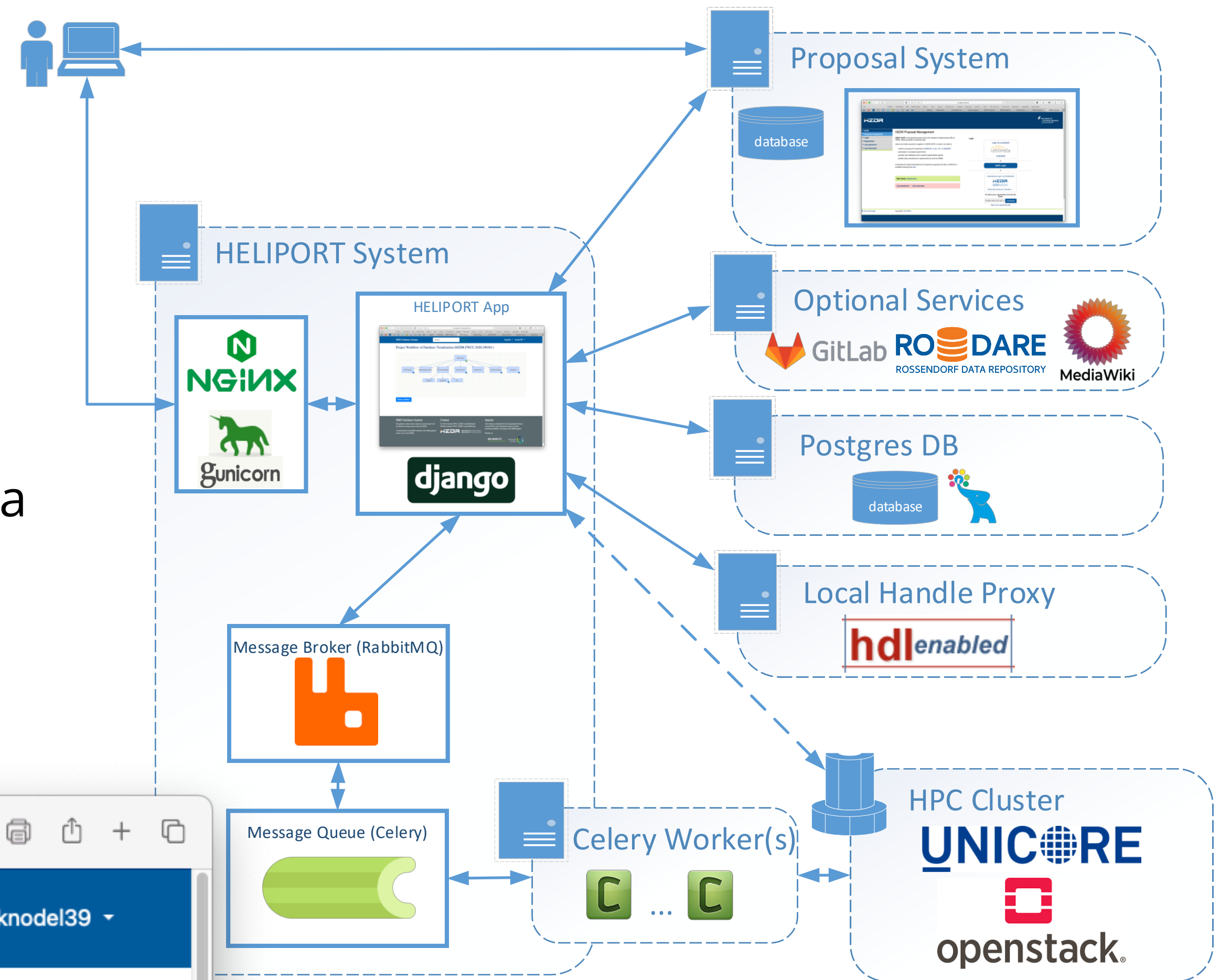
Field	Type	Constraints
<code>project</code>	integer	required
<code>handle</code>	string	≤ 100 characters, Nullable
<code>relation</code>	string	required
<code>category</code>	string	required
<code>description</code>	string	required
 - Responses:** A section showing a response with status code `201`.
- Right Panel:** A dark-themed sidebar containing:
 - Request samples:** A section with a `Payload` button and a content type of `application/json`. It shows a JSON example:

```
{  "project": 0,  "handle": "string",  "relation": "string",  "category": "string",  "description": "string"}
```
 - Response samples:** A section with a `201` status code and a content type of `application/json`. It shows a JSON example:



```
{  "digital object id": 0,  "project": 0,  "handle": "string",  "relation": "string",  "category": "string",  "description": "string"}
```

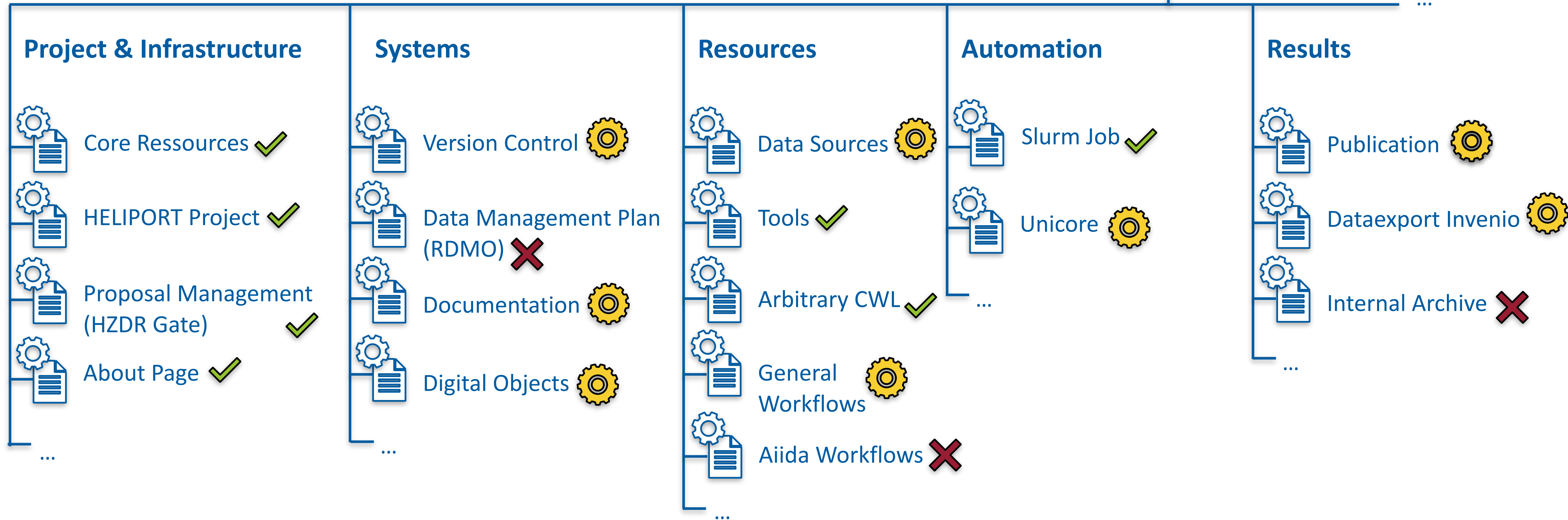
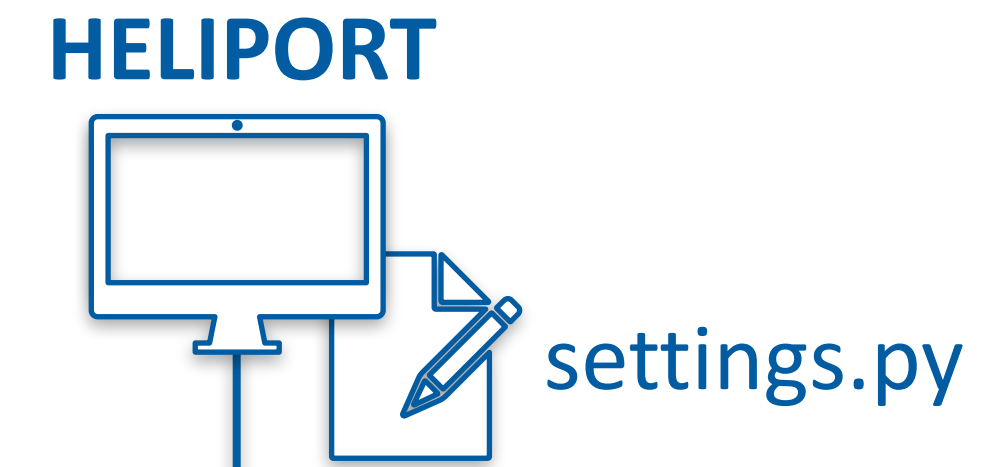

Heliport System Infrastructure

- The Heliport App is based on Django:
 - Heliport communicates with various system through REST APIs,
 - The project-level metadata is stored in a PostgreSQL database and can be exported in a metadata scheme based on DataCite.
- The CWL workflows are managed in Heliport, but executed on our cluster using UNICORE.



Modular HELIPORT Design (Django Apps)

- Microservice architecture based on Django plugins,
- All plugins offer a REST API, usable in internal workflows,
- Source code available under GNU GPLv3  on  and DOI [10.14278/rodare.947](https://doi.org/10.14278/rodare.947)



 Available
  In development
  Planned

Heliport (Project) Roadmap

First Draft: Project Plan (August 2020)

- Project and user management
- Configurable stages
- **REST API** for proposal information
- CWL visualization prototype

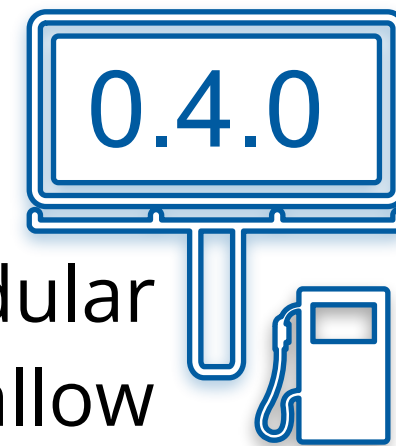
Modular Structure (July 2021)

- Subdivision of the stages into modular and configurable Django apps to allow individual extensions
- Refactoring of the project
- Official start of the HMC founded Heliport project:



Documentation TELBE and POLARIS experiment

- Integration of all related data sources
- Automated workflow initiation
- Publication of all data products



Initial Version (June 2020)

- Webinterface with user authentication (LDAP)
- DMS Projects and proposal information from the **HZDR GATE proposal** database

Improved Project Plan (December 2020)

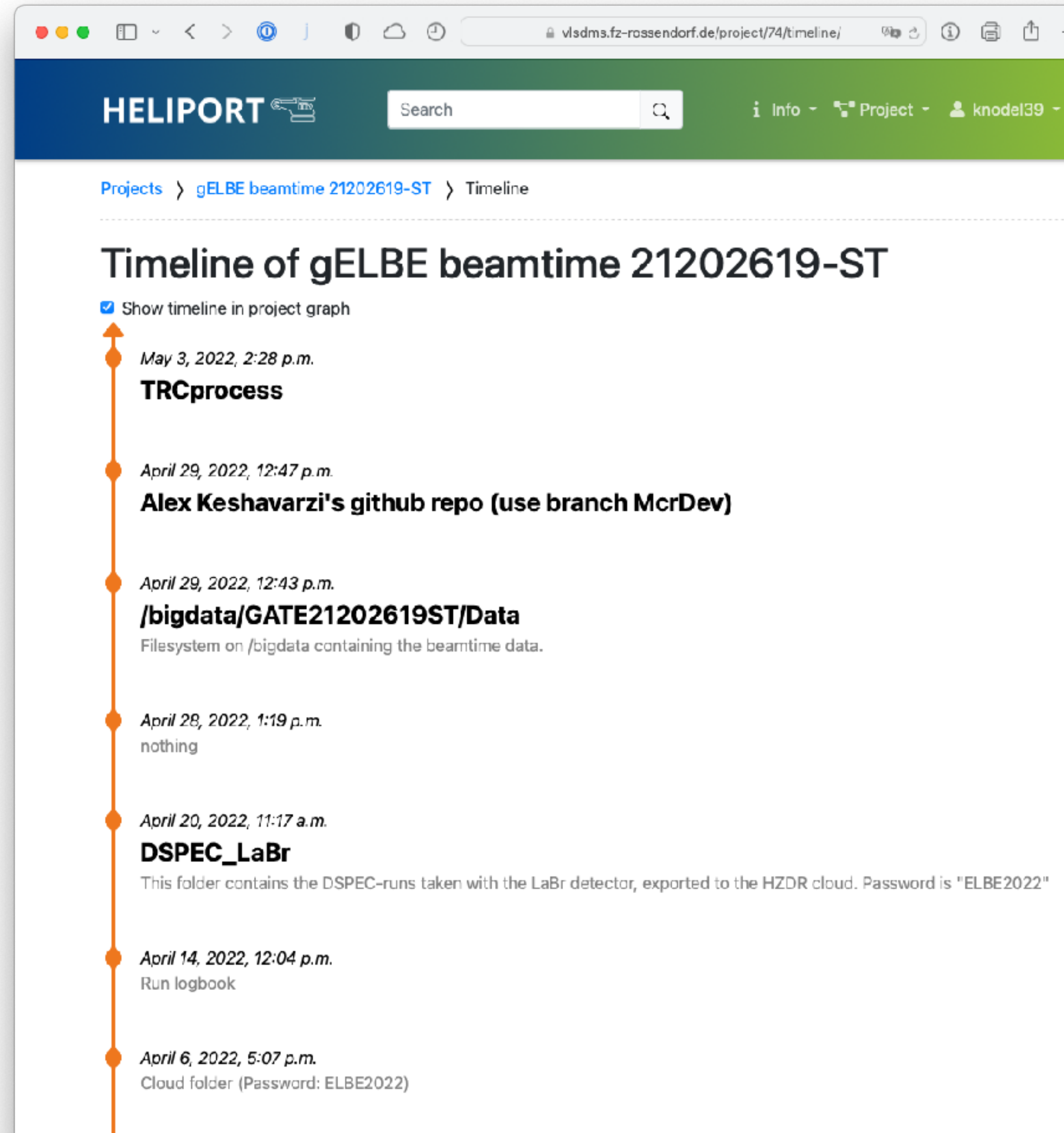
- Fully configurable stages and modules
- Infrastructure and database updates
- Daily proposal database update
- CI pipeline for test and deployment
- Advanced logging and monitoring

Integration of various Apps and Features

- Export for (different) Metadata Schemas
- Computational/Scientific workflow execution
 - Workflow management and monitoring
 - CWL support
- Documentation using GitLab pages
- (Global) **Handle management**
- Extended **Support for Digital Twins**
- Data Management Plan Export for RDMO

Upcoming Extensions: Data provenance and Comprehensibility

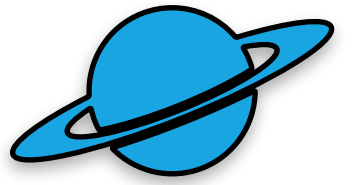
- For many systems and services we still have to develop necessary plug-ins for the integration into Heliport.
- The versioning of an experiment lifecycle is unavoidable and we are still discussing how we can present the feature in our web frontend:
 - A Git project with all metadata to restore a lifecycle,
 - Or an implementation direct in Heliport?
- Inheritance of projects,
- Different views based on roles (owner, beam line scientist, data curator, ...)



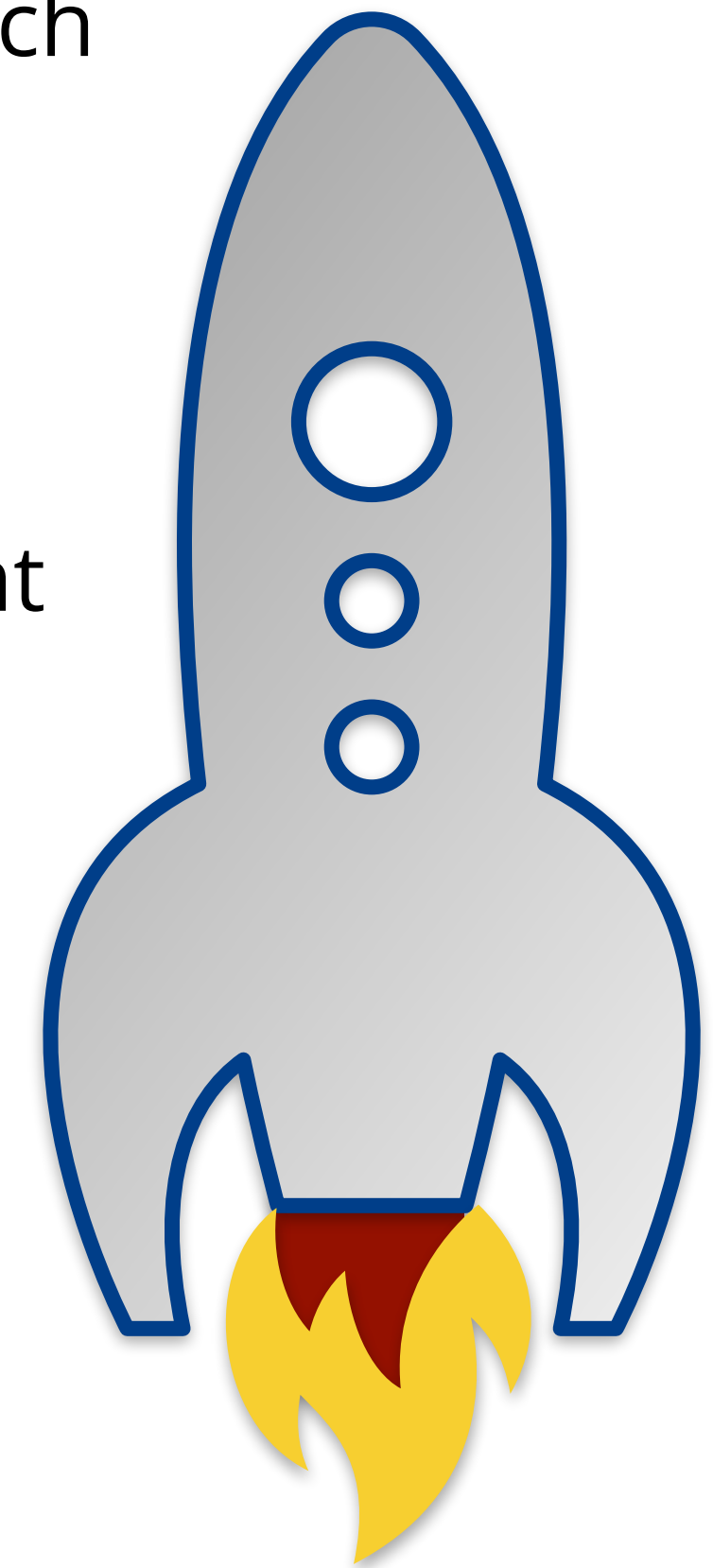
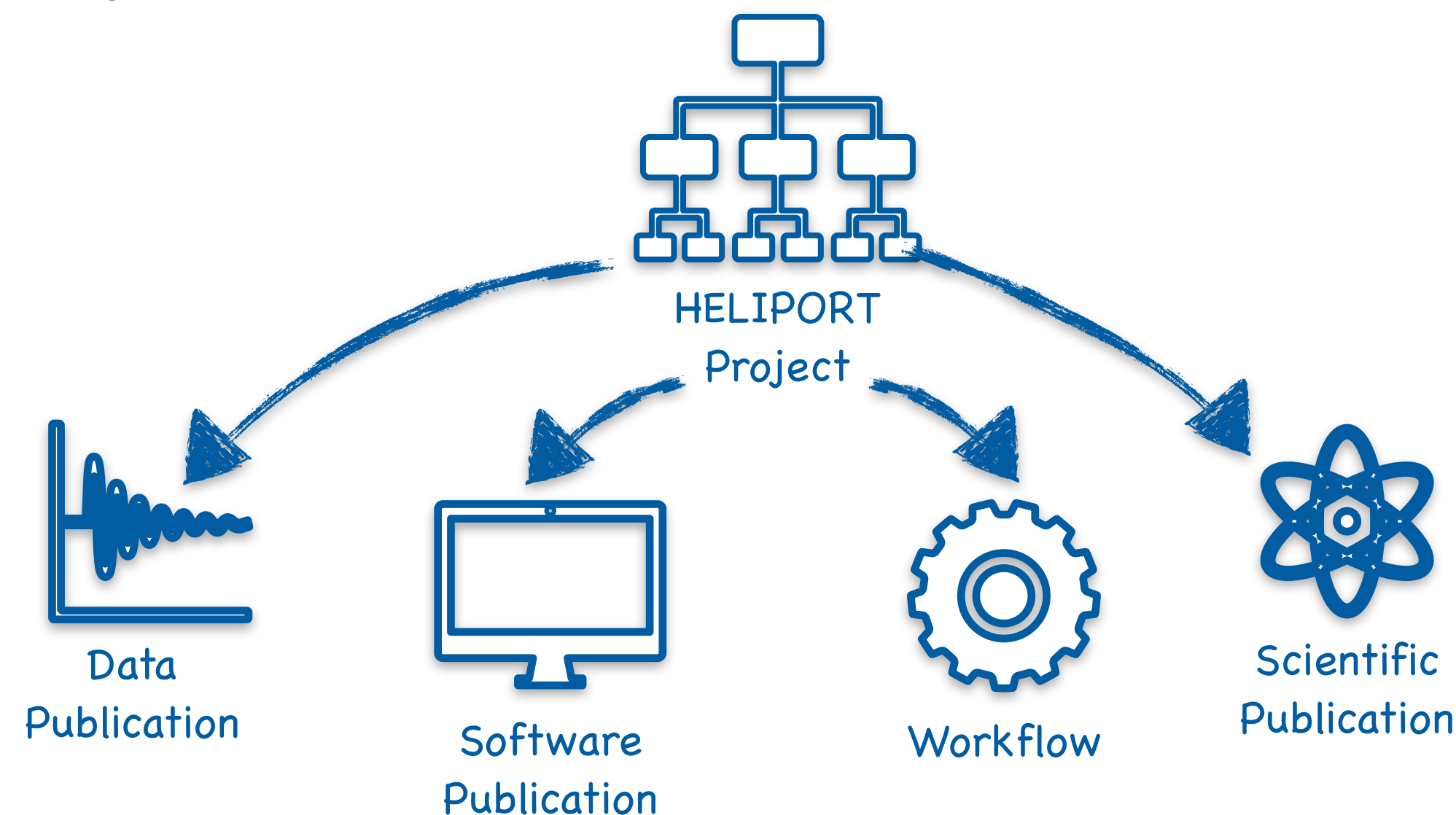
The screenshot shows the HELIPOINT web interface. The browser address bar displays 'vlsdms.fz-rossendorf.de/project/74/timeline/'. The page header includes the HELIPOINT logo, a search bar, and navigation links for 'Info', 'Project', and the user 'knodel39'. The main content area is titled 'Timeline of gELBE beamtime 21202619-ST' and includes a checkbox for 'Show timeline in project graph'. The timeline consists of several entries:

- May 3, 2022, 2:28 p.m.**
TRCprocess
- April 29, 2022, 12:47 p.m.**
Alex Keshavarzi's github repo (use branch McrDev)
- April 29, 2022, 12:43 p.m.**
/bigdata/GATE21202619ST/Data
Filesystem on /bigdata containing the beamtime data.
- April 28, 2022, 1:19 p.m.**
nothing
- April 20, 2022, 11:17 a.m.**
DSPEC_LaBr
This folder contains the DSPEC-runs taken with the LaBr detector, exported to the HZDR cloud. Password is "ELBE2022"
- April 14, 2022, 12:04 p.m.**
Run logbook
- April 6, 2022, 5:07 p.m.**
Cloud folder (Password: ELBE2022)

Conclusions

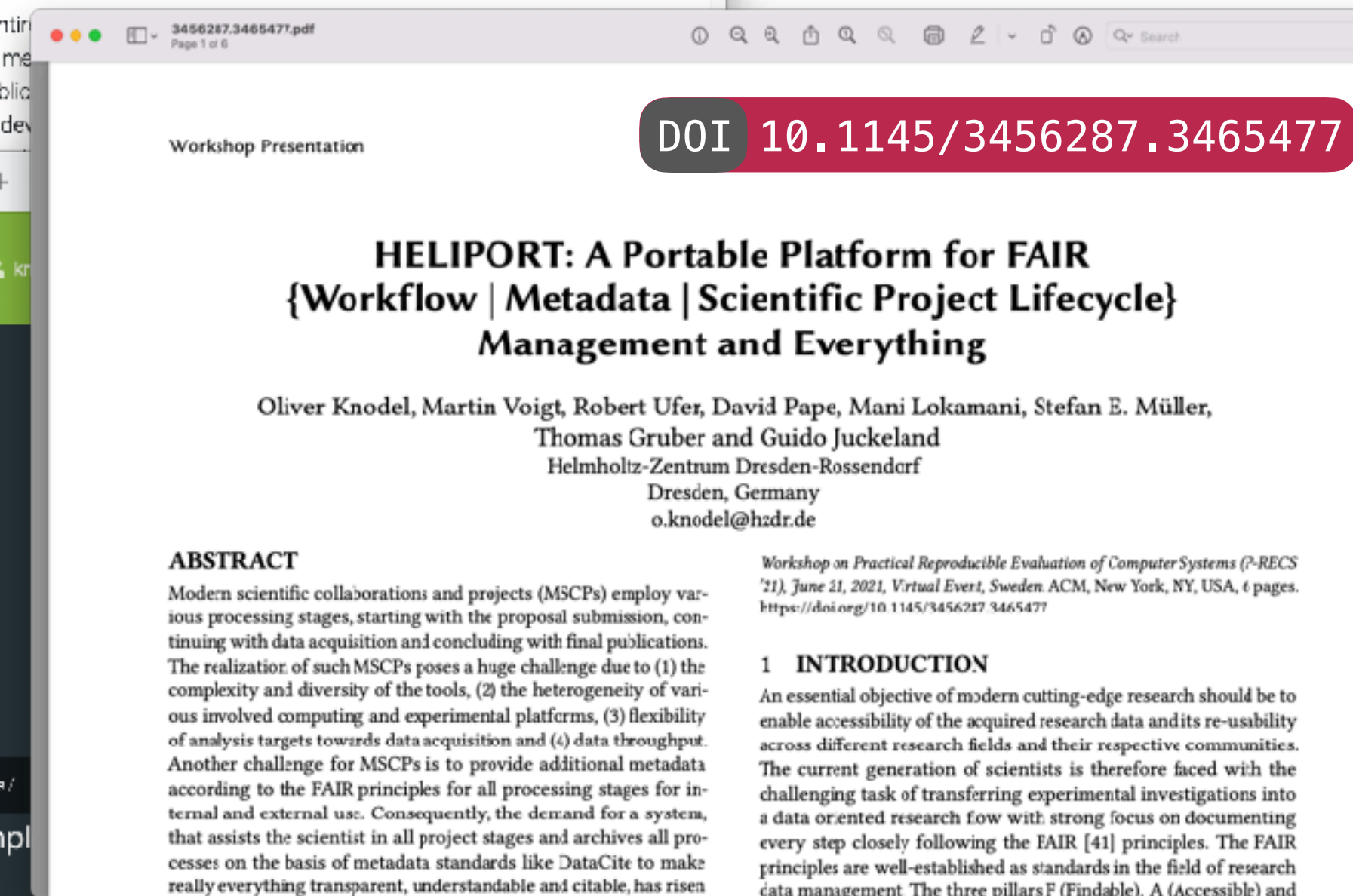
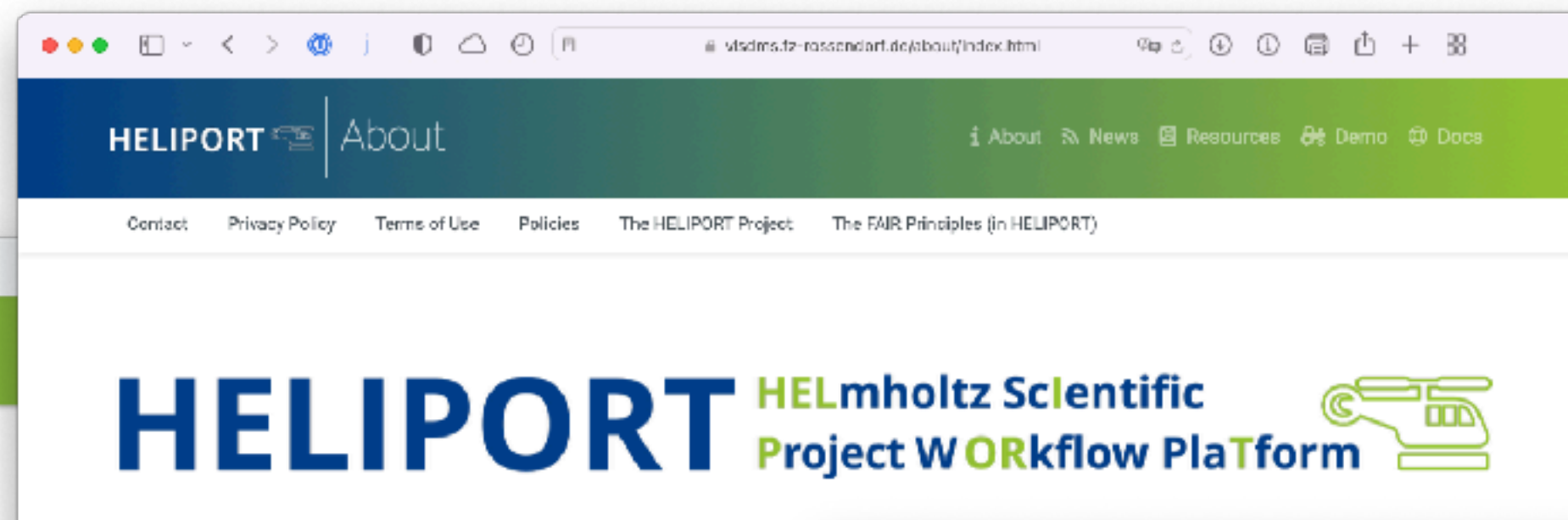
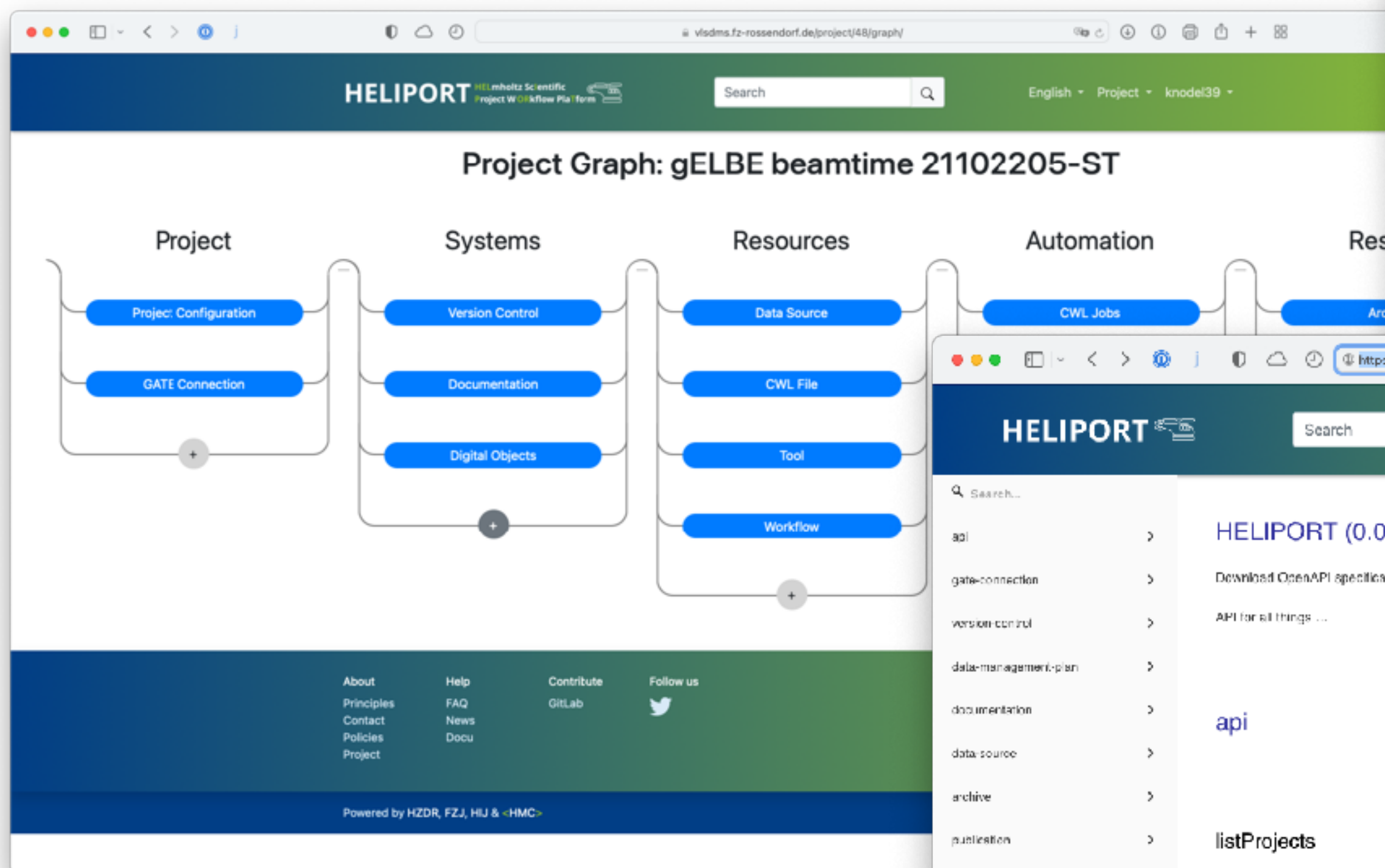


- A guidance system that describes and collects all metadata from the systems involved is desirable and leads us to a fully **FAIR** and comprehensible research project.
- The computational workflows are essential to keep track of everything what happened during the experiment.
- With all data products registered in one system we can promote the different data publications to make the research more visible and comprehensible.

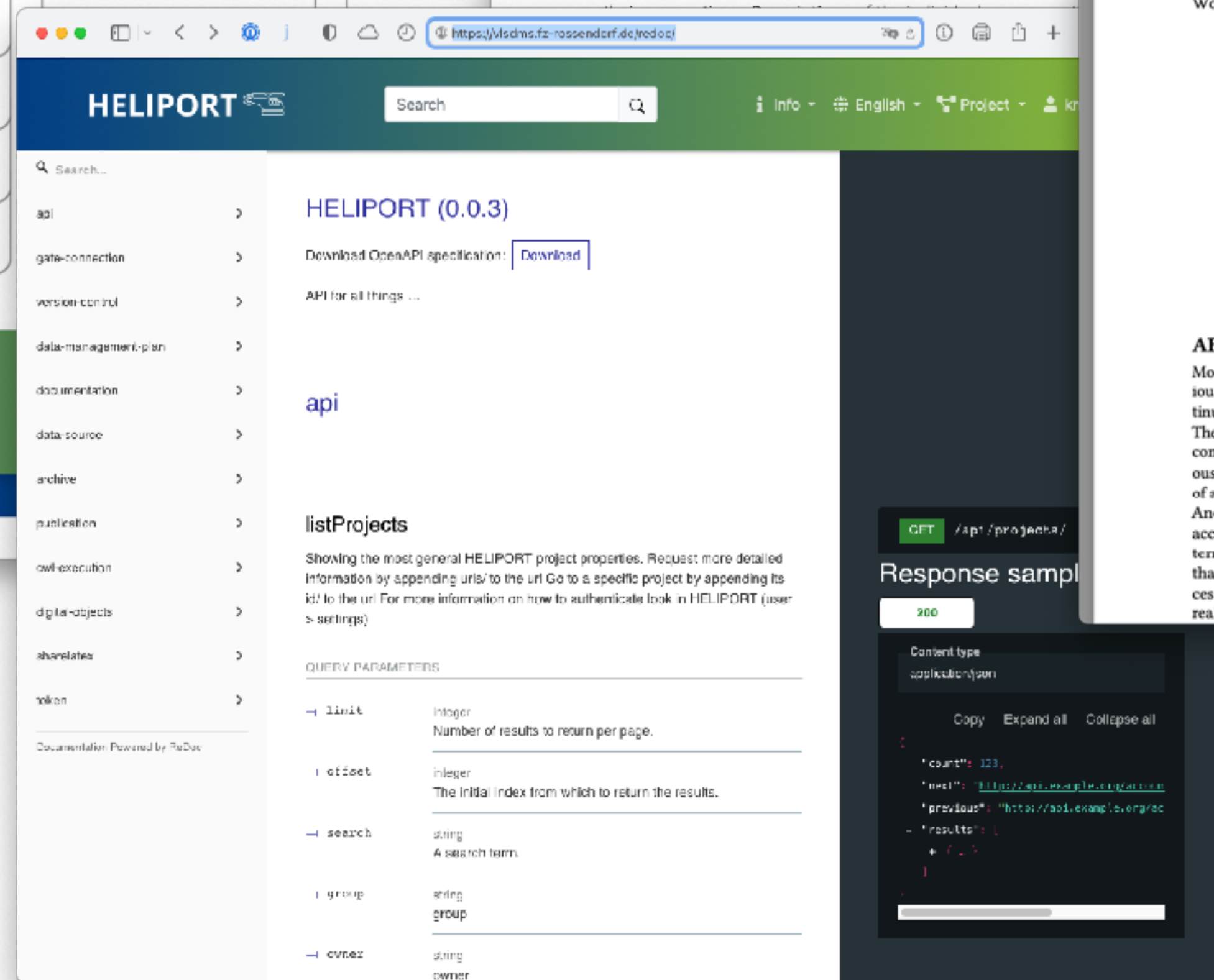


Resources

Website: heliport.hzdr.de



Demo: heliport.hzdr.de/app



API Doc: heliport.hzdr.de/redoc/