HELIPORT

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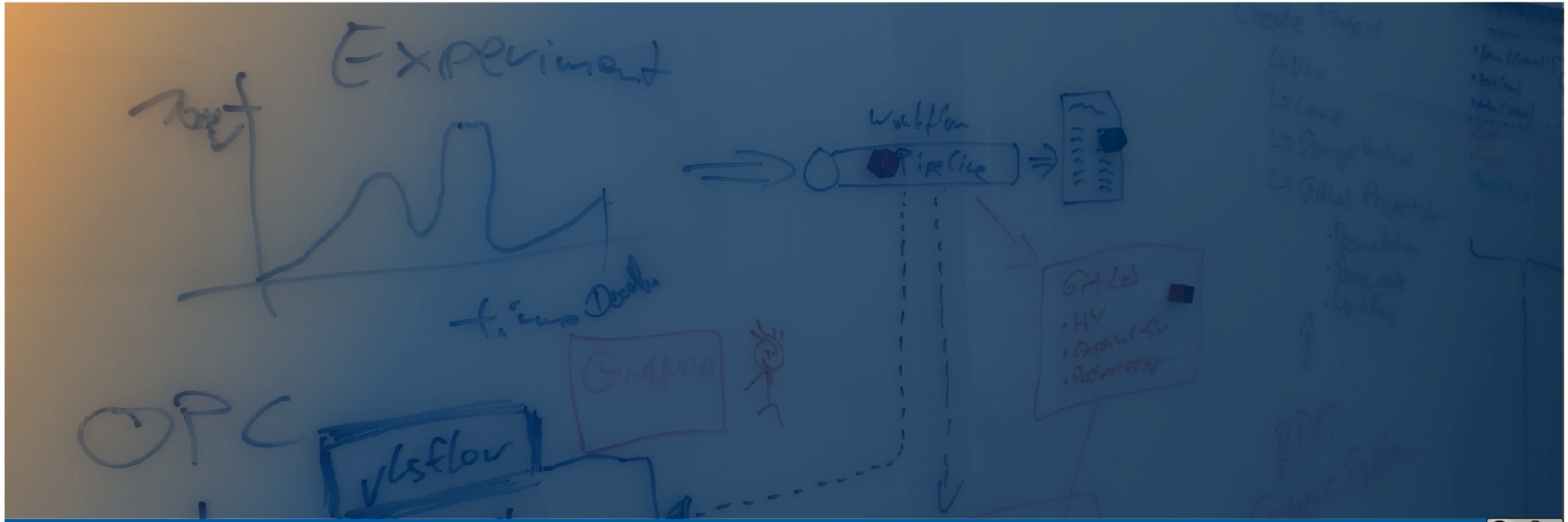

HELIPORT
A Potential Platform for Running Digital Twins FAIRly

LEAPS Integrated Platform Workshop, Digital Twinning Session, 11 May 2021

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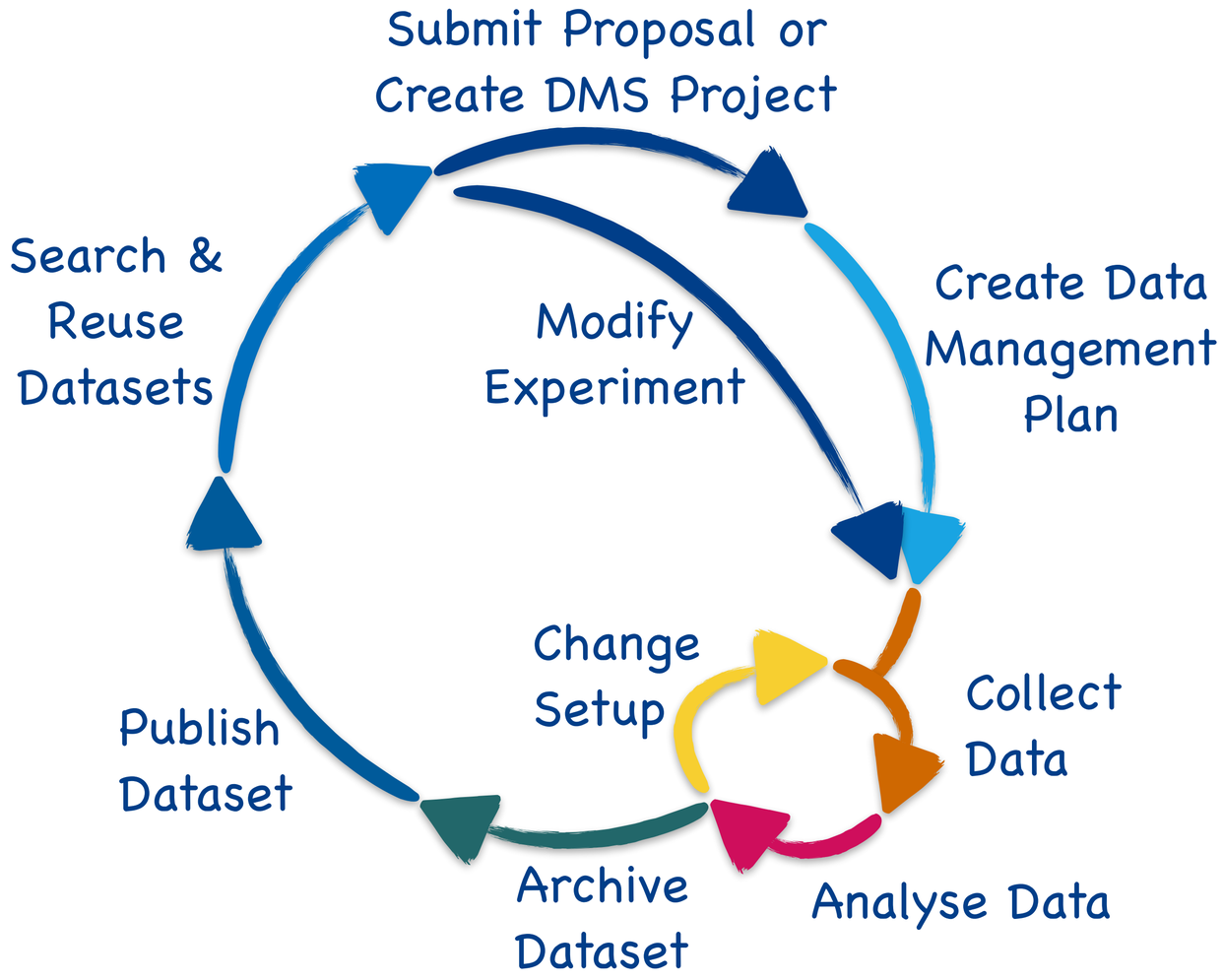
DRESDEN concept

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

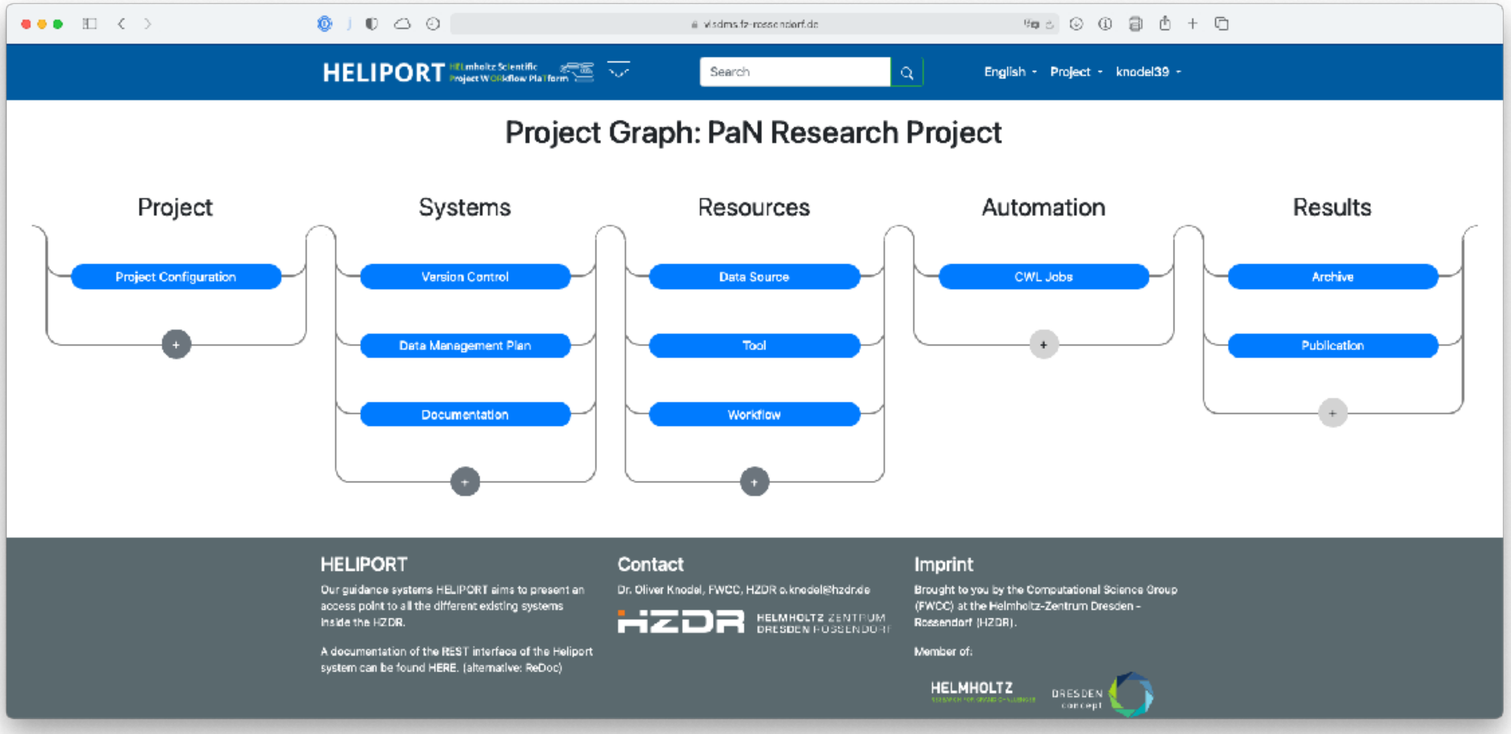
- We support many steps of a research experiment with tools:
  - electronic lab books,
  - interactive analysis,
  - publication of datasets,
  - scientific workflow management,
  - Handle generation and management.
- A uniform access to all services and systems is necessary.
- The documentation of all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



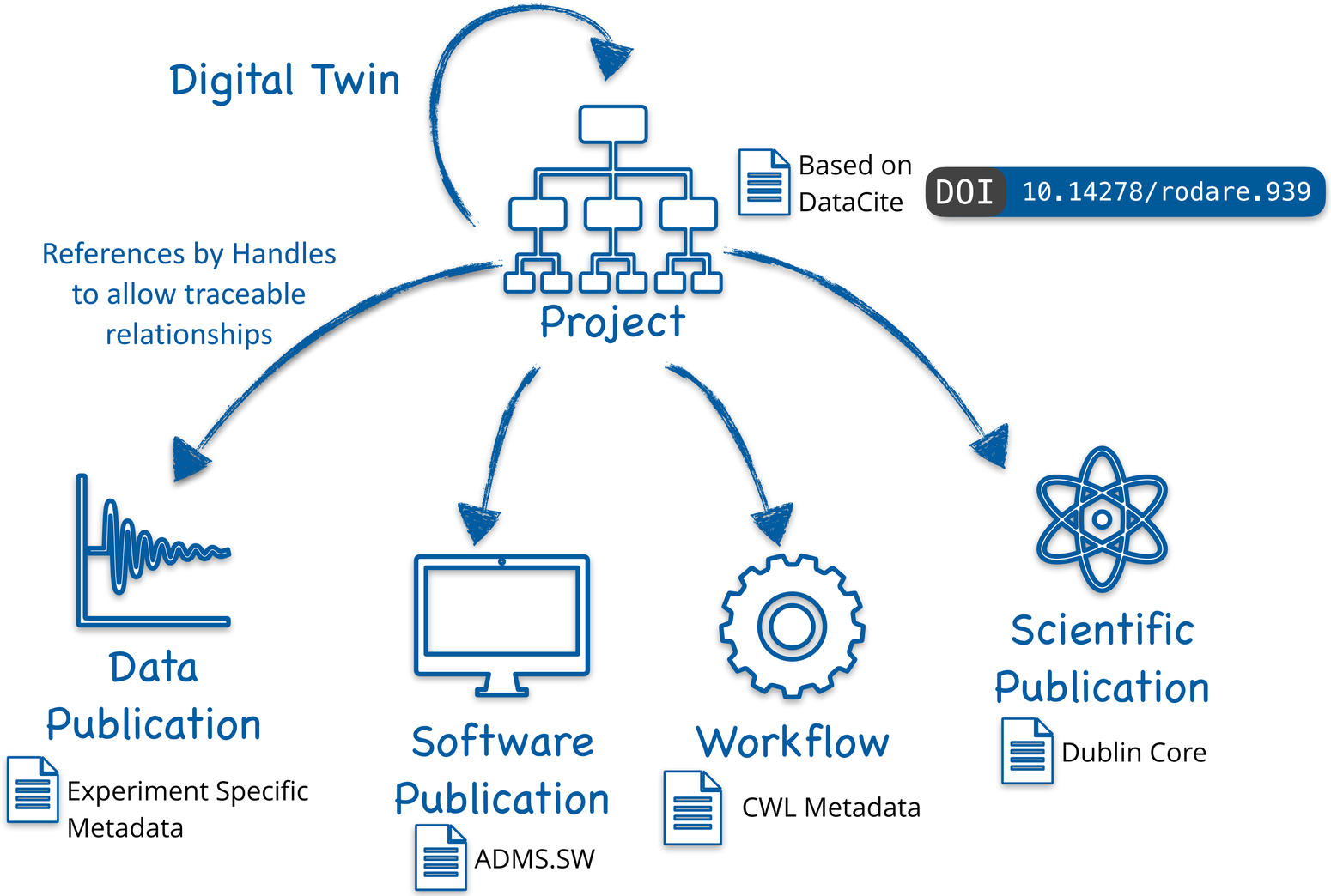
HELIPORT

HELmholtz Sc**I**entific
Project W**OR**kflow Pla**T**form

> 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.

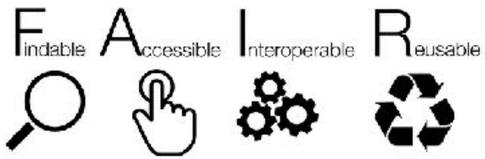


Heliport Metadata Ecosystem



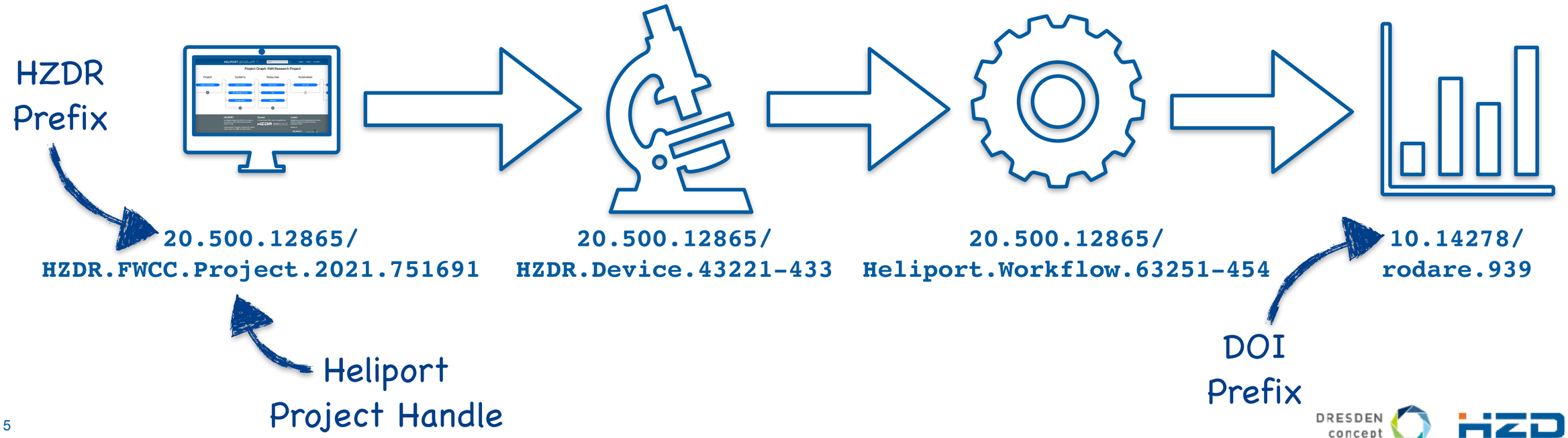
Our Objective

- 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.
- In the end every digital object should have an uniform PID, describing metadata in an open and widely used format to be



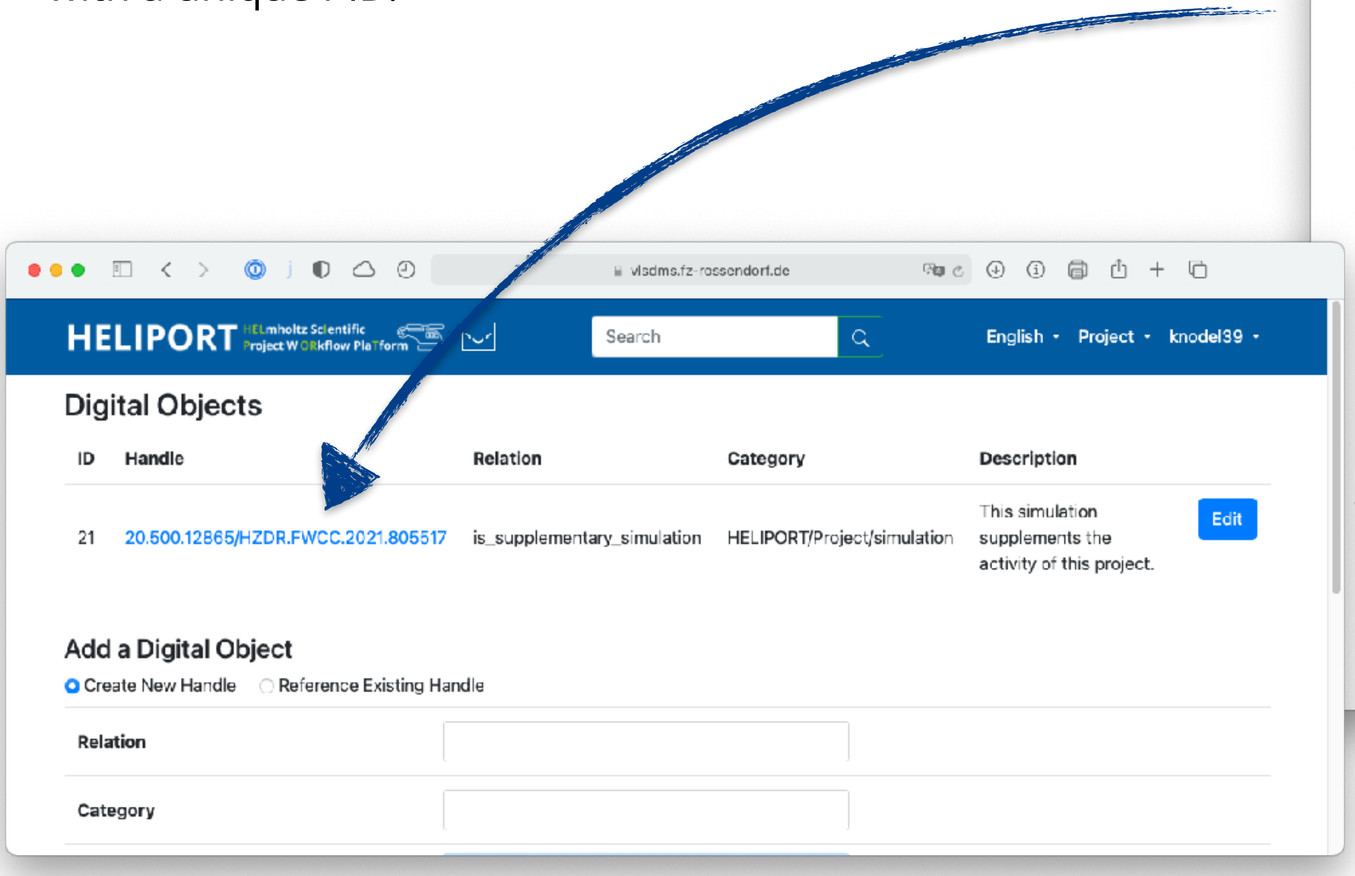
Handle Management Support in Heliport

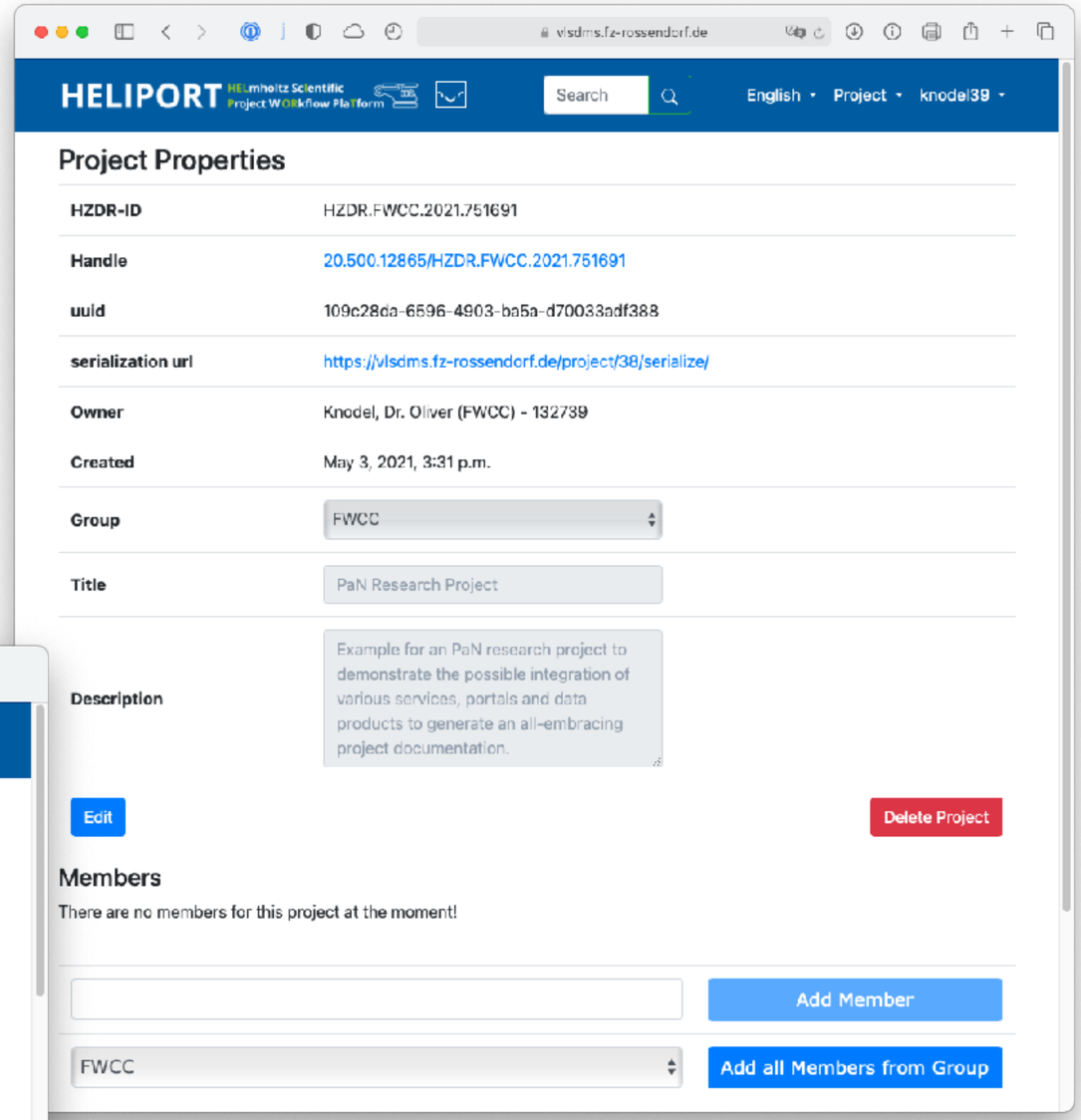
Heliport is linked with our local Handle-Server (handle.hzdr.de) hdl enabled and generates uniform PIDs (resolvable using hdl.handle.net) from and for various systems and services. Associated information can be changed as needed without changing the identifier.



Supporting Digital Twins in Heliport

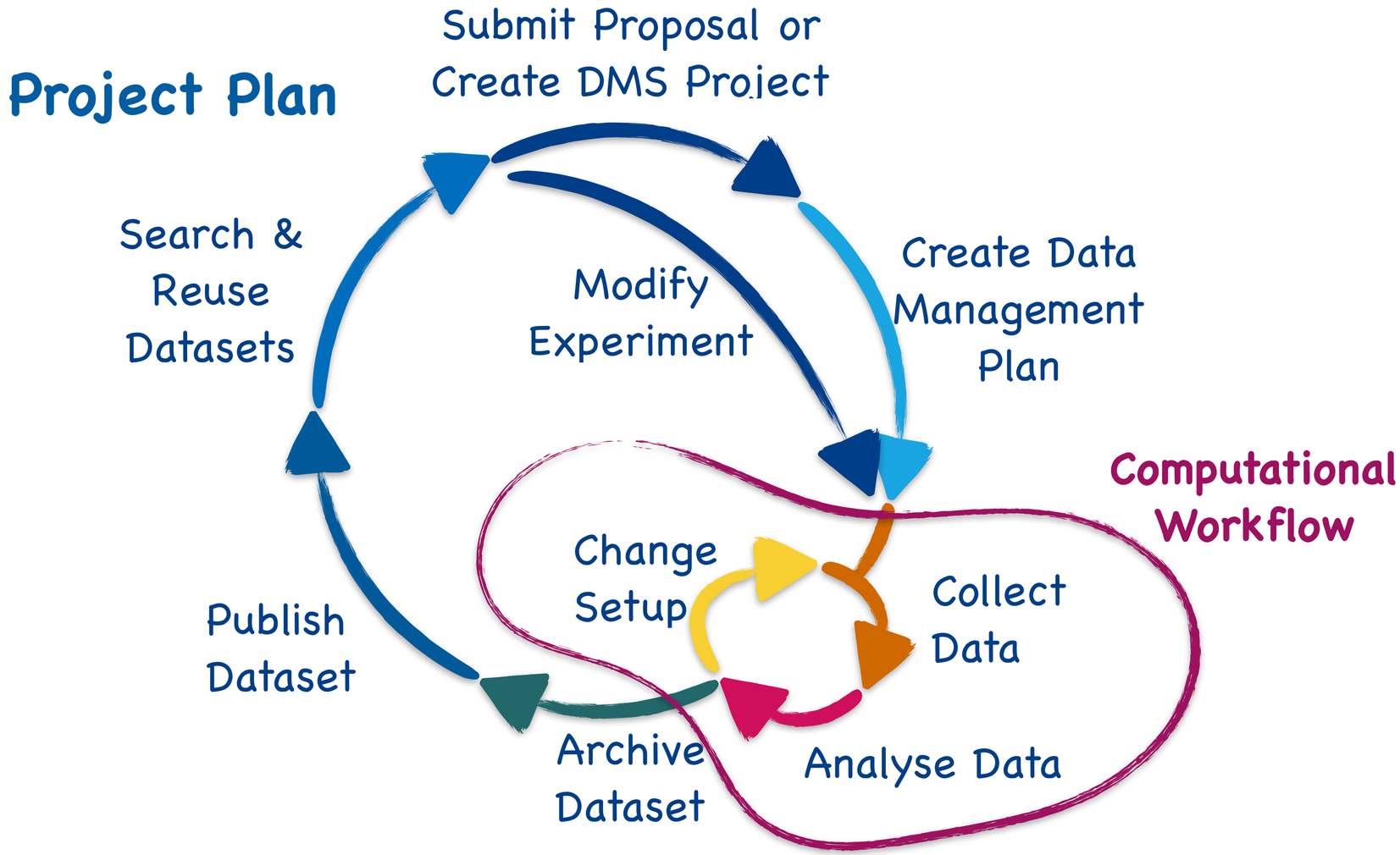
- We can map all kinds of digital workflows to Heliport and we can manage simulations,
- In Heliport a project can reference a digital twin (`is_supplementary_simulation`) as digital object with a unique PID.



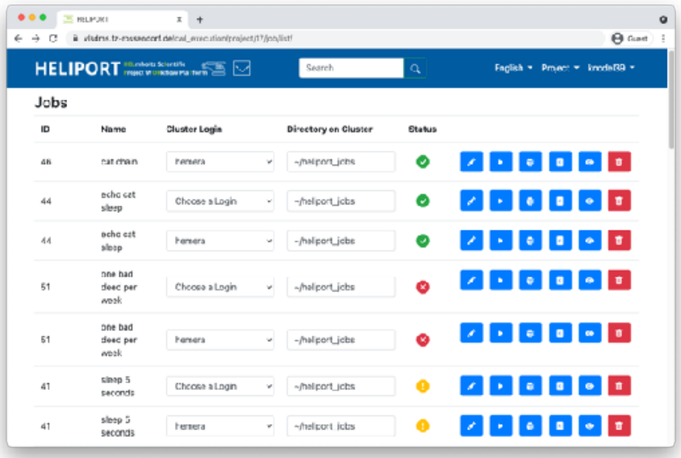


Scientific Workflow

HELIPORT has an build-in Integration of Scientific Workflows



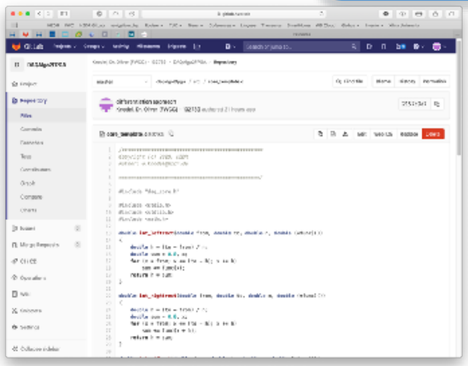
Scientific Software Development and Reproducible Workflows



Workflow Engine

Version Control
(GitLab)

Compute
(HPC/OpenStack)



GitLab

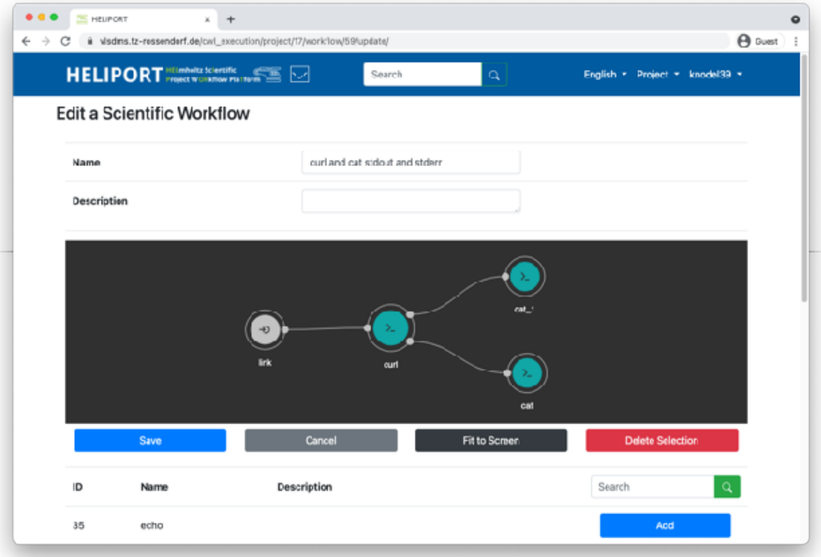
slurm
workload manager

UNICORE

— Analysis and Pre-/Postprocessing steps needs to be:
  - Documented and
  - Reproducible

COMMON WORKFLOW LANGUAGE

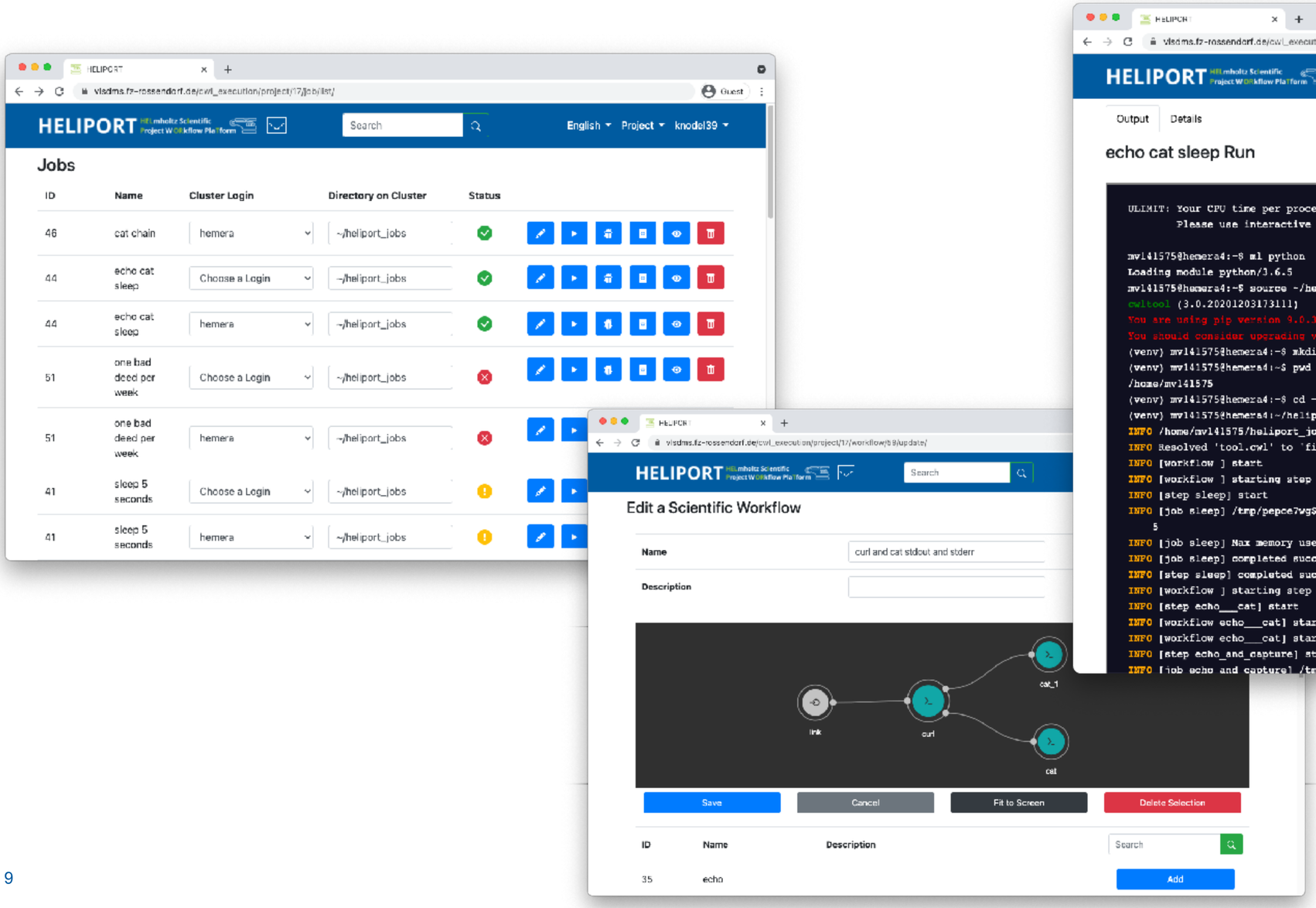
— Capsuling every step in a workflow adapts the **FAIR** principles.



DRESDEN concept

HZDR

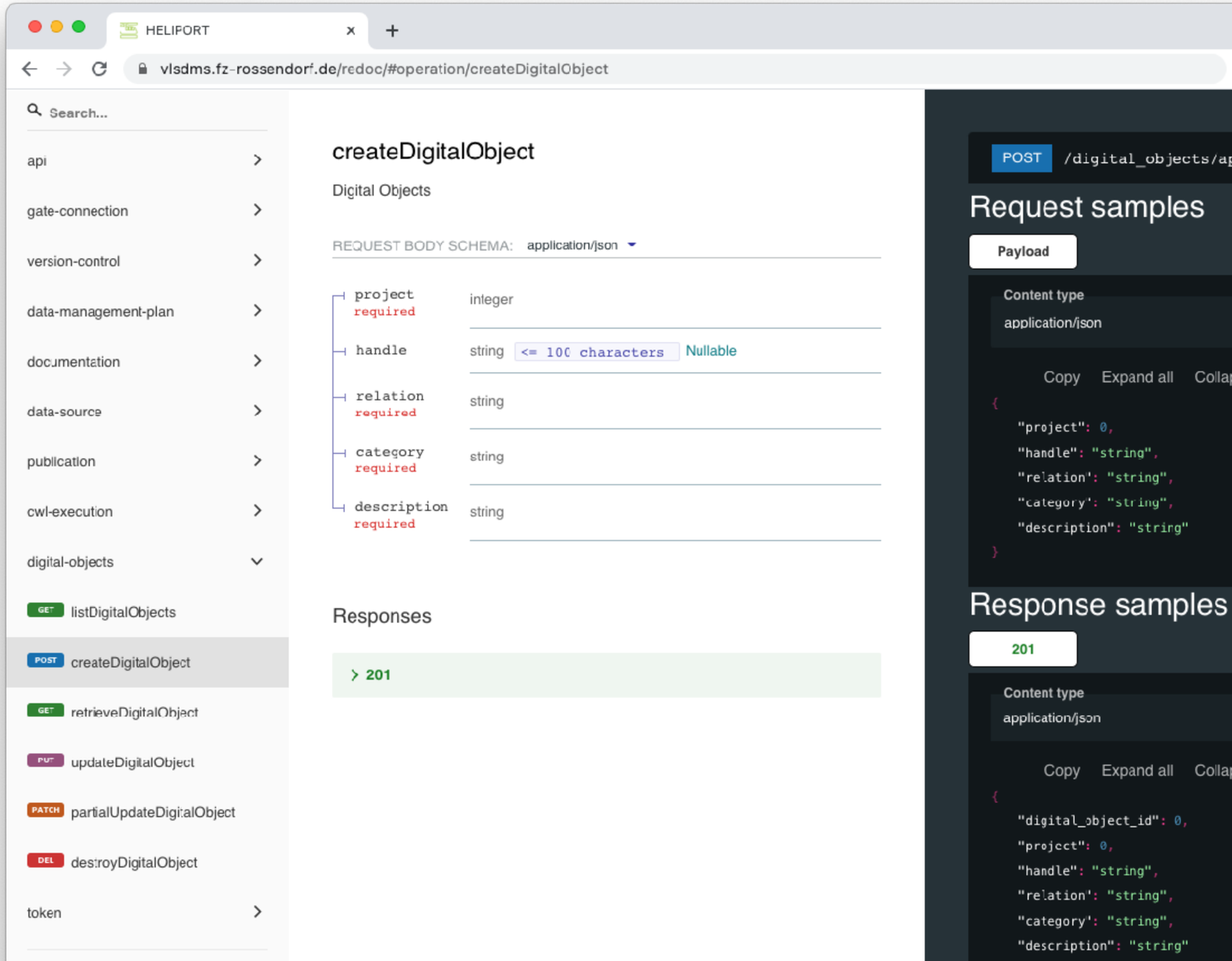
Heliport Tracks Workflows, their Execution and Metadata



Heliport REST API

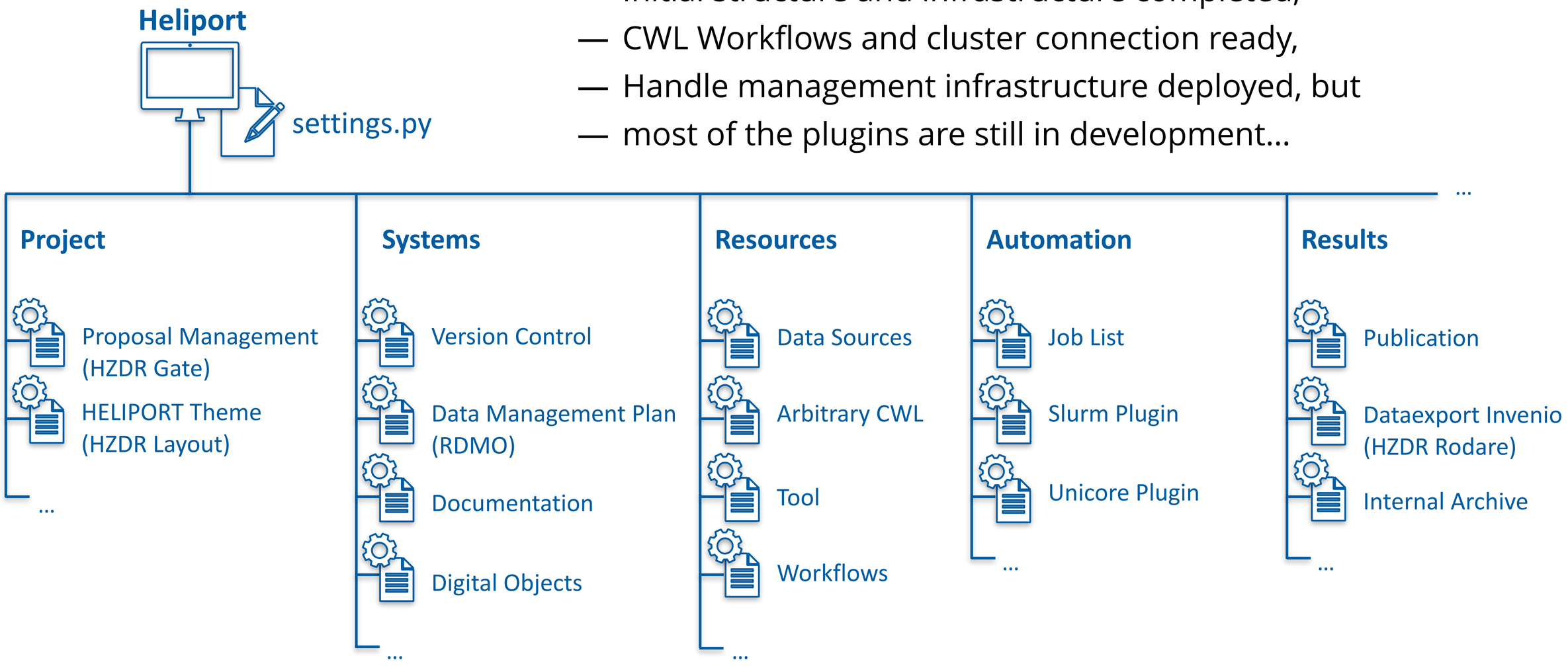
— The API provides access to our full Heliport infrastructure:
  - Proposal access (GATE),
  - Handle management,
  - CWL execution and monitoring,
  - Project metadata export,
  - Digital Object and
  - Lifecycle management.

— API documentation (ReDOC) available.

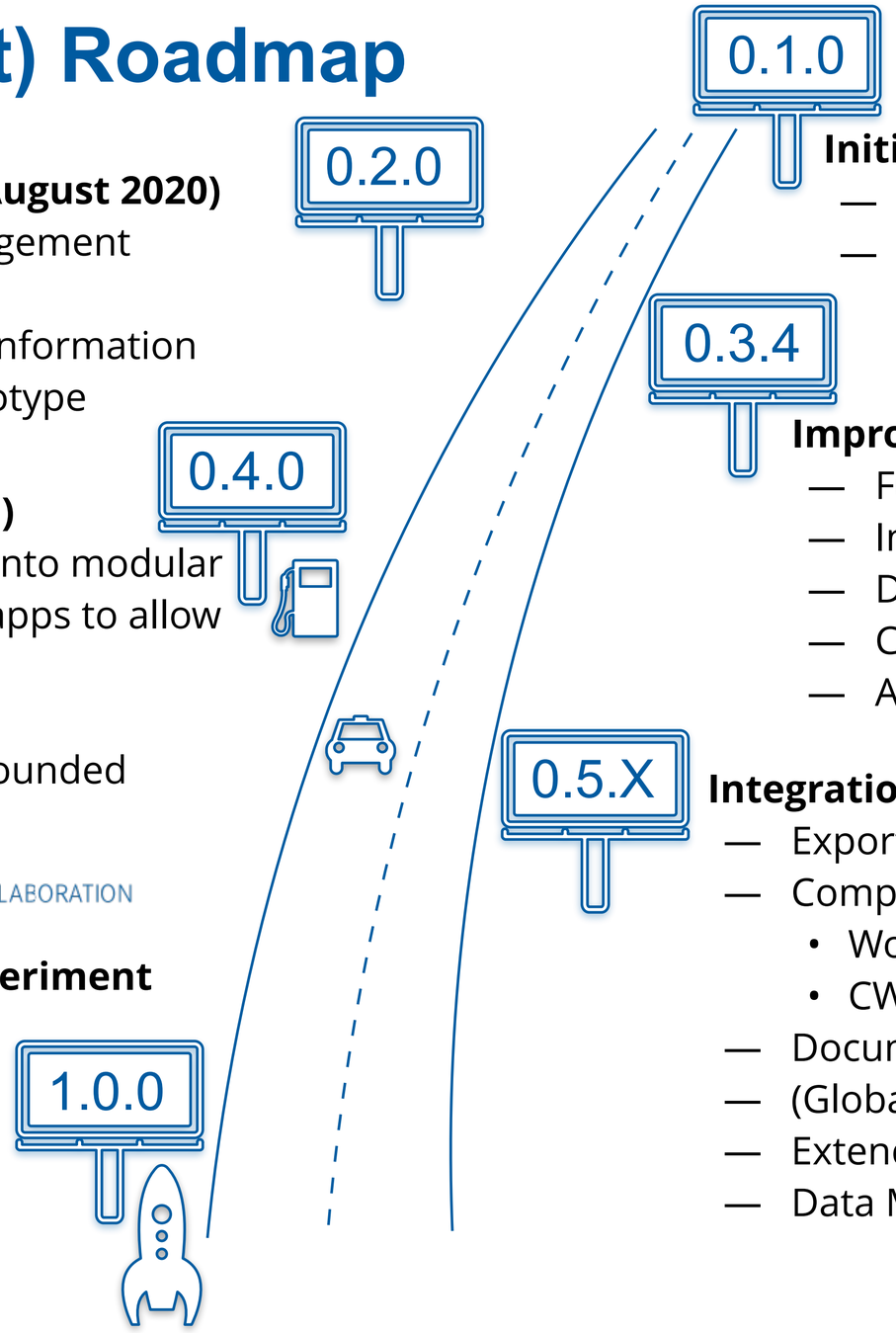


Modular Heliport Design (Django Apps)

- Initial structure and infrastructure completed,
- CWL Workflows and cluster connection ready,
- Handle management infrastructure deployed, but
- most of the plugins are still in development…



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:

HMC | HELMHOLTZ METADATA COLLABORATION

Documentation of a TELBE user 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 additional proposal information from the HZDR GATE 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

DRESDEN concept HZDR

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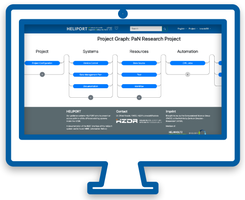

Heliport Prototype
(Only available within the HZDR network)

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Heliport source code v0.4.0 available on Rodare

DOI 10.14278/rodare.947

https://vlsdms.fz-rossendorf.de/

https://rodare.hzdr.de/record/947