# Photon and Neutron Open Science Cloud - PaNOSC

## Workshop on EOSC – Implementation steps

## 3 December 2019

## Presenter: Florian Gliksohn, Miroslav Ruda

## Venue: Technology Centre of the CAS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 823852

# PaNOSC factsheet

**Call:** Horizon 2020 InfraEOSC-04

**Partners:** ESRF, ILL, XFEL.EU, ESS, CERIC-ERIC, ELI-DC, EGI

**Description:** cluster of ESFRI Photon and Neutron sources

**Observers/non-funded:** GÉANT, EUDAT, national RIs

**Linked 3rd parties via EGI:** DESY, STFC, CESNET

**Status:** Started 1/12/2018

**Github:** https://github.com/panosc-eu

**Home page:** https://panosc.eu

**Twitter:** @PaNOSC_eu #PaNOSC

**Budget:** 12 M€

**Coordinator:** ESRF

**Started:** 1/12/2018

**Duration:** 4 years


ESFRI European Strategy Forum on Research Infrastructures



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# ELI in Brief

- ELI ERIC will be the world's most advanced **laser research infrastructure**
- First **international research infrastructure** built completely in **Central Europe**
- Funded in synergy between **ESIF, National and Framework** funds, after **EU approval** and delivered through a community effort



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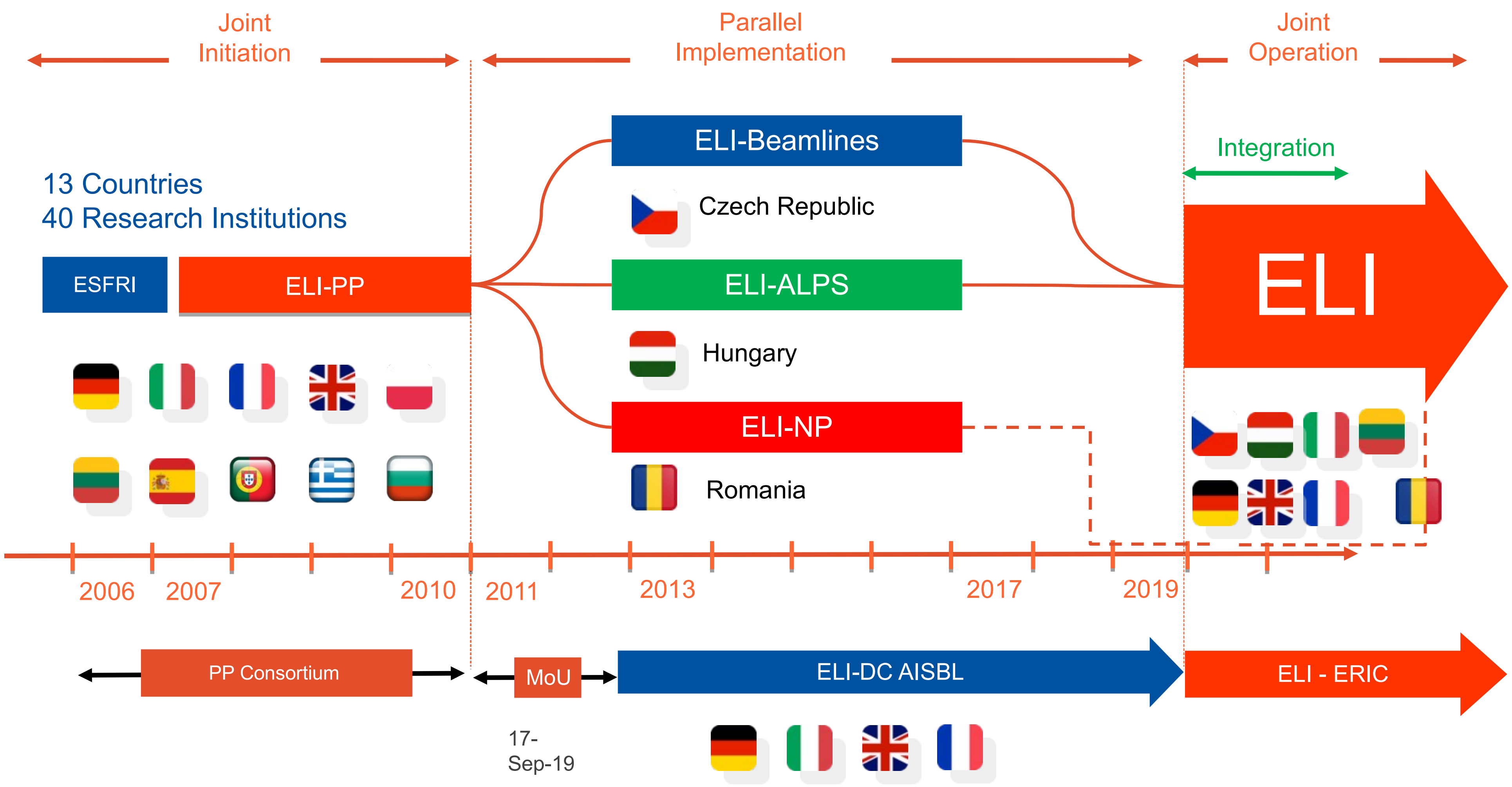
# ELI-ALPS


***X-UV and X-ray fs/atto-pulses, for temporal investigation of dynamics in atoms, molecules, plasmas and solids.***

# ELI BEAMLINES

***The forefront of high-intensity, high-energy density, short-pulse laser systems***

# ELI Timeline



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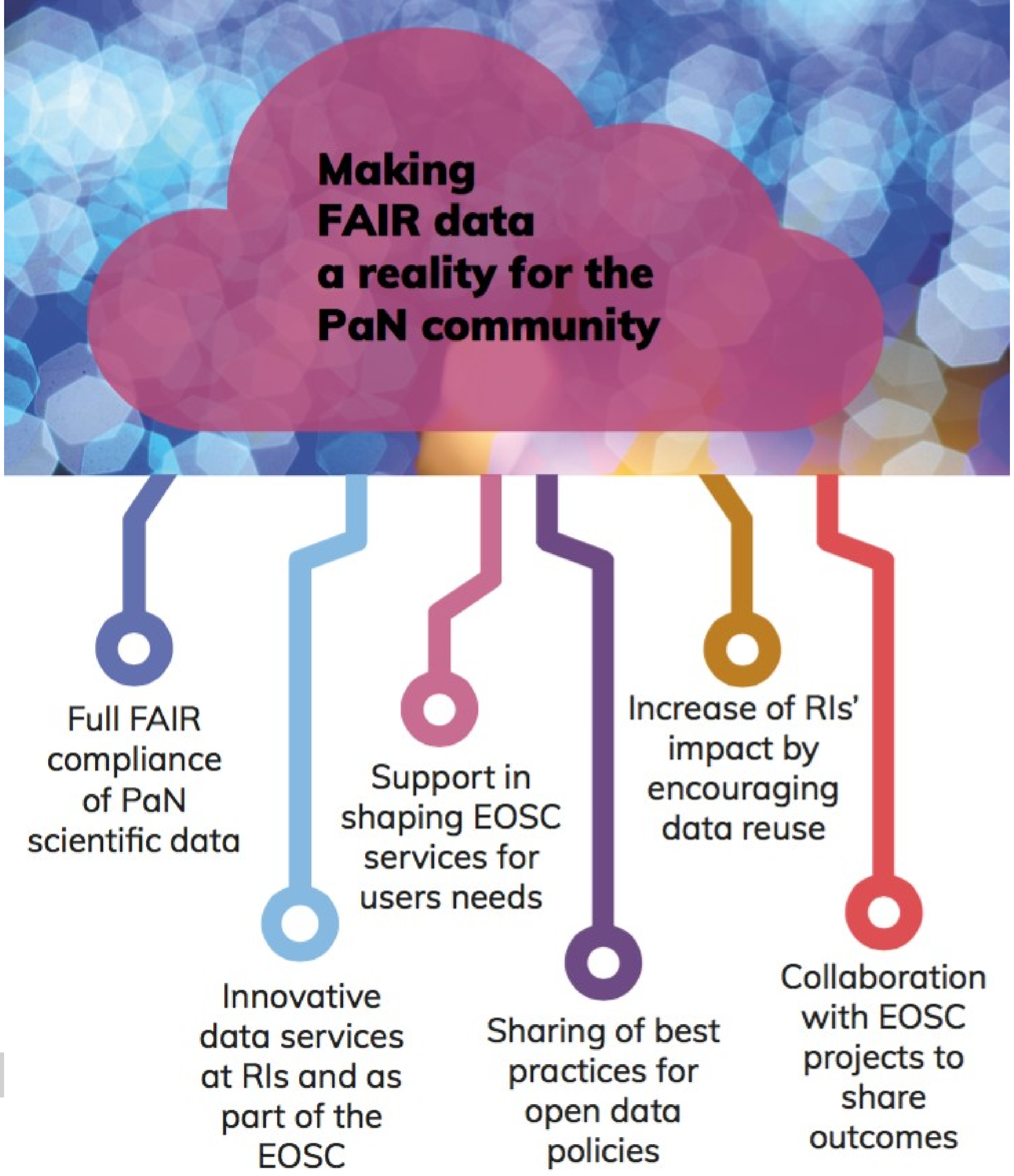
# PaNOSC goals




**PaNOSC works closely with the PaN sources in Europe to develop common policies, strategies and solutions in the area of FAIR data policy, data management and data services, integrating them into the EOSC.**

# Data policy WP

WP2

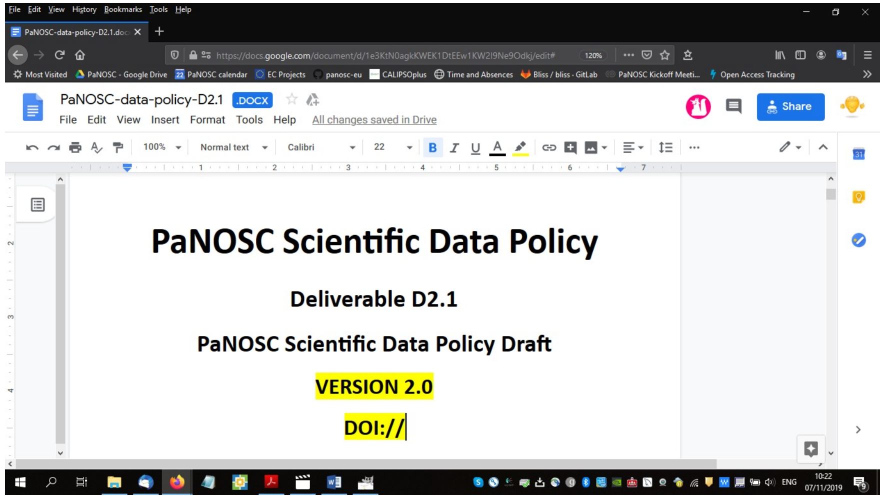
Update the PaNdata data policy

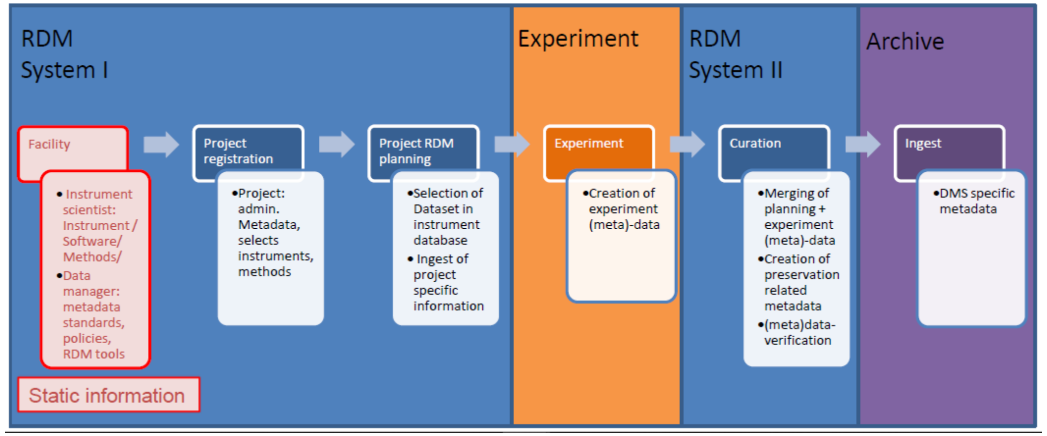
Include the FAIR concepts and make it FAIR compliant

Update existing Data Policies to be compatible with the Data Policy 2.0 framework

Develop a tool for Data Management Plans together with ExPaNDS

Share outcomes with ExPaNDS



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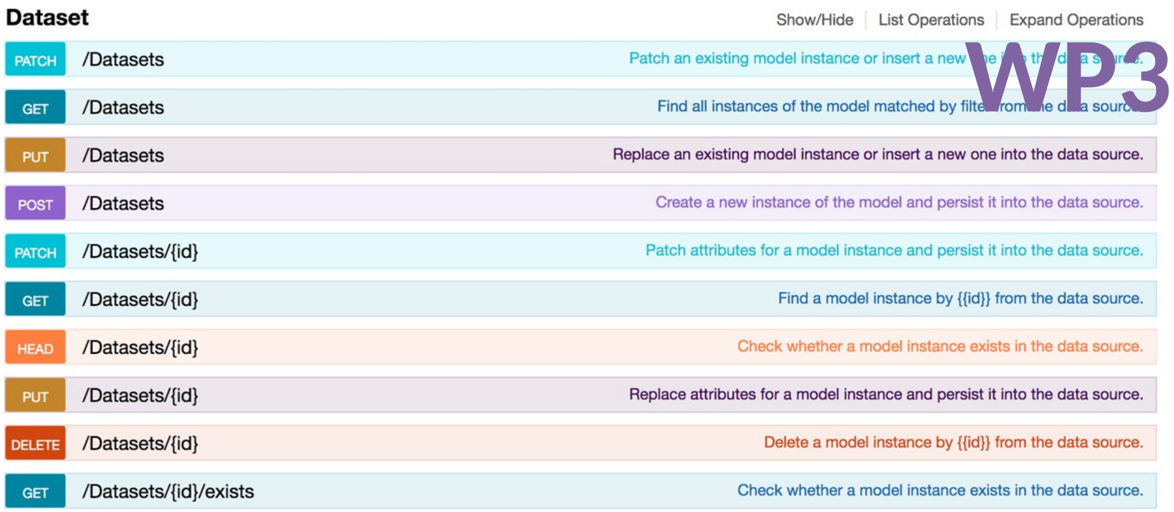
# Data catalogue WP

WP3




Develop an Application Programmers Interface (API) for searching for FAIR data

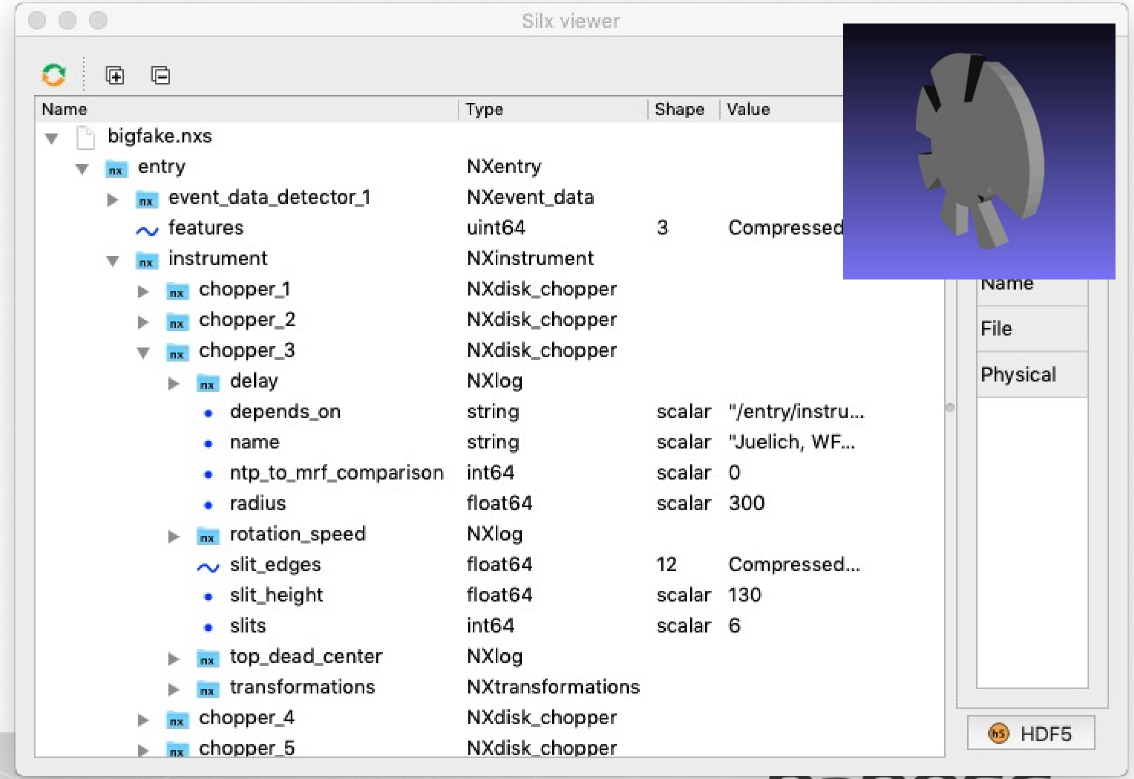
Integrate search API into EOSC portal

Use Nexus/HDF5 for metadata as much as possible

Enhance, extend and improve NeXus

Collect of metadata on beamlines

Share outcomes with ExPaNDS



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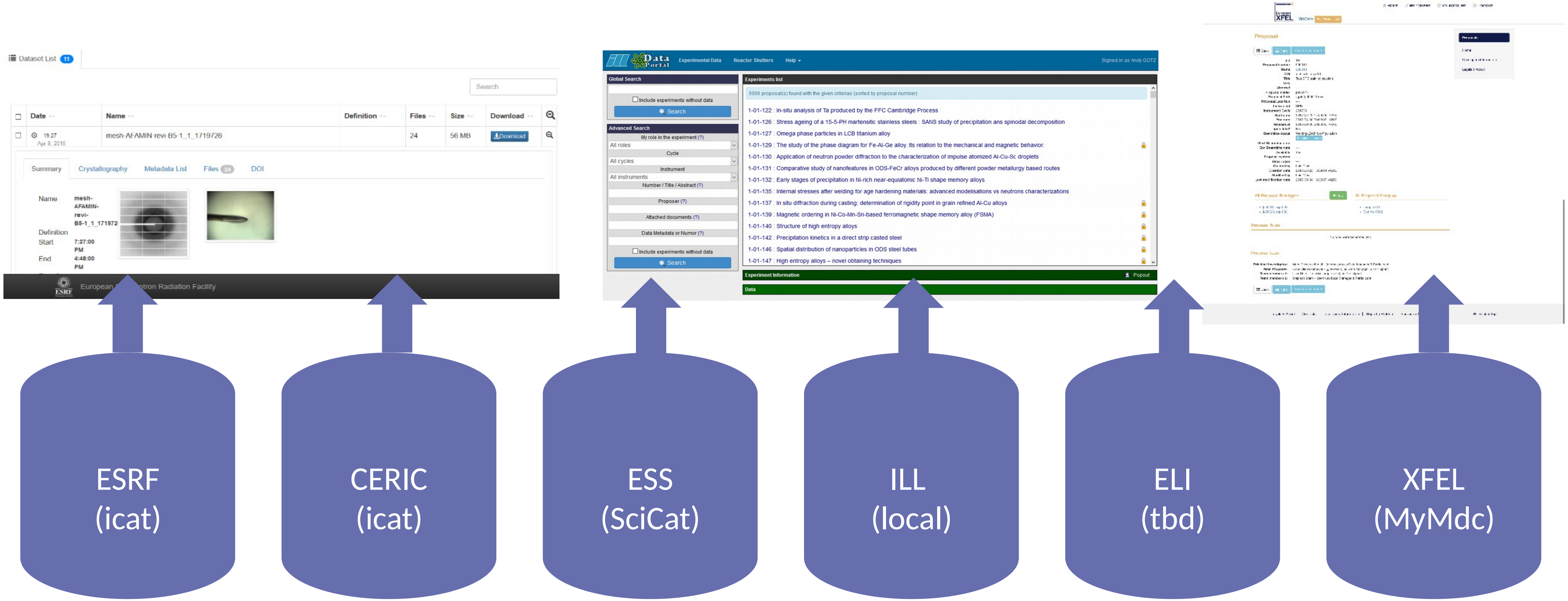
# PaNOSC has 6 data catalogues with different APIs + UIs





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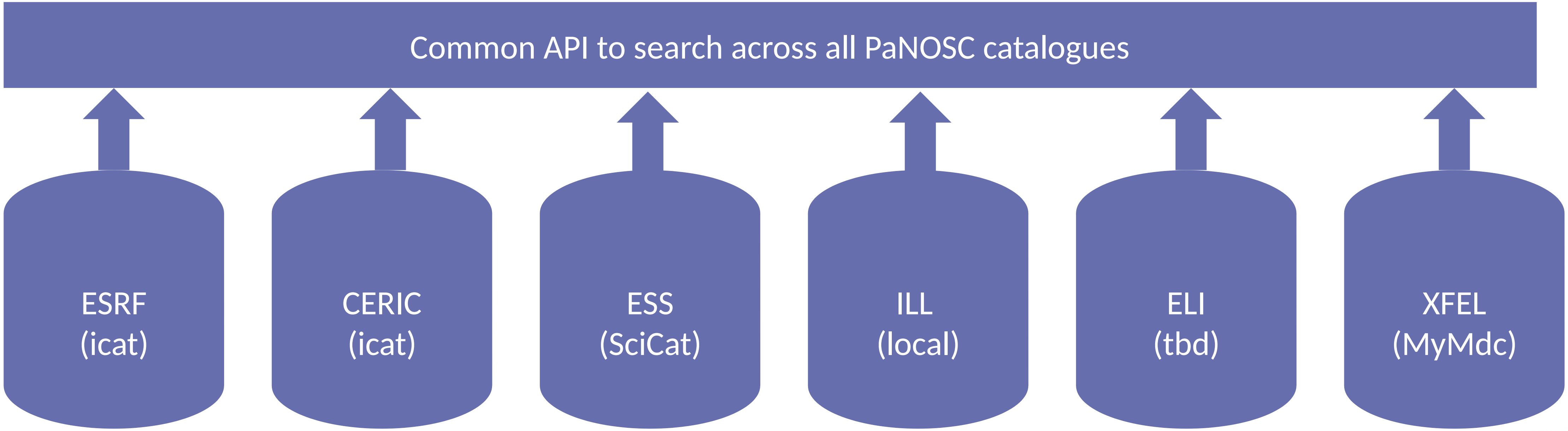
# PaNOSC common API across all sites

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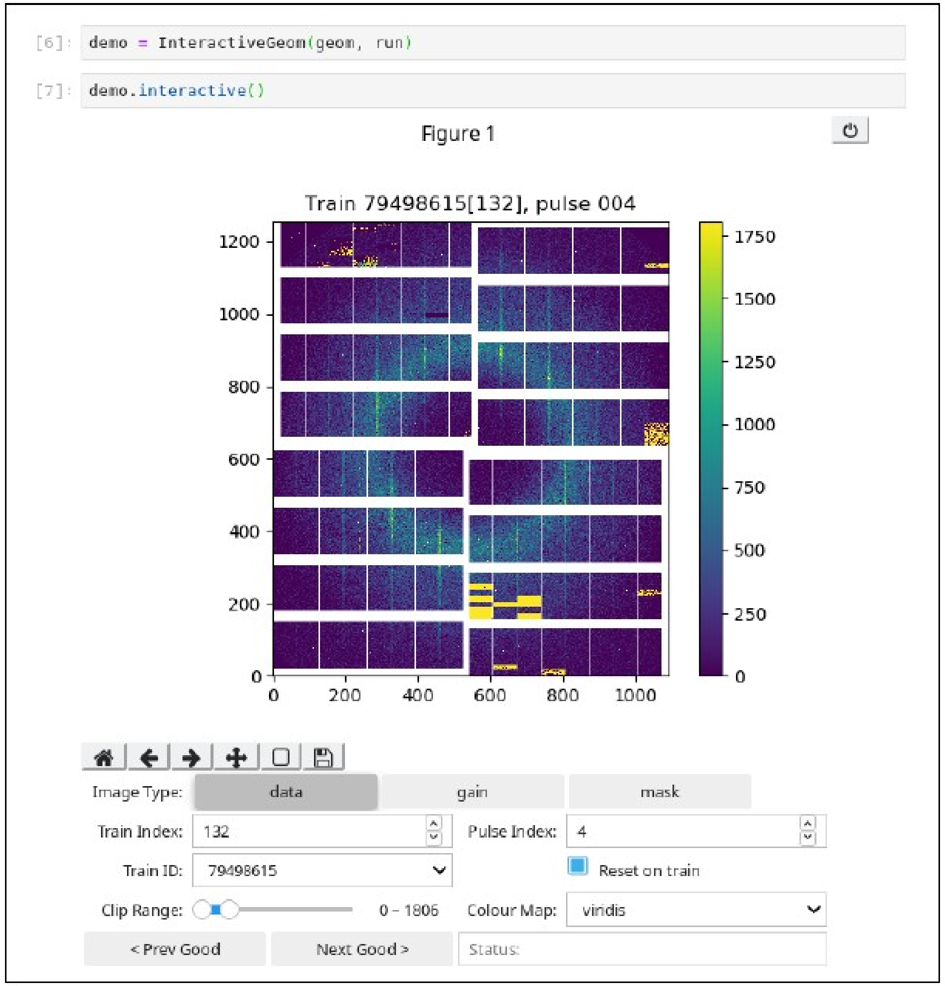
# Data Analysis Services WP

- Jupyter Notebooks
- Remote Desktop in Browser
- Remote data analysis portal
- HDF5 and visualisation in notebooks
- Package software for s/w catalogue



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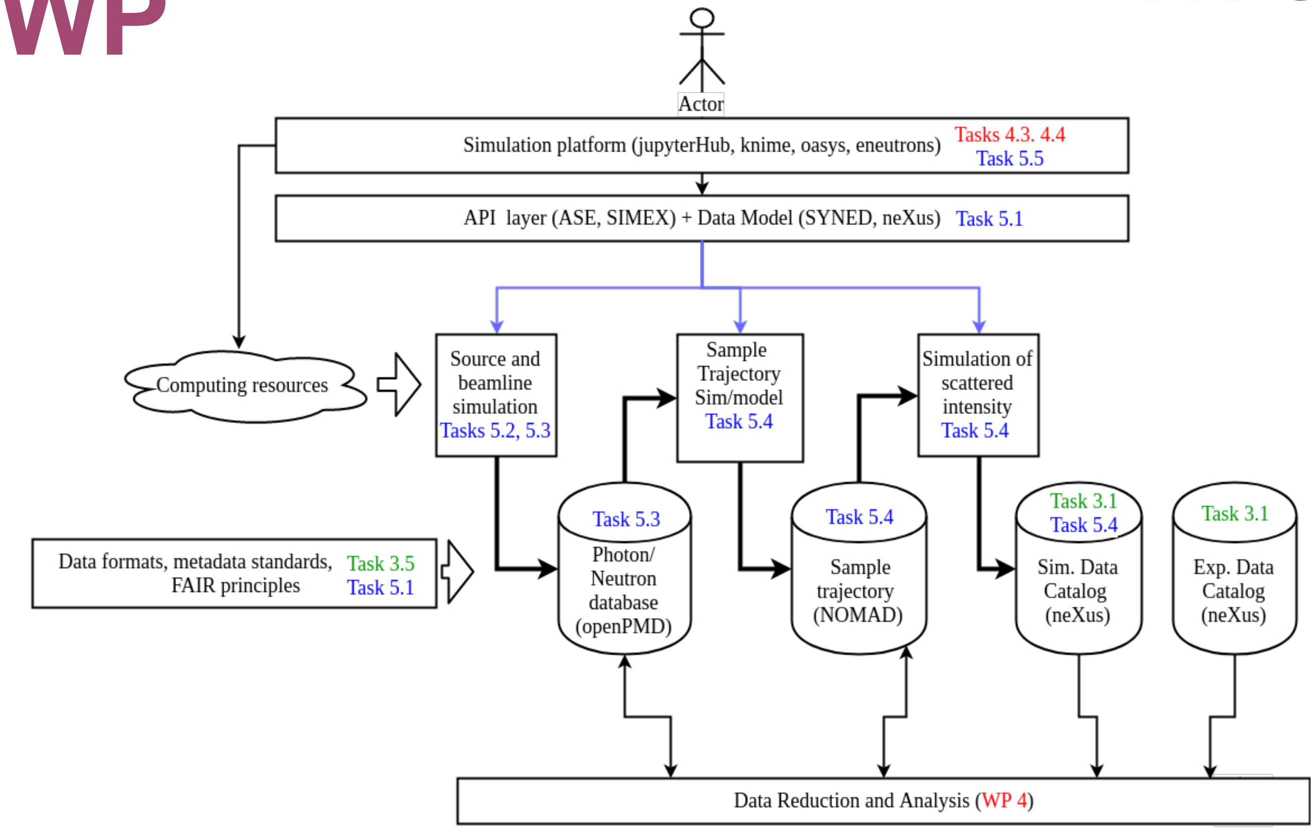
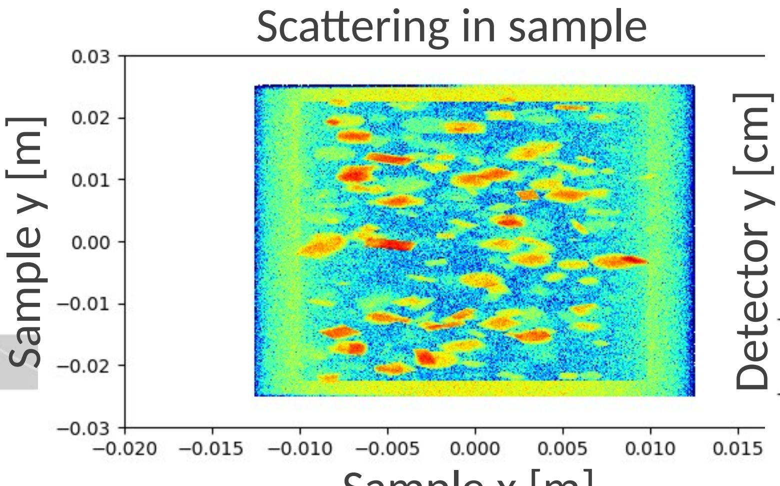
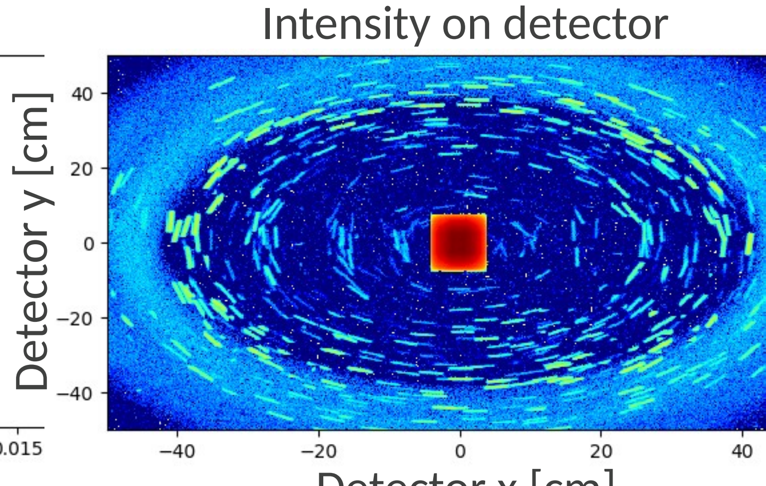
WP5

# Simulation services WP

- **SIMEX**: Start-to-end photon experiment simulation library (python)
- **McStas-script**: python API for Neutron ray-tracing with McStas
- **OASYS**: Wavefront propagation for beamline design (WISE)
- **EPOCH** particle in cell + McStas: Simulation of laser driven neutron sources and ray tracing



# EOSC Integration WP

- **AAI = Authentication and Authorisation Infrastructure**
  - Critical if we want to identify people and define roles
  - EOSC must solve at least the AAI problem
  - PaNOSC is working with Geant to make UmbrellaId sustainable
- **Develop a PaNOSC data analysis as a service portal**
- **Integrate PaNOSC services into EOSC**
- **Data download service + Software catalog service**



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# EOSC Integration – Data transfer

WP6

- **3 uses cases :**

1. User driven data transfer (e.g. **Globus Online**)

2. Data archiving for RI (**STFC as the archive center**)

3. Transfer from RI to compute facilities on behalf of users (i.e. based on the scenario where users perform analysis on a different infra than the one of the RI where the data have been produced). Currently exploring **OneData**, **dCache** and simple solution without caching (**webdav**)

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# Sustainability WP

- Develop a model to calculate cost of FAIR data
- Propose a sustainability plan for Ris
- Develop models for different service levels
- Participate and contribute to EOSC Sustainability



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# Training + e-learning WP

WP8

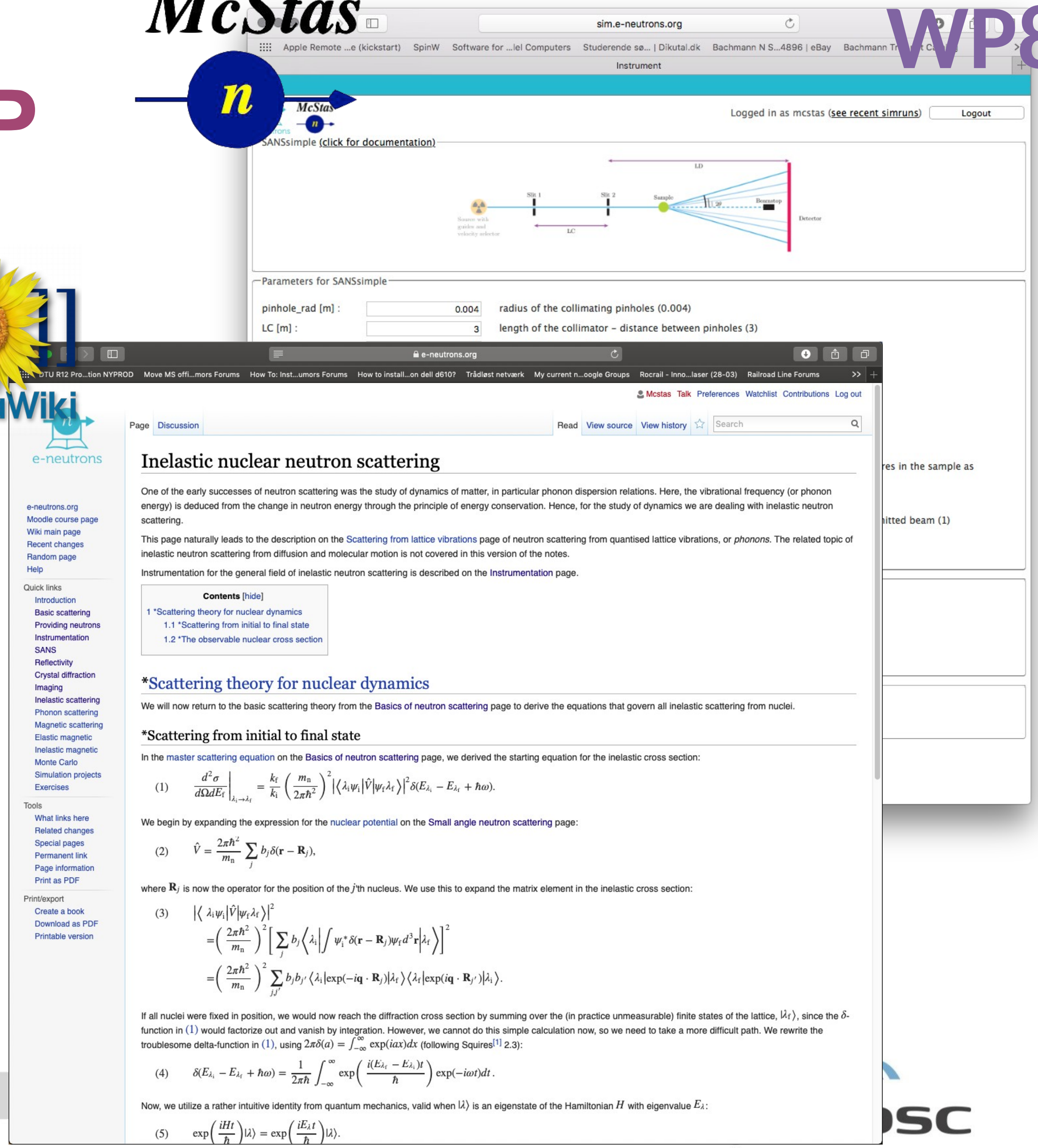
## e-neutrons.org

- Wiki with neutron scattering theory
- Web instrument simulation using McStas
- Quizzes using both theory and simulation

**Migration to ESS servers underway**

**Extensions:**

- **Support for Jupyter Notebooks**
- **Integrate data analysis services**
- **Integrate simulation services**



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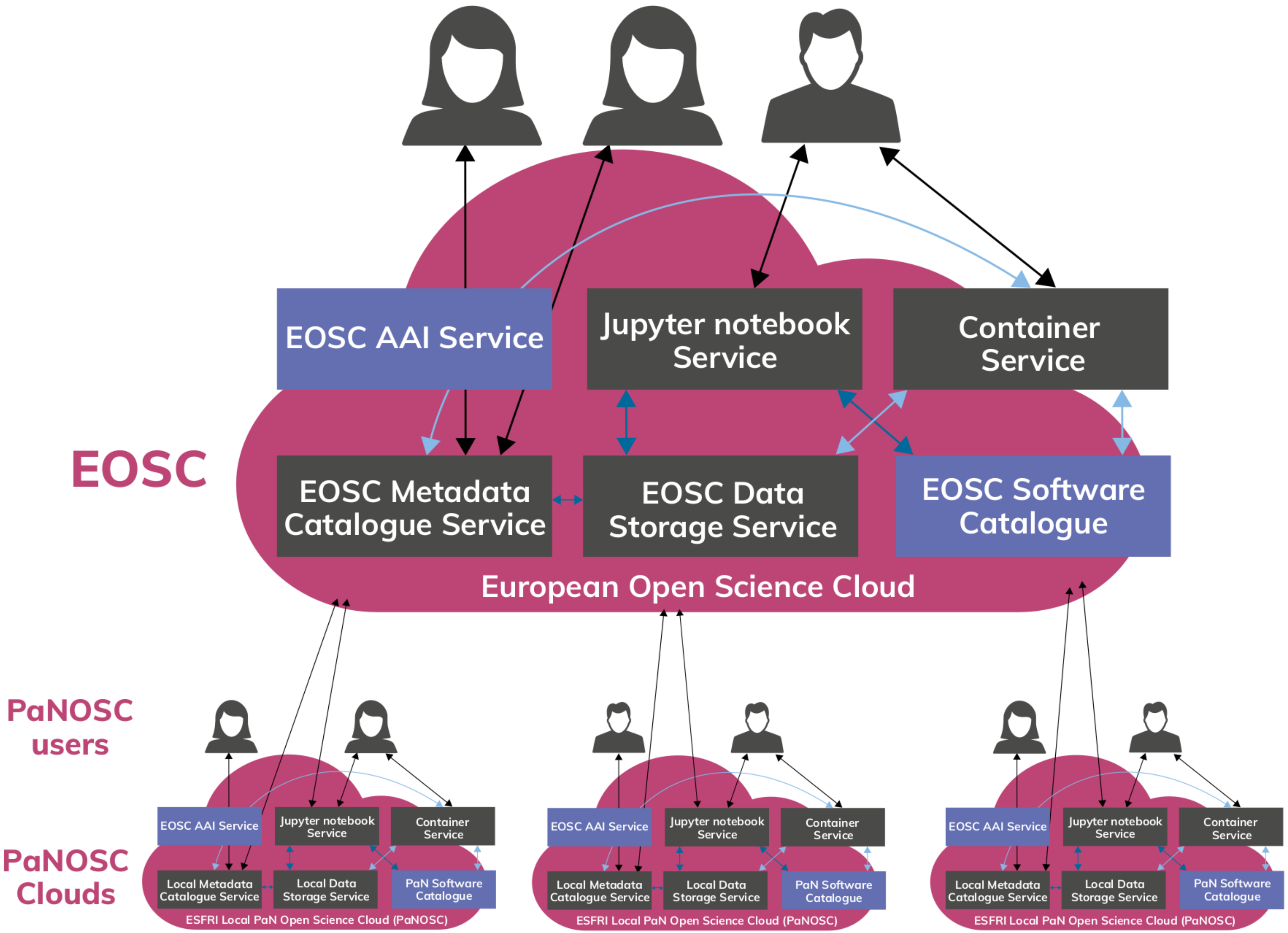
# Our Vision – a PaN scientific commons

ALL



# ELI in PaNOSC

- The amount of data will not be the main challenge (10+ PB of archived data per annum)
- Standardisation challenge (approach to metadata, detectors, etc.) as priority
- Cultural issue within due to a “lab approach” to experimental data (no significant experience on making data available and (re-)usable within the community)
- PaNOSC is helping structuring the thought and policy process:
  - Consortium gives access to resources and experience
  - Commitment to adopting PaNOSC Data Policy Framework
  - Push for integration of data-related activities within ELI
  - Push for long-term vision in terms of services
  - Cross-community approach

# CESNET in PaNOSC

- Third-party partner, together with DESY, lead by EGI.eu
- WP6 – cloud provider, integrated in EGI FedCloud, in EOSC Marketplace
  - Support for data transfer use-cases
    - OneData use-case
  - Support for JupyterHub integration
    - Already running on CESNET, integrated into EGI/EOSC-hub infrastructure
  - AAI lead by GEANT, federated solution based on EduTeams
    - CESNET provides one key component (Perun)

# Conclusion

1. PaNOSC vision is to create a Scientific Data Commons for Photon and Neutron sources and make the data available via the EOSC

2. PaNOSC will collaborate closely with ExPaNDS to make FAIR data a reality for all PaN RIs

3. PaNOSC has been running for 1 year and is now up to speed

4. PaNOSC will allow us to address the data analysis problem



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# PaNOSC Resources

- https://panosc.eu
- https://github.com/panosc-eu/panosc
- “Enabling Open Science for Photon and Neutron sources” presented at ICALEPCS 2019 http://icalepcs2019.vrws.de/papers/tubpl02.pdf
- Calipsoplus JRA2 – “Building a Data Analysis as a Service Portal” presented at ICALEPCS 2019 http://icalepcs2019.vrws.de/papers/wepha057.pdf



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