HZB BESSY II Light Source

EXPERIMENTAL DATA TAKING AND MANAGEMENT: THE UPGRADE PROCESS AT BESSY II AND HZB

MO2AO04, ICALEPCS ´23, Cape Town, South Africa
October 9, 2023

Will Smith et al

CONTENT

Path Towards 4th Gen BESSY III

FAIR Data

Historical Challenges at HZB

Bluesky at BESSY II

ROCK-IT Demonstrator

Remote Operando Controlled Knowledge-driven, IT-based project

BESSY II recently celebrated its 25th anniversary

BESSY III

4th Gen Soft X-Ray Light Source

Embedded in a campus in Berlin-Adlershof and Science Region

A Materials Discovery Facility

Pre CDR complete. TDR to be started by 2026

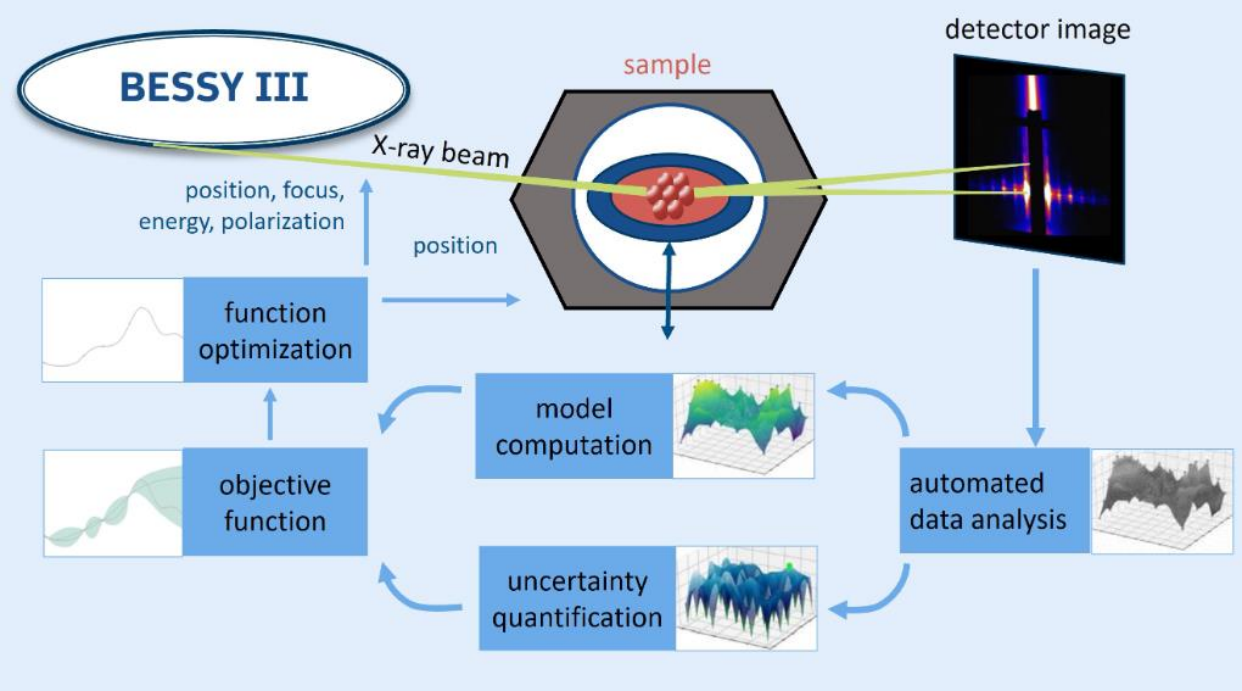
Operational some time in the late 2030's

DIGITALISATION

Automated and Remote

Smart and Autonomous

Data Quality and Quantity



BESSY II +

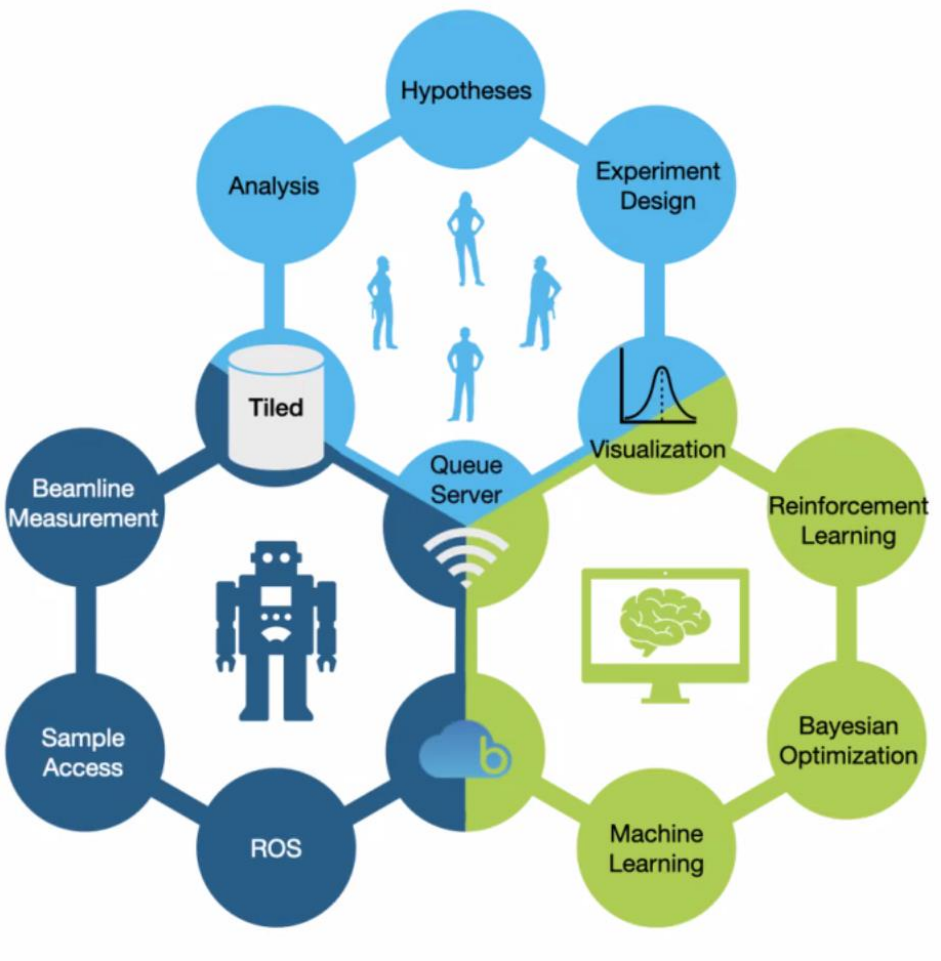
A stepping stone

Operando Experiments

Enabling remote access to experiments and data

Increasing efficiency and throughput

Acquire FAIR Scientific Data



from P. M. Maffettone *et al.* APS UM 2022

OBLIGATION AND OPPORTUNITY

We are publicly funded. We want to give back to the people who support us

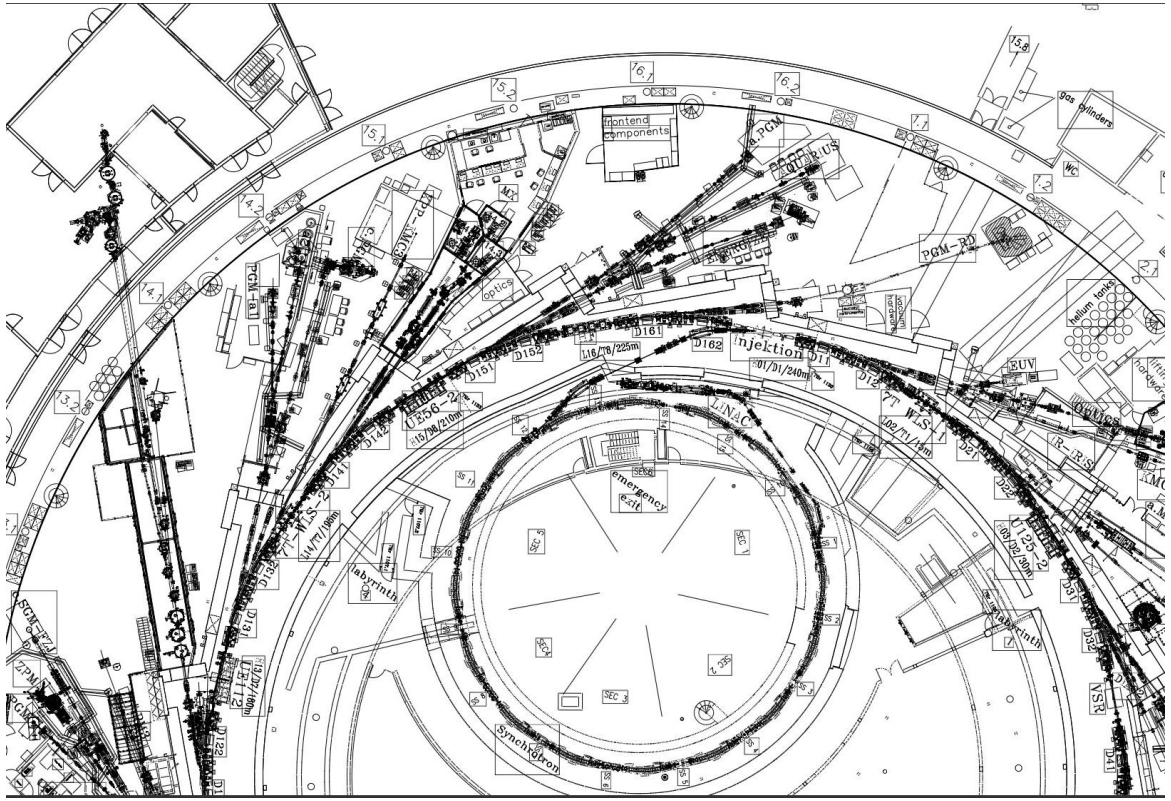
Offers exciting opportunities to use data in ways not previously thought of

HISTORICAL CHALLENGES AT HZB

Only the accelerator uses a consistent control architecture

Lack of central steering and under-staffing of experimental control support

Many different individual solutions around the hall. Spec, Igor, EPICS, Tango, bash scripts, pShell, Bluesky…



BESSY II, the most extensive used soft x-ray light source. Around 50 instruments share beamlines and source points at 16 segments of the 240 m storage ring.

2019 PROPOSALS

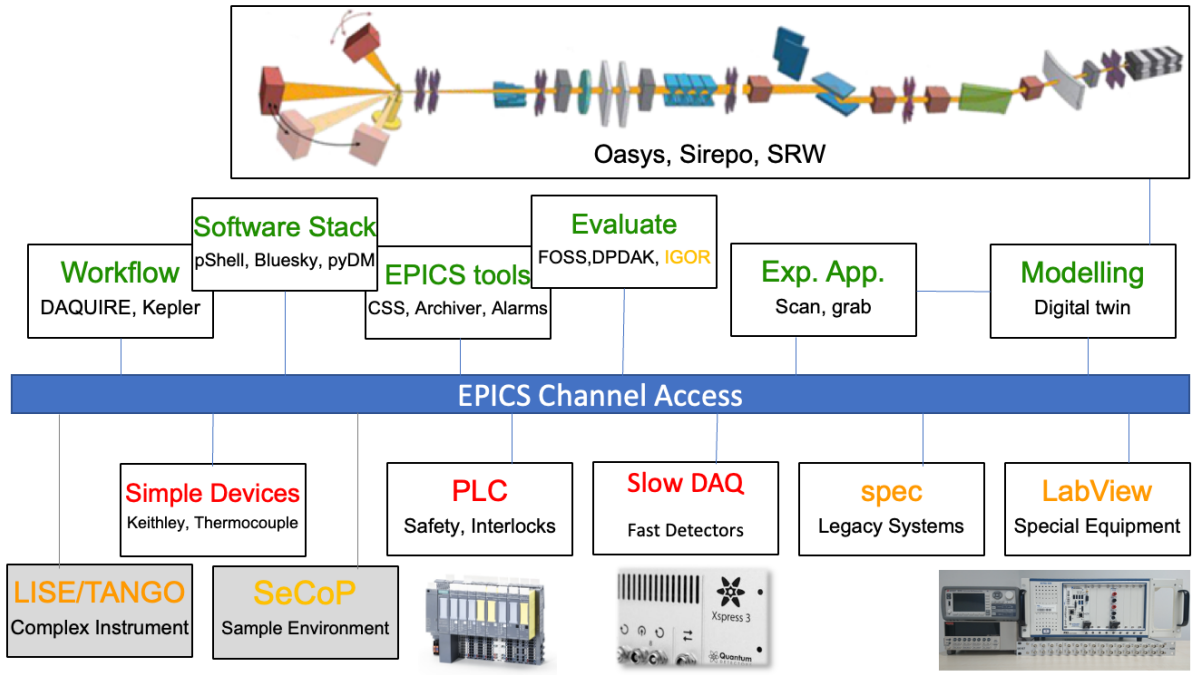
Use EPICS for distributed control system

Standardize on an experiment orchestration tool

Enable machine learning for beamlines and experiments

Develop digital twins for beamlines

Make data FAIR

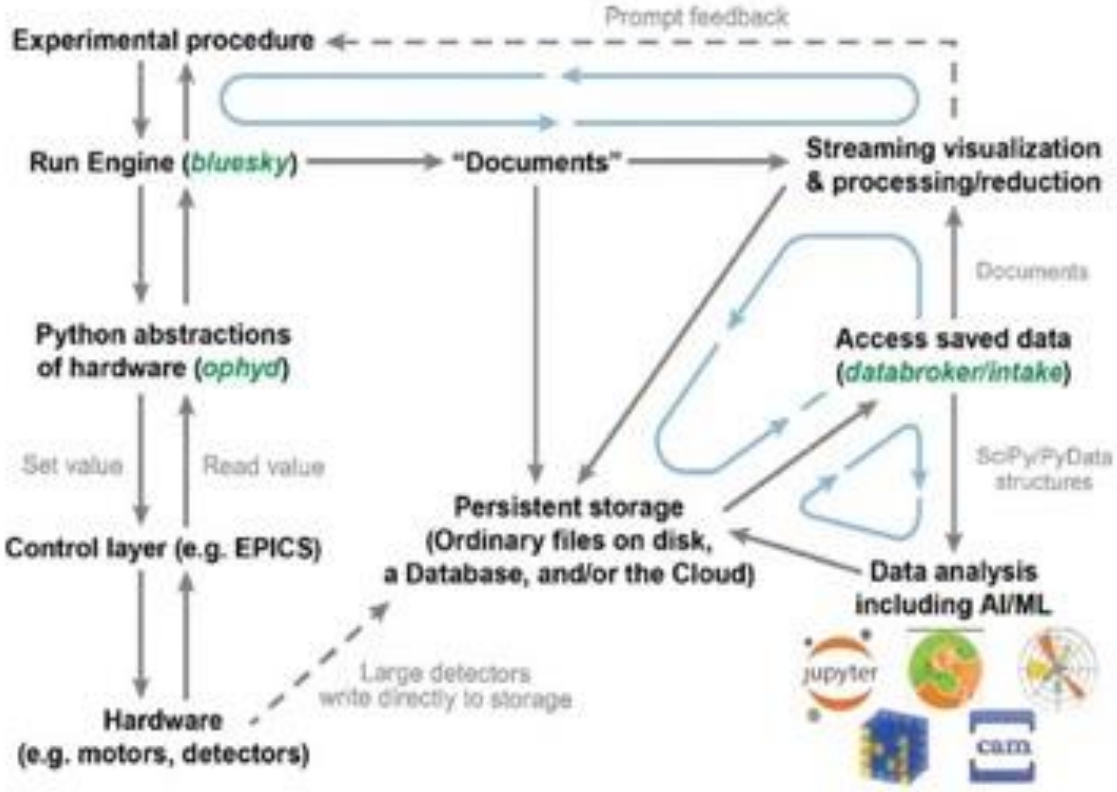


ADOPTION OF BLUESKY

A tool for orchestrating experiments

A series of useful independent python packages

A growing and extremely responsive international collaboration



https://blueskyproject.io/

ADOPTION OF BLUESKY

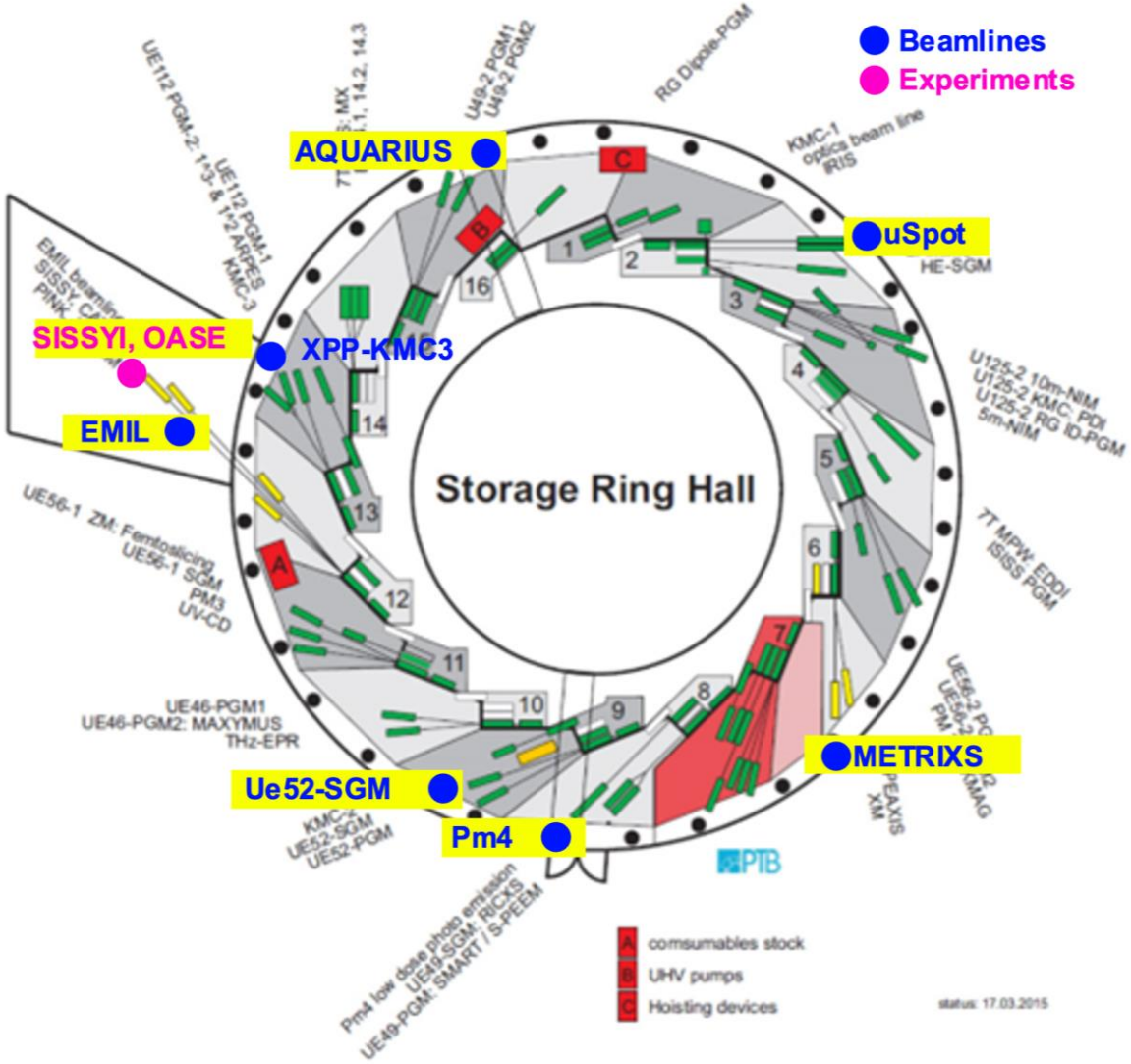
8 Beamlines

4 Experiments

Accelerator Commissioning

Undulator Commissioning

Motion Control Labs



BLUESKY COMMUNITY

NSLS-II, APS, ALS, LCLS, ANSTO, DLS, HZB, FHI, PSI, HZDR, HEPS…

Smaller labs, universities (Madison WI)

Public Mattermost chat, very responsive and with broad expertise

Regular Community Calls

Project Advisory Board

Technical Steering Committee

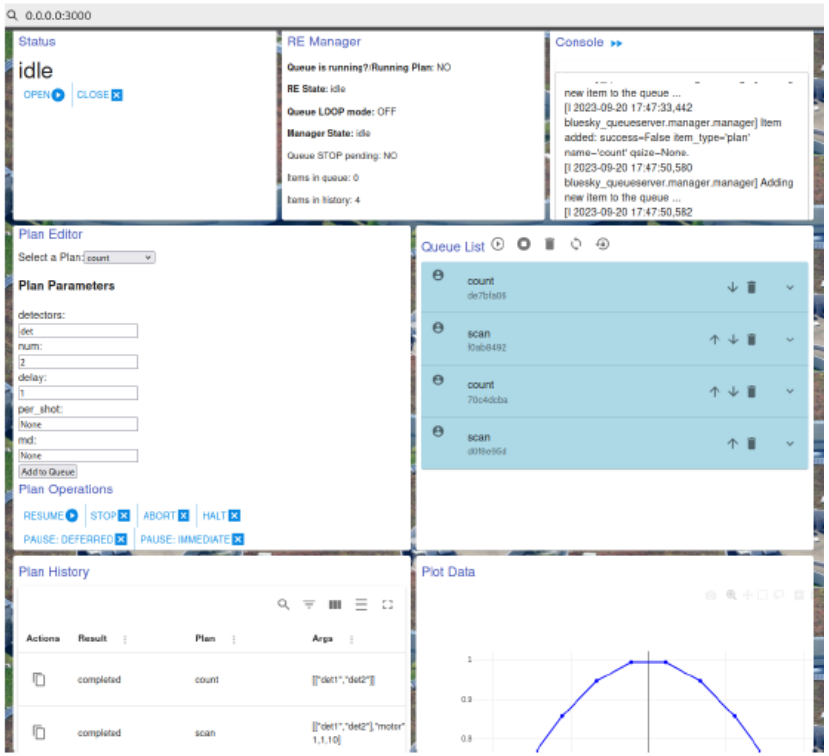
https://github.com/bluesky/governance/tree/main

HZB CONTRIBUTIONS

TUPDP014 A Web client GUI to the Bluesky Queueserver ***(Huiling He)***

THMBCMO10 Integrating SECoP into Ophyd V2 ***(Peter Wegmann)***

THMBCMO18 Interacting with digital twins using Bluesky ***(Simone Vadilonga)***



ROCK-IT

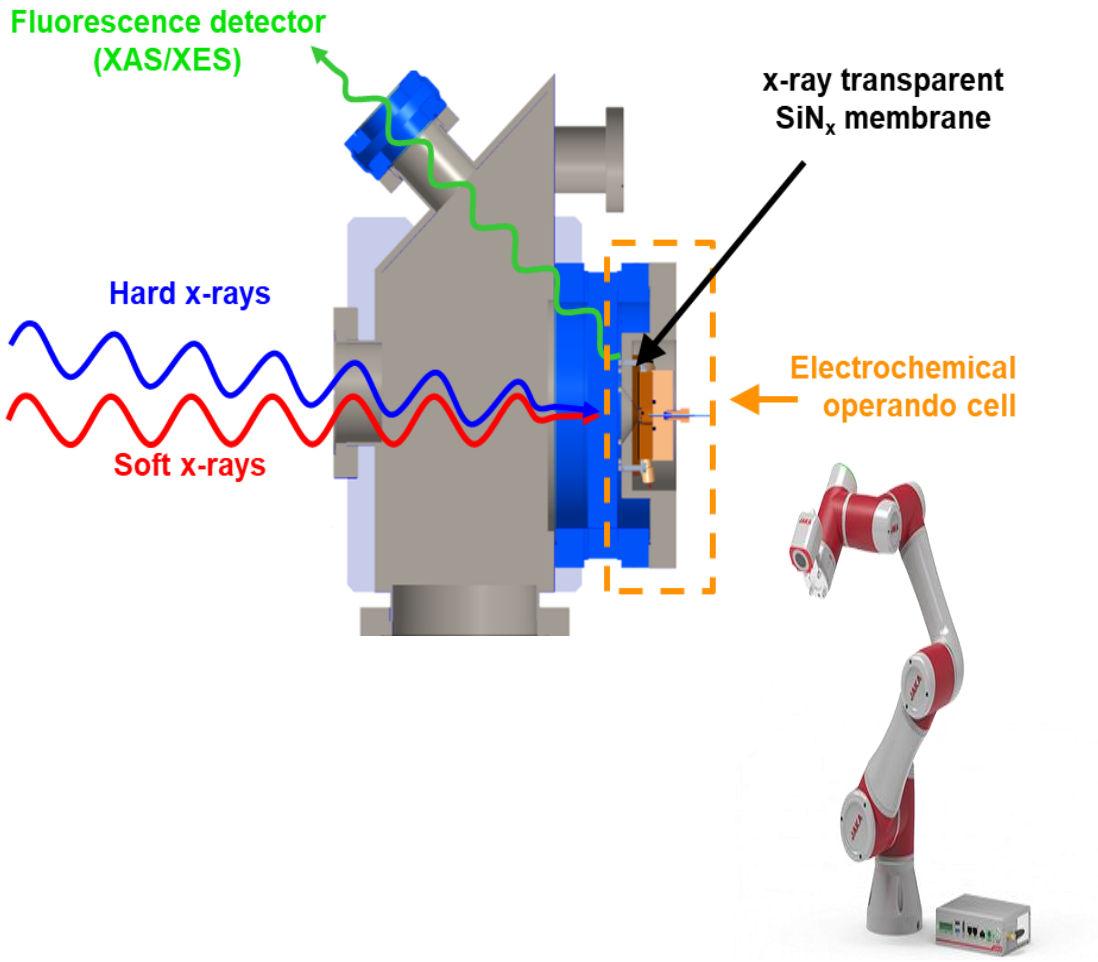
Provides a common goal and shared forces from member institutes

Automation of Operando Catalysis Experiments

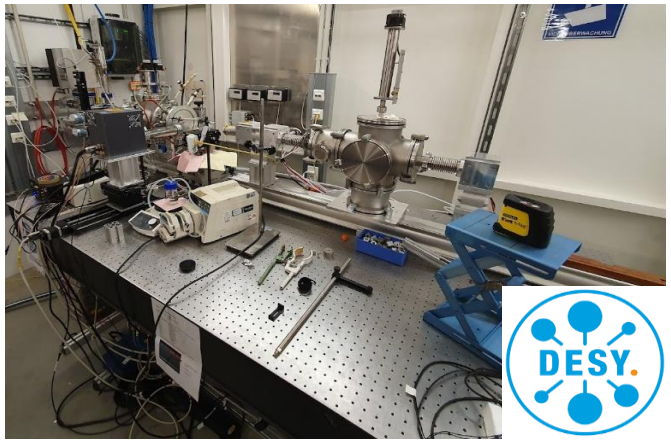
Remote Access to Experiment and Data

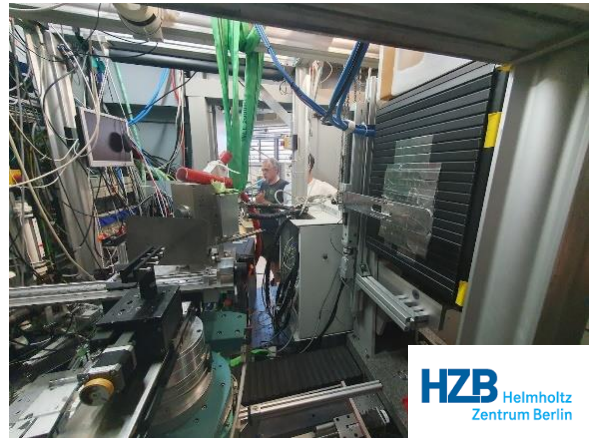
Integration of challenging sample environment

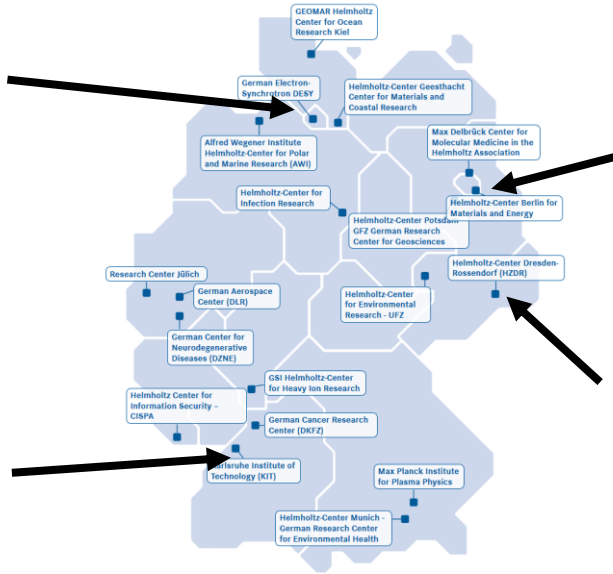
Integrating ML tools



A COLLABORATION







THE ELEPHANT IN THE ROOM

SUMMARY

BESSY III 4th Gen Light Source

FAIR Data obligations are also an opportunity

Grassroots activity led to standardization on EPICS and Bluesky

ROCK-IT demonstrator

Hack provides an opportunity!

THANKS FOR YOUR ATTENTION!