Contribution ID: **160** Type: **Talk (15min + 5min)**

Design decisions for software stacks in experimental research

Tuesday 25 February 2025 17:35 (20 minutes)

Design decisions for research software and IT infrastructure must reflect the unique needs of academia. Deviations from conventional best practices may be necessary to meet the requirements of academic work environments and scientific purposes.
We present our lessons learned and best practice guidelines derived from building a new specialized software environment for a large-scale experimental research facility.

In our ongoing work of modernizing the IT infrastructure and data flows of the atmosphric simulation chamber facility 'AIDA'at KIT we create a single, generalized software stack for multiple atmospheric simulation chambers.
To create a state-of-the-art research environment we follow the FAIR-RS principles (Findable, Accessible, Interoperable and Reusable Research Software), while further aspects of our design desicions are transparency, reproducibility and the maintainability of the new software stack.

We have adopted a modular approach to reduce complexity, while preserving flexibility, by separating different stages of the data flow such as data acquisition and data analysis, provision of analyzed data through an API and metadata handling.
Our open-source toolbox consists of well selected established technologies (Python, pytest, MariaDB, GitLab, CI-pipelines, Sphinx) alongside specialized tools for metadata management (Sensor Management System) and automated testing of time series data (SaQC).

The combination of a modular architecture, focus on low complexity, and a thorough selection of open-source tools ensures longevity and low cost while providing a flexible and robust IT and software infrastructure to safeguard good research practice of scientists.

I want to participate in the youngRSE prize

yes

Primary authors: FÖSIG, Romy (KIT); SCHORR, Tobias

Presenter: SCHORR, Tobias

Session Classification: Experiences from large tool stacks

Track Classification: Education: best practices for research software development