

# Testing & Commissioning Control Software and Components at EuXFEL

## Challenges:

- Some setups can be strongly modified on a weekly basis
- Requires flexibility of hard-, firm- and software while still maintaining a high level of reliability
- Beam time is in the orders of many 10kEuros per day, hence every hour of non-availability of a critical component incurs significant losses
- Even more important: beam time for certain users is limited to  $\sim(1 + 5)$  consecutive days usually, hence every hour of non-availability can significantly impact an individual user groups scientific program

# Automated Testing Overview

Automated testing ensures that Karabo updates are safe and reliable, it is minimising risks during the update process.

**Cross-Platform Tests. ~800 verifications** are executed on each supported platform:

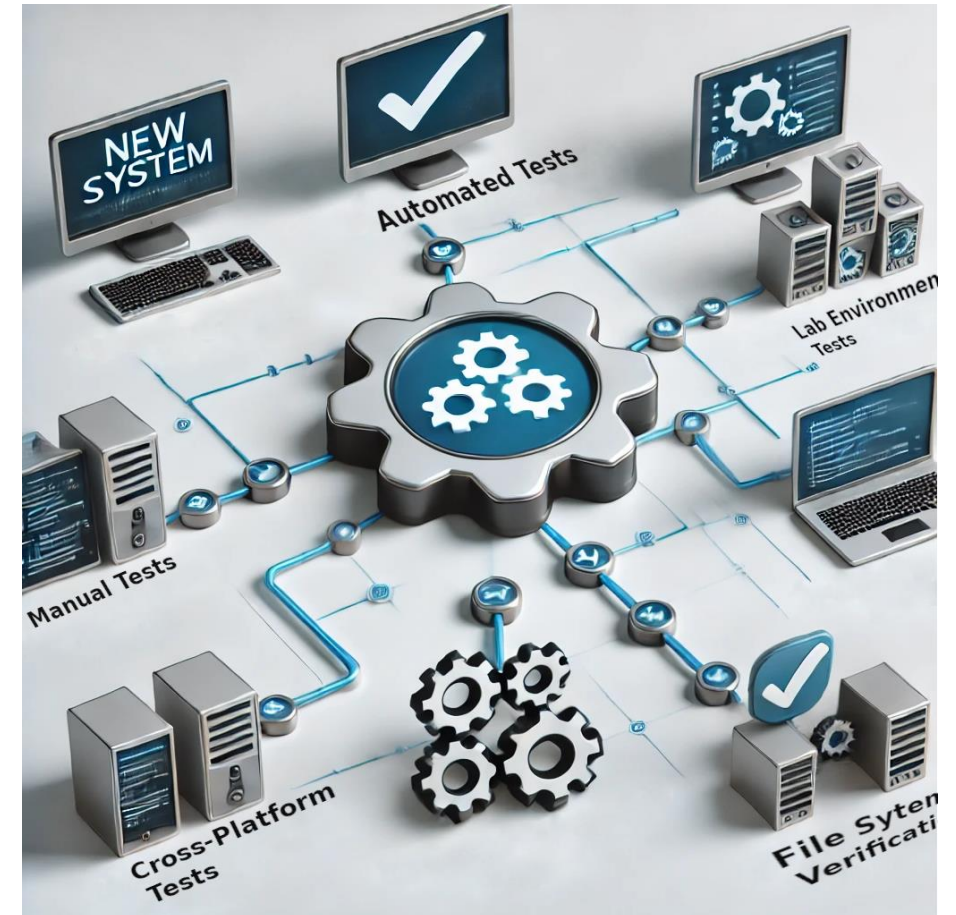
- Ubuntu 20 (only karabo 2.20), Ubuntu22, Ubuntu24, RedHat9
- Verifications for ~130 devices to check karabo's **APIs: C++, Python, MDL**
- Testing karabo commands like karabo-start/stop/check and others
- Communication with brokers and databases
- Karabo command line interfaces: cli, ikarabo
- Karabo installation and update

**Lab Environment Tests. ~900 verification** are executed on environment that mimics instruments' installations

- Deployment testing
- Test with real HW like PLC, cameras, mpod, digitizer, spectrometers
- Test for docs bridges and webproxy
- DAQ verifications
- Performance tests

**Gui Test. ~2000 verification** are executed on Ubuntu

- Gui installation and extensions update
- Verification of completeness of the karabo GUI
- Indirect testing of communication with databases as projects and history
- Verifications of all karabo panels
- Access rights and authentication procedure
- Stress tests



# Questions & Open Challenges

- The structured testing works well for software (on a framework level)
- What we don't capture in a structured way is (re-) commissioning with hardware / in operational settings after major changes
- Ideas to automate some of the commissioning tasks as tests
- Would be interested in Experiences with similar challenges