

3rd Annual MT Meeting – GSI – Darmstadt

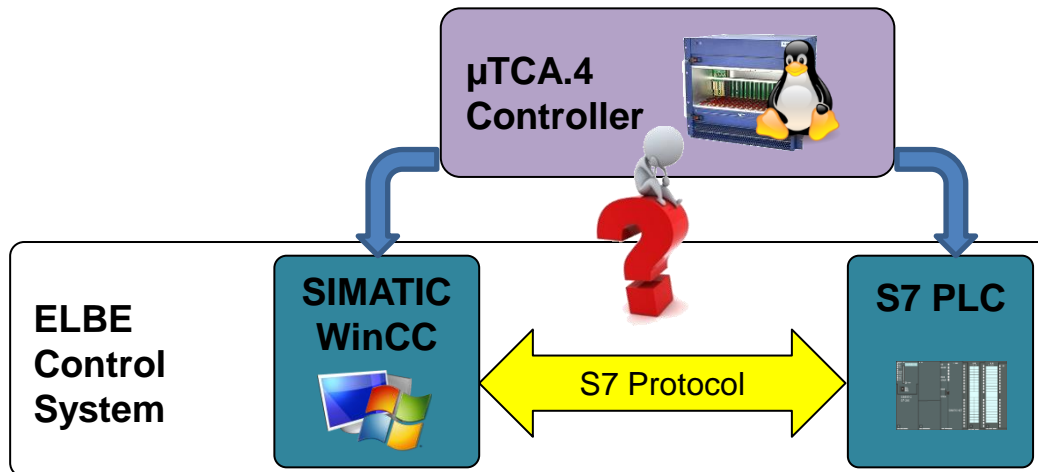
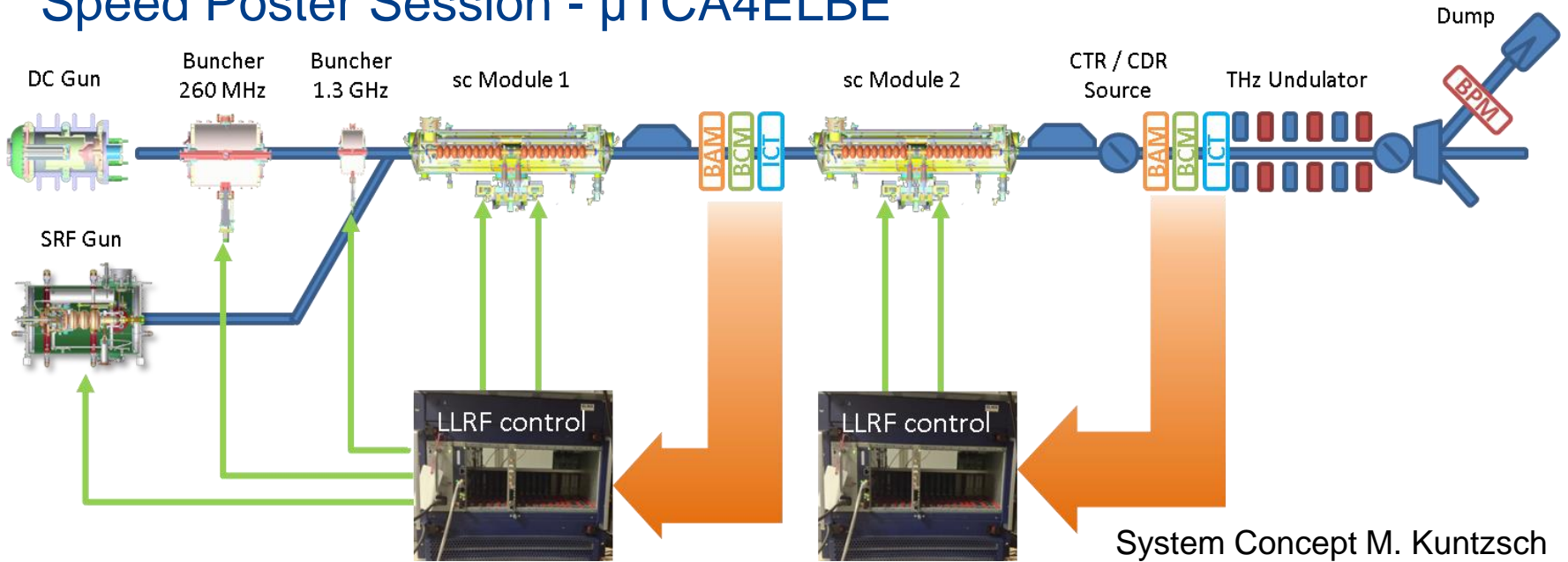
μ TCA.4 LLRF Control System Integration at ELBE From Concept to Realisation

Steinbrück, R.; Killenberg, M.; Hierholzer, M.; Iatrou, C.; Rahm, J.;
Marsching, S.; Kuntzsch, M.; Michel, P.; Schlarb, H.; Urbas, L.



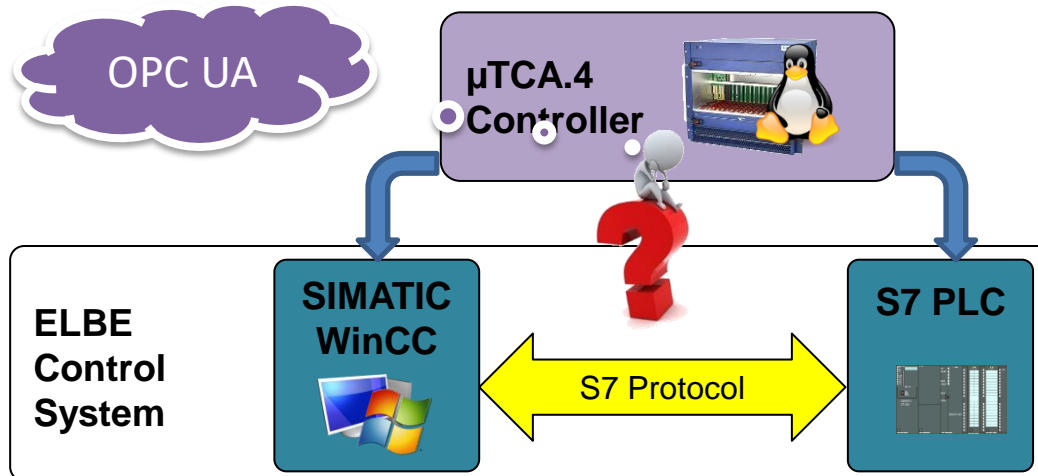
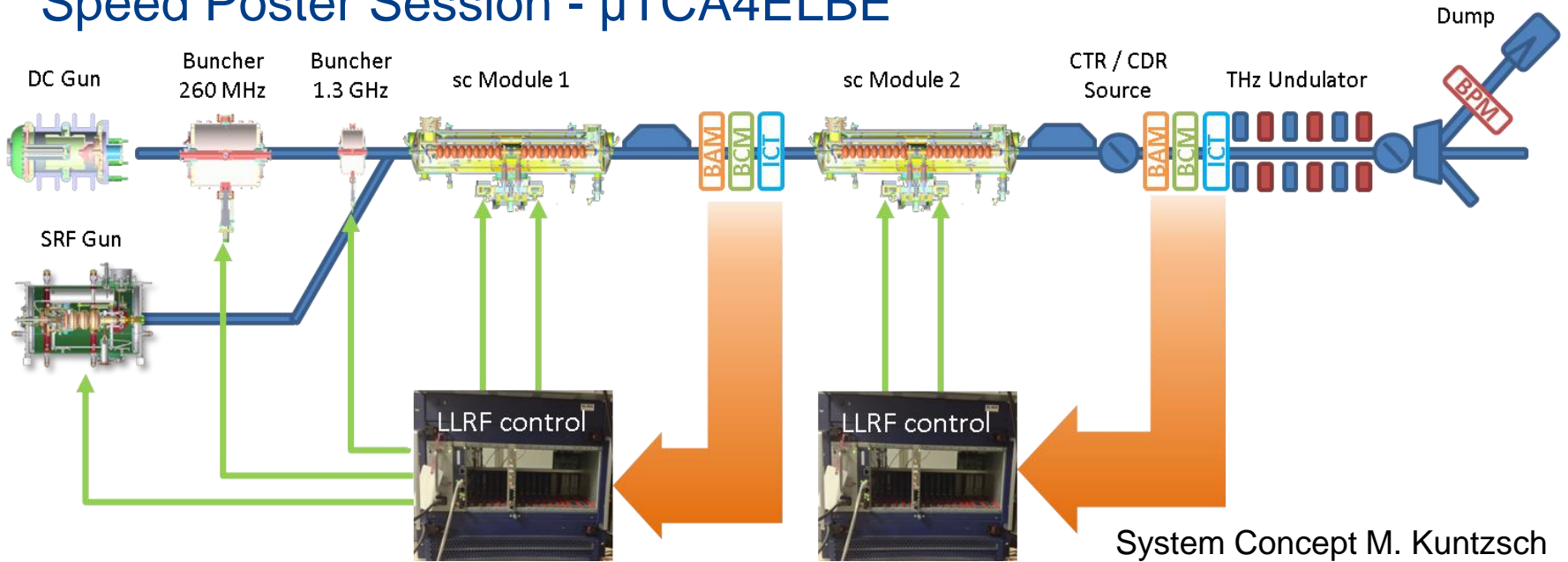
3rd ARD ST3 workshop

Speed Poster Session - μ TCA4ELBE



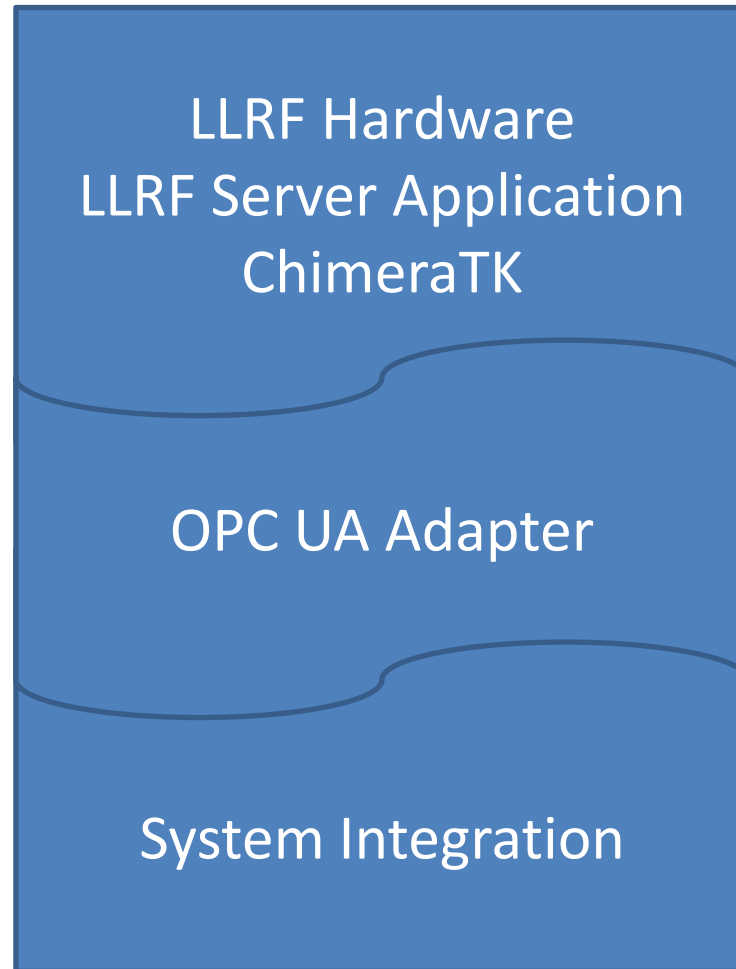
3rd ARD ST3 workshop

Speed Poster Session - μ TCA4ELBE



Concept based on
OPC UA
has been proposed
July 2015

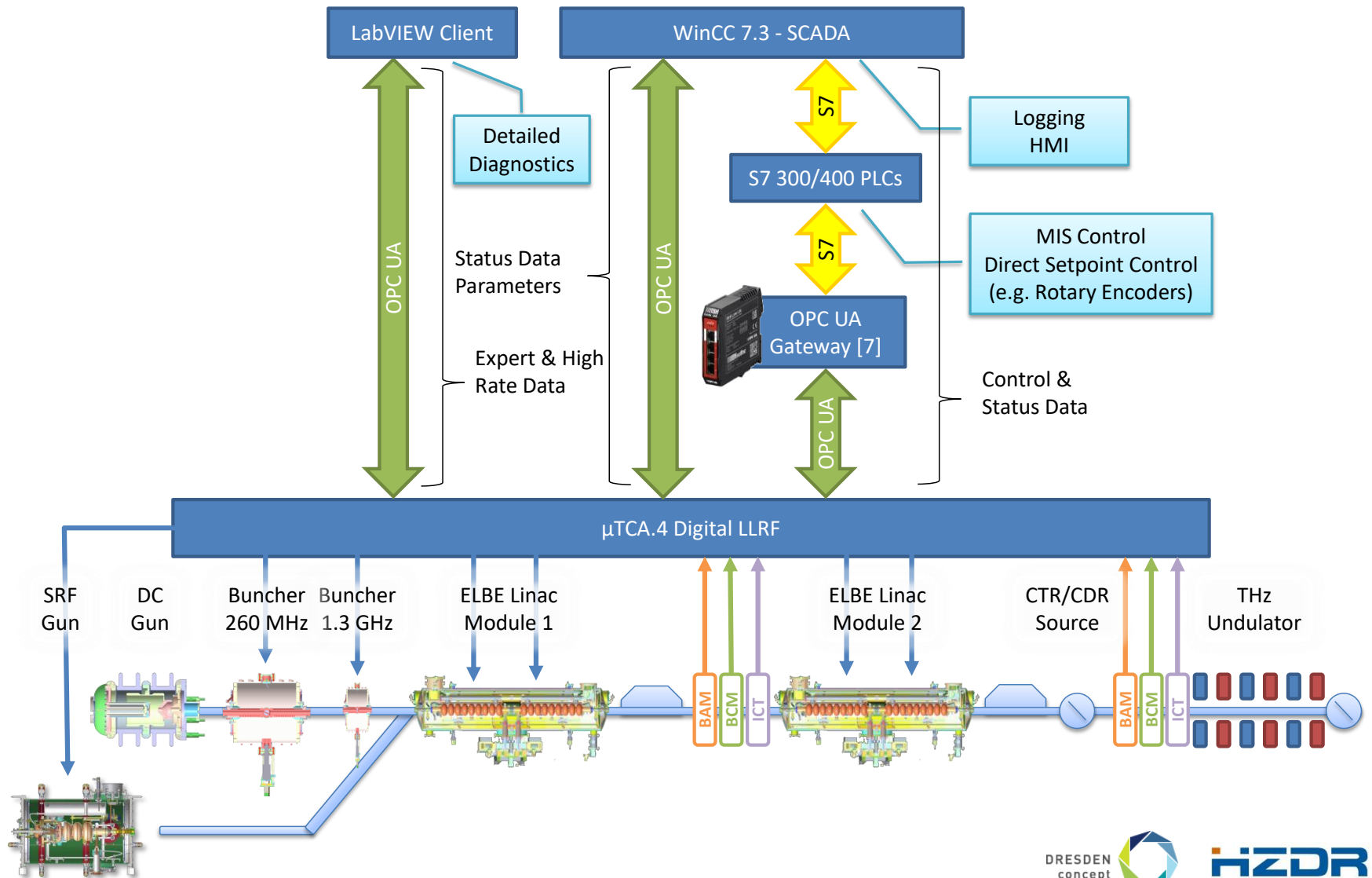
μTCA.4 LLRF Control System Integration at ELBE Cooperation – OPC UA Adapter Development Project



open62541



μTCA.4 LLRF Control System Integration at ELBE Realisation



μTCA.4 LLRF Control System Integration at ELBE

Poster

Interested?

Meet me at my Poster:

μTCA.4 LLRF Control System Integration at ELBE
From Concept to Realisation

Steinbrück, R.¹; Killenberg, M.²; Hierholzer, M.²; Iatrou, C.³; Rahm, J.³; Marsching, S.⁴;
 Kuntzsch, M.¹; Michel, P.¹; Schlart, H.⁵; Urbas, L.³

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ELBE is a superconducting linear electron accelerator at Helmholtz-Zentrum Dresden-Rossendorf. It is used as a versatile light source and operates in continuous wave (CW) mode to provide a high average beam current. In order to fulfill the requirements for future high resolution experiments the analogue low level radio frequency (LLRF) system is going to be replaced by a digital system based on MTCA.4. ELBE control system integration will be realized by an OPC UA interface based on the open source projects open62541 and ChimeraTK (formerly known as MTCA4U). The poster gives an overview of the software structure, project status and collaborating parties.

Deutsches Elektronen-Synchrotron
 Initiator of MTCA.4 Standard [1], [2], LLRF-Hard- and Software-Developer

Project Responsibilities

- Development of ChimeraTK control system adapter
- Development of LLRF application
- Git repository management including automated software tests (Jenkins)

ChimeraTK Structure [3]

ChimeraTK (Control system and Hardware Interface with Mapped and Extensible Register-based device Abstraction Tool Kit)

- Open Source license (GNU GPL or GNU LGPL)
- Abstracts device applications from control system middleware (DOOS, EPICS, OPC UA)
- Unified API for device access
- Available on GitHub [4]
- C++ 11

Helmholtz Zentrum Dresden Rossendorf
 Operation of Superconducting Linear CW Accelerator ELBE

Project Responsibilities

- Initiation and coordination of OPC UA integration project
- Requirements specification with respect to CW operation and Siemens based industrial ELBE control system
- Integration testing
- ELBE control system integration

Chair of Process Control System Engineering, TU Dresden
 Co-Founder and Co-Developer of open62541 [5]

Project Responsibilities

- OPC UA adapter development based on open62541
- Contributions to ChimeraTK concept design
- Process variable mapping (configurable, automatic OPC UA address space generation)

Variable Mapping Scheme

open62541 (open source C (C99) implementation of industry 4.0 communication standards OPC UA)

- Open Source license (LGPL & static linking exception)
- Multi Platform (Windows, Linux, Raspbian OS)
- Scalable (event based, single or multi threaded)
- Available on GitHub [6]
- C99

ELBE Communication and Future Feedback Scheme

Project Status

- Finalization Phase of OPC UA Adapter for ChimeraTK
- XML based mapping scheme (ChimeraTK to OPC UA) verified
- Complete communication chain at ELBE successfully tested

Next steps and Future Plans

- Completion of OPC UA Adapter development in 1st quarter of 2017
- Full operation of digital LLRF within 2nd half of 2017
- Implementation of beam based feedback loops

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