

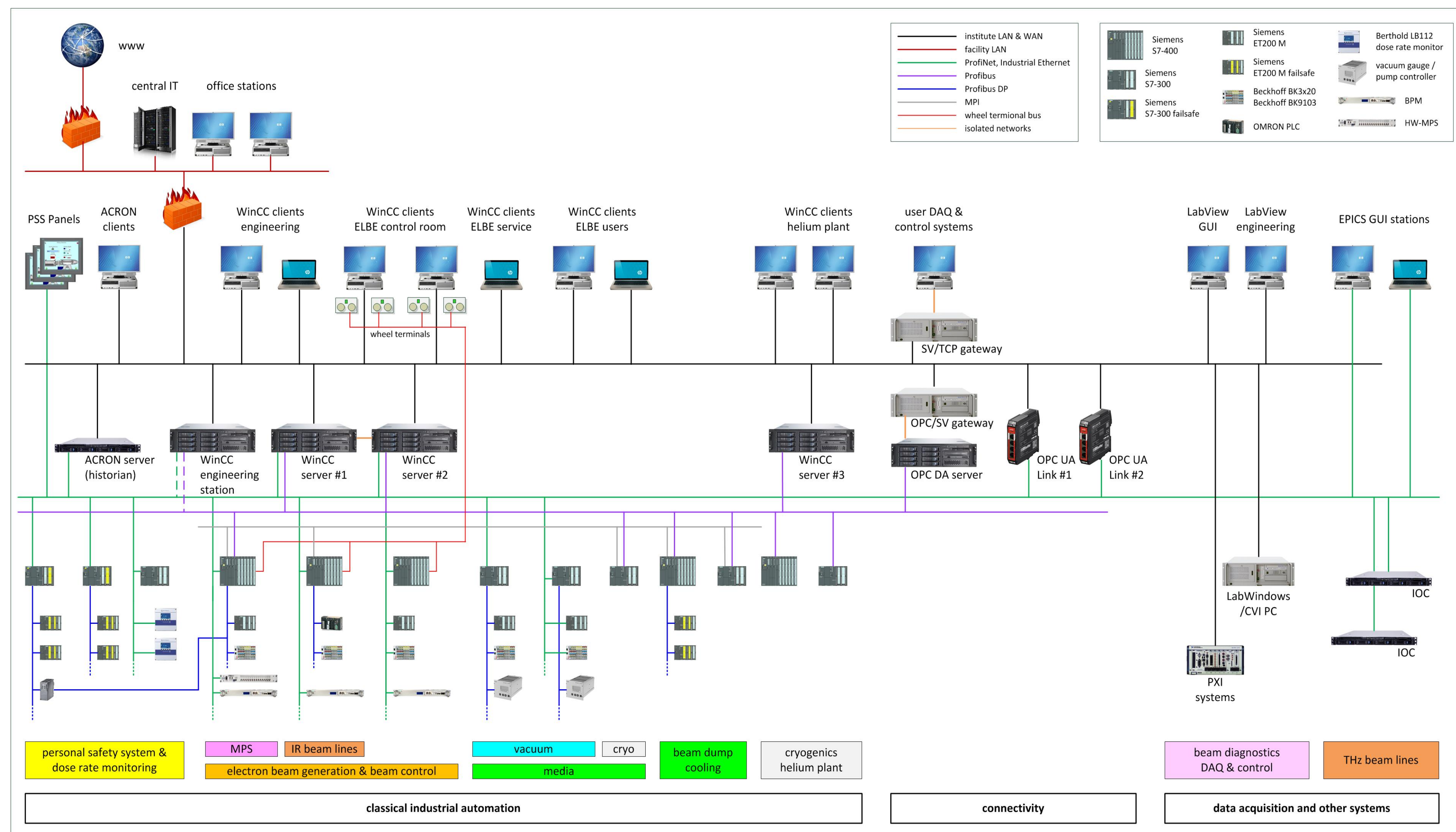
Improvements of the ELBE Control System Infrastructure and SCADA Environment

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ELBE CS Overview

ELBE is a 35 MeV C.W. electron LINAC user facility with diverse secondary radiation sources [1]

- Interconnected Siemens PLCs with WinCC SCADA System [2] for equipment control and MPS
- Fast & triggered DAQ mainly using NI hardware & software [3]
- Distributed I/O using Profibus / Profinet fieldbus technology
- OPC DA and OPC UA or TPC/IP Send/Receive for connectivity
- Configurable hardware based systems for fast MPS
- Separated LAN for institute, facility and control system



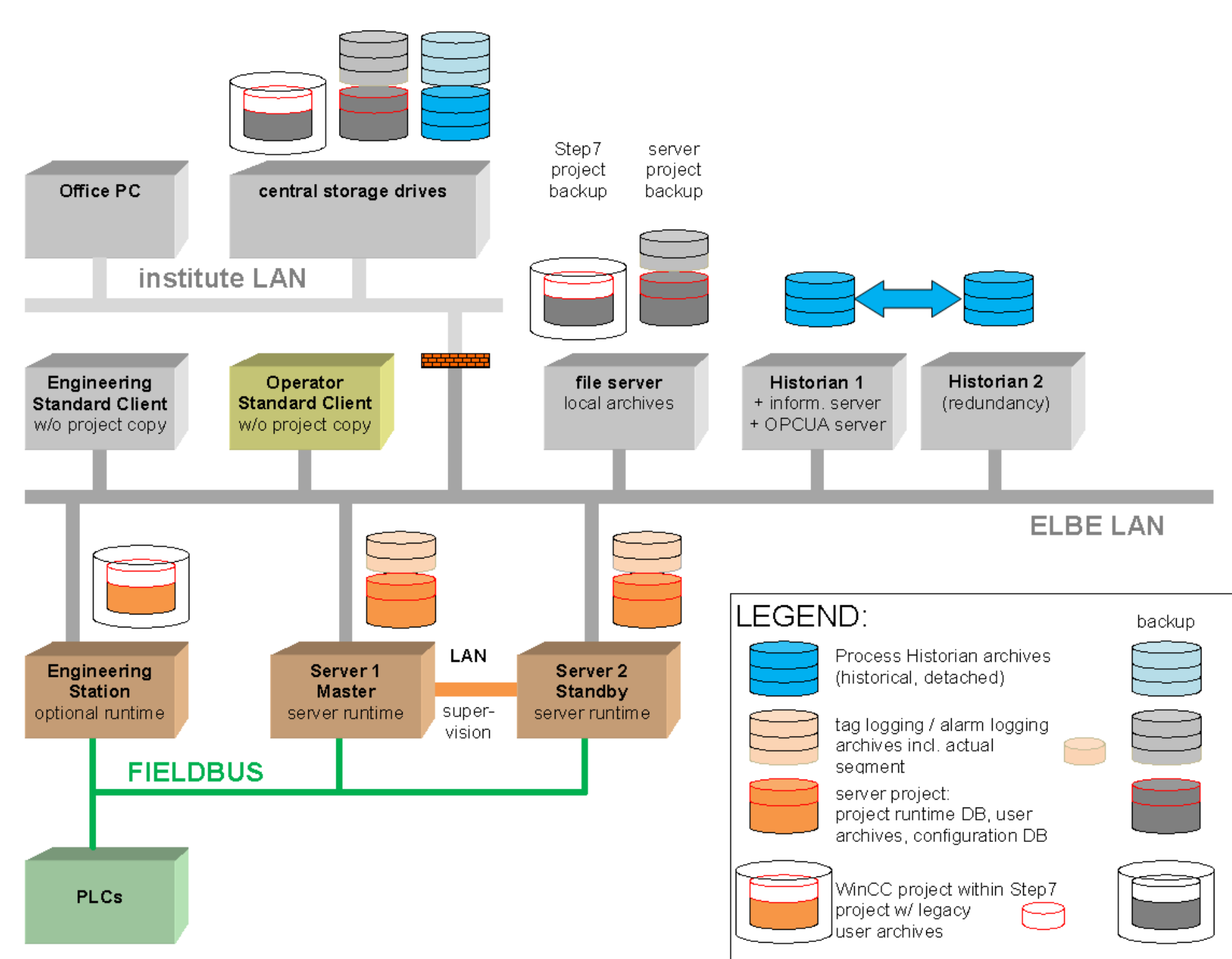
Fieldbus Improvements

- Replacement of Profibus by Profinet, esp. WinCC connection
- Improvement of Profibus systems (baud rates, optical Profibus components, electrical segmentation & termination)
- commercial Profibus monitoring system (TH Scope [4])
- SINEMA server for Profinet monitoring [2]

WinCC Upgrade

Upgrade to V7.0 → V7.3 incl.

- Compatibility revision for OS, hardware and software environment
- WinCC project integration into Step7 project environment to enable engineering station workflow [5]
- Change from cold to hot server redundancy
- Improved backup strategy
- redundant process historian foreseen → no more SCADA system failures



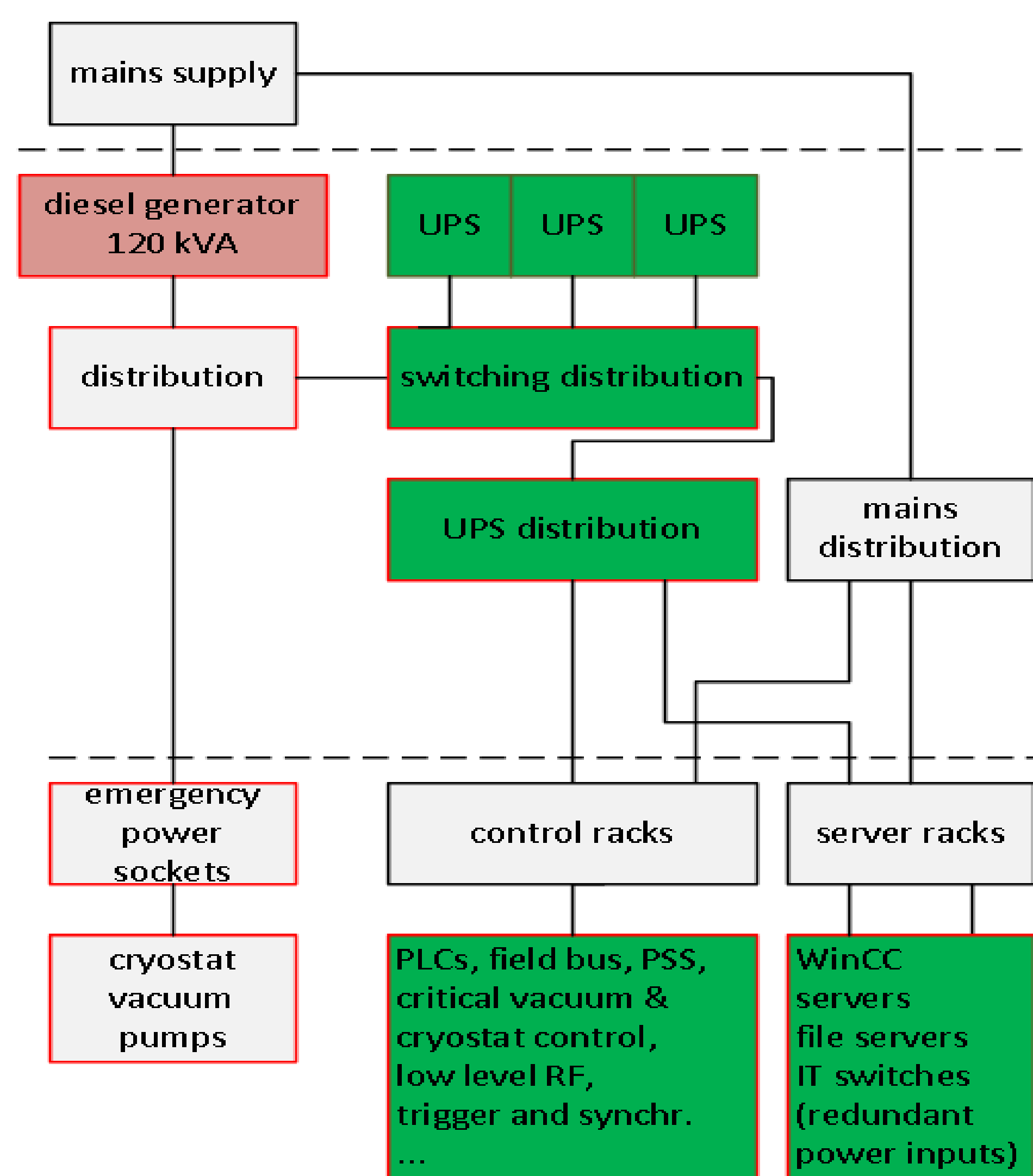
OPC UA evaluation

- test of IBH OPC UA gateway [6] and Siemens CP443-1 UA as successor of OPC DA
- use of native and third party [7] OPC UA client channel for WinCC
- Trilateral project with DESY and TU Dresden [8] for OPC UA stack implementation to MTCA4 hardware → **THPHA166** ←

Electrical Infrastructure

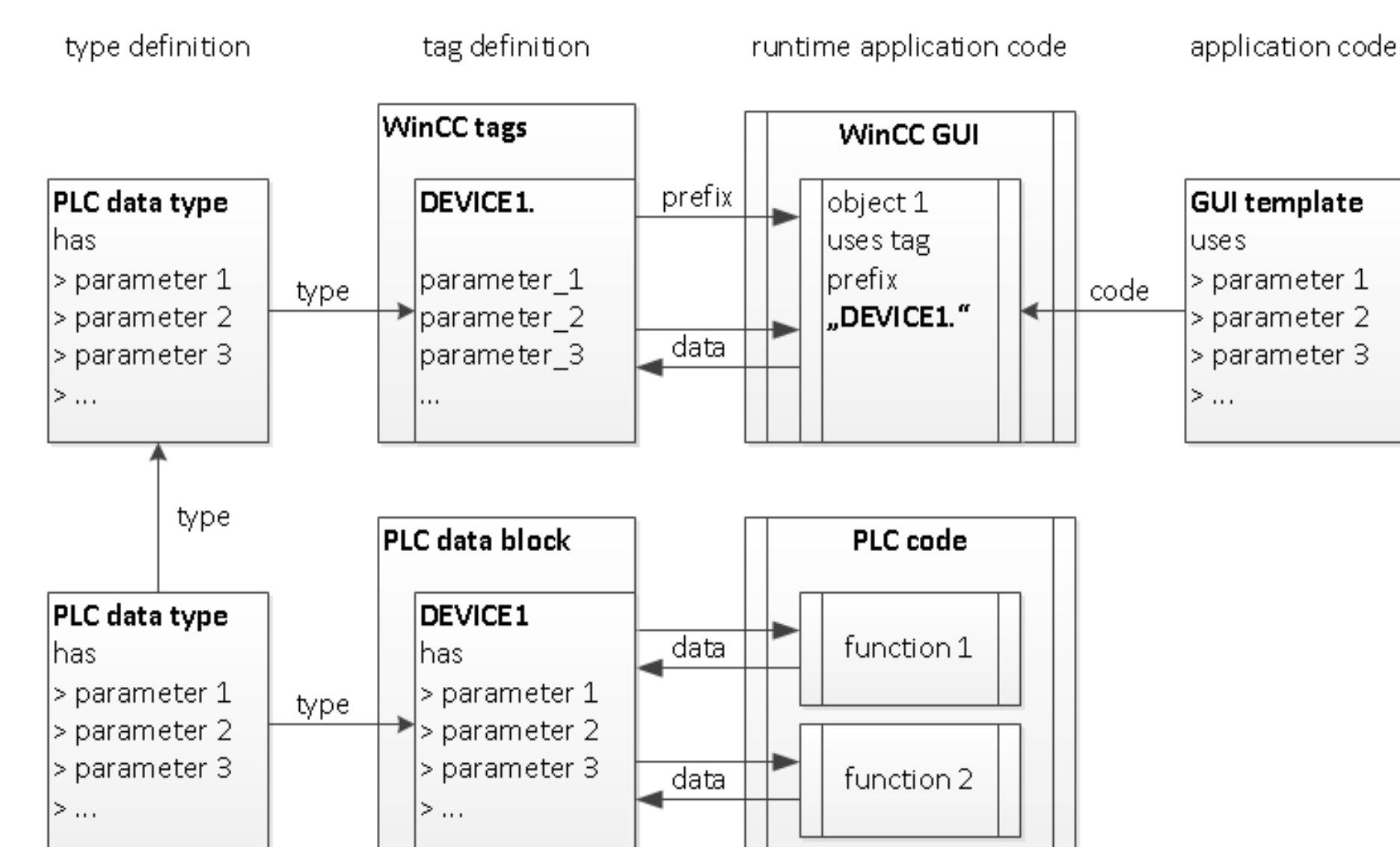
New 2+1 UPS cluster with diesel generator backup for

- CS and fieldbus components
- critical systems (i.e. injector & accelerator vacuum, cryo system)
- PSS, MPS and safety-related facility infrastructure



OOP for PLCs & WinCC

- structured data types in PLC code and WinCC improved reuse of software and well defined data access
- templates and tag prefixes for WinCC for efficient engineering



References

- [1] Helm, M., Michel, P., Gensch, M., Wagner, A., „Alles im Fluss“, in *Physik Journal* 15(2016)1, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2016, pp. 29-34.
- [2] <https://www.siemens.com/global/en/home/products/automation.html>
- [3] <http://www.ni.com>
- [4] <https://industrial.softing.com/en/products/network-diagnostics/monitoring.html>
- [5] Siemens WinCC V7.3:Configurations, System Manual 5E34376116-AA 06/2014, Siemens AG, Nürnberg, Germany, 2014
- [6] <https://www.ibhsoftec.com/IBH-Link-UA-Eng>
- [7] <https://www.allmendinger.de/Produkte/WinCCKommunikation/OPCUAClientforWinCCEN/tabid/1679/language/de-DE/Default.aspx>
- [8] R. Steinbrück et al., „Control System Integration of a μ TCA.4 Based Digital LLRF Using the ChimeraTK OPC UA Adapter“, presented at *ICALEPCS'17*, Barcelona, Spain, Oct. 2017, poster THPHA166, this conference