ESS Sample Environment Control System Reference Document (ESS-0038165)

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INTRODUCTION

What is this document for?

- Support integration of Sample Environment Equipment (SEE) at ESS
- Clarify integration process of SEE at ESS
- Standardize infrastructure, control hardware and control software

Why have we written it?

- Ensure pool and general SEE compatibility at all instruments
- A standardized interface enables support from SAD
- Make best use of limited resources

DOCUMENT SCOPE

- To define the required infrastructure for integration of SEE

- To define the general requirements to fully utilize the ESS pool SEE
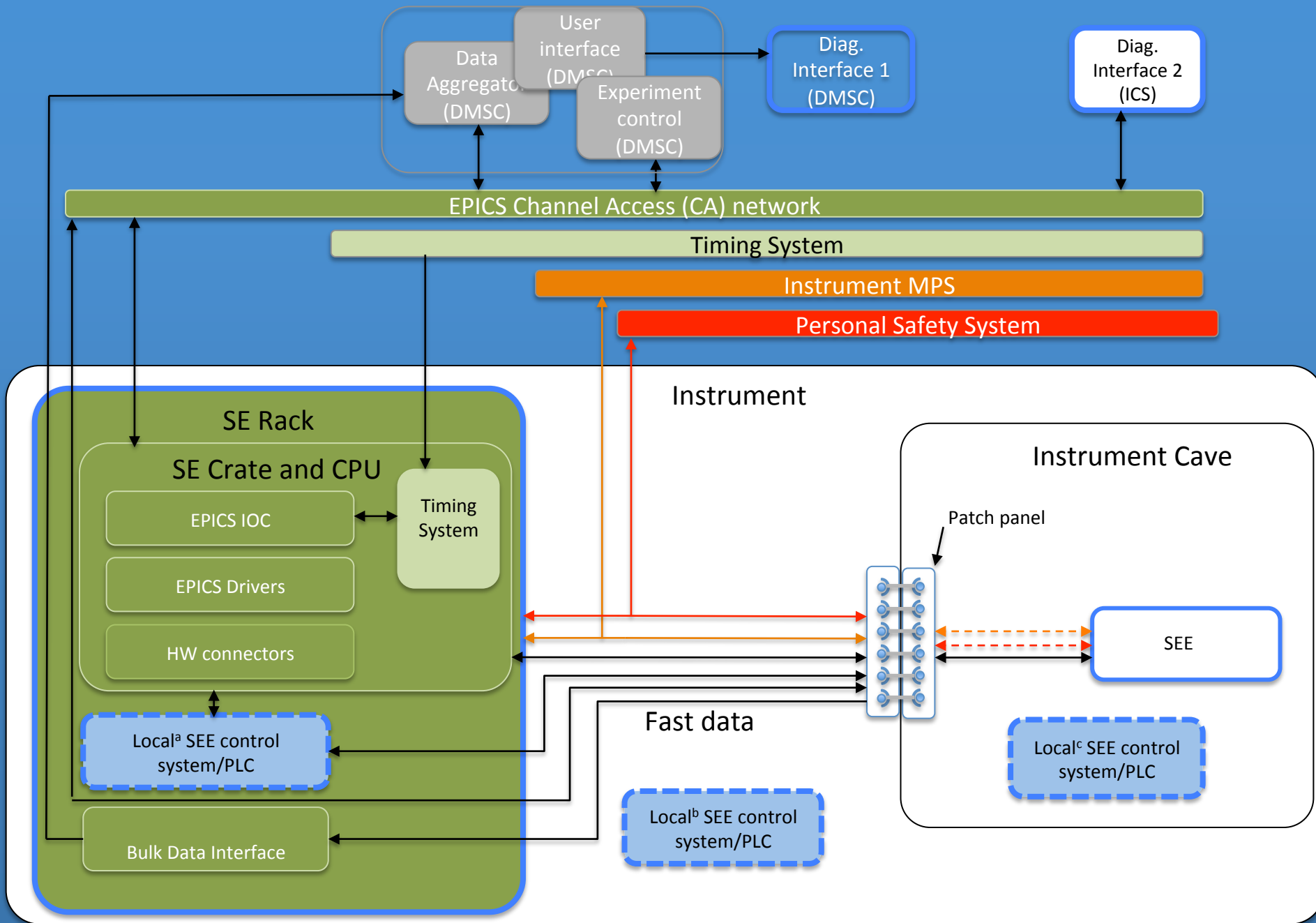
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- The document encompasses control integration for:
  - Pool SEE
  - Instrument specific SEE
  - User SEE

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- To define the SE interfaces to:
  - EPICS control system
  - Timing system
  - User and engineering interfaces
  - Control hardware
  - Fast data network
  - Personal Safety System (PSS), Machine Protection System (MPS)

SAMPLE ENVIRONMENT CONTROL SYSTEM INFRASTRUCTURE

Control system overview   Control system hardware   Control system software

SAMPLE ENVIRONMENT CONTROL SYSTEM INFRASTRUCTURE

ESS wide SEE controls infrastructure hardware
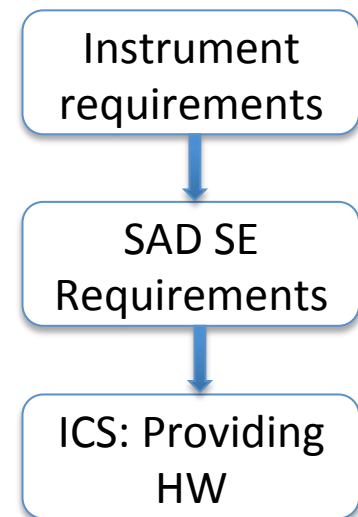
SAD provides
- Requirements for SE rack and SE crate and CPU
- Reviewing, testing, validating and commissioning
- Management of interfaces with ICS

Instrument provides
- Requirements affecting SE rack and SE crate and CPU
- SE rack infrastructure: e.g. cooling water, space, power

Integrated Control Systems (ICS) provides
- Provide the SE rack
- Provide the SE crate and CPU
- Provided as part of ICS's contribution to the instruments

Instrument requirements

→ SAD SE Requirements

→ ICS: Providing HW

Cables and patch panel

EXAMPLE

- **SAD provides**
  - Requirements on a standard patch panel setup
  - Provide patch panel design

- **INSTRUMENT provides**
  - Provide a patch panel at instrument cave (Available through SAD, TBD)
  - Provide patch panel at preparation area
  - Cabling: patch panel -> SE rack, crate and CPU

SAMPLE ENVIRONMENT CONTROL SYSTEM INFRASTRUCTURE

Safety systems

Machine Protection System (MPS)

- It will be evaluated to what extent SEE systems will require connection to the MPS system.

Personal Safety System (PSS)

- SEE will have their own interlock system as required for safety. Requirements on connections between the PSS and SEE will be further investigated

SAMPLE ENVIRONMENT CONTROL SYSTEM INFRASTRUCTURE

Control software

SAD provides
- Requirements for Experimental Control System functionality
- Requirements for EPICS interface
- SEE connection system

INSTRUMENT provides
- Requirements affecting SEE control system

Integrated Control Systems (ICS)* provides
- Configure the SE rack
- Configure the SE crate and CPU

DMSC provides
- Experimental Control System
- Provided as part of DMSC's contribution to the instruments

SAMPLE ENVIRONMENT CONTROL SYSTEM INFRASTRUCTURE

Enabling time stamped SEE fast data

SAD provides
- Compile requirements and coordinate with DMSC

INSTRUMENT provides
- Shall supply requirements for fast data to SAD

DMSC provides
- Provide the data aggregator and structure for fast data

INTEGRATION PROCESS OF SAMPLE ENVIRONMENT

POOL SEE Control integration

SAD provides

- Control hardware   (SAD standard e.g. PLC, CPU, temp controller etc.)
- Definition of logic functions   (SAD standard)
- Requirements on logic and EPICS and ECS integration
- Coordination of interfaces within ESS (ICS, DMSC, MC&A, PSS etc.)
- Implementation of logic in local PLC/CPU layer
- Design, review, test, validation, installation, commissioning

ICS provides

- EPICS integration
- Implementation of logic in EPICS layer

DMSC provides

- Integration into the Experimental Control System (ECS)
- Implementation of logic in ECS layer

INTEGRATION PROCESS OF SAMPLE ENVIRONMENT

Instrument specific SEE Control integration

INSTRUMENT provides

- Control hardware   (Meeting SAD std to ensure maintenance)
- Definition of logic functions (Meeting SAD std to ensure maintenance)
- Requirements on logic and EPICS and ECS integration
- Manage interfaces within ESS (ICS, DMSC, MC&A, P
- Implementation of logic in local PLC/CPU layer
- Design, review, test, validation, installation, commissioning

> SAD can provide all tasks, on instrument budget, if requested

ICS provides (…??)

- EPICS integration
- Implementation of logic in EPICS layer

DMSC provides

- Integration into the Experimental Control System (ECS)
- Implementation of logic in ECS layer

INTEGRATION PROCESS OF SAMPLE ENVIRONMENT

User SEE Control integration

SAD provides

- An SEE communication protocol standard between the SEE and the EPICS/ECS, and other facilities, control systems (part of SINE2020).
- Users will be requested to adapt to the standard interface

ICS provides

- EPICS integration
- Implementation of logic in EPICS layer

DMSC provides

- Integration into the Experimental Control System (ECS)
- Implementation of logic in ECS layer

FIN

Thank you for your attention.

Questions?

Control system overview **Control system hardware** Control system software

- All SEE integrated to EPICS!
- Local logic for safety/time critical systems.
- Individual computers on each SEE

OVERVIEW
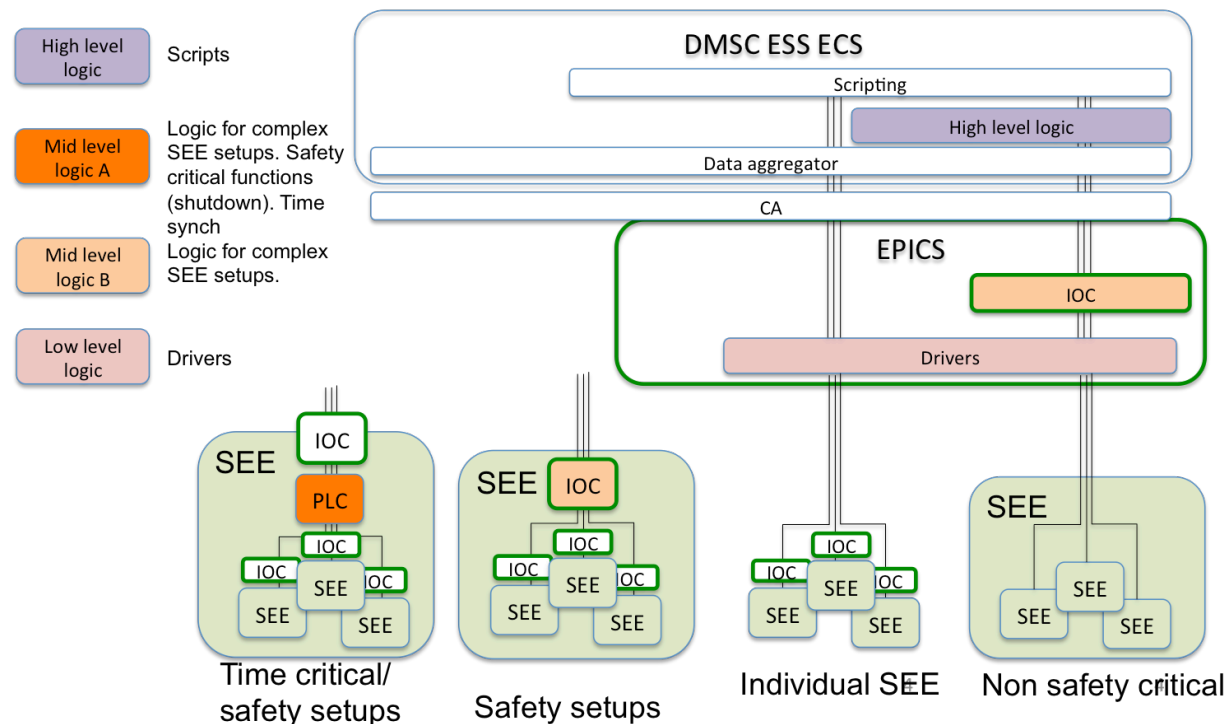
- INTRODUCTION

- SCOPE

- SAMPLE ENVIRONMENT CONTROL SYSTEM INFRASTRUCTURE

- INTEGRATION PROCESS OF SAMPLE ENVIRONMENT EQUIPMENT (SEE)