EUROPEAN SPALLATION SOURCE

ESS Sample Environment a part of Science Support Systems (SSS)

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On behalf of Scientific Activities Division

www.europeanspallationsource.se
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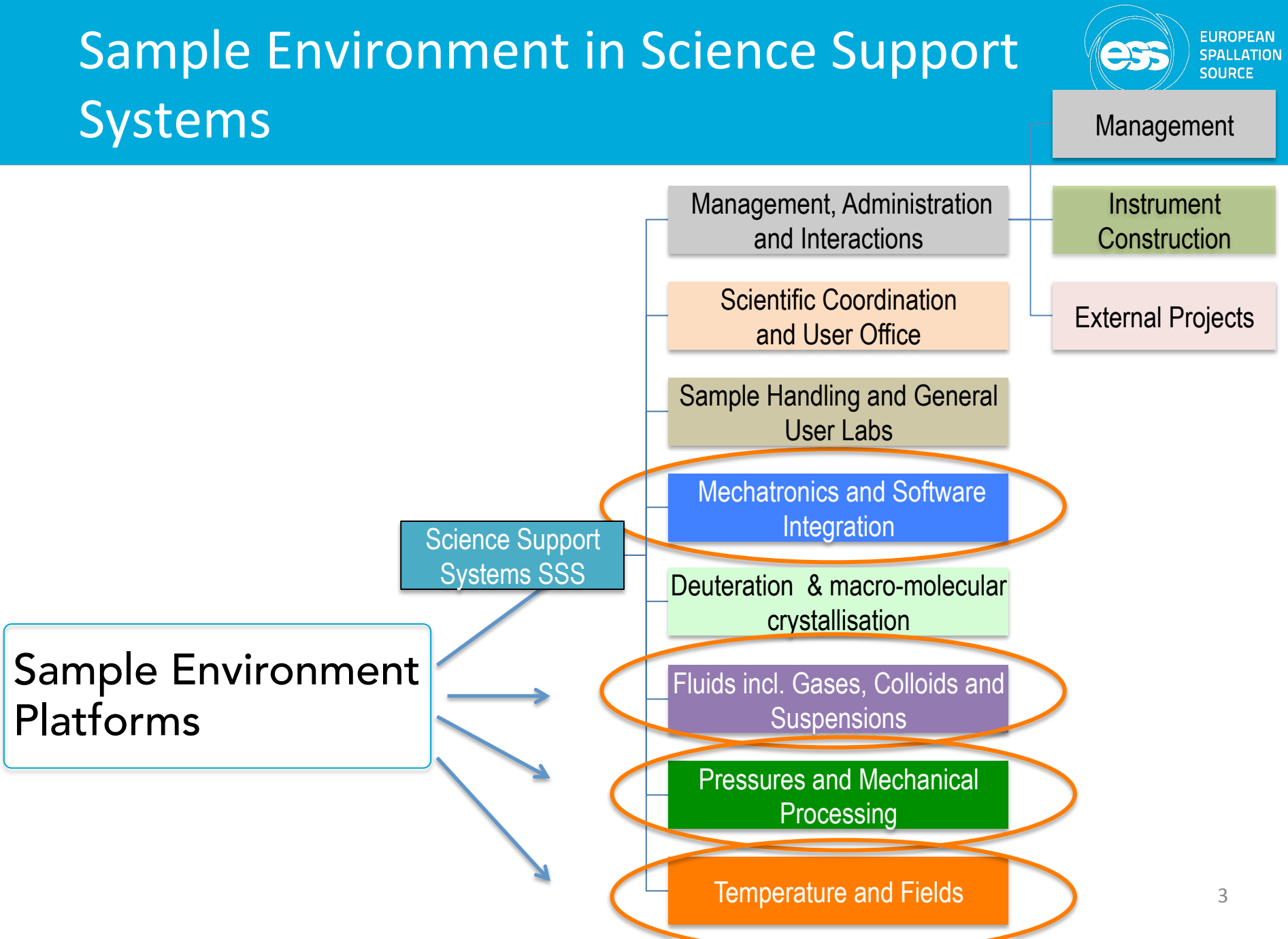
Overview

- Sample Environment in Science Support Systems (SSS)
- Contact person for instrument
- Instruments in SSS project structure
- Sample Environment equipment – Common pool plans
- Sample Environment Reference Handbooks
- Sample Environment Control system
- Zoning
- Sample Environment Labs

Sample Environment in Science Support Systems



Contact person for Science Support Systems

- Each instrument will have one SSS contact person
- A single contact point
- Your guide to SSS through:
  - Handle general questions
  - Coordinate contact with the suitable SSS platform
  - Attending instrument STAP meetings as needed
  - Preparing for, and attending, reviews and team meetings

Contact person to Science Support Systems

INSTRUMENT	Instrument team contact	ESS contact	SSS contact
LOKI	A Jackson	A Jackson	A Pettersson
NMX	E Oksanen	E Oksanen	Z Fisher
ODIN	M Strobl	M Strobl	M Guthrie
BEER	A Schreyer/P Lukas	M Strobl	M Guthrie (M Everett)
DREAM	W Schweika	P Henry	M Everett
ESTIA	J Stahn	H Wacklin	Z Fisher
CSPEC	W Lohstroh	P Deen	M Hartl / NN
SKADI	S Jaksch / H Frielinghaus	A Jackson	A Pettersson
BIFROST	K Lefmann	A Hiess	A Holmes
HEIMDAL	M Christensen	P Henry	M Everett
VOR	P Deen	P Deen	M Hartl / NN
FREIA	H Wacklin	H Wacklin	Z Fisher

Science Support Systems – contact persons

Michelle Everett

Zoe Fisher

Malcom Guthrie

Arno Hiess

Anders Pettersson

Alex Holmes

Harald Schneider

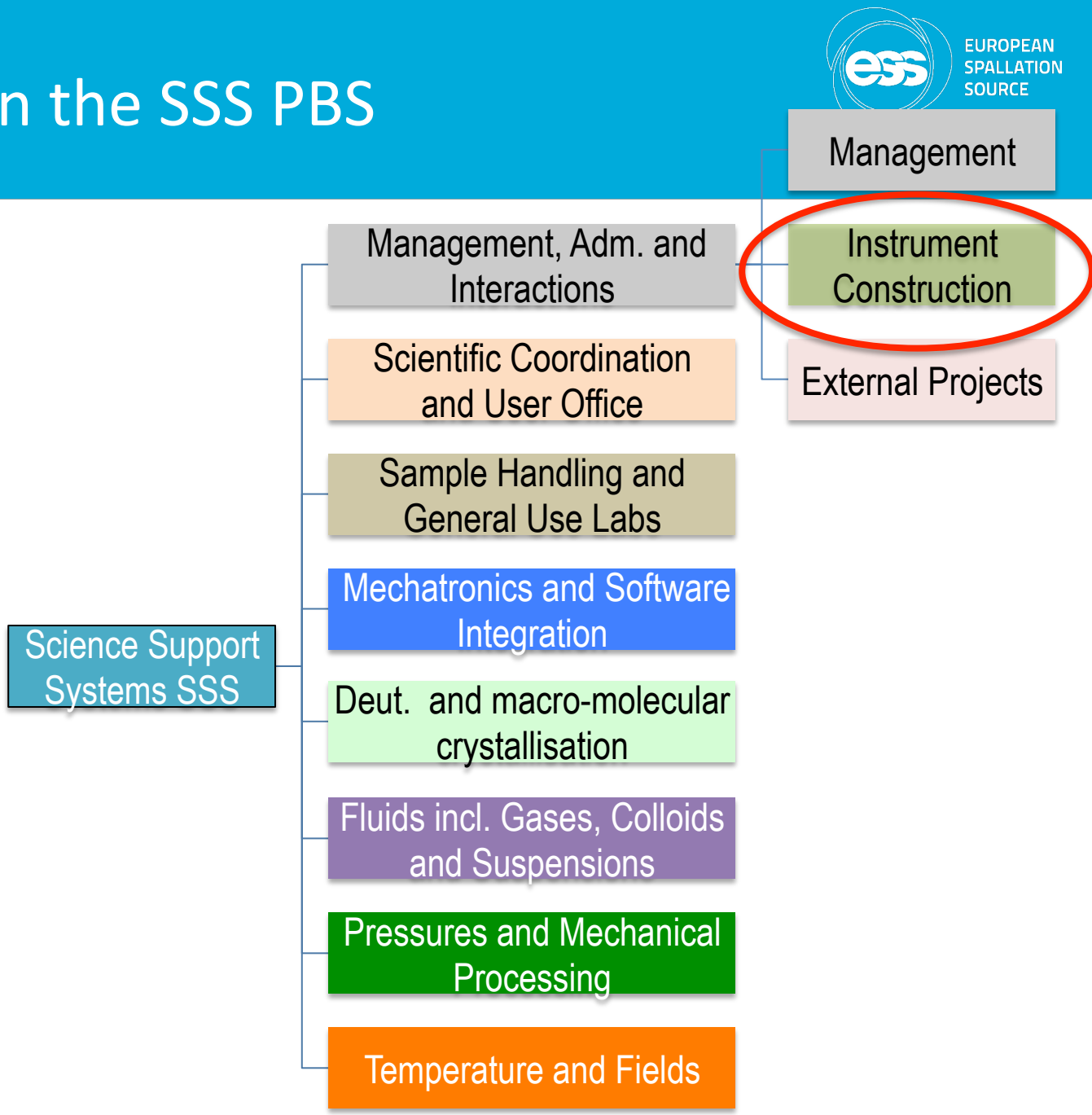
Monika Hartl



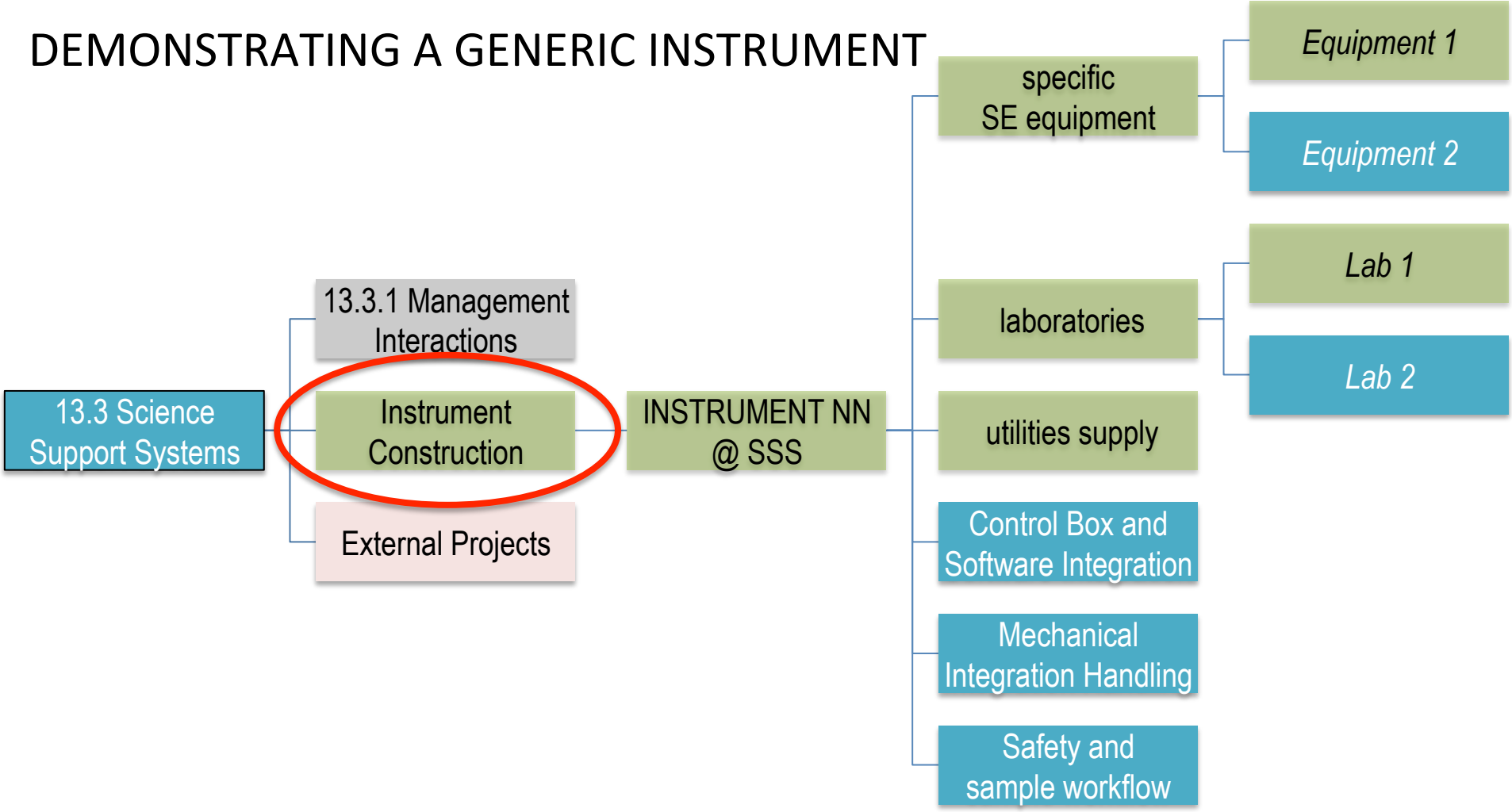





Instruments in the SSS PBS



DEMONSTRATING A GENERIC INSTRUMENT



- **'Pool' sample environment and common labs** for whole instr. suite 'freely' available.
- **Instrument specific sample environment and labs** part of instrument construction WP.
- Software and Mechanical Integration as well as Lab Safety always ensured by SSS.
- Instrument teams have different views on SSS involvement during construction / beyond.
- Additional emerging interactions / contributions:
    - **Mini - pool of sample environment equipment** between several instruments;

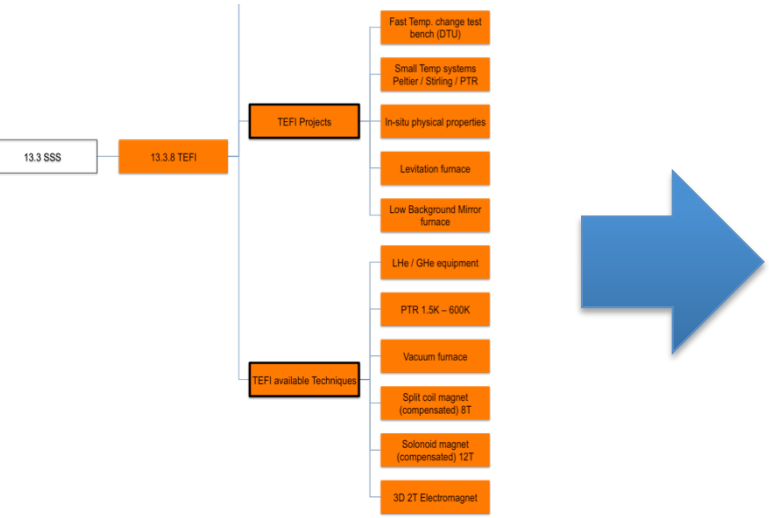
Sample Environment Equipment Pool

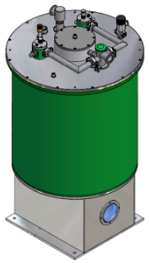
- In general SSS will support the sample environment equipment at all instruments.
- Clear agreements are needed for both the construction and operational phase for SSS towards SE equipment at an instrument
- This increases the need for references/standards.
- The pool of sample environment equipment will consist of both equipment available "off the shelf" and equipment from development projects
- The pool will be set up according to "First things first" and prioritized to match the instrument construction schedule.

THIS IS NATURALLY TO BE REFINED TOGETHER WITH THE INSTRUMENTS!

Temperature and Fields

PBS for Temperature and Fields





Development Projects

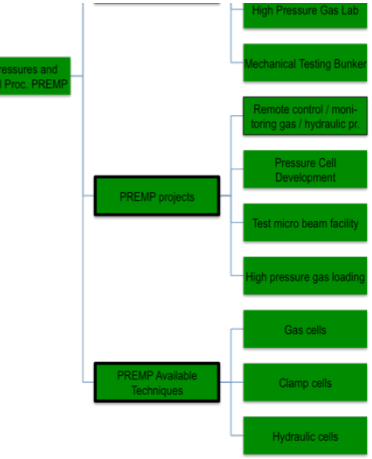
- Fast temp. change test bench (DTU)
- Small temp. systems (Peltier, Stirling, PTR)
- In-situ physical properties
- Levitation furnace
- Low background mirror furnace

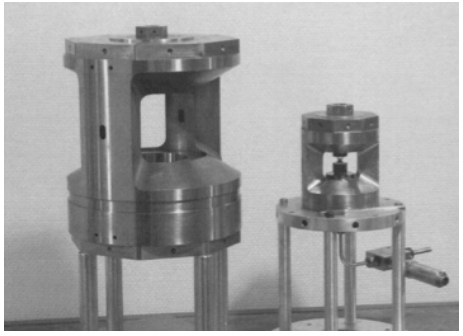
Available Techniques

- LHe / GHe equipment
- Cryostats for T-range 1.5 K – 700 K
- Vacuum furnace
- Split coil magnet with vertical field 8T
- Solenoid magnet with horizontal field 12T
- 3D electromagnet with field 2 T

Pressure and Mechanical Processes

PBS for Pressure and Mechanical Processes





Development projects

- Remote control / monitoring gas / hydraulic pr.
- Accurate positioning/alignment of small samples
- Pressure Cell Development (several designs from 1cm3 to 0.01mm3, 1 GPa to 100 GPa)
- High pressure (2kbar) gas loading for pressure cells

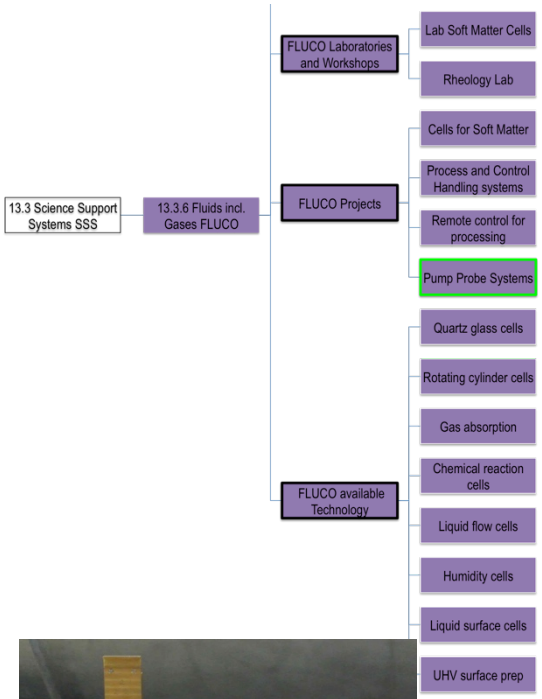
Available Techniques

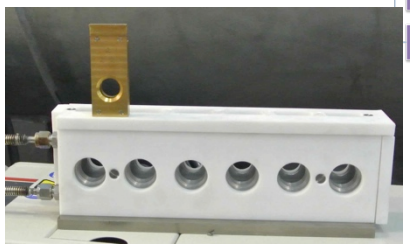
- Traditional Gas cells <= 1 Gpa
- Traditional Clamp cells 2-3 Gpa
- Hydraulic cells (PE-type) 20 Gpa
- Diamond cells 100 GPa (specialised case-by-case use).

* we'll aim to couple P cells with low T (specific CCR/Cryostats) and high T…

Fluids and Gases

PBS for Fluids and Gases





Development Projects

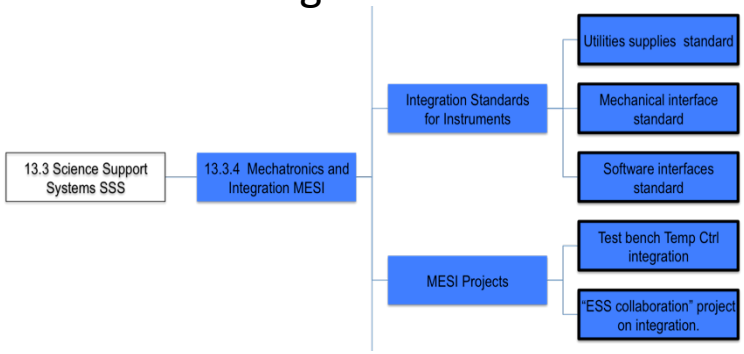
- Cells for Soft Matter
- Process and Control Handling systems
- Remote control for processing
- Laser Pump Probe System

Available Techniques

- Gas absorption
- Humidity chamber
- Chemical reaction cell
- Liquid flow cell
- Rotating cylinder cell
- Liquid surface trough
- In-situ UHV surface prep

Mechatronics and Software Integration

PBS for Mechatronics and Software Integration



Development projects

- Fast temp control test bench
- Test bench Temp Ctrl integration
- "ESS collaboration" project on integration.
- Robotic sample changer

Integration Reference for Instruments

- Utilities supplies reference
- Mechanical interface reference
- Software interfaces reference

Reference Handbooks – intentions

- We want enable as much science as possible by building in these specifications during construction
- In most cases it will not be a large cost, if it is considered early in the process.
- If these requirements are defined too restrictive, nobody will be gained by this, BUT we need to standardize.
- We will need feedback from instruments!

Sample Environment Mechanical Interface Reference

- Transportation of equipment to sample position
- Distance from sample table to beam
- Baseplate drawing and bolthole pattern
- Available Space for auxiliary equipment (pumps etc)
- Magnetic fields considerations (Forces, Materials..)

Draft version: end of Q2
Internal review: Q2/Q3
External feedback: Q3
Final version: Q1 2016

Sample Environment Utilities Supplies Reference

- Gas supply
- Cooling water
- Power
- Data connections

Using available ESS standards as far as possible

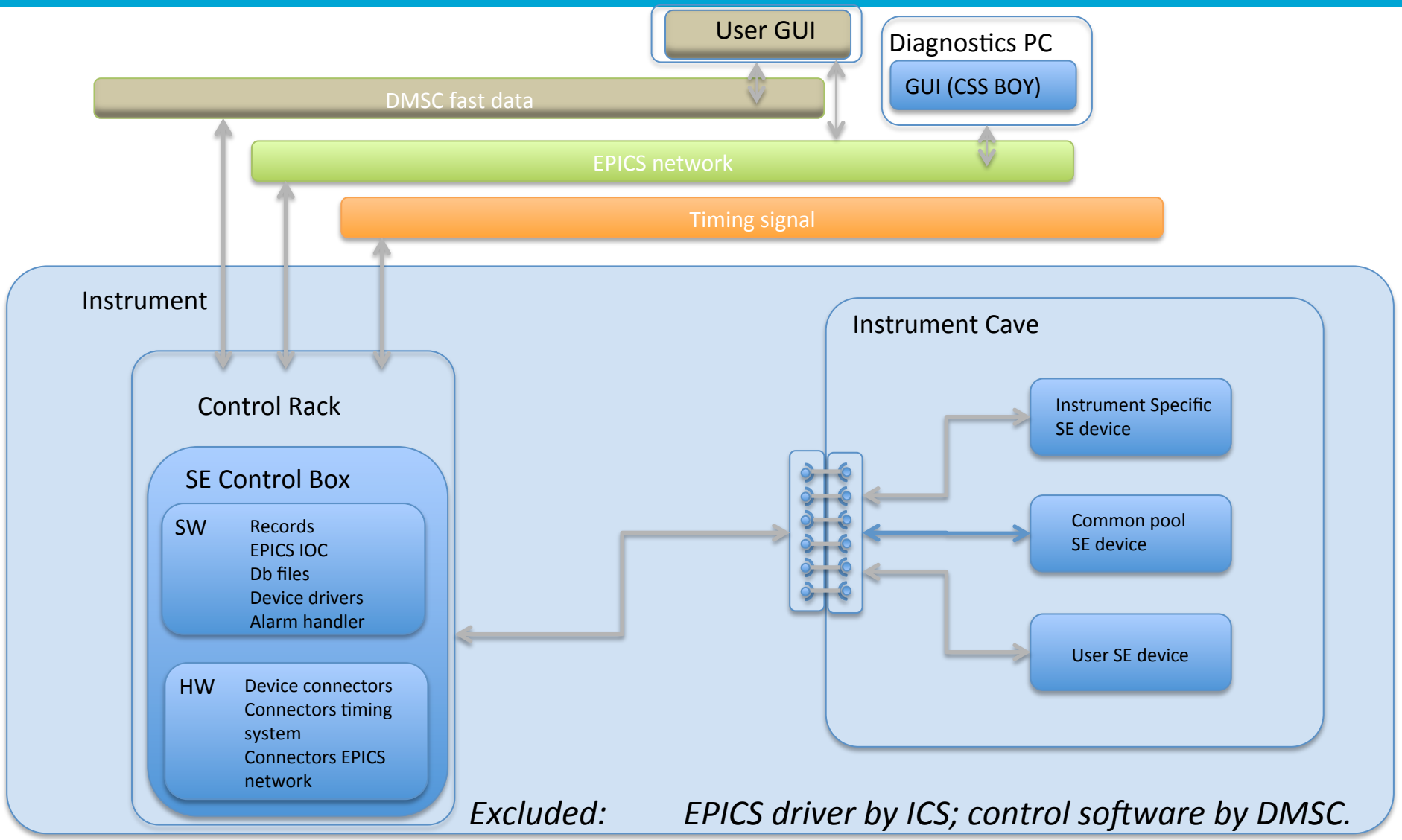
Draft version: end of Q2
Internal review: Q2/Q3
External feedback: Q3
Final version: Q1 2016

Reference handbook SW Interfaces

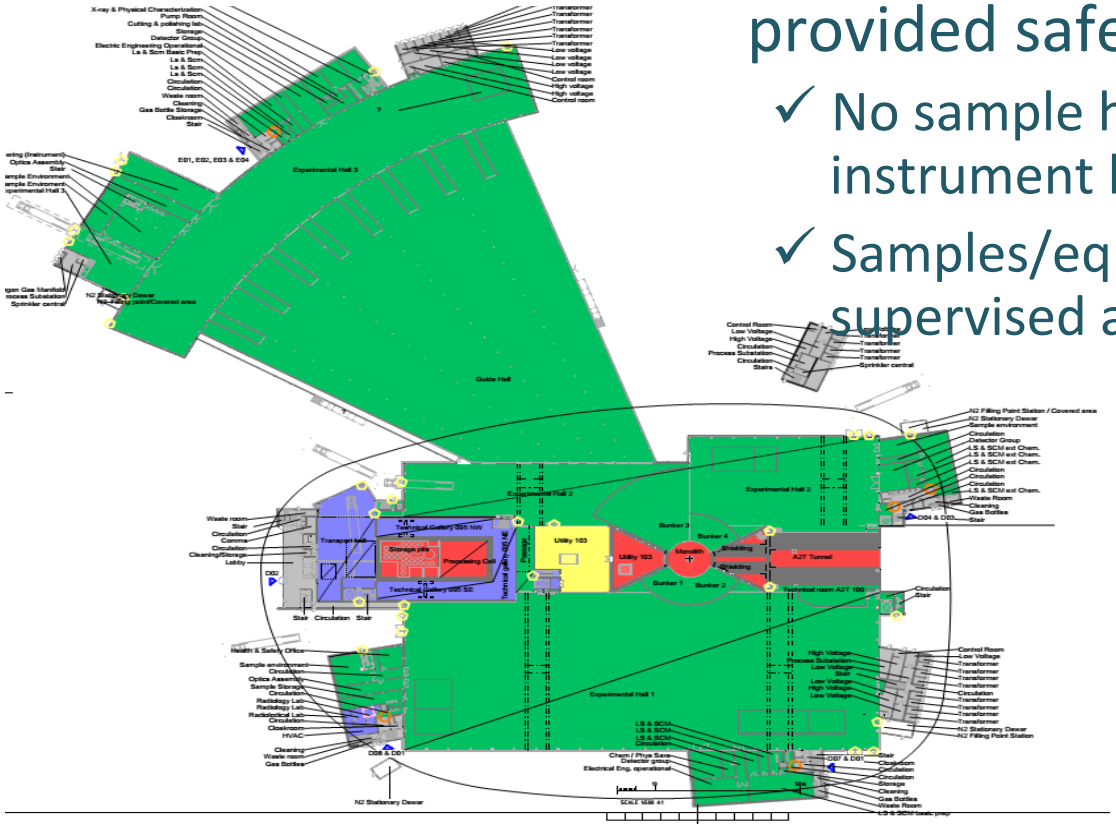
- Control Box
- Control system EPICS
- Alternative controls e.g. PLC
- Engineering interface (CSS BOY, EPICS)
- Protocol available (HORIZON-2020 with EU-NSFs)

Draft version: end of Q2
Internal review: Q2/Q3
External available: Q3
Final version: Q1 2016

Sample Environment – Software Interfaces

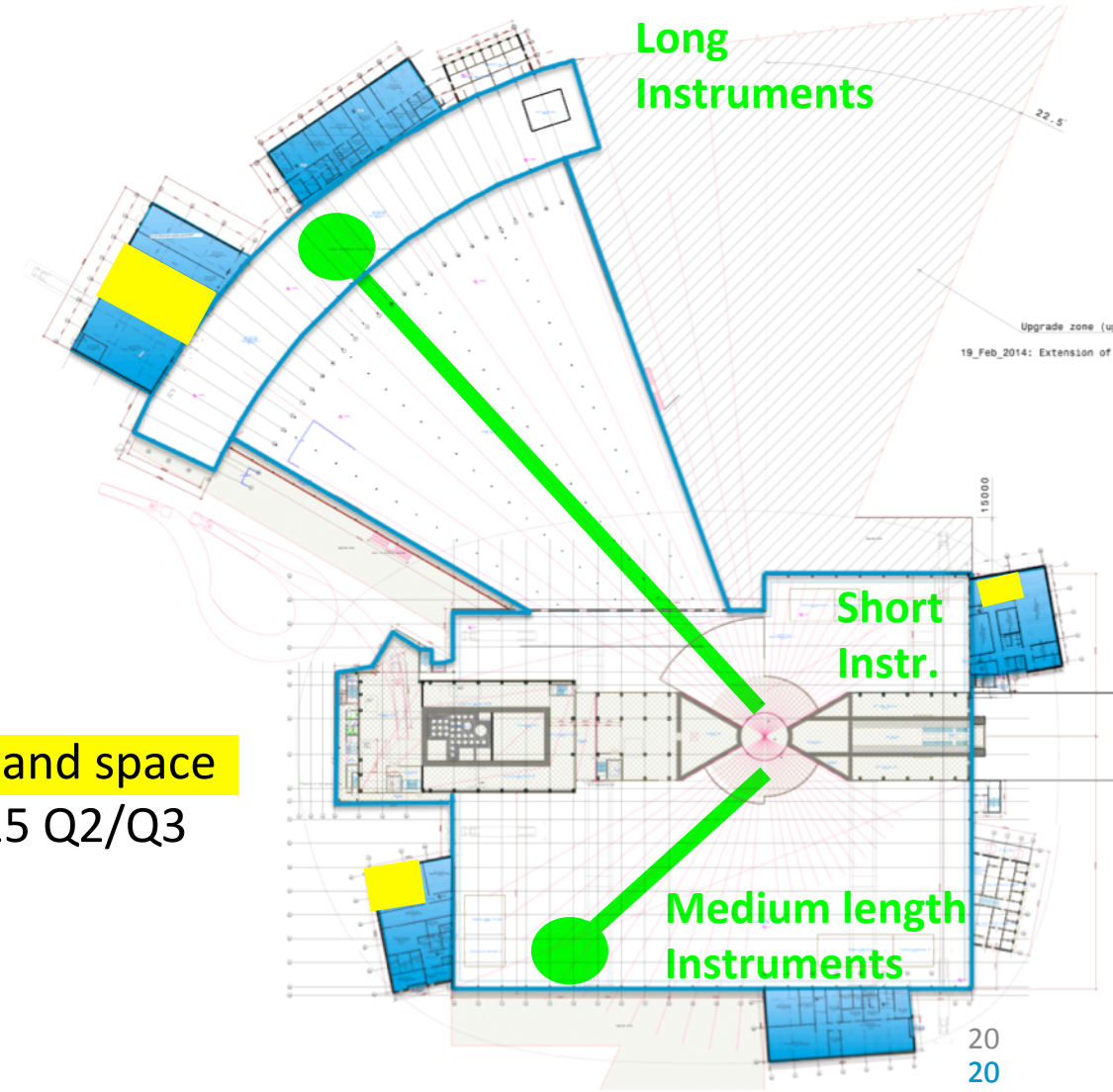


Zoning in the Experimental Halls at ESS (ESS-0033188)



- Plan: Free mobility in the green area (supervised zone) between labs and instruments with samples/equipment - provided safety review is done
  - ✓ No sample handling space necessary on instrument but possible
  - ✓ Samples/equipment that leaves the supervised area have to be surveyed

User laboratories and sample environment workshops in experimental hall - NSS



- Sample Environment workshop and space
- A temporary SE lab setup in 2015 Q2/Q3

END

EUROPEAN SPALLATION SOURCE

Please contact us and involve us early in the process,

and

Thank you for your attention