



Chemistry and Life Science Support

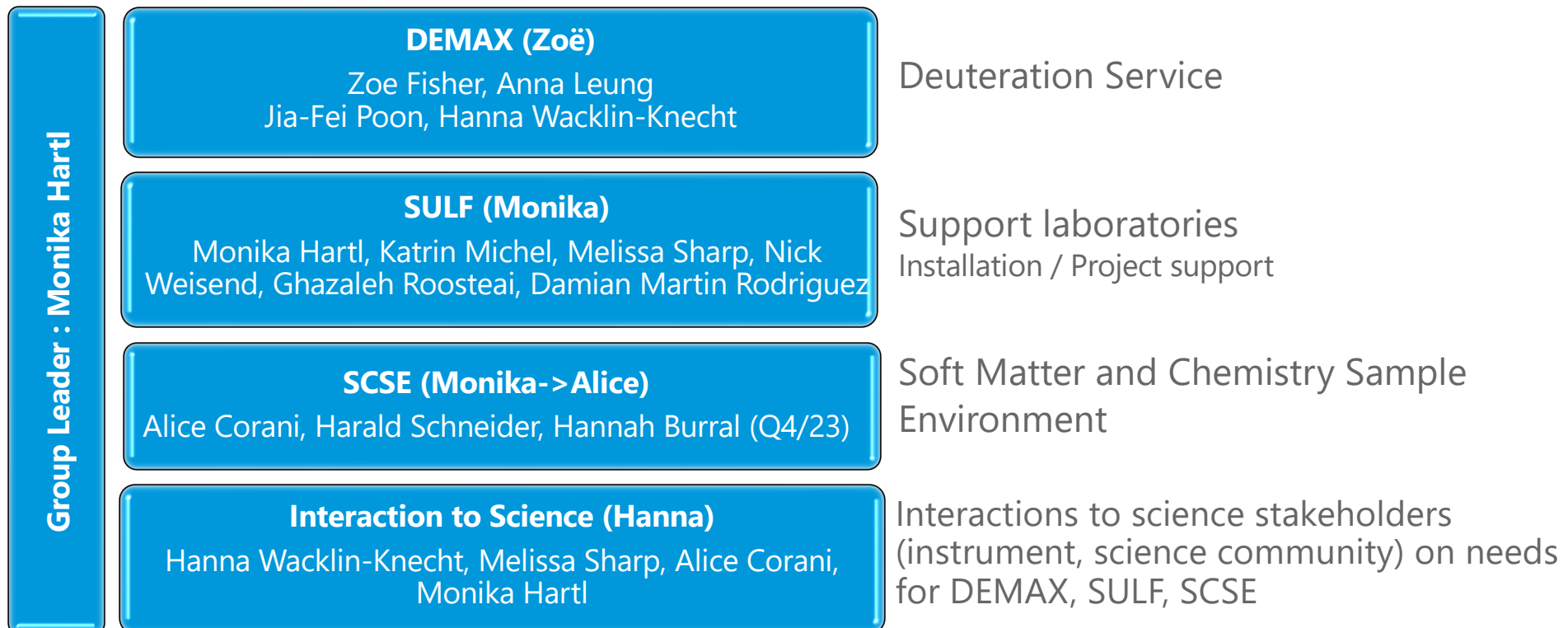
Soft matter and Chemistry Sample Environment
SESC

PRESENTED BY ALICE CORANI

2023-10-17

Chemistry and Life Science Support - CLS

Structure of CLS with functional leads



SCSE Team



Provide sample environment system and devices for soft matter and chemistry

• A. Corani:



- Sample environment related to chemistry, Electrochemistry and chemistry cells.

• H. Schneider:

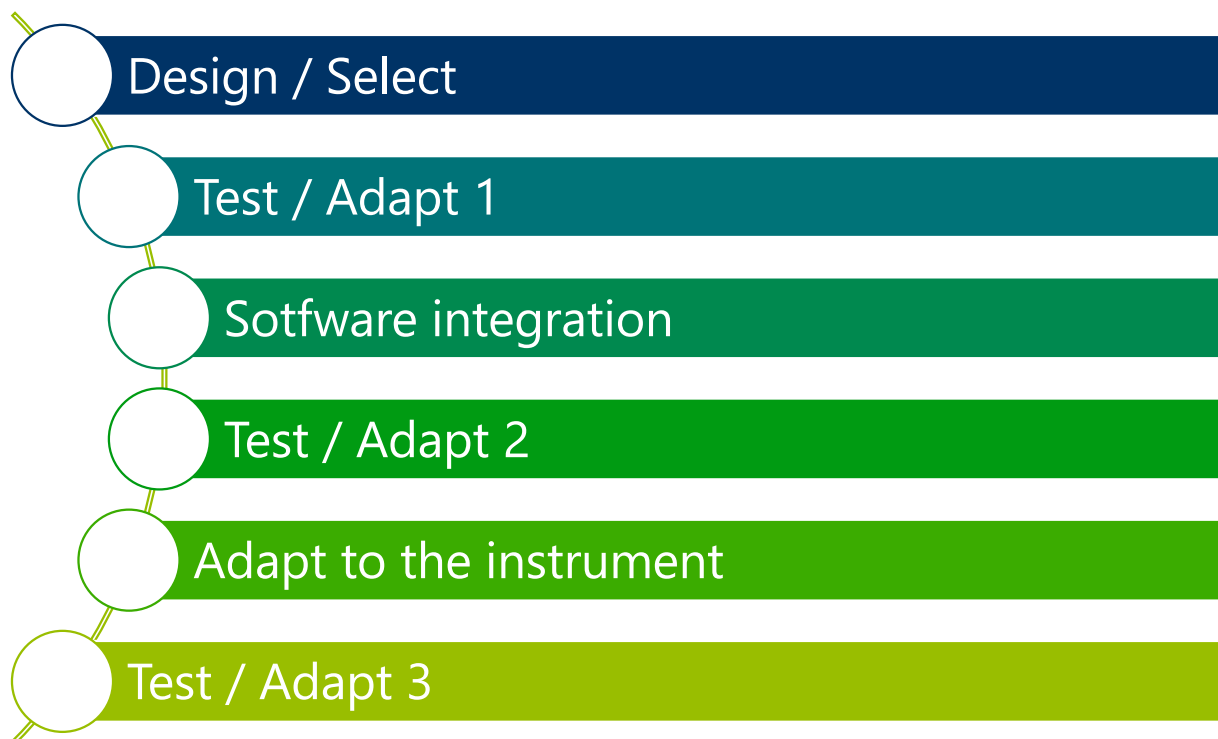


- Sample environment for life science and soft matter R&D on ultrasonic levitator.

• H. Burrall :



- Sample environment mainly for Soft matter with H. Schneider

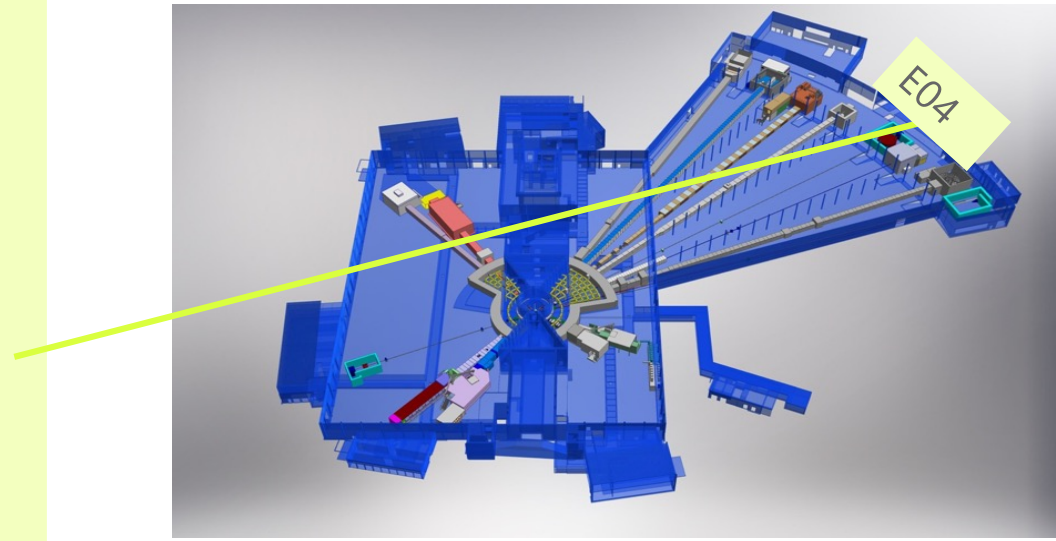


SCSE workshop

Currently being installed in D04 – Move in before end of the year



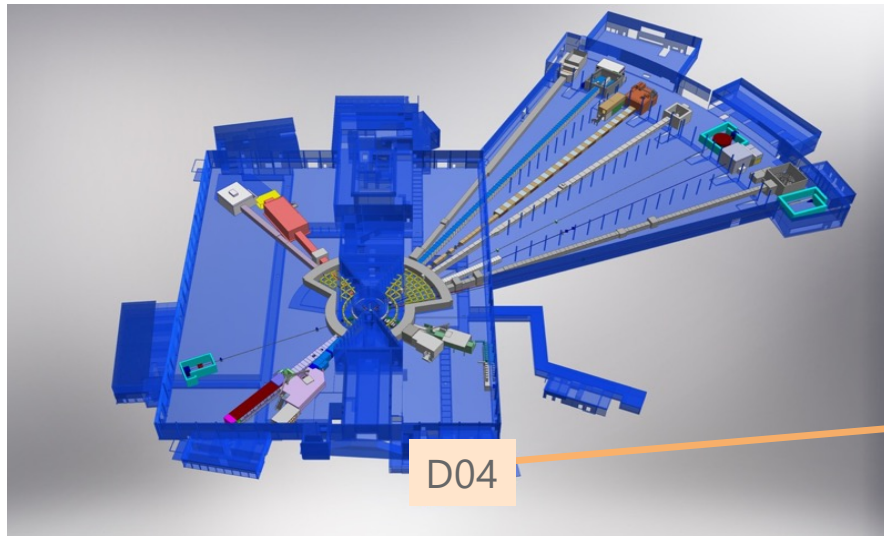
Current space:



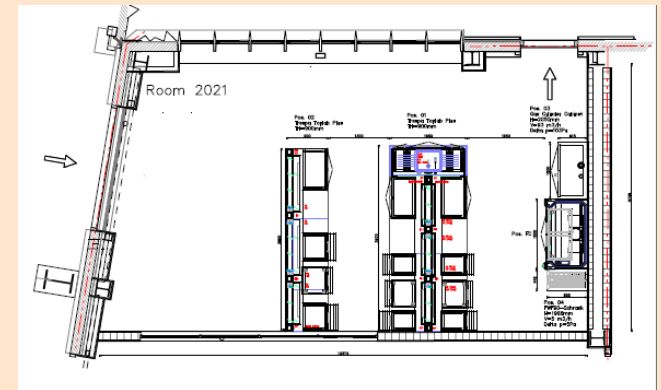
Working temporary in lab - E04

SCSE workshop

Currently being installed in D04 – Move in before end of the year



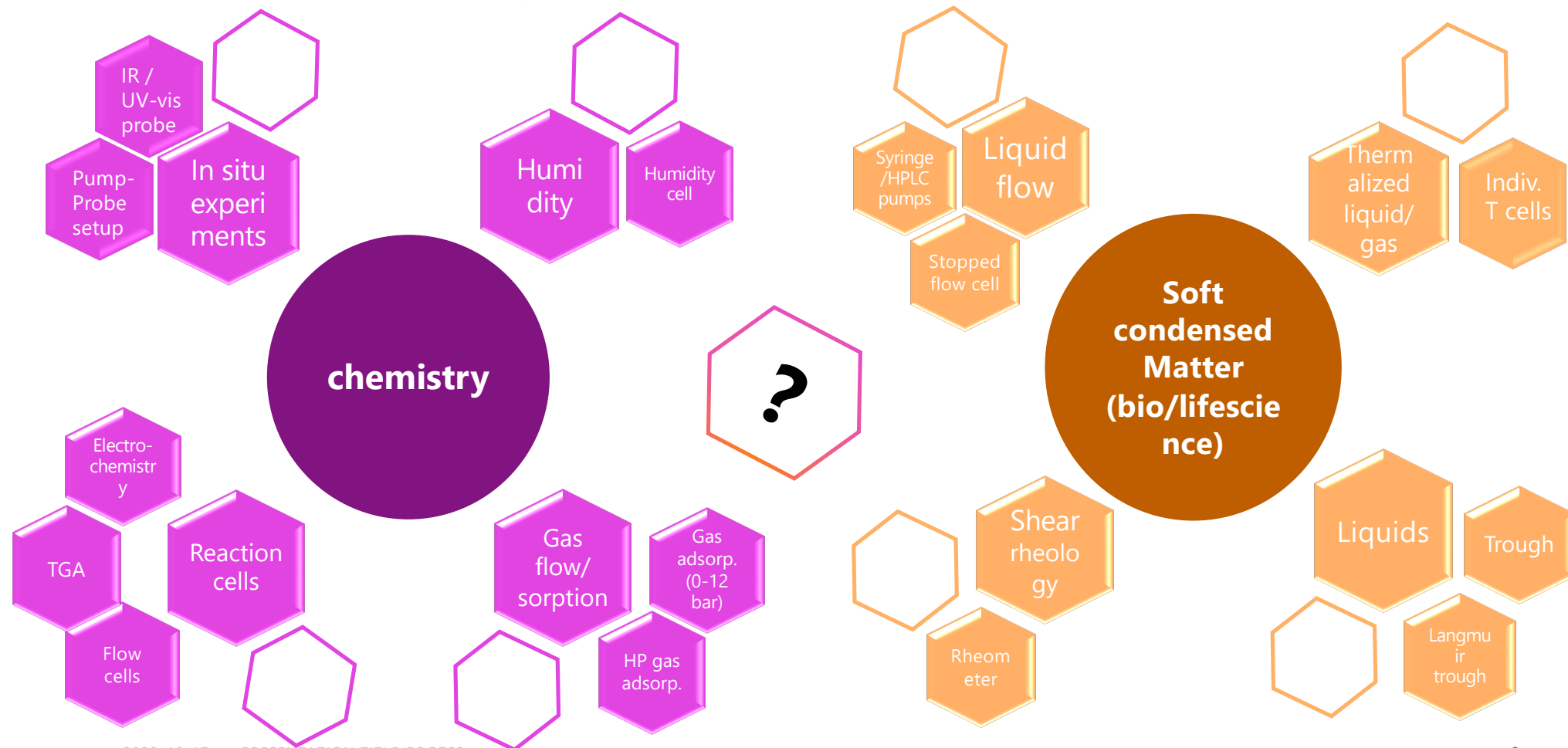
D04 Q3/23 – commissioning of workshop



Soft matter and Chemistry Sample Environment



Provide sample environment systems and devices for:



I2S – Interfaces to Science in CLS

Strategy and interfaces in Chemistry, Soft Matter & Life Science



Work with all stakeholders to:

Capture scientific requirements and efforts

Create a strategy/prioritisation for:

- First Science
- First proposal call
- Towards Steady state Ops

Liase with external stakeholders

Leverage synergies with other actors

Interact with instrument teams/ scientific community on support needs for science in the areas of DEMAX, SULF, SCSE;



Hanna



Melissa

Soft matter/life science



Alice

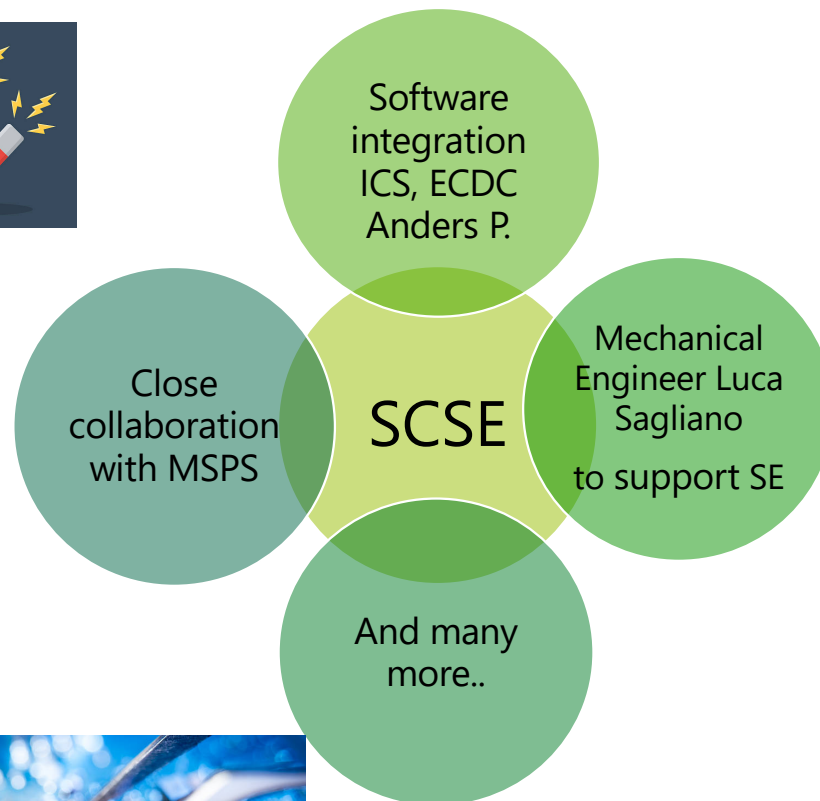
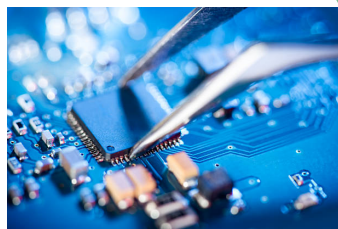
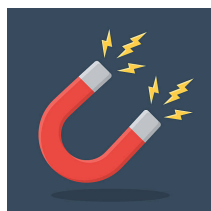


Monik

Chemiatry

I2S – Interfaces to Science in CLS

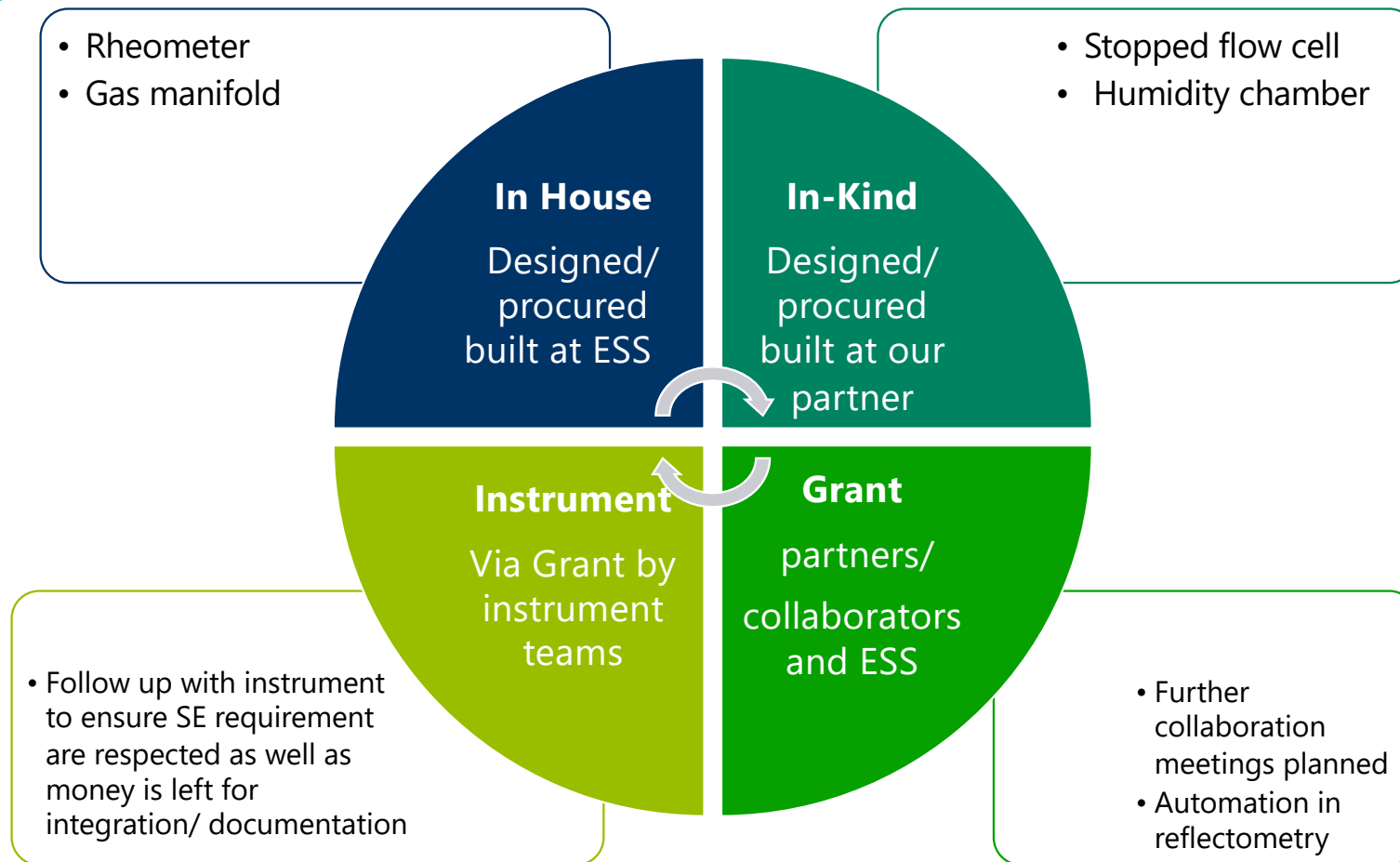
Strategy and interfaces in Chemistry, Soft Matter & Life Science



System distribution



Budget and personal



SANS

Interaction to instrument



Softmatter

- Temp controlled cuvette changer (LOKI)
- Sample tumbler
- Hugginn 5 position changer (finished)
- Sandwich cells
- Flexiprobe project, Humidity cell, WLS, GISANS
- Flow cell (LOKI)
- In-situ fluorescence/UV set up (NURF)
- Stopped flow rig(s)
- Rheometer (cylinder + cone-plate)
- In-line size-exclusion chromatography (SEC)
- Autosampler
- Skadi?
- GISANS/GINSES multilayer resonator/Prism?

General

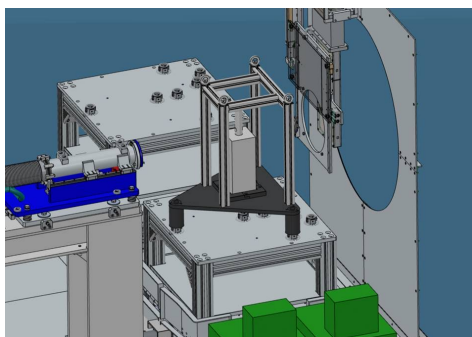
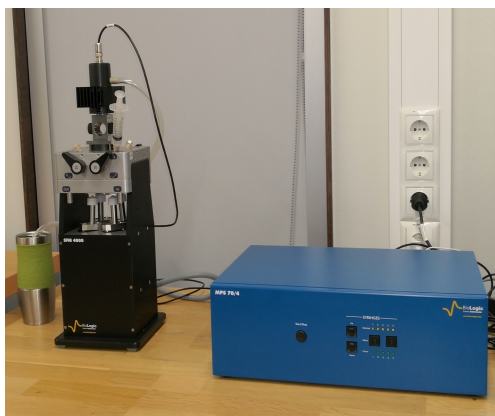
- HPLCs + syringe pumps/switches
- Humidity cell
- Julabos
- Temperature controllers

Chemistry

- Electrochemical cells
- Battery membranes / Impedance on electrolytes
- Electrical field (1000V/mm)
- Photo excitation in-situ (stroboscopic measurements/ stimulus-response)
- Humidity cell extend to 85%-95% humidity, contrast matching.
- Vapour sorption (Ethanol, solvents – use gas handling manifold)
- Liquid/gas mixing device (up to 2 bar) – supercritical CO₂
- reaction cells (liquid) < 2bar – upgrade stopped flow cell to handle corrosives and reactants
- in-situ measurements of pH, conductivity, O₂, => flow cells
- reaction cell (gases/liquid)
- Biothermolizer = 4-6 samples (25 C- 300 C)

Stopped-flow cell

In kind contribution from Estonia



Plan for stopped flow cell:

- Cell for rapid mixing of samples directly before measurement

Set-up options:

- Scan cell position and fix

Parameters we would like to control through NICOS:

- Like the HPLC pump, 4 syringes of sample to fill and mix
- Temperature
- Start/Stop

Status:

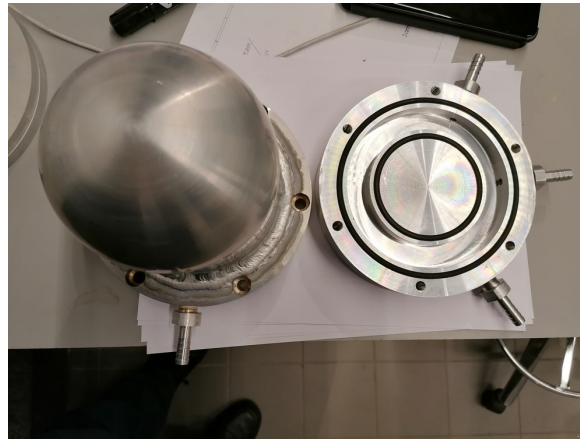
- Test on going
- Software integration to be done
- Mechanical integration preliminary design done

Humidity Cell

In-Kind Tartu University, at ESS dec. 2023



- Humidity chamber
 - To be tested
- Humidity generator
 - At ESS
 - Integration of the Humidity generation, started
- Mechanical integration



Gas Handling

Manual manifold (RT, 10-3 bar < p < 15 bar)



Can be used with corrosive gases, here ammonia on MOF

Science case:

Gas sorption at low pressure

Development:

Have a system for corrosive gas and one for inert gas

Automatic valves



SCSE – STATUS OVERVIEW



	Sample Environment System (SES)	Design/select	Test/adapt I	Software integration	Test/Adapt II	Adapt on instrument
POOL	Julabos	Done		Done		Documentation
POOL	Potentiostat	Done		1st level		
POOL	Humidity chamber	Done	At ESS Q4 2023			
POOL	Humidity Generator	Done		On going		
POOL	2 EC/Battery cells	Done	At ESS Q4 2023			
Spec./ Diff.	Isorb gas sorption High pressure	Done				
Spectro	Laser pump probe	Done	At ESS Q4 2023			
Reflect.	Troughs (various)	Starting				
Reflect.	Solid liquid cell	Done				
DREAM	EC/Battery cell	Ongoing				
ODIN	EC/Battery cell					
DREAM	TGA					



SCSE – STATUS OVERVIEW



	Sample Environment System (SES)	Design/select	Test/adapt I	Software integration	Test/Adapt II	Adapt on instrument
LOKI	Thermoslistated sample changer for quartz cuvettes (part of SANS Mag)	Done				
LOKI	Cell tumblers/rotating sample holders (Part of SANS mag)	Done				
LOKI	Flow cell (including HPLC pumps, Part of the NURF for LOKI)	Done		Done		
LOKI	In situ spectroscopic measurements for the flow cell (NURF for LOKI)	Done				
SANS	Flexiprobe	Done				
POOL	Rheometer	Done		On going		
SANS	Huginn cuvette rack	Done		Done		
LOKI	Stopped-flow cell	Done		On going		
POOL	Syringe pumps	Done		Done		Documen- tation
POOL	HPLC pumps	Done		Done		Documen- tation



Future plan

Priority for SANS

Humidity chamber:

Test adapt, possible development for high humidity and contrast matching

Software and mechanical Integration priority

1. Stopped flow cell
2. Rheometer
3. Humidity Generator

Sketch plan / idea:

EC, Battery, and photo excitation insitu

Input for first science CLS

SES

Labs

DEMAX

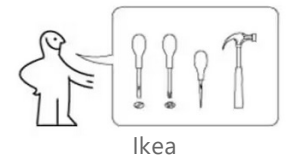


Follow up on the possible grant



Vetstreet

Train the operator



Documentation



Thank you

