



STAP presentation: Sample and User Laboratory Facilities

> including installation for SAD<


PRESENTED BY MONIKA HARTL

2024-04-22



SULF Team (increased scope/FTE)

Distribution of Full-Time-Employee (FTE) on areas of work

0.75 FTE Installation (D04/D08) 


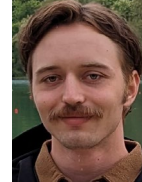





2.0 FTE Area Coordination (E04,D04,D08), Lab operations (E04, D04, RML)& maintenance

0.5 FTE ESS Project support

0.75 FTE CLS Admin, inventory, budget, planning 

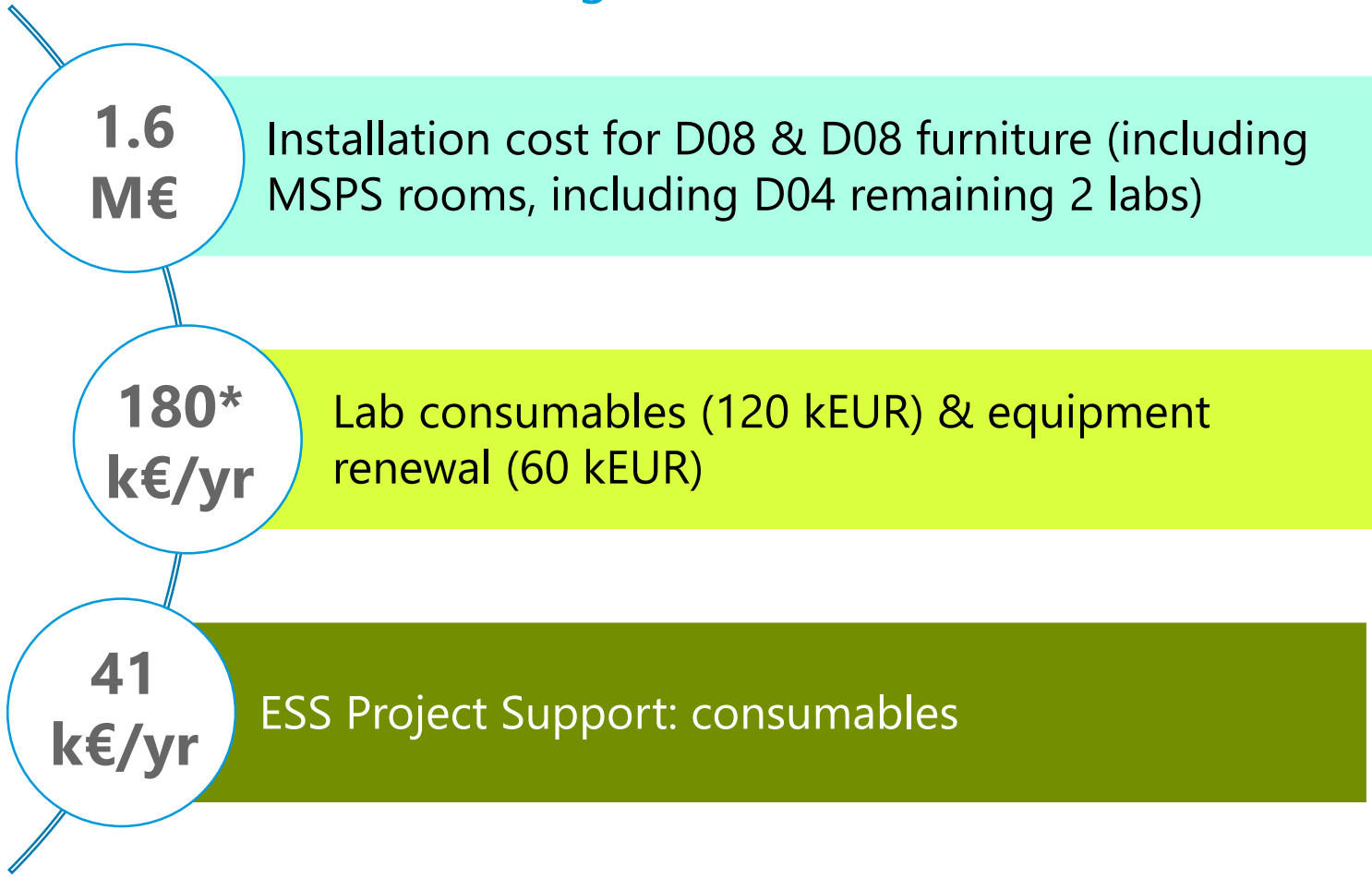
- 1FTE on long-term sick leave, MH ~50% on other tasks
- 2024 hire lab technician/admin permanently
- 2028: 6 FTE (2 more FTE to be hired)

CORE TEAM (3 FTE+1):

 Katrin Michel	 Nicholas Weisend	 Monika Hartl	 Christopher Mosunda (INTERN -> April '24)
 Ghazaleh Roostaei	 Melissa Sharp	 <u>intern</u> (CTA Q3/24)	

SULF Budget

Distribution of Budget on areas of work



Lab AREAs (4 buildings):

E04: SULF offices, current user labs (6 rooms)
E03: optics lab (1 room)
D04: future user labs (4 rooms) + workshop
D08: SULF offices, Radioact. Mat. Lab (RML), future user labs (4 rooms)

Permission to use money from contingency to fit out labs in D08: January 2024; start of electrical installation February 2024.

1

Installation (D04/D08)

Area Coordination, Lab operations
& maintenance

ESS Project Support



D04 installations finished – summer '23

1 large user lab, 1 lab for DEMAX, and CLS Sample Environment Workshop



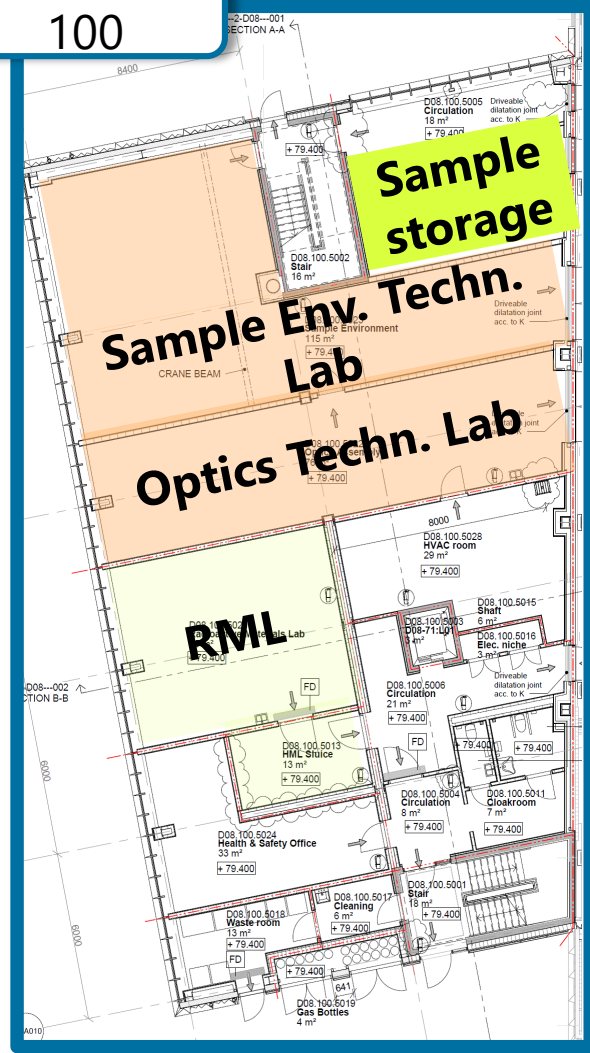
Lab/workshops to fit out

Scientific Activities Division – D08 and D04

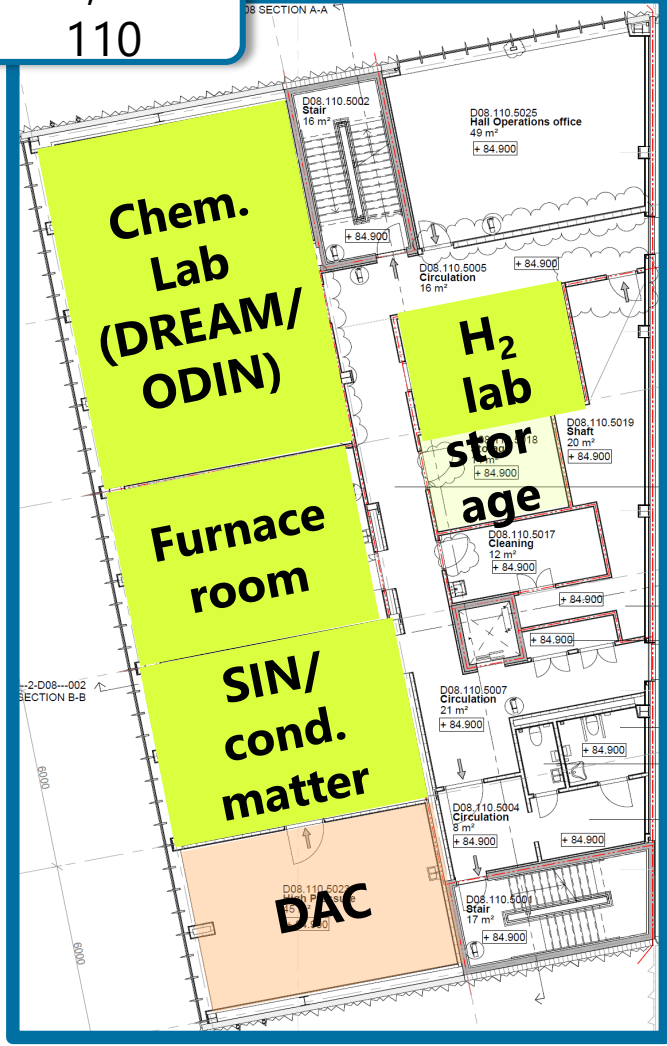
- MSPS areas to be fitted
- CLS areas to be fitted
- CLS areas already done



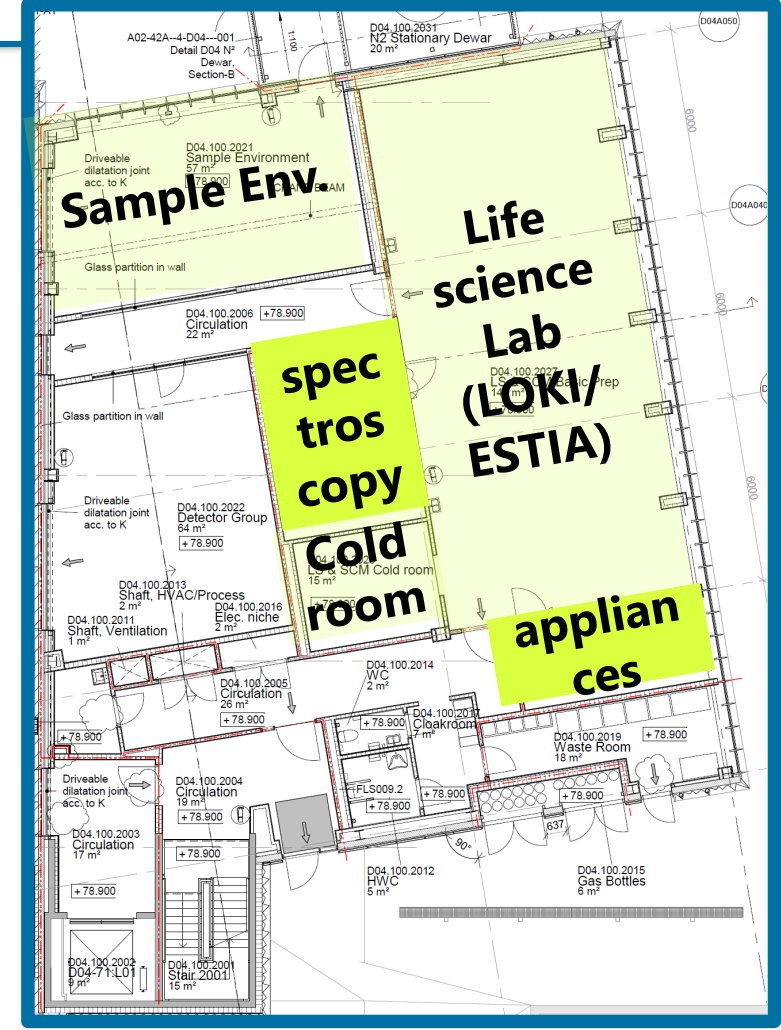
D08, Level 100



D08, Level 110



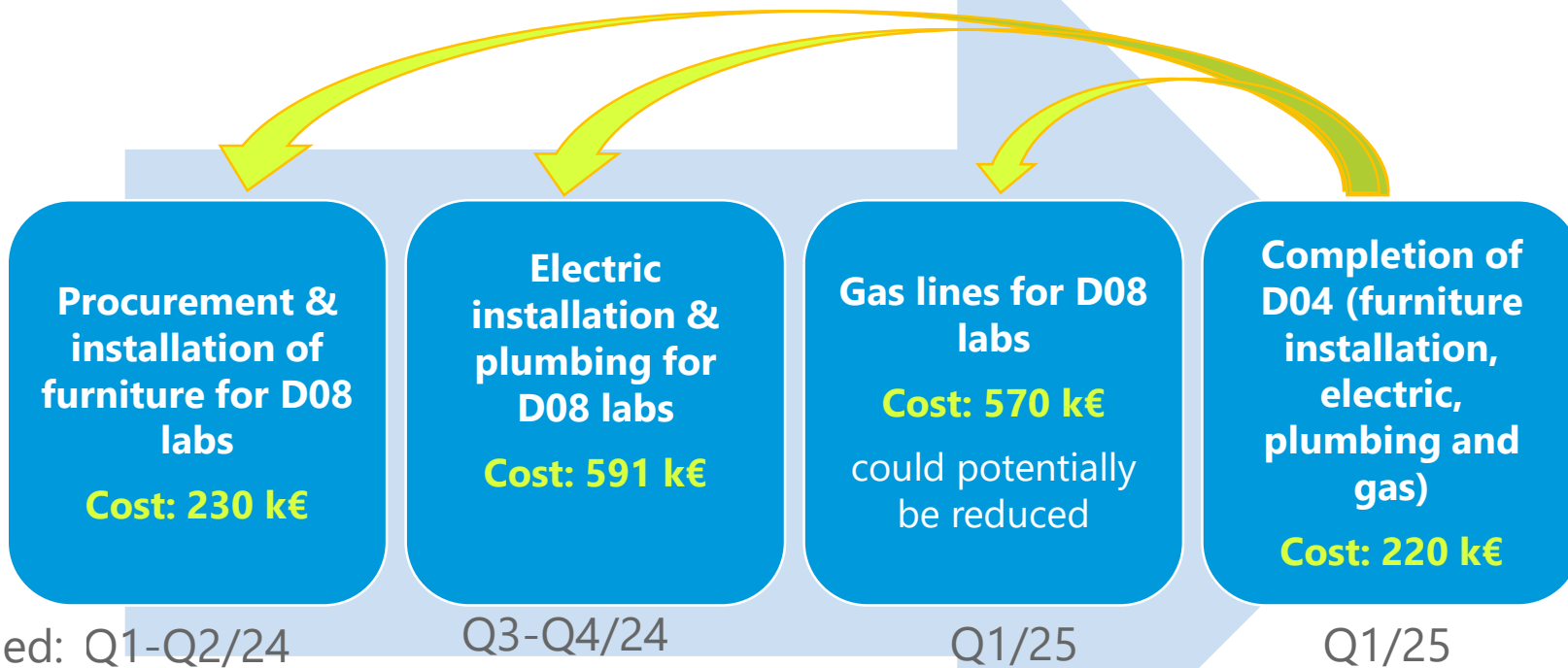
D04, Level



Procurement in four steps – by trade



Old framework agreement is not exclusive –will go out for tenders



Total costs before
(current framework):

2.4 M €

reduced
cost by
ordering
trades
separately
via tenders

1.62 M€

(reduced by 789 k€)

- 1.40 M€ for D08
- 220 k€ for rest of D04

Procurement in four steps – by trade



Total costs: 1.62 M€

At this point we can use the labs!

Procurement & installation of furniture for D08 labs and D04
Cost: 230 k€ + 10k€

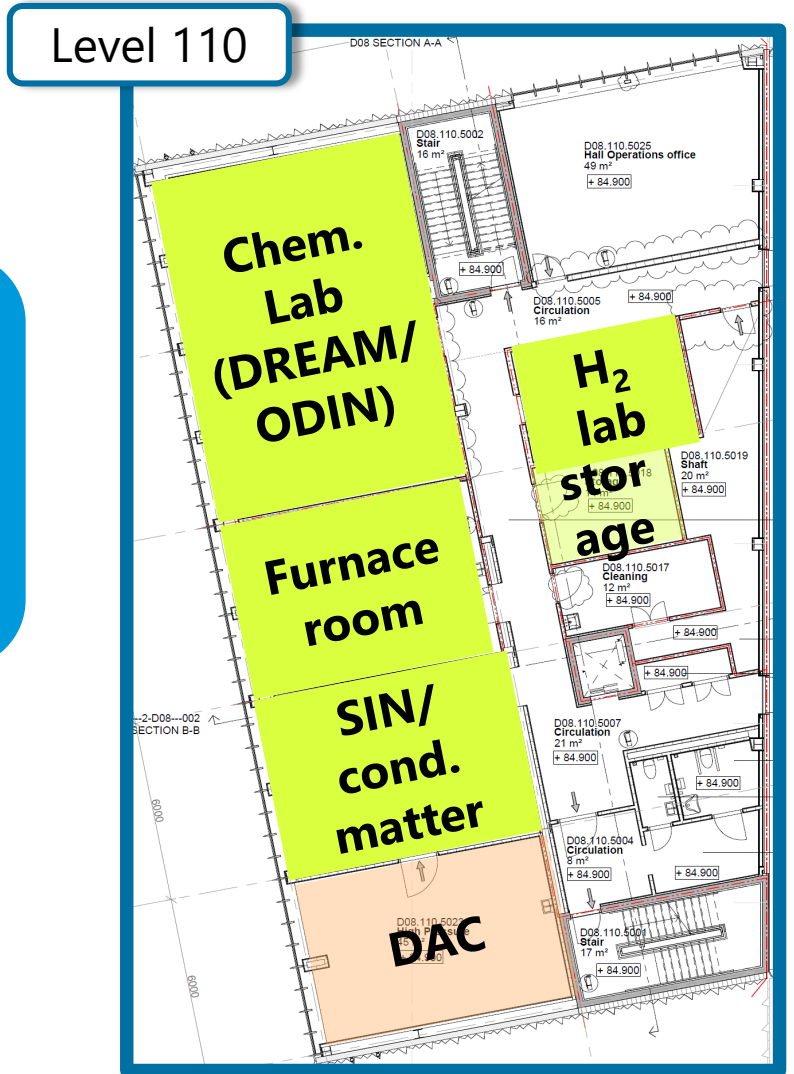
Electric installation & plumbing for D08 labs and D04
Cost: 591 k€ + 100k€

Gas lines for D08 & D04 labs
Cost: 570 k€ + 110k€
could potentially be reduced

Planned: Q1-Q2/24
Scheduled for May 16th

Q3-Q4/24
First part of electrical inst. started Feb. 10th

Tender planned for May



SULF Timeline –installation (status 2024)



Upcoming: installation of chemistry and sample environment labs in D08

- installation
- commissioning
- in operation

★ Lab ready for operations

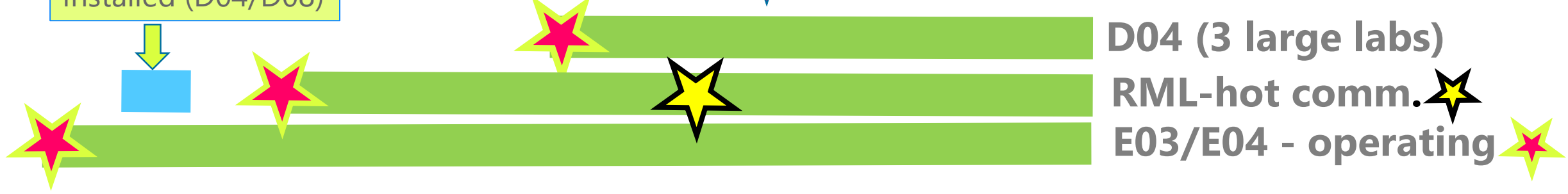
All fume hoods Installed (D04/D08)

NEW

Price increase: instead of 800k€ for rest of D04/D08, now ~2.3 M€ (incl. MPS)

D04 (2 small labs)

D08



2021 2022 2023 2024 2025 2026 2027 2028

★ BOT

Installation (D04/D08)

2

Area Coordination, Lab
operations & maintenance

ESS Project Support

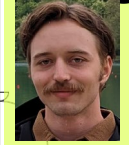
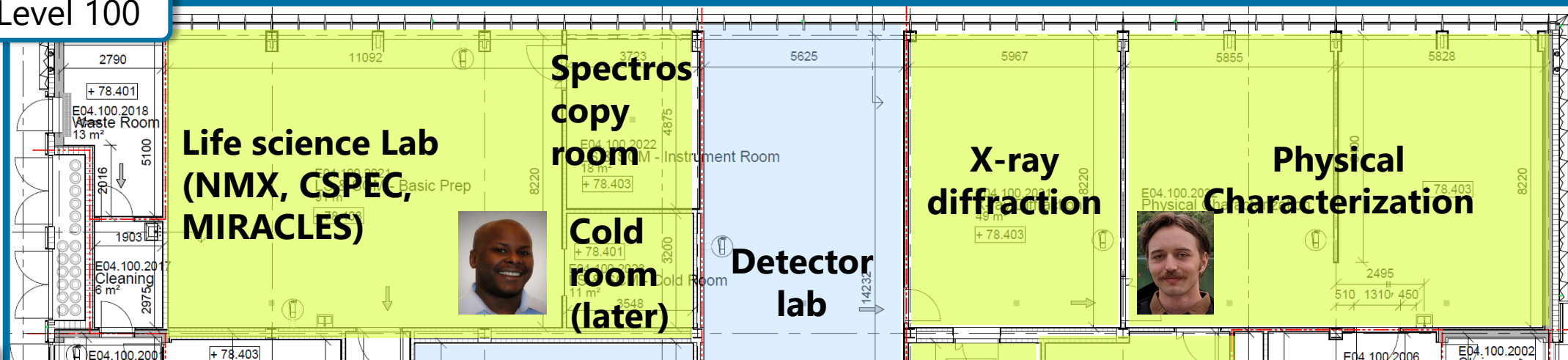


Operating Labs: E04 Level 100/110

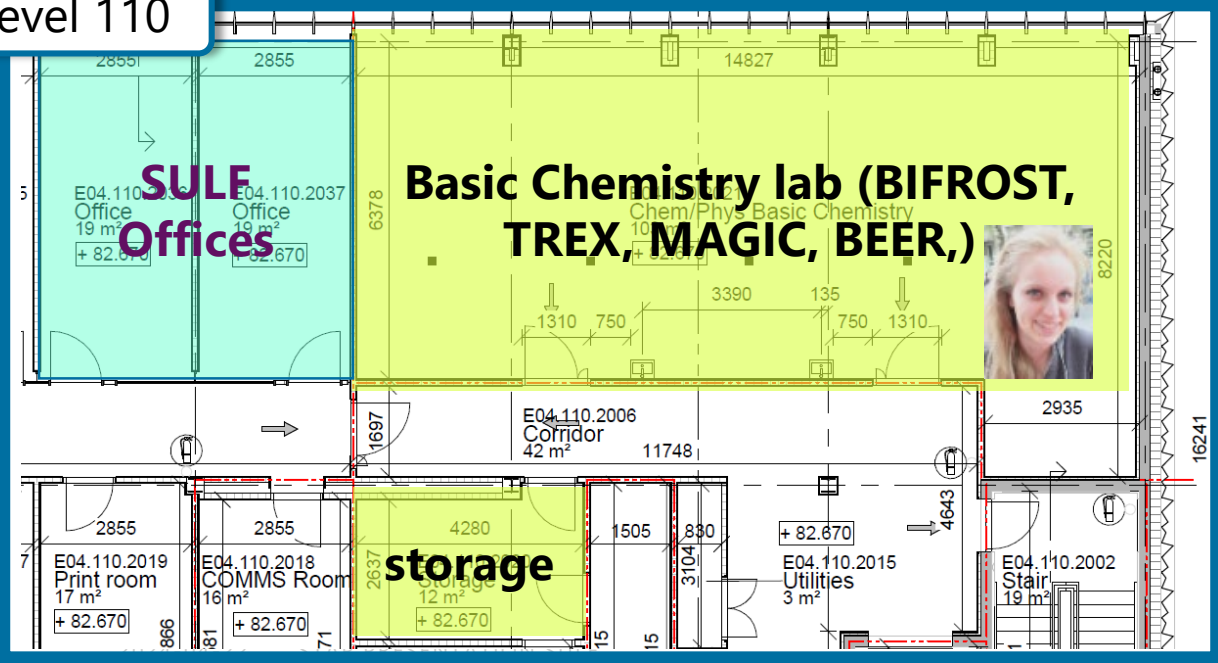
Area coordinator: Katrin



Level 100



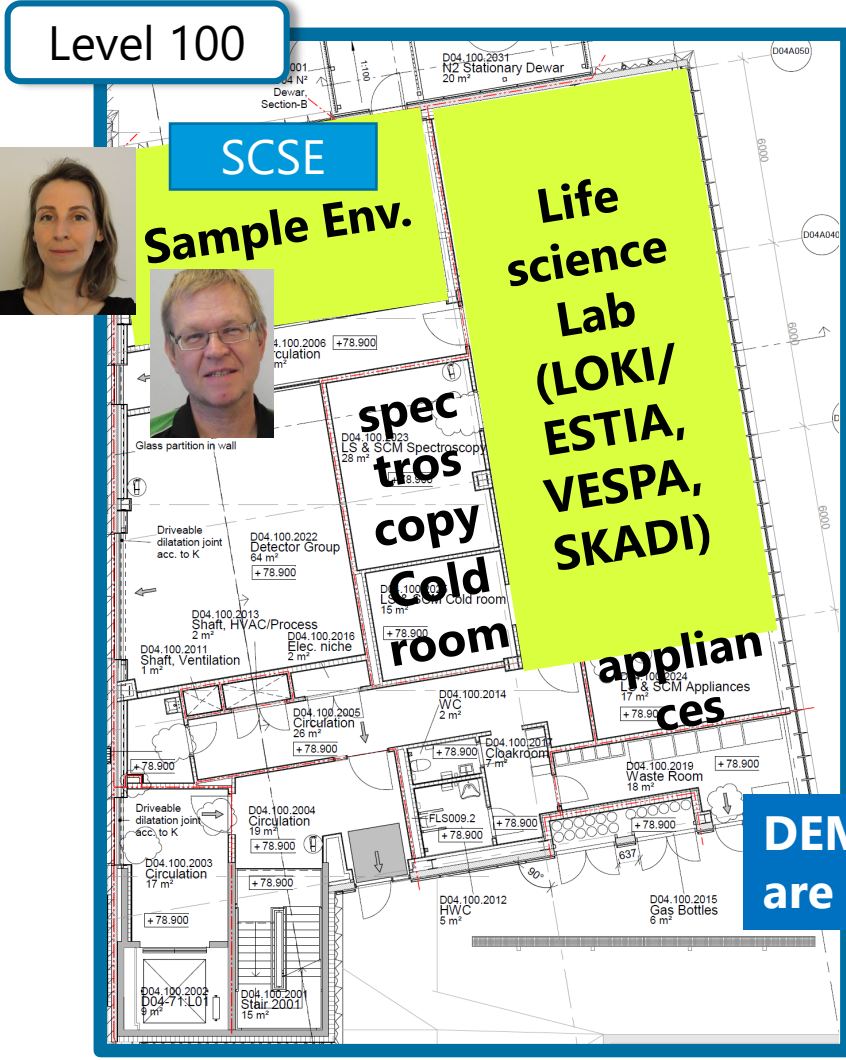
Level 110



Offices: Katrin, Melissa, Nick

D04 is operating

DEMAX move complete Q3/23, area coordination: Ghazaleh



STATUS:
Electric & Data fully working;

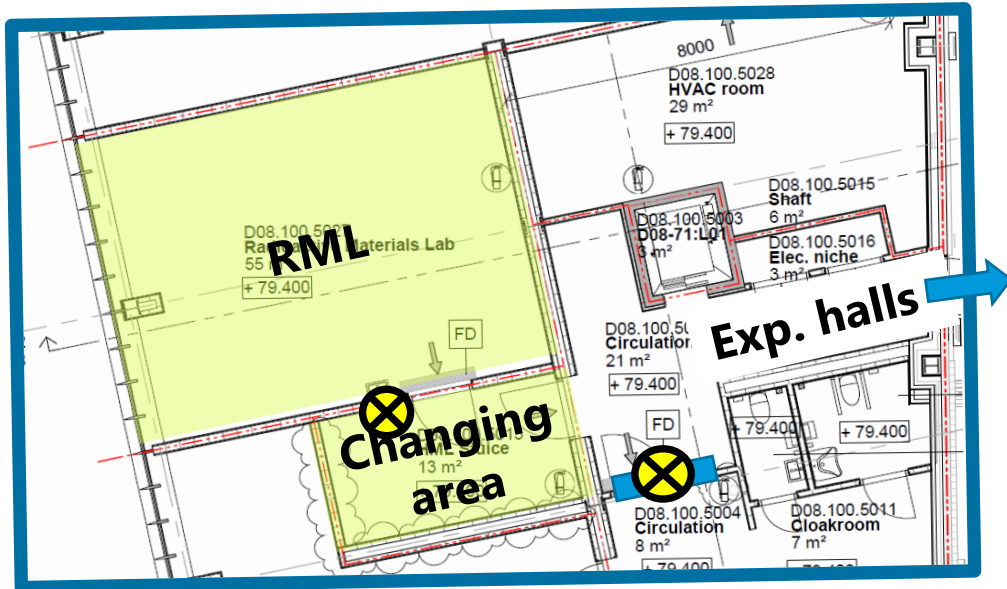
- N₂-gas operating,
- House vacuum operating in fall,
- House gas installation with D08 gas installation.



Thanks to Anna, Jia-Fei, Harald and Alice for commissioning!

Commissioning finished: RML in D08

“Hot” commissioning of radioactive materials lab in fall 23? 2024



⊗ Radiation monitor

Test cases:

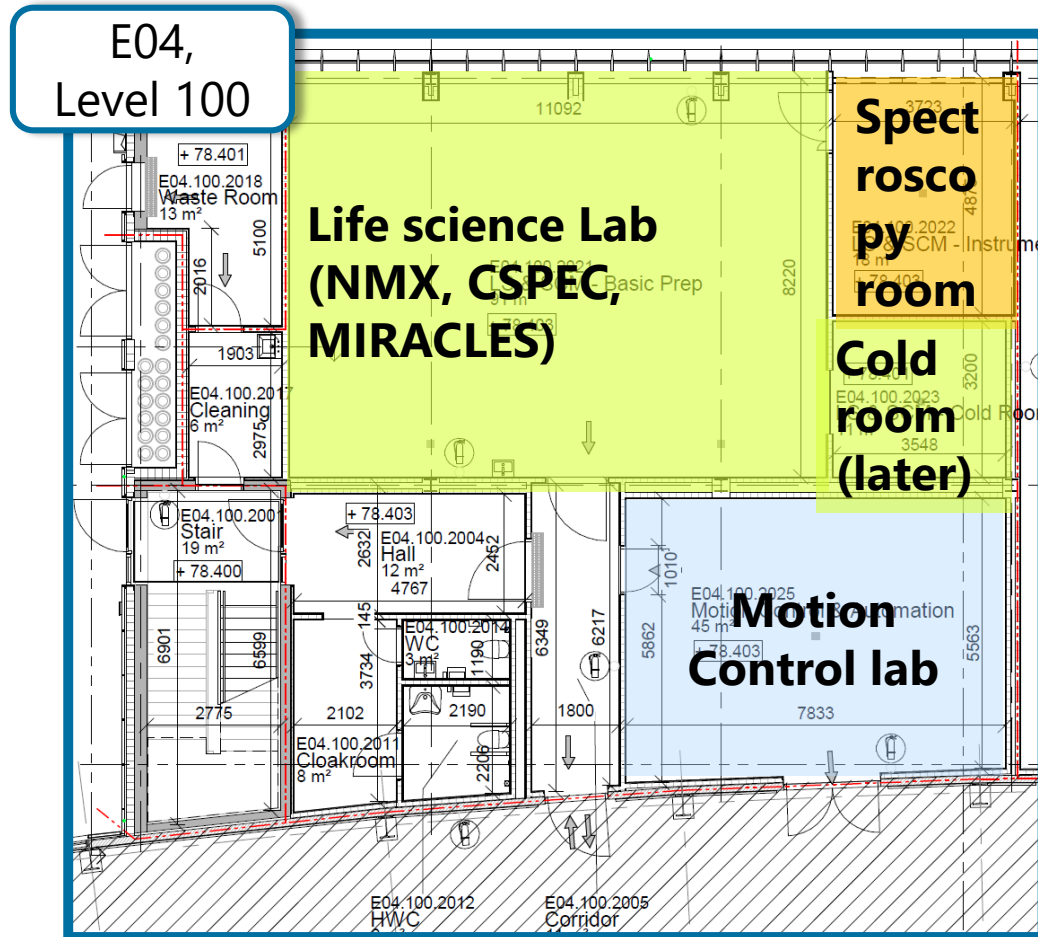
- H&F Monitor need (already at ESS)
- Filling of catalyst into vessel for target cooling water (May 2024)
- tensile testing of proton beam window



Changes in layout



Spectroscopy lab moves to D04 to be close to SCSE

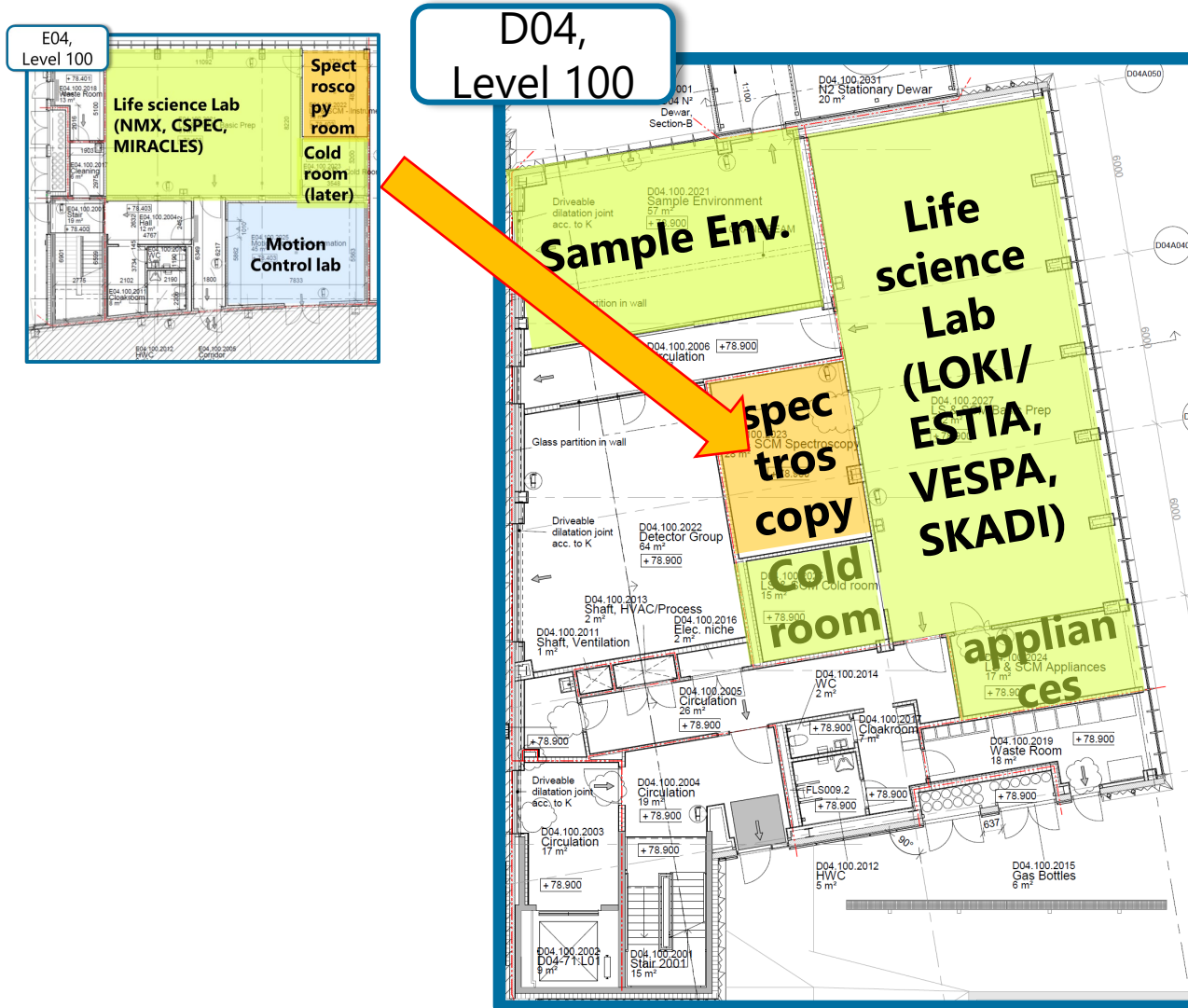


- There is more and more work with cell cultures at neutron sources.
- CLS has the know-how to establish a small area for cell culture work at ESS close to NMX (but also for SANS, QENS, NVS)
- Spectroscopy room on ground floor or E04 is suitable (badge reader on door, can be kept clean)
- Zoë & Katrin are working on coming up with a layout including – incubators, lamellar-flow cabinets and others...
- At the moment S1 lab is planned

Changes in layout



Spectroscopy lab moves to D04 to be close to SCSE



- Spectroscopy lab moves to D04, ground floor close to SCSE
- Will establish a laser lab (Alice, Harald) that can be used for users (Raman system, flash photolysis...) but also for the SCSE team to align pump probe system (sample environment equipment)
- Reasoning: SCSE workshop in D04 is too small for an additional optical bench // SCSE laser system is not only necessary to align the pump probe setup but is also good for research purposes

SULF – lab operations / core business



Main issue still – lack of time/staff

Daily tasks (core business):

- keep instruments calibrated and maintained, train colleagues
- update lab safety guidelines, perform quarterly safety walk-throughs (successful first official walk-through with OHS and safety delegate Q1/2024)
- chemical inventory, order I-N₂ & gas cylinders, chemical waste removal
- procurement of consumables/glassware, chemicals and basic setups for D04 and D08

Unavoidable issues:

- single-point failure: a lot better/less since DEMAX is on-site
- systems change without notification (procurement, access, EAM,...) and cause disruptions
- need more time/staff (installation, CLS bureaucracy is time drain)

ERASMUS internship chemical/physical technical assistants:

- 2024: two applicants (CTA/PTA) for SULF and SCSE -> will continue and maybe expand to 3?

SULF – non core business



Still too many things...

Challenges:

- Good relationship between SULF and OHS, but a lot of extra tasks are pushed onto SULF that are unnecessary or should be handled by OHS (inventory transition, experimental safety review, waste water analysis/online system???)
- communication with office support difficult – desire that we follow same rules as (rented) office building B01, but services are not the same. Waiting times are long (conference room);
- Facility management would like SULF to be responsible for gases (ordering, handling, repair and maintenance for gas lines) – this should not be our job
- Building Management Responsibility for D04, D08, E04 will go over to Monika and area coordination to SULF (Katrin E04, Ghazaleh D04, Monika D08). Time taken away from core business.

Successes:

- liquid N₂ and N₂ gas will now be provided by ESS Cryo group.
- chemical waste management works (mostly) well

Equipment renewal and extension

What has been done to the list from 2022



Larger equipment wish list (2022):

- ~~CHN+S elemental analysis (approx. 80 k€)~~ on the way ✓
- ~~polishing setup (15 k€)~~ in use ✓
- ~~benchtop NMR (approx. 70 k€)~~ need extra funding
- ~~reflectometry setup for XRD (approx. 100 k€, 2x 50k€)~~
Or new machine (150 k€) grant + in-kind (300k€,Hanna)
- camera for microscope& software (15 k€) **Q3/23**
- ~~cutting/-(30 k€)~~
- spin coater (20 k€??) **Q3/23** (NGO budget?)
- ~~electrochemistry module for corrosion potentiostat~~
need extra funding (operations in-kind?)

Procured by collaborators:

- ~~Parr reactor (procured by Target)~~ ✓
- ~~Gamma spectrometer (Neutron Optics)~~ ✓
- ~~universal tensile machine (with Beam diagnostics/engineering)~~ ✓

New on list

- **GC-MS (target)?**

Budget per year 220 kEUR (flat):

- € 41k ESS project support
- € 120k consumables
- € 60k equipment (renewal, small)

Installation (D04/D08)

Lab operations & maintenance

3

ESS Project Support

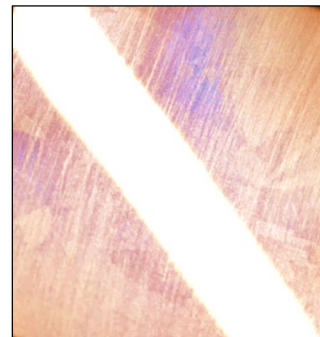
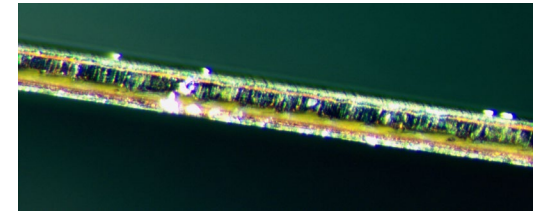


Project support in the pas 6 months



Demand still constant

- Capacitor silver coating (RF system accelerator): SEM measurements to determine thickness, setup to perform electrochemical Ag coating
- Cooling water for klystrons - Cu analysis using ICP-OES
- Radiation damage in Cu (DTL, accelerator) - grain
- pH/conductivity/dissolved oxygen in water for accelerator/target/general ESS water systems + expertise in water chemistry
- target cooling water loops –fill catalyst into vessel (May 6th), assist with Raman system for investigating H₂/N₂/O₂ levels in gas expansion tank
- He circulators for target cooling use 300l oil -> need to assure filters for contamination are working:
 - test with H₂ gas at 3 bar 60 C to assure tritium does not react with the oil (Parr reactor)
 - Oil quality check (expensive oil exchange): rheology/viscosity (Rheometer) // water in oil (Karl-Fisher titration) // metals (ICP-OES)
 - GC-MS needed for determining (NO !) oil in He gas
- CSPEC - quality of Cd for detector ICP-OES, ¹⁰B-content of collimator blades





Response to STAP/Charge

Issues raised in STAP report from fall



- **D08/D04:** Management input based on instrument teams needs, as well as a **proper budget and plan must be provided to complete the installation of this space as soon as possible.** D08 will support the user program, but also other activities during construction and commissioning of ESS. D08 will be essential for ODIN (hydrogen handling). The STAP also has concerns over the remaining fit out of D04 ~25 %. What kind of values and scale/scope of work are we talking about here? What impact is this delay likely to have and over what time scale?

We are happy to report that we have received the budget to complete D04 and D08. If we manage to stick to the schedule, there will be no impact on hot commissioning for the instruments.

- Budget: **The current CLS/SULF budget** for capital equipment to support the user program long-term **remains insufficient.** A plan for regular investment between now and first user program (2027) should be developed. Financial support for completion and/or operation of the support labs is sorely needed. Recent increases in inflation and supply chain disruptions are impacting current budget estimates negatively.

We have requested budget for steady-state-operations (see SSO report). The budget increase needed now has not been discussed internally but SULF was asked justify the current spending with the labs not being in the user program yet.

Issues raised in STAP report from fall



-continued-

- Staffing: CLS's mission will ultimately be directed heavily toward chemistry, biology, and soft matter/polymers. Multiple specialized labs will support this mission at ESS. **The broad array of science to support will require a corresponding set of technical skills** (e.g., bio, soft matter/polymers, and chemistry) to run the labs. Develop a plan to ensure that the proper expertise is in place by 2027.

Hiring is currently not moving forward until SSO has been decided.

- Interaction with instrument teams: This topic has been addressed in the DEMAX and SCSE sections. SULF needs concrete feedback from instrument teams to decide on infrastructure and equipment for the labs that remain to be equipped.

...

Interactions with science have provided good input. Communication session at next Science Directorate Away Day.

Charge to STAP



(1) **We need to hire a PhD chemist** as second scientist for SULF. In CLS, we are well covered for topics in life science & protein crystallography (Zoe), lipids & reflectometry (Hanna), and general chemistry & inelastic scattering & SANS (Monika). We have several soft matter experts of various flavors in the Large Scale Structure Division. **Should we hire another general chemist** to help cover the wide science area to help support and balance the planning for operations in all three lab buildings or should we go for a polymer scientist or organic chemist with focus on D04?

(2) We are now at a point that we have requests for common items with many expected users (spectrometers, microscopes, sonicators,...) to be close to all the experimental halls and present in all buildings for fast access. **Do we start spending money on duplicating most used small and medium-sized equipment or do we rather try to procure missing larger equipment.**

Charge to STAP



(3) The long-term planning for steady-state operations at ESS is ongoing. SULF within CLS will have to justify asking for more than the planned 6 FTE to cover 25 labs in three buildings including the RML which will need to be under constant supervision. The staff is to cover the lab operations but also the sample handling/barcoding aspect for the user program as well as providing access training and maintain safety the labs.

How many people do we really need to

(a) have a critical mass of people to be able to run labs in three buildings safely

(b) to provide scientific support to the users when needed and

(c) to maintain the expensive lab instrumentation so it is ready to go when needed.

(4) There is as yet no dedicated funding for many types of lab equipment that is both essential or more advanced characterization in the absence of an overview of the expected equipment and service to be delivered for first science, and towards steady state operations. While this will be explored by I2S in conjunction with the first science workshops, **advice on how to approach the prioritization without of knowledge of available budgets would be appreciated. Balances and spectrometer for everyone or more targeted/advanced equipment staged to match the instruments coming online?** Bearing in mind that all 15 instruments come on-line within a few years.

Thank you for the attention.

