

SAC members present: Harmut Abele, Debora Berti, Elizabeth Blackburn (Vice Chair), Anne Borg, Jacqueline Cole, Fabrice Cousin, María Teresa Fernández Díaz, Victoria García Sakai (Chair), Stephen Hall, Annette Eva Langkilde, Maria Paula Marques, Martin Sahlberg, Frank Schreiber, Romain Sibille, Bill Stirling.

SAC.32 was held at ESS with complete on-site presence and welcomed five new members, Harmut Abele, Debora Berti, Anne Borg, Frank Schreiber and Romain Sibille. The SAC discussions were lively, with strong engagement from all members, but suffered from limited time. We ask ESS to keep this in mind when drafting the agenda for the October meeting. We thank ESS for addressing our previous recommendations and comments so diligently and also thank the STAP chairs for their reports and input.

SAC would like to thank the ESS for the tour and take this opportunity to congratulate all staff for the impressive progress with the project to date. The tour highlighted the scale and complexity of the ESS project, and the clear drive to get the accelerator ready for beam on target (BOT). The SAC enjoyed the very interesting talk by Zoë Fisher highlighting the important role of neutrons in drug discovery and design, with a particular emphasis on neutron protein crystallography and the successful work of the DEMAX platform.

Updates from ESS Council, ESS Director General, Science Directorate, Instruments, Detector Group and STAPs

SAC to note and comment

General Comments

We welcome the work undertaken by Council to help the organisation transition from a project to a world-leading operating facility. Of particular interest to the SAC for the next meeting are updates on work being done on the ESS mandate and progress with the operational budget and implications for staffing and instruments and the user access policy.

ESS is taking shape and there are many areas where progress is really impressive. The accelerator tunnel is near completion, the target is in and closed, and the personal safety systems are being installed. This indicates that the milestone of beam on dump in November 2024 will be met. SAC notes the move to the next phase of the project, with commissioning of systems commencing. SAC also notes three major risks at this time: a number of high value items that could have serious financial implications, issues around operational performance including licensing, and the vulnerability of some instrument projects.

The risk to instruments is, of course, the one that concerns us most. We note a significant amount of slippage in some instruments, particularly within the spectroscopy suite, with, in principle, only 3.5 years left to deliver 15 instruments ready for hot commissioning. In Helmut’s words “Completion means reaching the promised scientific performance and where possible even reversing the descoping.” The SAC is very concerned about the impact of further slippage to instruments on the eagerly awaiting scientific user community and to the European neutron landscape more generally. SAC reiterates the importance of ESS delivering the maximum number of operationally ready instruments and of the technical performance

as advertised, on time. We thus recommend ESS think carefully about how to proceed within the limited timeframe.

We remain concerned about the relationship between the ESS and IK partners. The relationship, one of collaboration, requires partners to understand their accountability for delivery, and requires the ESS to be responsible for ensuring that projects are supported and managed to enable delivery as agreed. This includes managing the collaboration and intervening when necessary, especially when things are not going as expected. One observation is the limited IK partner staff presence on-site. This is a concern that we have raised in previous SAC meetings, and we are left wondering why this is still not in place at the necessary levels.

We thank Pascale Deen, Tom Arnold and Mikhail Feygenson, the new science division heads for detailed instrument updates. We note many successes, clearly visible throughout our tour of the facility, but also a number of worrying issues, both of technical nature and around staffing. There has been an increase in open or soon to-be-opened positions. With the information provided, we are unsure if this is a part of the planned ramp-up or an indication of an increase in staff turnover, and if so, if the ESS understands why; SAC were left wondering whether this could indicate discontent with the organisation and/or its culture. We thus request for some clarity at our next SAC meeting with specific attention to staff turnover, current and planned SSO staffing levels (including ramp-up) on a per instrument basis, and more detail on current and planned roles in instrument teams. Insufficient engineering and technical support for some beamlines is highlighted, with the worry of sub-optimal use of staff skills/expertise and experience to perform the tasks at hand, could be causing delays and dissatisfaction among staff. Of specific concern is ODIN, which at present has no dedicated permanent engineer on site and the lead scientist is soon leaving ESS, LOKI and the TBL with no data scientists, all in tranche 1, but also ESTIA with the instrument data scientist and lead engineer are recent recruits, and BEER suffering a temporary loss of lead engineer. Stable long-term solutions must be found soon to avoid risking delays on the initial instrument suite.

Finally, we note the changes to the order of instrument deployment/readiness (for example CSPEC was initially in tranche 1 and now is one of the last instruments alongside VESPA), and the re-planning of the later instruments. We appreciate that change is inevitable with such a sizeable project and that the plans at the time of the re-baselining may have been unrealistic. However, we would like to understand the impact of these changes in terms of first science and ESS's scientific success demonstrators. We also recommend informing the community of these changes, as well as of any other risks or major delays, as soon as possible.

Science Directorate. We are pleased to see the new structure now in place, that the moves of DEMAX and DMSC are complete, and that in general the directorate is beginning to settle into a steadier state. As always, scientific life is thriving which is essential for such a team. There is good progress with activities related to preparing for hot commissioning and first science, including many opportunities of user engagement and outreach activities planned. We note plans to launch a proposal call by the end of 2025 or early 2026. We recommend caution around the timing, ensuring appropriate readiness of systems and a clear knowledge

of what exactly the ESS will be able to offer and when. This should be carefully communicated to the user community to manage expectations appropriately.

Detectors. We thank Kevin Fissum for his update on the detector group. We are very happy to see that the team is working well and the evidence of a very different culture within the team (“no one works alone”). The team has a clear roadmap and prioritised objectives, that align with the instrument roadmap and are resourced appropriately. We note good progress on a number of fronts.

STAP reports. The SAC thanks the STAPs for their continued hard work to support the ESS. We note that neither the reflectometry nor the spectroscopy STAP met this time and highlight that the latter has not met since April 2023. SAC recommends that ESS reconsider bringing back or reconstituting the spectroscopy STAP and think about which expertise will be most valuable at this stage of the project.

Overall, the STAPs identify many positive developments. Several STAPs are acting as crucibles for developing first science ideas, with multiple methods suggested. The Diffraction STAP is most advanced in this area and could provide a template to other STAPs. Discussions on first science have also highlighted a lack of clarity around the practicalities of both hot commissioning and first science from the user perspective.

Several STAPs have highlighted issues with quality control, at both the internal and external level, as well as severe constraints on the availability of engineering resources. They have also noted issues around staff recruitment and retention at multiple levels, which illustrates that significant parts of the instrument projects are dependent on specific individuals.

Moving to some more specific comments from the STAPs, we strongly support a full detector re-scoping on all 3 diffraction instruments and funding of the remaining 25% wide angle polarisation analyser for MAGIC. We note the positive news of testing an enriched Gd detector for NMX to increase detector efficiency and agree with the STAP’s recommendation of taking quick action on this, and reiterate their concern that a single fixed prototype detector is not sufficient for user experiments. The Material Science and Physics Support (MSPS) STAP highlights the benefits of visits to other facilities and agrees with the Steady State Operations (SSO) Review recommendation of joining Chemistry and Life Sciences (CLS) and MSPS as a single group, but note the potential risks of another structural change. DMSC notes both good technical progress and more stability following the completion of the move to DTU. It is now the time to articulate a compelling vision that exploits the opportunities of the two-site model, to clarify the expectations for instrument data scientists and EC-DC staff, to understand the full user workflow and to finalise a decision on the future location of the DMSC server room after vacating from Copenhagen by September 2025. The STAP for fundamental physics, now a part of the ESS science portfolio STAP, met for the second time. Work remains to better interact with this community and agree needs and capabilities and it remains unclear whether there is a liaison person for fundamental physics at ESS.

Rescoping prioritisation, User access policies, Steady state use cases, Identifying first science, Update to ESS science case and call for next instruments.

SAC to advise

Rescoping and Benchmarking. SAC thanks Pascale for the more detailed presentation on instrument benchmarking at 2 MW. However, we were disappointed not to see the performance comparison at a reduced power of 0.8 MW (expected at initial operations), and we note little progress from SAC.31 on how this data will inform plans for prioritising the re-scoping options. Achieving a fully scoped suite of instruments remains a priority for SAC and we request that a priority list is presented at SAC.33 detailing costs versus gain/return of investment per instrument, as well as an implementation plan.

User access policies. The SAC did not have time to discuss this in detail but is happy to provide feedback on the user access policy via email.

SSO review. We thank the ESS for sharing the relevant findings and recommendations from the SSO review, some of which resonate with previous comments from SAC. To gain a better understanding of SSO, the ESS has started working through use cases. SAC views this as a worthwhile exercise and advises the ESS:

- to broaden the set of use cases and the dimensionality of the set; e.g. not only consider different types of experiments, but also different types of users (of varying experience levels), consider users that bring their own sample environment equipment, consider the possibility of future remote experiments, etc...
- to review the number (and scope) of 'roles' that have been identified throughout the experiment pipeline
- to broaden their advisory group; make use of STAPs, ask currently operating facilities about their experiences on user expectations.

Readiness for FS. In general, work to date in getting ready for early science is progressing well, with the directorate finalising user access policies, running through the experiment workflow, and identifying FS cases, with some good engagement activities with the user community. Further work is needed but pace and direction are good. We recommend that ESS takes advantage of the expertise of the STAPs in many of these tasks. We note for example the good work already started in partnership with the diffraction and SANS STAPs to identify candidates for FS (following different approaches) and recommend that the relevant science division heads lead work with other STAPs to follow a similar process. For the particular advice from SAC on aspects such as level of support (e.g. out of hours, travel and subsistence, guesthouse), we would prefer to do this via a clear set of specific questions given to us via e-mail or ahead of the next meeting.

Plans around the 'who' will be doing hot commissioning and first scientific experiments were not clear to SAC and would ask for clarification at SAC.33. In addition, we had some concerns around the level of staff expertise for commissioning activities. Regarding first (or friendly) users, we are unclear of who these users would be, and how they would be selected. We note that memoranda of understanding are being signed with institutions regarding their involvement in hot commissioning and first experiments. SAC believes that it

is vital that the instrument teams are recognised as the key part of an instrument's initial scientific output. Information about science during these commissioning and early science periods should be relayed clearly to the user community, to manage expectations.

Updated science case. We note the work being undertaken to update the original science case for the ESS. However, we are not clear about what the purpose of this work is. Given the state of the project and the work that remains to make ESS a success, we recommend a much narrower focus on the identification of the scientific demonstrators.

New instrument call. We thank Sindra for her presentation which helped SAC understand the plans and timing of the ESS proposal for a new instrument call relatively soon. The suggested process outline presented is appropriate and clear. The SAC supports such an instrument call, and supports the proposal to have the individual projects fully owned by ESS, rather than through the in-kind mechanism. The SAC voiced multiple viewpoints on the specifics of the timing and duration of the call. Some points raised include the recommendation to wait for a successful and sustained BOT, the concern that such an exercise may distract from the current objectives and needs resourcing which could be better utilised in other parts of the organisation, the question of how to fund the instruments and how to manage expectations for the proposing teams. On the other hand, we note the existence of high momentum and enthusiasm from multiple communities to propose an instrument and worry that further delays in a call for new instruments would lose or fracture these community efforts. SAC would recommend that when ESS launches the call, it remains open for some time (18-24months).

V. García Sakai, 17th May 2024

Cc: all members of the ESS SAC, STAP chairs, Giovanna Fragneto, Helmut Schober.