

Sample Environment STAP Report – March 2018

Executive Summary

The Sample Environment (SE) team is responsible for setting up support workshops, providing and maintaining a pool of sample environment equipment, and assisting with the integration of non-pool equipment into the ESS working environment. The SE team needs to combine the best practices in place at other neutron facilities.

Workplace safety is a key priority, and the STAP is pleased that a health and safety engineer has been recruited and is supporting the Scientific Activities Division. The STAP is surprised and disappointed that standard utility supplies, such as electrical points and water, for the sample environment workshops are not included in the ordinary room construction. Quality assurance needs to be resourced at the appropriate level in the institution; the SAD staff should not be dealing with this alone.

The team is presently focussed on providing full support for the first eight instruments. There has been a clear effort to establish chains of communication with the instrument teams, and this is incorporated into the tollgating process. Planning is clear, but needs to be fleshed out with more short-term deadlines (e.g. quarterly milestones), particularly with respect to large procurement and in-kind contributions.

The team also needs to look beyond the equipment and start to prepare for the day-to-day issues of handling sample environment within a user programme. This also includes interactions with parts of ESS beyond SAD and the instrument teams. This should be done over the next year.

Introduction

The STAP met in a joint meeting with the Samples and Users STAP, with a mix of joint and separate sessions. We were charged with considering some items together, and some separately. This report will consider the questions raised by ESS first, and then cover other issues identified for discussion by the panel. Before doing that, we will briefly summarize developments since the last STAP report.

Developments from the last report

In our report from April 2017, we made several recommendations. Of our key recommendations, the following have all been clearly addressed:

- A health and safety engineer has been recruited and is supporting the Scientific Activities Division (SAD), and information on this is addressed elsewhere in this report.
- The imaging and engineering user community and instrument teams have been consulted, and Malcolm Guthrie is in the process of compiling detailed information on specialist sample environment for this area. There is also a proposal to redistribute some funds in this direction.
- The technician recruitment process has been started, although is not yet complete.
- Information on Day 1 priorities is discussed in more detail elsewhere in this report.
- Communication chains with the instrument teams have been established, and should be built upon for successful collaborative project development.

Some of our prior key recommendations remain in place, or were not specifically addressed in our most recent STAP meeting:

- The issue of shielding of sample environment equipment from the intense neutron beam needs to be clearly addressed, and the ownership of the issue on a case-by-case basis established. This requires close collaboration with the relevant instrument designers. We note that this issue can destroy the feasibility of a given experiment, or make equipment changeover impossible in a reasonable period of time.
- The Sample Environment team need engineering support (internal and external). An appropriate solution has to be found that includes a well-defined interface with central engineering services.
- Develop a clear, short-term timetable (e.g. quarterly milestones) and steps to achieve these aims. The STAP is pleased to see work on projects between pairs, but we still encourage the team to practise working together. To this end, we recommend identifying some joint projects that bring the team together, and make use of all of the team members' individual skills and cross-expertise understanding. This will help to identify which skills need broadening across the team.

Specific Discussion Points Raised by ESS

Day 1 Priorities

The Sample Environment activity at ESS is clearly and correctly focussed on the sample environment for the first eight instruments. The sample environment staff have liaised with the instrument teams, through various mechanisms, including, but not limited to, attendance at instrument STAPs, the tollgating process, and informal meetings. The standard of engagement between the instrument teams and sample environment team varies from instrument to instrument; this should be standardized where possible. Prioritization lists have been adjusted based on Day 1 science cases. However, essential equipment should not be neglected, as they will be needed for the majority of users.

Recommendation: together with the instrument scientists, develop estimates of likely equipment demand for each instrument.

The **equipment** required for these targets is drawn from a mix of in-house procurement and in-kind contributions. Timetables for the procurement processes are available, but not all time/stage dates are included, and this needs to be up-to-date. Delivery of an item is not the same as being 'user-ready'. On the timetables presented, there will be a period of about a year after delivery of the key equipment for the first eight instruments, for testing and final integration, prior to possible first use. The STAP would like to see a clear timetable for testing, with a particular eye on manpower resource, considering the number of items involved. The STAP would also like to be given information on the dates of key milestones for the in-kind contributions. This is particularly important for very expensive items like the magnet provided through the French in-kind contribution.

Recommendation: development of plans (for both in-house and in-kind projects) for equipment testing and cold commissioning.

Recommendation: individual work-load expectations to be provided to the STAP at its next meeting.

For the testing and preparation of high-pressure equipment, a shielded test room (STR) is required. While there are some open questions as to whether two STRs are required, we encourage Malcolm Guthrie, the high-pressure lead, to design the STR and start procurement. A decision on the location is needed; this may be outside the supervised zone in the first instance. As a part of this design, other options for sample loading, as opposed to cell testing, may be explored. One of the STAP members, Prof. Stefan Klotz is happy to provide advice on the design aspects of this.

Beyond the equipment, **staff preparation** is also an important aspect of Day 1 readiness. We *strongly recommend* that the theme leads visit (for weeks or months) other neutron facilities during active operations to work with the host sample environment teams. It would be of particular benefit to be involved in the installation of sample environment that will also be available at ESS, such as the rheometer. This should be done this year where possible, as many of the procurement tasks may be pursued remotely. In two years' time, the pace of work will have shifted such that this may no longer be as easy to do. We make this recommendation to give the theme leads more practical experience of the day-to-day issues relating to handling sample environment for a user programme. This will also help cement contacts with existing centres of good practice. Accordingly, we also *strongly recommend* that the entire team attend the ISSE Sample Environment Workshop in Berlin, in September 2018.

Recommendation: team leads to take secondments at sample environment groups at other neutron facilities during normal operation.

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Full experimental suite completion

The timeline for the completion of the full experimental suite is too far away to make detailed comments on the sample environment plans; they look appropriate at this stage.

Utility Logistics

The sample environment team have developed good protocols and plans for various important features, such as kinematic mounts, utility patch panels, vacuum pumps, and management of cryogenic liquid supplies. When in operation, the STAP thinks that support and maintenance of these features more properly falls into the remit of the experimental hall services (i.e. plant and services, or instrument support), rather than sample environment. We encourage SAD to explore *now* how this workload will be managed in the operations phase.

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Specifically relating to cryogenic liquid supplies, firm decisions on the supply and distribution setup need to be made in discussion with the Accelerator Cryogenic team and the Conventional Facilities. This should cover the helium recovery system, transport dewars, costs and

responsibilities, and needs to be done in time to be implemented in the buildings. If some of these things are not implemented at this point, the cost increases significantly for retrofitting.

Workshops

The STAP is surprised and disappointed that standard utility supplies, such as electrical points and water, are not included in the ordinary room construction. Given this, the STAP notes that additional resources are required for workshop fitting and that the budget allocated for user lab outfitting will now only cover 1/3rd of the lab space.

The proposed workshop space for sample environment outside of the supervised zone does not sound appropriate for the requirements of the Sample Environment group. SAD should anticipate that the mechanical workshop inside the supervised zone will have to be shared with other users, which should be discussed now and perhaps can also enable cost sharing.

Recommendation: we encourage SAD to explore how the mechanical workshop will be shared, with a view to enabling cost sharing.

Software integration

There is a bottleneck with ICS and DMCS support for integration into the standard control systems. Broadly, the integration work is going well, with a lot of progress made in multiple areas. Good documentation should be maintained on all sides, so that staff turnover does not result in too much lost time.

Conventional safety

We are happy to see that a health and safety engineer has been appointed working (also) for the SAD team. We strongly encourage her to visit MAX-IV and related large-scale neutron facilities, where there are established good practices (including on user safety training), to speed up development of appropriate procedures and protocols for ESS. In particular, the safety engineer must rapidly get acquainted with the different types of high pressure equipment currently used in other neutron facilities to be able to properly assess potential hazards. We also recommend making contact with the safety engineers at Lund University.

The sample environment staff also need to find out what the right questions to ask are, regarding safety. For each piece of equipment, there should be a risk assessment completed early in the commissioning process, with particular focus on the development stage. As an international facility, there will be many different expectations as the staff and users come from many different backgrounds; this will have to be navigated by people experienced in the local environment.

Quality assurance needs to be resourced at the appropriate level in the institution, and should not be left solely with the sample environment team leads. The SAD staff should not be dealing with this alone.

General Comments from the STAP

The sample environment team should be primarily focussed on sample environment issues. The line management should make sure to manage work balance across the group, and that the tasks assigned are appropriate for the team. Domains of responsibility should be clearly defined, recognizing that this may be different in construction and operation phases.

To assist with this, we have some suggestions:

- Each team lead should have a science-focussed project in their area of work, to provide a driver for active research and development. We recognize that this must be fitted in with many other active responsibilities.
- The establishment of internal deadlines may assist with workflow.
- Individual work load expectations should be established. This will help with planning for testing and commissioning.
- The balance of meetings in the work schedule should be re-evaluated, perhaps by making some not compulsory. The STAP recognizes that it is not in a position to say anything further.

The STAP endorses the proposal to shift resources (100 k€) from the portable laser heating system to support of imaging/engineering-specific sample environment. The list of potential items is still in development, but this is being done in close collaboration with the instrument teams and broader community.

The sample environment website will eventually need to provide details on available sample environment systems and associated instrumentation for users. The team could make a headstart on this by providing detailed information on completed and ongoing projects.

Final Remarks

The sample environment team is clearly focussed on Day 1 priorities. The STAP welcomes this, and emphasises that the team must have sufficient support to be able to carry out this work safely. As a part of this, project milestones and deadlines need to be clear, to focus work efforts and provide deliverables.

The STAP considers that the key missing area is in preparation for the duties involved in supporting the user programme. As such, we recommend that the team leads take secondments at sample environment groups at other neutron facilities during normal operation.

Thanks

We would like to thank the Sample Environment team for fruitful discussion. The panel enjoyed their detailed presentations and open discussions. Giovanna Fragneto is stepping down from the STAP, and we thank her for her work on this.

Elizabeth Blackburn, 20 April 2018