EUROPEAN SPALLATION SOURCE

Date 24/10/2016

Summary of FREIA Scope-Setting Meeting

Meeting Date
17/10/2016

Location
ESS HQ, Linneasalen

Chairman
Andreas Schreyer

Attendees
Jim Nightingale, Kevin Jones, Ken Andersen, John Webster, Sean Langridge, Clara Lopez, Hanna Wacklin, Gabor Laszlo, Oliver Kirstein, Zoe Fisher, Francesco Piscitelli, Thomas Gahl, Erik Nilsson, Kristina Jurisic, Phil Bentley, Natasha Cherkashyna, Damian Martin-Rodriguez, Iain Sutton

Markus Strobl, Shane Kennedy (during final sessions)

It was agreed that the instrument configuration corresponding to the cost category budget (configuration 1 of the scope-setting report) is neither able to make good-quality measurements, nor upgradeable to the full scope in a reasonable manner.

ESS management pointed out that the budget of the configuration 3 instrument is so high that it would preclude the delivery of another instrument within NSS.

In respect of configuration 2, the FREIA team did not provide compelling evidence that

a) the scope of world class instrument has been benchmarked against best in class, and
b) that all efforts had been made to reduce the initial cost toward the cost category of 9 M€.

In order to move forward towards resolution, it was agreed that the instrument presented as configuration 2 in the scope-setting report will form the basis of the scope and budget for FREIA, though its cost book value needs to be significantly reduced. The main topics and actions arising from the meeting are summarised below.

- It was noted that FREIA plans to enter into hot-commissioning in mid-2023. This timing places FREIA outside the first 8 instruments. It does, however, provide opportunities for accessing operations funding before the start of instrument commissioning.
- Pre-build will take place at ISIS, decoupling the installation programme from the ESS operational schedule until early 2022.
- FREIA, like all ESS instruments, will need to pass through the ESS tollgate reviews. Good collaboration will ensure that this will not adversely affect the instrument cost or schedule and allow early procurement of time-critical components.
- ESS management considers that the manpower costs need to be significantly reduced:
    - ESS cost book values need to be used throughout. Scientists and engineers should be costed at 60 €/hour and technicians at 48 €/hour.

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- Any savings made from the differences between ISIS effective labour rates and ESS cost book values can be kept within the instrument project.
- NSS has established a core engineering support team for the instrument projects. This team provides support for design integration, neutron technologies, systems engineering and co-ordination of on-site assembly and installation, at no cost to the instrument projects. Therefore, assuming that ISIS recruits a Lead Instrument Scientist before TG2, the ESS staff and travel costs beyond phase 1 can be removed from the instrument budget, in line with other instrument projects.
- No manpower should be included in the budget after the end of cold-commissioning. Staffing needed for hot-commissioning will be covered within the operations budget.
- The FREIA team agreed to work towards reducing the project manpower needs towards 25 PY (including contractors), representing the ESS expectation for this type of instrument. An updated manpower proposal should be submitted to ESS within one week (see points on the report further below).

- Several other cost savings were identified:
  - A report from the Neutron Optics and Shielding Group (NOSG) indicates that a saving of 250 k€ can be made in the cost of the guide, at a minimal cost in performance, by adjusting the geometry and supermirror coating of the horizontal bending (4 channels and m=4). The FREIA team confirmed that they have been looking at very similar ideas and agreed to the change in cost.
  - The lifting gear for remote handling of choppers, at a cost of 83 k€, will not be necessary, as it is covered in the chopper group budget.
  - The sample environment budget was reduced to zero, saving 392 k€, as was the budget for the sample preparation area, saving another 44 k€. It is understood that both are essential for early science success. However, given the proposed timescale for FREIA installation and commissioning, these items should be covered by operational funds and will be made available for hot commissioning.
  - The full detector of 300x300mm^2 will be built, but electronics will be provided only for the central 200x250mm^2, resulting in a cost saving of about 110 k€. This active area is sufficient for early operations and can straightforwardly be upgraded to the full physical area.
  - The cost for electrical cabling material was overestimated and should be reduced from 333 k€ to 111 k€.

- A number of issues were raised which could not be resolved at the meeting. It was agreed that the instrument team will work quickly to address the issues in a short report. NSS management requested that the report be submitted within a week of this meeting. Topics to cover include:
  - A performance comparison between FREIA and other instruments needs to be presented, which corresponds to the scope of a world-class instrument. Separate comparisons can be made for different types of measurement. This comparison should quantify the reduction in performance of all possible reduced chopper configurations.
  - A reduction in the amount of manpower, as outlined further above.
  - The bandwidth chopper system consists of 3 chopper pairs. It was proposed to replace each pair by a single chopper disk, resulting in a saving of 448 k€. This would effectively constrain the high-resolution and high-intensity modes to operate at the same bandwidth, which is not expected to have a significant impact on the instrument performance.
  - A vertical frame-overlap mirror (deflecting long wavelengths to the side) might allow one or even two of the remaining bandwidth choppers to be removed from the scope, saving 130 k€ or more. The FREIA team identified issues with beam divergence which would need to be overcome, but agreed to pursue this concept working with NOSG.

- More information is needed on what is included in the planned utilities panels, to ensure that double-counting does not occur. Panels for sample environment equipment have been specified by ESS for inclusion in the instrument scope.
- A quote for the projected cost of logistics of 250 k€ for transporting the instrument components between ISIS and ESS after the pre-build, was felt to be very high. The FREIA team will re-evaluate.

- A specific action was identified for sample environment:
  - The instrument team should provide a prioritized list of sample environment equipment, to allow the ESS sample environment group to plan appropriately.

- ESS management endorsed the main upgrade paths outlined in the scope-setting report.
  - There was agreement that GI-SANS should remain as an upgrade option. The instrument cave should be designed to allow convenient future extension, and provision should be made for GI-SANS dedicated slits in the guide. The cost impact of these provisions should be minimal.
  - The fast shutter system is an important upgrade path. Provision needs to be made for it in the instrument design and development addressing the technical risks will progress in parallel with the FREIA project.
  - Polarising the incident beam is important for magnetic reference layer measurements. The design and choice of materials for the collimation section and sample area needs to allow for future polarised-beam operation.