EUROPEAN
SPALLATION
SOURCE

ESS 1st Annual Review
2013

ESS Response to the 1st Annual Review

Report from the 1st Annual Review

Annual Review Tracking Log

EUROPEAN SPALLATION SOURCE

ESS Response to the 1st Annual Review held in November 2012[1]

19 December 2012

ESS considers the report from the 1st Annual Review to be accurate and constructive. A detailed tracking log was prepared for each of the 92 recommendations in the report. The tracking log provides the ESS response and planned action(s), responsible individual, completion date, and other relevant information for each recommendation. This log will be regularly updated and used as an internal management tool and as a communication tool both internally and externally with our advisory committees and stakeholders.

A follow-up review will be conducted in May 2014, six months after the 1st Annual Review and one month prior to the start of facility construction. The May 2014 review committee will include at least one person from each of the seven subcommittees from the November 2013 review. This committee of less than ten experts will be charged to assess general progress and ensure adequate resolution of the November review recommendations.

The executive summary of the report identified general issues and ten high-level recommendations. Major cross cutting issues identified by the committee include the need for increased technical coordination, increased definition and maturity of In-kind contributions and plans, and stronger support in the areas of procurement and staffing.

The Executive Summary from the 1st Annual Review Report is provided below with the ESS perspective in italics.

Executive Summary

The first annual review of the European Spallation Source (ESS) project was conducted on 12th-14th November 2013. The purpose of the review was to evaluate the project's progress and readiness to start construction in mid-2014, and included an assessment of technical areas, the overall cost, schedule, and management aspects of the project.

The participants included the ESS project team, 33 members of the review committee organized in seven subcommittees, and seven observers. The committee's charge, membership and the review agenda are included in the Appendix.

[1] The 1st Annual Review was conducted 12-14 November 2012 with a 59 slide closeout briefing provided at the conclusion of the review. The final report was provided 16 December 2012.

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The Committee found that the ESS project has made significant progress in the last 10 months to build a management team for the construction phase. The management of the project is strong, well determined, motivated and success oriented, and the Committee congratulates the ESS team for the quality of the material and presentations submitted to the Committee.

The Committee concluded that ESS would be ready to start construction in mid 2014 following regulatory approvals, adequate funding commitments through signed Letters of Intent (LOIs) or Agreements, and resolution of key recommendations and actions from the review. Additionally, the Committee recommends that a smaller subset of the review committee conduct a "delta review" approximately in May 2014, to ensure adequate resolution of the outstanding recommendations prior to construction.

ESS Response: A delta review will be organized in May 2014 to ensure adequate resolution of recommendations from the November 2013 review.

Technical

In the Committee's opinion the technical design maturity of the ESS project is sufficiently advanced, to provide a good basis for establishing the project's cost and schedule, and therefore a good performance measurement baseline. There are, however, some issues that remain a concern to the Committee, which are:

- The basis for the assumption of 1 W/m halo beam loss as a Level 1 requirement for the Accelerator was not clear. This assumption has major implications *inter alia* on licencing, shielding and operation and the basis needs to be supported through some logical method (e.g.; performance of similar operating accelerators, end-to-end beam simulations).

  ESS Response: 1) Verify that shielding is sufficient for all possible loss scenarios using the available particle-matter simulation codes. 2) Verify that shielding is sufficient for normal operations 1 W/m plus additional short-term beam loss cases as/if defined in the previous item (include both realistic and simplified geometry models). 3) Develop Technical Note with worst-case scenarios to use for shielding analysis. Progress reviewed at Technical Advisory Committee meeting on 2-3 April and completed by 1 May 2014.

- Timely execution of the Engineering Design and Demonstration (EDD) activities for the target (cooling, moderator, etc.).

  ESS Response: Target Engineering Design Demonstration (EDD) activities are included in the ESS project schedules and will be tracked at monthly project reviews and assessed at the Technical Advisory Committee meeting on 2-3 April 2014.

- Planning of the remote-handling schemes for target & moderator-reflector replacement needs to be completed. The two-dimensional move of the MRP should be avoided.

  ESS Response: The ESS Moderator concept will be finalized in the spring of 2014. Ease of remote handling is one aspect being considered in this selection process. Following this decision, the remote handling scheme will be established during the preliminary design process for the Moderator-Reflector Plug and the Target Wheel. Progress will be assessed at the Technical Advisory Committee meeting on 2-3 April 2014.

- Integrated Controls Systems (ICS) mandate need clarification and more proactivity toward defining interfaces and communication with other systems. All safety aspects including interlocks need to have a common approach. Develop a plan to incorporate in-kind contributions into ICS.

  ESS Response: Define a list of "other" systems and appoint lead integrators to these systems. Establish regular correspondence and communication between ICS and other systems.

  Develop a list of ICS standards and systems and prepare milestones for establishing relevant ICS and ESS standards.

  Reassess In-kind Contributions (IKC) for ICS and identify additional possibilities. Assign an individual to help with IKC management in ICS.

- Neutron Scattering Systems (NSS) needs a workable breakdown of the budget to deliver an acceptable number and quality of instruments, while establishing essential support systems for commencement of operations. In addressing this need the project should consider plans to maximize the in-kind contributions to the NSS.

  ESS Response: Conduct a project level review of NSS by the end of March 2014. Organize a workshop with our partners in February 2014 to discuss models for significantly enhancing the possibilities for In-kind contributions to NSS. Progress will be assessed at the Science Advisory Committee meeting in 5-6 February 2014 and 21-23 May 2014.

- Conventional Facilities (CF) construction is starting in mid-2014. The Project must establish internal milestones for freezing interface requirements between CF and other systems.

  ESS Response: DG memo on 19 December 2012 established the internal milestones for freezing interface requirements between CF and other systems and defined a process for internal review and approval of preliminary design and interface documents. Progress will be assessed at the Conventional Facilities Advisory Committee meeting 23-24 January 2013.

Cost and Schedule

The ESS overall schedule foresees first protons on target in December 2019. The cost cap has been fixed to 1.843 B€ (year 2013). The project should use the current schedule and cost estimates as a 'reference or preliminary baseline' (subject to a final 'scrub' and agreement from the ESS work package managers) to ensure a correct Total Project Cost (TPC) and contingencies.

It was noted that the cost contingency is slightly less than 10%. However, the Project presented three primary cost containment strategies, which are:

- Conventional facilities costs above the cost report value (423M€) are proposed to be covered outside the cap by the host countries or new partners.

- Fixed construction budget of (350M€) for the NSS instrument program. Additional financing as part of ESS initial operations or from new partners would be used to realize 22 instruments planned as part of the TDR. Currently, the Project estimates 16 of 22 public instruments will be built using construction funds.

- Explicit scope contingency into the accelerator plans (scope that can be delayed if necessary). Currently, the baseline scope of the accelerator includes 5MW power capacity but this may be reduced to resolve other issues of higher priority.

Combining these strategies, contingency on the at-risk scope and project interfaces is closer to 25%, which is more in line with other large science projects of similar maturity and complexity.

The Committee judged that the cost estimate is sufficiently mature for this stage of the project, however noted that the cost basis relies heavily on engineering estimates. The Project should work to refine the cost estimate and seek vendor quotes and/or scaling estimates when possible. Schedule is success-oriented with little built-in contingency, which is acceptable at this stage of the project; the Committee encourages the project to seek additional efficiencies so as to increase float. Once construction commences, staying to schedule is imperative to avoid cost increases due to delay.

ESS Response: Agree with the committee assessment of the cost containment strategies and the importance of emphasis on schedule performance. Work continues to scrub cost estimates and schedules to identify additional efficiencies and savings. Progress will be assessed by the standing technical and scientific advisory committees (CFAC, TAC, SAC) and at the follow-up review in May 2014.

Project Management

The subcommittee congratulates the ESS team for the impressive progress made in preparation of the project's performance baseline and readiness for construction.

Most management procedures and support functions are in place, including Configuration management and Change control, Engineering Data Management, and standards for Quality Assurance (QA) and Safety, Health and Environment (SHE). However, the Committee found some functions weak due to the lack of a host laboratory to draw upon for expertise and established policies and procedures. This will be difficult to overcome for some time and the Project should give serious attention to developing strategies that mitigate this problem.

There is a good start on integration, configuration management, and change control, led by a very experienced engineer, under the machine directorate. However, there is no top-level authority for technical coordination. This leads the committee to the following assessment: At a high level, the Committee found the greatest risk to the project in the areas of technical integration, in particular areas around interfaces, reviews, configuration control, installation, commissioning and anticipating unforeseen problems. To strengthen this area, the Committee recommends the appointment of an ESS Technical Coordinator, or Deputy Director General, who can steer the day-to-day management and integration of the project through the construction phase.

ESS Response: Agree with the committee assessment on the importance of technical integration and control to the ultimate success of ESS. The steps taken to address this need include the hiring of an experienced Technical Director (formerly the Machine Director) by May 2014. The position is open and a search committee is actively identifying candidates. The role of the Technical Director includes project wide technical integration, systems engineering, and configuration control. The Deputy Technical Director is already in place and is responsible for administering these functions today. The Technical Director will the day-to-day technical management and integration throughout the construction phase.

There is also a need for additional support and internal day-to-day management at the highest level of the organization. This need will be evaluated the Executive Management Team at a retreat planned for 16-17 January.

The project's staffing plans are very demanding with many positions to be filled in short periods. Clarity around rules and taxes when bringing staff from the partner institutions to ESS is needed. The procurement and in-kind management functions were also not developed sufficiently to support the project's 2014 plan and key, experienced staff are needed in these areas.

ESS Response: Agree with the committee assessment on the challenges and demands of meeting the staffing needs through hiring and in-kind effort. There is a short-term need to find solutions under the ESS AB and a longer-term plan for the ERIC organization. The staffing requirements presented at the November review are currently being used to develop a staffing and recruitment plan. This plan will be approved in early January 2014 and used to measure progress.

The procurement and in-kind management personnel are being recruited now and will be in place and fully operational by May 2014.

Summary

There is impressive progress towards defining the project goals and execution plans. The ESS project will start construction in June 2014 provided partner funding is secured, regulatory approvals are in place, and there is good progress resolving the recommendations and actions identified in this report.

2013 Annual Review of the European Spallation Source (ESS) Project

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Summary

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1.1 Accelerator System

The Committee's scope of the review in this area was the following:

- Baseline design and requirements
- Accelerator and radio-frequency (RF) systems
- Beam instrumentation
- Safety and Reliability
- Specialized technical services
- Accelerator-to-target interface

Status and Brief Description of Present Achievements

The Accelerator System (ACCSYS) has recently been re-scoped for the purposes of containing costs and staying within the ESS 1.843B€ TPC. This has provided a sound approach to deliver the accelerator system and produced greater design coherence and modularity, as well as offering a strategy to effective contingency management.

Scope contingency has been created through procuring accelerator equipment in stages.

The Accelerator Division currently consists of 54 staff, organized towards project construction. It holds the responsibility of ACCSYS in a matrix-like structure that integrates WPs entrusted to external partners and other ESS Divisions. Group leaders, Work Package (WP) leaders, and lead engineers are well focused and an operational management and communication structure is in place. A general construction schedule has been established for ACCSYS with consistent spending and personnel profiles.

Development and prototyping of different WPs conducted in collaboration with national institutes in Europe, has generated a collaborative culture with some of the potential candidates for IKC. The IKC goal for ACCSYS is 50 %; currently the most probable IKC fraction is at 35 %.

Necessary Milestones Prior to Start of Construction

Validate the 1 W/m assumption on halo beam loss

Define ACCSYS interfaces to Conventional Facilities as precisely as possible, and build in scope contingency in the CF general contract for the yet undefined part.

Critical Risks and Possible Showstoppers

ACCSYS accelerating gradient parameter is 44 MV/m surface field on elliptical RF cavities. This is achievable in principle but aggressive. There is moderate performance risk in industrial production but can be mitigated by lower beam energy or adding additional

cryomodules. The civil construction design includes 170m of unused tunnel for adding extra cryomodules.

Spoke cavities have never used before in this application. There is moderate risk once the prototypes are fully tested. The economic interest (cost per unit of accelerating gradient) of spoke cavities over conventional solutions remains to be demonstrated.

Inductive Output Tubes (IOTs) are being planned as an alternative to klystrons. The result of the R&D is uncertain, the risk is however mitigated by the strategy of integration of the IOTs in the project.

RF couplers for the elliptical cavities must now transfer power up to 1.1 MW nominal: while capacity in excess of nominal power was demonstrated on prototypes, performance of series production constitutes a moderate risk.

The basic assumption of halo beam loss of 1 W/m needs to be supported. This parameter, used as Level 1 requirement has major implications *inter alia* on licencing, shielding and operation, and should therefore be confirmed, e.g.by performing realistic end-to-end beam simulations including errors, showing sufficient margin and/or appropriate scaling from experience at other facilities. Moreover, the normal operation envelope should include all beam loss scenarios.

Accidental beam loss analysis needs to establish "worst case" scenarios based on risk analysis and to conduct simulations to determine appropriate shielding (interface with CF) and system interlocks for personnel protection.

The ACCSYS split on IKC is ambitious. Objective of 50% is critical to the success of the project. The execution of IKC also brings challenges in quality, performance, cost and schedule: some effort should therefore be spent on structuring contributions, WP definition and documentation complemented by thorough follow-up.

The planned staff ramp-up of the Accelerator Division (54 to 79 FTE from 2013 to 2014) is incommensurable with the on-going recruitment effort, and casts doubt on credibility of staffing plan.

The interface definition and requirements between ACCSYS and CF can be a potential cost and schedule risk. These requirements should be reviewed prior to finalizing the scope of the single CF general construction contract.

General Assessment (implementation readiness, project organization)

Overall, the ACCSYS design is sound, and knowledgeable and experienced staff has been recruited to deliver the accelerator scope. The ACCSYS team is to be commended on technical choices, use of previous experience, and involvement of contributing labs for warm RF systems.

The extra length (170 m) of tunnel, although an expensive over-investment, is supported by the Committee. It serves both as scope contingency for the 5 MW objective, and as reserve for possible future upgrades.

The rationale for the cost-saving proposal to "initially reduce" beam instrumentation have not been clearly established.

Staffing requirements appear relatively high and showing large variability: scrutiny and levelling are required by a top-down managerial approach complementary to the bottom-up collection of requirements. Advantage should be taken of potential IKC and of developments at other laboratories to limit in-house staff numbers while providing the necessary personnel resources.

The Committee was pleased to hear that the success-oriented schedule for R&D and the construction of accelerating structures were endorsed by the representatives of the contributing institutes present at the Review.

The Committee supports the approach of developing IKC and acknowledges the choice of uTCA for beam instrumentation.

The Committee acknowledges the integrated approach of a single group providing front-end specialized technical services to the whole project, and appreciates that this group also takes care of complete integration using a 3-D CAD system capable of integrating 3-D models developed by the IKCs.

Several technical services are not yet clearly allocated and need to be specified (e.g. emergency and no-break power systems, gas systems).

The Committee notes that the necessary input for sizing the cryoplants will be available in due time, though only based on estimations (no experimental data): an adequate margin on specified power therefore needs to be defined.

The Committee welcomes the improved high-level definitions of 1-hour reliability and availability. The Committee further acknowledges the sound design of Accelerator-to-Target and the raster concept.

Recommendations

1. Reassess accelerator beam instrumentation based on effective strategy of commissioning and the needs of operation.
2. Consider a faster prototyping of all accelerating structures and raster magnet system.
3. Establish criteria for success and formalize decision process for making the decision of IOTs and the end of 2017.
4. Analyse and develop IKC potential for beam instrumentation.

5. Be aware of the critical importance and manage properly the communication of radiation-protection issues to the public.
6. Translate high-level requirements for reliability and availability into performance figures for elementary components and systems, identify discrepancies with state-of-the-art and implement corrective / mitigating actions (overcapacity, redundancy, reparability, "hot" spares, etc.).
7. Integrate the ACCSYS utilities into reliability/availability studies.

1.2 Target Station

The Committee's scope of the review in this area was the following:

- Review the target station design, cost, & schedule
- Provide input as to the status and whether the target station is ready to baseline and initiate civil construction
- Provide an independent assessment and recommendations on the Target System

Status and Brief Description of Present Achievements

The Target Station scope of work is well defined and understood by the Target Station management team. A detailed, bottoms-up cost and schedule has been developed consistent with the scope. The Target Station organization has added additional experienced spallation project staff, and has reorganized staff to align structure to WBS to deliver project.

Necessary Milestones Prior to Start of Construction

- 28 Preliminary Design Reviews are planned for 2014. Although Target Division has no outstanding decisions that impact the start of construction, design reviews should be scheduled to provide details as required to support the project schedule.
- Finalize key design features (He pressure, monolith diameter, etc.)
- Work with the new Associate Director for Operations, ESH & QA as well as with the ESH Division to complete the hazard analysis and mitigation, and the waste stream analysis for the target facility as needed to support start of construction.

Critical Risks and Possible Showstoppers

The moderator and reflector system is on the critical path, and work package manager needs to be hired. The new moderator design decision must be made soon or it will impact the overall ESS schedule. This decision has key dependencies to other areas of the project.

Target staffing must double in 2014 and nearly double again in 2015. Finding qualified people may be an issue. There are three work package managers who must be hired as soon as possible.

Evaluation of the ED&D activities is underway. Completion of this review, prioritization of old and new activities, and reallocation of funds is a critical step in the management of target systems technical risk.

General Assessment (implementation readiness, project organization)

Overall, the Target Station design is sound, the scope is well understood and the team is ready to execute, but several key people need to be hired. Organization is aligned with the key deliverables, with five elements comprising 90% of the target system budget.

Interface control documents are in place, but some interfaces (e.g., instrument, ES&H) may need additional attention.

Managing in-kind contributions is an issue for many parts of the project, including target systems. Some in-kind contributions may offset some of the staff hires. But these people must come on board soon to have an impact in 2015 when it is needed.

Recommendations

1. Only two years are being allowed for the moderator and reflector plug build; this may not be enough. Consider interacting with vendors to speed up the process and obtain feedback on constructability.
2. The price of off-spec steel is important; a supplier should be located and a price negotiated soon to reduce risk. This is currently in the project schedule for 2015.
3. The target/instrument, target/accelerator, and target/conventional facilities interfaces are important and appear to be improving. These interfaces need continued improvement, and a timely decision on the new moderator design is a first test. Completion of interface documentation and tracking will be important.
4. Planning of the remote-handling schemes for target & moderator-reflector replacement needs to be completed soon, but require completion of the moderator decision. Develop a plan for the decision process showing that decisions are made in time to support the project schedule.
5. Spare components are currently delayed to operations. Make sure to manage this.
6. Consider consolidating neutronics and shielding efforts into one group to avoid duplication of efforts.
7. Complete the water-cooled target backup study of beam power versus need for emergency coolant as soon as possible.

1.3 Integrated Controls System

The Committee's scope of the review in this area was the following:

- Review the ICS baseline design, requirements, cost and schedule
- Provide input as to the status and whether the ICS is ready to baseline and initiate civil construction
- Provide an independent assessment and recommendations on ICS

Status and Brief Description of Present Achievements

The ICS has a baseline that reflects project dates, complete scope, and a reasonable structure. Cost and schedule estimates have been prepared to baseline the project.

There are 7 full time employees, two new additions: Suzanne Gysin in core software components and Timo Korhonen have been hired as the chief engineer, and a couple of posts open to fill key roles.

ICS has made good progress in Machine Protection Systems (MPS), Physics applications, and database applications. A start is being made on system integration.

Necessary Milestones Prior to Start of Construction

- Milestones are tied to project deliverables for system integration.
- Milestones are identified for database applications and physics applications.
- Milestones are identified for defined for MPS rollout
- Milestones are **not** derived for setting standards and stating specifications.

Critical Risks and Possible Showstoppers

The Personnel Protection Safety Systems needs personnel to move forward. This is critical and behind. This should be given high priority.

The ICS staffing plan is heavily biased using large amount of contractors and staff managers, lacking in-house engineers. There is a big risk that in-house technical know-how will be insufficient for operations.

Set equipment standards early to avoid costly diversion of equipment types.

Hardware reviews were not performed on controls nor in the accelerator areas for RF, installation, power, power supplies, instrumentation etc.

General Assessment (implementation readiness, project organization)

- The high level requirements and scheduling are well understood.
- The project is organized well to meet the schedule, however, key personnel need to be put in place.
- The acquisition of personnel needs to be considered an area of high risk and given due attention and priority.

- The budget could be scrubbed in light of project priorities, completeness and correctness.

Recommendations

1. The baseline should be scrubbed and reviewed by the project prior to finalizing the budget. This could be done in very short order by clearly identifying the staff roles from the bottom up. Some areas appear to be too high and some too low. The teams that are in place have assumed scope that the project has not reviewed. These include the physics applications, relational database applications and to a lesser degree, Machine Protection and System integration. The areas that are not staffed: network and computer infrastructure and Personnel Safety both appear to be light on manpower and equipment.
2. Reconsider the large outsourcing and convert contractors/managers to engineers. At a minimum consider hiring in key areas for continuity into operations.
3. Be more proactive in defining interfaces and in communication with other systems. Pursue production of ICD's with highest priority to clarify scope and interfaces with external systems. For instance, assert that there is a requirement to provide position feedback between pulses and determine the rate and depth of the data that is needed by the physicists to study RF faults and beam aborts, such as first faults and forward reflected, and cavity power.
4. Be more proactive and assertive in setting standards (e.g., low energy beam transport) and conducting hardware reviews.
5. ICS should work with the other ESS technical systems to define potential IKCs within the ICS. This potentially can also help alleviate the large contractor resource requirements.

1.4 Neutron Scattering Systems

The Committee's scope of the review in this area was the following:

- Review the technical design and specifications of the NSS
- To assess the maturity of scope definition, cost, schedule and risk of the NSS
- To assess the readiness of the NSS management team and adequacy of staffing for move to construction phase
- To assess the appropriateness of the plans for managing in-kind contributions
- Provide an independent assessment and recommendations on NSS

Status and Brief Description of Present Achievements

The NSS project team has done a commendable job in the establishment and implementation of a process for engaging the EU community in the instrument selection process

Neutron technologies division has identified key competencies required to be managed in-house and recruited competent leaders in all those areas

Progress towards initiation of construction of the first three instruments is well advanced

Concept development and design of essential neutron beam infrastructure (transport systems, detection, automation, DAE etc.) is progressing in timely manner

Necessary Milestones Prior to Start of Construction

- Refinement of cost breakdown to establish a cost contingency commensurate with the current level of uncertainty in construction costs –by January 2014
- Establish clear agreement with other ESS sub-projects on scope boundaries (including agreement on financial responsibilities)
- Establish "in-principle" agreements with in-kind partners for involvement in the engineering design and construction of the first suite of instruments –by April 2014
- Conduct a detailed assessment of Data Management and Software Centre scope and budget
- Focus existing personnel on commencement of construction for first three instruments, for ramp up in workload for assessment of second wave of instrument proposals and motivate them to attract in-kind contributions.
- Establishment of essential support services (e.g. procurement, recruitment, finance)
- Conduct an independent assessment of instrument construction cost, with 1st level cost differentiation (e.g. low, medium and high cost prototypes)
- Resolve outstanding questions on moderator design –by April 2014

Critical Risks and Possible Showstoppers

The NSS budget is fixed at 350M€ which appears to be tight for the proposed scope of the project. Clear pathways for maximization of in-kind contributions and leveraging of additional EU resources and expertise need further development

NSS needs to drive the design for key technical components of concern to NSS (e.g. moderator, shielding, interface boundaries, but not necessarily for choppers, detectors etc.)

The success of NSS is intimately linked to its interactions with other projects (target, controls etc.). It is essential that the interfaces with these activities be appropriately managed.

General Assessment (implementation readiness, project organization)

Overall, the design is sound, progress on the definition of scope, and selection of first wave capabilities and processes for ongoing instrument selection are well advanced. Progress on establishment of key in-house competencies is also well advanced.

Plans for management of instrument construction are in place

Cross-project communication strategies require some adjustments (e.g. with target and moderators on modeling of source flux, background radiation and transport systems design and with CF on guide hall floor stability and HVAC)

Clarity is required on scope boundaries between NSS and other ESS sub-projects (e.g. target, CF, ICS, PM)

NSS project contingency requires further consideration. The committee believes that, with the current NSS project contingency, the risk of delivering substantially less than 16 instruments is high and that the consequences, in terms of stakeholder support, may be severe. The committee is also concerned that the instrument completion may extend into the operations phase and compete for funding with operations. This is highly undesirable.

The high budget risk may be mitigated by involvement of technical expertise from the stakeholder community in the preliminary engineering design stage of instrument construction. Early engagement in engineering design should ensure buy-in from potential in-kind contributors, and increased "ownership" in construction phase, with potential transferal of cost risk through the in-kind construction work-packages (which could even extend to complete instrument design). This will have the added benefits of reducing the requirement for recruitment of specialist technical staff and establishment of organizational infrastructure in support of the project, and may also reduce schedule pressure.

Recommendations

1. Conduct a project level review of the NSS budget to reduce the risk of delivering less than 16 instruments to an acceptable level.

2. Establish an acceptable scope for NSS, consistent with budgetary constraints and seek endorsement of stakeholders
3. Establish agreements with in-kind partners for implementation of instrument development and construction, and for bringing those instruments to full potential)
4. Reassess instrument construction costs, with due consideration of the impact of a high proportion of in kind contributions.
5. Focus existing personnel on attracting in-kind contributions and establishing interfaces /standards to accommodate those
6. Maximize consolidation of procurements for key components with other subprojects (e.g. steel, concrete…)
7. Establish a detailed work program for the Data Management and Software Centre including a time-line for recruiting staff.

1.5 Infrastructure

The Committee's scope of the review in this area was the following:

- Review and assess the infrastructure, designs, interfaces, cost and schedule
- Review of Readiness for mid-2014 ground breaking
- Assessment of proposed construction contract strategy
- Assessment of Environmental and Regulatory prescriptions
- Assessment of the quality of interactions between the Infrastructure team and its stakeholder (client) groups
- Assessment of the overall power supply and energy management strategy

Status and Brief Description of Present Achievements

At least 50% of the concept design work is complete and collecting all necessary requirements to complete the concept design appears to be on track.

Tendering is well underway for the main C101 contract with offers expected by 4 December 2013. The contract signature will be the first step towards entering into a Target Cost with incentive schemes within the contract in order to ensure the selected contractor remains committed to keeping the Out-turn cost as low as possible

A plan is in place for bringing in the necessary resources from a number of external companies to complete the design work. These external companies will effectively provide personnel to the in-house design team and as such the ESS Organization shall maintain control and responsibility for aspects of the conventional facility designs.

A way forward for the necessary environmental and regulatory permits is in place although it is noted that there remains a risk of delay in obtaining these permits.

The CF team presented a reasonably robust cost estimate developed from two independent and externally produced bottom-up estimates.

A detailed schedule has been developed which indicates that some areas of the CF are on the project critical path. The schedule (and cost estimate) is reliant on timely provision by others of the detailed system requirements.

Regarding the power supply strategy, it is noted that the final Energy Concept report was issued in January 2013.

Necessary Milestones Prior to Start of Construction

- The main hearing of the ESS application according to the Swedish Environment Act is scheduled for April 2014 with a subsequent court decision in May 2014. The ESS staff

interacting with the Environmental Court and other Swedish Authorities in this matter is quite confident that a positive outcome will be achieved.

- The Swedish Radiation Safety Authority (SSM) is applying a graded approach for the licensing of the ESS facility. The first approval, regarding permissibility and start of the construction of the facility is expected in August 2014. However, SSM has stated that ESS can start land and earthwork without any permission from SSM. The outcomes of this first approval may impose additional requirements on the Conventional Facilities.
- Contracts for engineering support need to be put in place by early 2014.
- The Contract award for C101 needs to be signed in early 2014 as the Earthworks, Accelerator Tunnel and Conventional Utilities Buildings are on the critical path of the project Sub-contract for earthworks needs to be in place within the window after the Environmental court but before the planned construction start of 2 June 2014.
- Some design work needs to be fully completed before the ground breaking can commence and other parameters will need to considered frozen at this point in time (e.g. overall structure locations, sizes of buildings, location of networks).
- The CF team needs to be ramped up including their external consultants and C101 contractors well in advance of ground break.
- Preliminary designs and the final Construction designs will be required for pricing purposes by Q3 2014 in order to establish target costs for Accelerator tunnel and auxiliary buildings.
- Some important safety issues will need decisions early in 2014 (e.g. third confinement barrier, plane crash consequence, earthquake design criteria)

Critical Risks and Possible Showstoppers

Mandate to sign C101 is necessary although it is noted that the contract signature in itself does not obligate the Organization to large expenditures.

Implementation of the engineering support contracts and construction contract C101 are on the critical path and it is important that the whole ESS Project Organization remains committed to achieving these contract signatures

Design maturity needs to be at a level sufficient for ground breaking and future activities. This is considered a high risk to the project and it is important that could lead to significant cost over-runs if the construction contracts are initiated but then cannot proceed at the planned rate due to immature or missing data

Environmental Regulatory authorization is required prior to ground break. Construction work regarding buildings requires as well a permit from SSM. As these are to a large extent in the hands of external regulatory bodies, there is always some risk of delay. Furthermore, there is a risk that additional requirements may come from the Nuclear Regulator (e.g. third confinement barrier) which could have significant impacts on the project.

Contract C101 selection could be challenged by unsuccessful bidder(s), particularly given the soft parameters in the selection process. This could potentially delay the implementation of the project

The financing needs to be in place before start of multi-million earthworks contract scheduled to start in June 2014. It is understood there will be a "Host States" commitment in this regard.

General Assessment (implementation readiness, project organization)

Overall, the CF team appears reasonably well prepared for the near future works and has a reasonably robust strategy and organization to tackle future activities. Lack of experience in dealing with a large science project has caused some "frustrations" in client systems but these are not deemed to be show-stoppers and could be dealt with by implementing some improvements in communications practices to promote better understanding of goals and needs between the various systems including the CF.

There is a large amount of interface data/requirements still required before preliminary and final designs can be undertaken. The gathering, recording and management of these requirements are not yet fully under control within the ESS project and improvements are necessary.

There is opportunity to question the already stated requirements for example need for stainless steel reinforcement, deflection tolerances, temperature tolerances, heat recovery etc. This could lead to cost reductions. (A value-engineering workshop should be considered).

The target cost C101 contract is being used to address schedule and design maturity issues. However it will need to be carefully implemented and managed to avoid future problems with the Contractor. Also there will be uncertainty on out-turn costs as work will effectively be "cost-plus".

C101 has been put in place (partly at least) to avoid lengthy procurement processes that would have been necessary if ESS had chosen to manage directly a larger number of contracts. As this strategy avoids the need for the time consuming EU public procurement rules to be applied to subsequent sub-contracts by the C101 contractor, this could lead to perceptions of contract manipulation if not managed correctly.

The current lack of a robust Procurement Department is of some concern in particular as the CF department need to move forward with major procurements which they are doing perhaps without staying within the (existing or future) necessary framework of procurement rules and procedures.

Concerning the Energy Concept, it was noted that this report still refers to ESS investing in its own windmills for 150 M euros however during the review it was stated that this idea had now been dropped and that ESS will now simply purchase "green" energy but be supplied by the national electricity grid. If confirmed, this approach is supported. On heat recovery the goal of ESS is ambitious but by selling to the municipality of Lund it is achievable. It is however doubtful whether it is economically and environmentally reasonable to recover the 20-degree heat using heat pumps. Lastly it was considered

that the 5 M euros estimate for the grid connection was over-estimated due to an originally higher budget price from the supplier.

Recommendations

1. A Stronger overall Project Integration/configuration management team is recommended. This must be implemented at a level above the CF department and the managers of this team must be empowered to make decisions across all areas of the project
2. A more rigorous planning, recording and control of interface data must be implemented. Again this should be done at a high level and imposed across all systems. This is essential for CF as they move forward into detailed designs and construction.
3. Better communication/understanding of "needs" between CF and other systems is required. It is suggested that as well as the formal improvements in data management and integration management mentioned above, ESS should consider informal seminars during which system owners will have the opportunity to explain in an informal setting how they are planning to meet the overall project technical, schedule and cost requirements and why and when they require information from their colleagues in interfacing systems.
4. To create cost contingency, review, (through value engineering or similar process), some of the less standard requirements (stainless reinforcement, deflections, space demands in Experimental halls, temperature stability in experimental halls). Use this to prepare a potential de-scoping list if needed after target cost established. This should be done before the Target Cost is established.
5. An external expert review of the soil parameters and assumed ground loading conditions should be carried out along with an assessment on the foundation designs; in particular the extent of piling solutions should be critically reviewed. This should be done before the Target Cost is established in order to ensure the benefit remains with the ESS Organization
6. The Administration department must put in place a rigorous assessment of the C101 selection process to avoid challenges either by unsuccessful bidders or other concerned parties. This should be done before the opening of the C101 Bids by the ESS Organization.
7. Rapidly create / improve the Procurement Department and then ensure the Procurement Department in conjunction with the CF department develops and implements effective and transparent rules and procedures for the management of the C101 contract in particular with respect to the selection of suppliers and sub-contractors by the CF Team (which will include staff from ESS and the C101 contractor). These rules and procedures must be developed before the contract is signed with the C101 contractor in early 2014.

1.6 Cost & Schedule Subcommittee

The Committee's scope of the review in this area was the following:

- Assessment of the thoroughness of cost and schedule development
- Review the project management methodologies key assumptions
- Assess the consistency of requirements, scope, schedule and cost
- Provide an independent assessment and recommendations on the ESS Cost and Schedule

Status and Brief Description of Present Achievements

The ESS project team have expended considerable effort during the recent period to develop and integrated cost and schedule baseline, establishing a very high level of ownership of the schedule and estimates by the technical work package managers. The project should be commended for its progress in this area and is recommended to continue trying to build on this success.

The project should use the current schedule and cost estimates as a 'reference or preliminary baseline' (subject to a final 'scrub' and agreement from the ESS work package managers) to ensure a correct TPC and contingencies.

This will enable the project to begin to manage risks and performance issues in a structured and methodical way while also recognizing that as the project progresses and further information is developed for each work package that the integrity and accuracy of the baseline will be improved

General Assessment (implementation readiness, project organization)

Float (schedule contingency) has been included against key milestones. This is a best practice.

Management summary schedule / strategic vision is missing. These should be developed in the future.

Escalation has not been included in the base estimate although the project has developed base assumptions for escalation

A training budget has not been uniformly identified. This should be added to the budget, as it will pay off in the future.

The lifecycle cost contingency is noted as <10% of the total project cost.

The project is currently developing the in-kind sharing for the project scope however this is still very immature

Systems Engineering and Integration function at the project-level appears to be missing

Constructability and Maintainability studies are ongoing

Stakeholder management was not presented

Export control is not properly considered

Recommendations

1. If total float (schedule contingency) is included within the integrated schedule its consumption should be managed under authority of the appropriate management level. Add this to the Project Controls Manual.
2. Use early finish versus late finish etc. The use of the term float can be misleading and implies an opportunity to delay schedule.
3. Additional float / contingency should be calculated based upon a more detailed analysis of technical, schedule and cost risks at a suitable future date.
4. The development of a management summary schedule and vision statement that clearly define the integration of each system, key and major milestones, senior management strategic vision etc. This should consider triple constraints of schedule, quality and cost – what is the highest priority?
5. Continue development of the on-site installation activities for Instruments to ensure these are consistently sequenced with respect to constraints such as resources, work areas, procedures, materials and site materials management.
6. Infrastructure planning and scheduling should be properly integrated and performed in a manner consistent with the other work packages.
7. Ensure that each work package is further developed in the performance management baseline and updated to include escalation for direct resource costs, bulk commodities, in-direct / overhead costs, and to ensure that performance reporting is consistent with escalated costs.
8. Continue to develop/refine the estimates to reflect benchmarks, parametric, industry inputs, 3rd party inputs and to ensure that the basis is properly structured, and consolidated in a formalized approach.
9. Add a budget article for training. This could be a percentage of staff salary that is allocated to HR for the management and preparation of training programs – Project Management, Safety, Regulatory, procurement, internal processes etc.
10. Consider the potential savings from early negotiations with suppliers of bulk commodities and to potentially procure early if cost benefits are identified and if this is consistent with the funding profile.
11. Cost contingency is noted as <10% of the total project cost. Recommend to review this value considering the potential for risks that may materialize in the near term e.g. related to in-kind sharing, design maturity, staffing ramp-up, regulatory uncertainty, and past performance levels.
12. Ensure the project funding is profiled such that rolling wave planning is consistent with the coming execution year funding and the availability of resources. It may also benefit the project to establish and publish execution year +1 and +2 budgets to obtain advanced agreement on preliminary budgets/exchange rates.
13. Continue development, control and review of requirements to ensure that these are clear and not excessive i.e. they do not imply unnecessary work leading to cost increases and schedule delays.
14. Ensure that requirements relate to quantifiable deliverables.

15. Continue the development/refinement of the WBS dictionary using PM standards / best practices.
16. Obtain an early-as-possible agreement on the allocations for in-kind contributions amongst the 17 nations to minimize the potential impacts of future delays:
    i. Clearly defined governance structure
    ii. Clear processes
    iii. Compatibility with domestic processes and constraints
    iv. Measurable in-kind deliverables
    v. Earned Value / performance measurement (via milestones?)
17. Adapt existing procedures to the requirements / constraints coming from in-kind procurement processes.
18. In-kind project teams comprising multi-disciplines e.g. contracts, technical, quality, safety, and project management from ESS and also the in-kind contributor, should be established as soon as possible to commence early-as-possible negotiations and implementation of in-kind procurements.
19. Develop the contractual requirements and detailed procedures for receiving status reports for the in-kind scope within the PM systems on a regular (monthly?) reporting cycle to ensure that progress is accurately integrated within the scheduling system and reported. (Experience from other projects may be useful to identify the monthly reporting deliverables, follow-up tasks, acceptance criteria, payment schemes etc.)
20. Consider the period of time between "staff-in-post" and "staff effective / productive" to ensure the realism of the schedule and associated deliverables.
21. The function of systems integration / engineering i.e. management of interfaces, configuration control, design processes etc., should be developed / reinforced.
22. Continue the work related to constructability and maintainability studies for the early clash detection, kinematic studies etc., and to provide early feedback to the system designs. This includes the identification and budgeting of appropriate storage, and laydown areas to support the path of construction.
23. Review and confirm the contracts management resource requirements and the projects overall ability/capacity to prepare and place multiple contracts within a short/parallel timescale.
24. Develop a stakeholder management plan for the ESS project and also for each work package:
    i. Impact
    ii. Influence
    iii. Handling strategy
    iv. Communication strategy
25. Investigate the potential impacts of export control for items that may have dual use applications.
26. Ensure that the definition of levels within the WBS i.e. project, sub-project, work package are clearly defined and that these are consistent with an OBS having clearly

defined roles, responsibilities, accountabilities, and authorities (Responsibility Assignment Matrix)

27. Consider mandatorily prescribing account/charge number levels relative to the WBS to reduce errors in timesheet booking, charging, and cost reporting.
28. Continue the progress made in the areas of risk management, change control, in-kind to ensure robust reporting to support the decision making process.
29. Review the resources and roles dictionaries for example to distinguish technicians/crafts from engineering *(Technician and craft resources are much easier to hire than mechanical/electrical engineers etc.,)*

1.7 Management

The Committee's scope of the review in this area was the following:

- Assess the maturity of the ESS management systems to be applied during the construction phase, which are: Management, Sourcing, Integration, Safety, Health and Environment (SHE), and QA
- Provide an independent assessment and recommendations on the ESS Management

Status and Brief Description of Present Achievements

The subcommittee congratulates the ESS team for the impressive progress of this year. A new DG/CEO is in place and focused on readiness for construction and the importance of in-kind; cost adjusted with cash and scope contingency; an impressive ramp-up towards construction established.

Most procedures and support structures in place, including Configuration management and Change control, Engineering data management, and standards for QA and SHE.

A formal procedure for agreeing on in-kind is set up. Risk management has been implemented and a software system for registering, analyzing and treating risks is starting up.

A vital spirit, that ESS is a project of in-kinds, starts to impregnate the organization

Planning for the challenging staffing is addressed, preparations for changing the legal entity to an ERIC are underway and many more impressive achievements.

Necessary Milestones Prior to Start of Construction

- May 2014: Permissibility from the Environment Court (EC) in order to have ground break in June 2014.
- August 2014: Permit from the Swedish Radiation Safety Authority (SSM) in order to start construction of buildings during autumn 2014.
- April 2014: Achieving 80-85% commitment from stakeholders
- Conclude in-kind agreements to make stakeholders commitments possible
- Conclude the corresponding high-level agreements
- March 2014: Comprehensive overview of radiation constraint-shielding-zones, including cost implications for high radiation zones, and review dose-limits to minimize number of radiation workers
- February 2014: Appoint an overall Technical Coordinator under the CEO, and transfer the activities of integration, change control etc., to his/her office. If external recruitment, implement first with an acting Technical Coordinator.
- February 2014: Transfer central SHE activities to be directly under the Associate Director for SHE

- March 2014: Arrange a dedicated SHE review
- March 2014: Review and document all possible "bad" scenarios for the target wheel with the different cooling options
- June 2014: Reiterate the staffing plan taking into account work elsewhere on in-kind, getting detachments from partner laboratories, and the operations phase
- April 2014: Establish a system allowing to receive detached personnel from stakeholders laboratories
- (Not a prerequisite for construction start) Establish purchasing rules for the ERIC regime

Critical Risks and Possible Showstoppers

Transfer large parts of the WBS to in-kind – Reaching 80-85% commitments from stakeholders

Permissibility & Conditions from the Swedish Environment Court (EC)

Permit & Conditions from the Swedish Radiation Safety Authority (SSM)

Keeping the construction phase on schedule

Achieving the challenging staffing plan

General Assessment (implementation readiness, project organization)

It has been a real pleasure to see the excellent progress and the competent and engaged staff presenting what has been done and the plans for the future.

2013 has been a year when the ESS focus has shifted towards a construction project while the negotiations continued with the stakeholders. The in-kind mechanism is a key enabler for this. The responsibility for in-kinds must include the responsibility for cost. Each in-kind partner must of course make their own resource planning, taking into account their national specificities, for the deliverables they have signed up to. However, the credited value remains what is written in the cost book.

Work packages are set up in all required domains, like engineering management, staff plan, procurement, SHE, QA and risk. An immense effort is needed to implement this organization, and the devil is in the details.

Technical integration, Configuration Management and Change Control procedures led by an engineer with experience are put into place under the Machine Directorate. However, the Committee recommends that ESS has a technical coordination directly under the CEO and with authority across all directorates; there is a need for a centralized technical coordination and integration to ensure consistency in procedures, authority in implementation and to minimize uncertainties on interfaces. Construction, schedule management, system integration, change control and internal technical reviews are crucial for the success of the project, should be led by a Technical Coordinator and organizationally directly under the office of the CEO.

Like in all other organizations, the central overview of Safety, Health and Environment should be placed directly under the office of the CEO, and not be embedded in one of the subprojects; this is not yet the case.

Staffing is one of the major challenges. However, a lot of technical work should be performed in the execution of in-kind projects in the partner laboratories; the ESS staffing plan should be consistent with that. Detachment of personnel from other laboratories may be crucial to achieve the staffing in number and in particular experience; ESS must be formally capable to receive such personnel. A fast growth of staff is a challenge, but also a fast reduction. Competence profiles during recruitment, and training during employment must be done having transfer to operations in mind. Swedish Labour law limit, to some extent, flexibility in staff changes, and detached personnel is one tool to ease that problem. Does the ERIC status mean that ESS remains under the Swedish labour law?

Recommendations

1. Ensure that the top-level agreements, arrived at through the Chief negotiators, are consistent with in-kind/deliverables agreements transferring the cost-responsibilities to the in-kind-providers.
2. Establish the procedure for the contingency management (scope & cash). Which is used first to cover increases, how is scope released, incentives for efficiency and savings?
3. Appoint an experienced Technical Coordinator, directly under the CEO, technically responsible for construction, integration, technical reviews, and uniform procedures. Place the relevant technical control and follow-up activities and services (Integration, Configuration control, Scheduling, Engineering data management system, Review office) directly under this Technical Coordinator.
4. Place the central SHE activities directly under the Associate Director for SHE
5. Establish a way to receive personnel detached from other laboratories, and actively seek such contributions as in-kind
6. Re-look at the staff planning in numbers and competences taking into account:
    a. The effort to be done by staff at other laboratories for in-kind
    b. Receiving detached personnel from national laboratories, e.g. as in-kind
    c. Restrictions by labour law
    d. The operation phase
7. Establish an Internal Audit function. Reporting should be agreed upon between CEO/DG and ESS AB.
8. Ensure that contracted personnel are not put into situations of conflicts of interest
9. For financial management, ensure segregation of duties for Budget authorization and payment: No payment without budget authorization. Budget authorization and

payment executed by different people, with their authorities delegated to them in writing.

10. Establish the possibility for outside partners to purchase through ESS for their in-kind
11. Establish the most optimal purchasing rules under the ERIC regime, and explore if there could be a different set of rules for purchases from the ESS budget proper compared with rules for in-kind-partners purchasing through ESS (supplier qualification)
12. Make a quantitative assessment of the purchase-staff needed based on the number or purchases to be performed
13. Assess and plan the staffing and effort needed for the arriving goods with respect to:
    a. Reception
    b. Acceptance
    c. Storage
    d. Identification, tracing, labeling
14. Put in place simplified automatic procedures for low-value orders
15. Train engineers on commercial contacts and negotiations
16. Make an insurance plan for received goods, including delivered in-kind equipment
17. Relook at phase-3 in the in-kind procedure. Avoid redefining the credited cost book value. Ensure that the final acceptance of an in-kind contribution lies with the ESS CEO.
18. Make sure all technical personnel in leading positions understand the important on transferring WBS parts to in-kind, and have incentives to do so.
19. Ensure that sufficient effort is devoted to the technical follow-up of the in-kind
20. Organize a dedicated SHE review
21. Make an overview of the combined issues of Dose constraints, Shielding and Zones
22. The beam loss scenarios, to be included under normal operation conditions, must be defined once and for all, in agreement with the Accelerator Division. Shielding calculations must then be based on these beam loss scenarios.
23. Too low dose constraints may push non-radiation workers to be classified as radiation workers
24. Insufficient shielding may transfer normal radiation-monitored areas to be classified as high radiation areas requiring additional very large investments in construction, ventilation, access, etc.
25. Put in place periodic training of staff for the area of SHE: radiation, cryogenic, electrical
26. Carefully review of all possible bad scenarios regarding the target

27. Continue the good QA development with a pragmatic approach and in dialogue with the technical activities
28. For the future QC look into contracts with dedicated companies to do QC at the industrial suppliers
29. Regarding Change control: PMs should be authorized to approve Change, only within qualified unchanged overall cost and schedule for their WP
30. Establish a review office for design reviews and reviews required before green light is given to significant resource-commitments (hundreds of reviews will be needed; establish a routine to mobilize experts from one part of ESS (including partner labs) to review other parts of ESS). This should be under the supervision of the Technical Coordinator
31. Put in place a group in charge of schedule management and control
32. Continue the nice work on risk management. Have a qualification step for what is entered into the register, do not allow individual uncontrolled entries, and continue to have it as a standing item on the relevant agendas.

2. Worries and Recommendations

2.1 Top 10 Worries

1) Integration and technical overview of the entire project is vital and must be strengthened, in particular areas around interfaces, reviews, configuration control, installation, commissioning and anticipating unforeseen problems. There is a missing key figure in the organization.
2) The staffing plans are very demanding. Too many positions to be filled in short periods. To be clarified first is the ratio of staff in the various activities. Obtain clarity of rules and taxes when bringing staff from the partner institutions to ESS. Today staffing figures mix ESS staff with in-kind staff in an unclear way, including for controlling and follow-up of in-kind contributions.
3) Accelerator: basic assumption of 1 W/m halo beam loss used as Level 1 requirement with major implications *inter alia* on licencing, shielding and operation; needs to be confirmed by realistic end-to-end beam simulations including errors, showing sufficient margin, and/or adequate scaling of experience at other facilities. The normal operation envelope should include beam loss scenarios.
4) Timely execution of the EDD activities for the target (e.g., cooling) will address most of the identified technical risks. Implications on cost and schedule might become a important issue
5) Planning of the remote-handling schemes for target & moderator-reflector replacement needs to be completed. The two-dimensional move of the MRP should be avoided
6) ICS mandate need some clarification. ICS must be available in time while components are qualified. Be more proactive in defining interfaces and in communication with other systems. All safety aspects including interlocks need to have a common approach across the organization. It would be advantageous to incorporate IKCs into ICS.
7) NSS needs a workable breakdown of the budget with increased in-kind contribution to deliver an acceptable number and quality of instruments, including essential support systems, and to mitigate technical as well as financial risks.
8) CF construction is starting in mid-2014. The project must establish internal milestones for freezing interface requirements between CF and other systems.
9) The CF budget as of the date of the Review (516 M€) exceeds the cost estimate (42 M€) by 93M€; it is necessary to understand how this delta will be handled by the project.
10) Management and integration of in-kind contributions and procurements needs strengthening. Timeline for in-kind and industrial contracts might be too aggressive. Having the right staff and procedures at the right moment is an issue.

2.2 Top 10 Recommendations

1) Appoint a technical manager of the entire project, as a direct report to the CEO/DG (deputy DG?).
2) Develop a plan to maximize the in-kind contributions to NSS
3) Establish a clear process for freezing and enforcing controls to changes to interface requirements to contain cost and schedule impacts. CF is particularly urgent.
4) Reassess the entire staffing procedure and schedule. Come up with a realistic plan.
5) Put in place the necessary manpower and procedures for the procurements planned in 2014.
6) Solve the HR contract problems related to short, long time visitors and in-kind manpower.
7) Validate at the assumption of halo beam line loss of 1W/m along the accelerator and establish consequences if different.
8) Prepare a project plan for the ICS personnel safety system by April 2014.
9) Get the LOI process for in-kind ready before April 2014.
10) Confirm the exact responsibility of the host countries on CF procurements and contracts. Ensure that the process for selecting the contractor is robust to limit the possibility of challenges that might cause unnecessary delays.

3. DEFINITIONS AND ACRONYMS

Abbreviation	Definition
ACCSYS	Accelerator Systems
CF	Conventional Facilities
EC	Environmental Court
EDD	Engineering, Design and Demonstration
ERIC	European Research Infrastructure Consortium
ESS	European Spallation Source
ICS	Integrated Controls Systems
IKC	In-kind Contributions
IOT	Inductive Output Tube
LOI	Letter of Intent
MPS	Machine Protection System
NSS	Neutron Scattering Systems
QA	Quality Assurance
QC	Quality Control
PM	Project Manager
PPS	Personnel Protection System
SSM	Swedish Radiation Safety Authority
R&D	Research and Development
RF	Radio-frequency
SHE	Safety, Health & Environment
TPC	Total Project Cost
WBS	Work Breakdown Structure
WP	Work Package

A.1 Appendix 1 – Review Charge

Annual Review Committee Charge

1. Is the technical design sound and likely to meet the performance expectations identified in the ESS Technical Design Report?
2. Are the technical specifications sufficiently advanced and under adequate configuration control to support the project baseline?
3. Are the cost, schedule, and risk estimates complete, reasonable, and adequately understood to serve as the performance baseline for the construction project? Does the project baseline provide flexibility to address typical project risks, e.g., schedule float, budgetary contingency, technical performance margin, etc.?
4. Are the Safety, Health and Environment and Quality Assurance aspects being properly addressed given the project's current stage of development?
5. Are the plans for managing the regulatory permitting adequate for this stage of the project?
6. Are all the prerequisite activities and documents necessary to support a project performance baseline complete?
7. Are the plans for host laboratory support functions (HR, IT, Legal, Finance, etc.) adequate to support the construction project?
8. Are the plans for managing procurements, including staffing the procurement function, appropriate?
9. Are the plans for managing In-Kind contributions appropriate?
10. Is the management team organized and adequately staffed to successfully execute the project?
11. Will ESS be ready to establish the project performance baseline[!] in early 2014 and start conventional construction in mid-2014?

[*] A Performance Measurement Baseline (PMB) is an integrated work plan made up of a sequence of activities, which cover the complete scope, cost and schedule of a project. Once the PMB established and approved, the PMB can be used to evaluate actual cost and schedule performance to determine whether the project is meeting its planned scope, cost and schedule objectives.

A.2 Appendix 2 – Review Committee

Review Committee
for the Annual Review of the
European Spallation Source (ESS)
November 12-14, 2013

Committee Chair, Marzio Nessi, CERN
Committee Coordinator, Mark Reichanadter, SLAC

Subcommittee 1 Accelerator	Subcommittee 2 Target	Subcommittee 3 Integrated Control System
* ** Philippe, Lebrun, CERN	*** Phil Ferguson, ORNL-SNS	* Bob Dalesio, BNL
Mikael Eriksson, Max-Lab	Yujiro Ikeda, J-PARC	Anders Wallander, ITER
Carlo Bocchetta, SOLARIS	Friedrich Groeschel, IFMIF	Mark Heron, Diamond Light Source
Maurizio Vretenar, CERN	Georg Bollen, MSU-FRIB	
Francis Perez, ALBA		

Subcommittee 4 Neutron Scattering Systems	Subcommittee 5 Infrastructure	Subcommittee 6 Cost and Schedule
* Shane Kennedy, ANSTO	* ** Tim Watson ITER	* Steve Gilligan, ITER
** Ken Herwig, ORNL-SNS	Wilhelm Bialowons, DESY	Cathy LaValle, BNL-NSLS-II
** Sean Langridge, ISIS	** Peter Lundhus, formerly of Öresundskonsortiet and Femer Belt	Barbara Thibadeau, ORNL
Mark Johnson, ILL (DMSC)	Ingvar Carlsson, formerly of TVL (Energy)	
** Geoffrey L Greene, UT-SNS		
Winfried Petry, FRM-II		

Subcommittee 7 Management, Sourcing, Integration, SHE and QA	Observers
* Torsten Åkesson, Lund University	David Edvardsson, Swedish Ministry of Education and Research
Ken Blackler, ITER	Morten Scharff, Danish Ministry of Science, Innovation and Higher Education
Helmut Krech, formerly of ESRF (in-Kind)	Philippe Lavocat, French Ministry of Higher Education and Research
Serge Prat, XFEL (In-Kind)	Pascale Delbourgo, French Ministry of Higher Education and Research
Anders Unnervik, CERN (Procurement)	Sven Landelius, Chair ESS AB
Andreas Hoppe, DESY (SHE)	Tom Barrett, EIB
Frank Kornegay, retired SNS-ORNL (SHE)	
Paul Berkvens, ESRF (SHE)	

*** = Subcommittee Chairperson**
**** = Member of ESS Advisory Committee (SAC, TAC, CFAC)**
Count: 34 (excluding observers and coordinator)

A.3 Appendix 3 – Review Agenda

ESS Annual Review

12-14 November, Lund, Sweden
FINAL AGENDA

Tuesday, November 12, 2013 – Auditorium, Medicon Village

8:00	Bus from Hotel Planetstaden to Medicon Village
8:30	Committee Executive Session..... Review Committee Chair
9:30	Welcome and ESS Overview and Status (30+15) ..... J. Yeck
10:15	Science (20+10) .....D. Argyriou
10:45	*Break*
11:00	Accelerator System Overview and Status (20+10)..... M. Lindroos
11:30	Target Station Overview and Status (20+10) .....J. Haines
12:00	Integrated Control System Overview and Status (20+10) .....G. Trahern
12:30	*Lunch*
13:15	Tour to Construction Site and Archeological Work ..... A. Weeks
14:15	Neutron Scattering System Overview and Status (20+10) ..... O. Kirstein
14:45	Infrastructure Overview and Status (20+10) .....Ö. Larsson
15:15	Operations, ES&H and QA Overview and Status (20+10) .....P. Carlsson
15:45	Project Support & Administration Overview and Status (20+10) M. Tiirakari
16:15	ESS Cost and Schedule Baseline (20+10) .....J. Brisfors
16:45	*Break*
17:00	Committee Executive Session..... Review Committee Chair
18:40	Bus to Restaurant
19:00	Reception and Dinner

Wednesday, November 13, 2013 - Conference rooms according to detailed schedule, ESS

8:10	Bus from Hotel Planetstaden to ESS
8:30	Parallel Subcommittee Presentations/Discussions
12:15	*Lunch*
13:15	Parallel Subcommittee Presentations/Discussions
15:00	Subcommittee Working Sessions
16:00	Review Committee Executive Session .....Tänkartanken, 1st floor

Thursday, November 14, 2013 - Tänkartanken, ESS / Auditorium, Medicon Village

8:10	Bus from Hotel Planetstaden to ESS
8:30	Review Committee Executive Session ..... Tänkartanken 1st floor
10:30	Dry Run of Closeout Briefing
11:00	Closeout Briefing with ESS Management
12:00	*Lunch*
13:30	Closeout for ESS Programme Team ..... Auditorium, Medicon Village
14:30	Adjourn

Breakout Sessions - Wednesday, 12-14 November

Accelerator (Sub-Committee 1, ESS POC – Mats Lindroos) – Linneasalen, 1st floor

08:30 – 09:15	Accelerator Status (30+15)	M. Lindroos
09:15 – 09:45	Baseline Design & Requirements (20+10)	D. McGinnis
09:45 – 10:35	Accelerator Systems & RF (35+15)	A. Sunesson
10:35 – 10:50	*Break*	
10:50 – 11:15	Beam Instrumentation (15+10)	A. Jansson
11:15 – 11.35	Safety & Availability (15+5)	A. Jansson
11:35 - 12:15	Specialized Technical Services (30+10)	J. Weisend
12:15 – 13:15	*Lunch*	
13:15 – 13:55	Accelerator to Target Interface (A2T) (25+15)	T. Shea
14:00 – 16:00	Open Q&A / Subcommittee Working Session	All

Target (Sub-Committee 2, ESS POC – John Haines) - Paracelsus, 3rd floor

08:30 – 09:15	Target Status (30+15)	J. Haines
09:15 – 09:45	Baseline Design & Requirements (20+10)	E.Pitcher
09:45 – 10:30	Monolith Systems	R. Linander
10:30 – 10:45	*Break*	
10:45 – 11:30	Moderator and Reflector Systems	S. Gallimore
11:30 – 12:15	Target Systems	C. Kharoua
12:15 – 13:15	*Lunch*	
13:15 – 14:00	Remote Handling Systems	M. Göhran
14:00 – 16:00	Open Q&A / Subcommittee Working Session	All

Integrated Controls (Sub-Committee 3, ESS POC – Garry Trahern): – Kornet, 3rd floor

08:30 – 09:15	Integrated Controls Status (30+15)	G. Trahern
09:15 – 09:45	Baseline Design & Requirements (20+10)	G. Trahern
09:45 – 10:30	Integration Support (30+15)	M. Reščič
10:30 – 10:45	Break	
10:45 – 11:30	Physics Core Components (30+15)	L. Fernandez
11:30 – 12:15	Software Core Components (30+15)	S. Gysin
12:15 – 13:15	*Lunch*	
13:15 – 14:00	Protection Core Components (30+15)	A. Nordt
14:00 – 16:00	Open Q&A / Subcommittee Working Session	All

Neutron Scattering (Sub-Committee 4, ESS POC –Oliver Kirstein) – Open Space, 2nd floor

08:30 – 08.35	Neutron Scattering System Status (5)	D. Argyriou
08:35 – 09:15	Instrument Concepts (10+10)	K. Andersen
08:55 - 09:15	Science Support Systems	A. Hiess
09:15 - 10.15	Instrument Projects (40+20)	R. Connatser
10:15 – 10:30	*Break*	
10:30 – 11:00	Detectors (20+10)	R. Hall-Wilton
11:00 – 11:30	Neutron Optics & Shielding (20+10)	P. Bentley

Breakout Sessions - Wednesday, 12-14 November

11:30 – 11:50	Choppers (10+10)	I. Sutto
11:50 – 12:10	Electrical Engineering (10+10)	T. Gahl
12:15 – 13:15	*Lunch*	
13:10 – 13:40	DMSC (20+10)	M. Hagen
13:40 - 14:00	In-kind & Interfaces	D. Argyriou
14:00 – 16:00	Open Q&A / Subcommittee Working Session	All

Infrastructure (Sub-Committee 5, ESS POC – Örjan Larsson) – Boket, 4th floor

08:30 – 09:15	Conventional Facilities Status (30+15)	K. Hedin
09:15 – 09:45	Baseline Design & Requirements (20+10)	J. Molander
09:45 – 10:30	Construction Management & Procurement Status (30+15)	M. Eneroth
10:30 – 10:45	*Break*	
10:45 – 11:15	Design Status (20+10)	J. Molander
11:15 – 12:00	Energy Status (30+15)	T. Parker
12:00 – 13:00	Lunch (Discussions with Acc, Target, NSS 12.15-13.00)	
13:00 – 13:45	Construction ES&H Program Overview (30+15)	P. Jacobsson
13:45 – 14:15	Licensing processes and status (20+10)	P. Jacobsson
14:15 – 16:00	Follow Up on Issues / Subcommittee Working Session	All

Cost and Schedule (Sub-Committee 6, ESS POC – Johan Brisfors) – Kvarnen, 3rd floor

08:30 – 09:15	Overview of ESS Project Controls (30+15)	J. Brisfors
09:15 – 10:00	Tools and Processes (30+15)	M. Jakobsson
10:00 – 10:30	Cost and Cost Basis (20+10)	M. Palade
10:30 – 10:45	*Break*	
10:45 – 11:30	Schedule and Critical Path (30+15)	M. Jakobsson
11:30 – 12:30	*Lunch*	
12:30 – 16:00	Project Manager/ Work Package Manager Interviews	TBD by Committee

Project Management (Sub-Committee 7, ESS POC – Allen Weeks) – Tänkartanken, 1st floor

08:30 – 09:15	Baseline Strategy and Risks, Transition to Construction (25+20)	J. Yeck
09:15 – 09:45	Staffing and Host Lab Start-Up (15+15)	M. Tiirakari
09:45 – 10:15	Supply & Procurement System (15+15)	A. Weeks
10:15 – 10:30	*Break*	
10:30 – 11:00	In-Kind Contributions (15+15)	G. Németh
11:00 – 11:45	ES&H Program, Licensing & Security Overview (25+20)	P. Jacobsson
11:45 – 12:15	Quality Assurance (15+15)	L. Berdén
12:15 – 13:15	*Lunch*	
13:15 – 14:00	System Integration & Configuration Control (25+20)	J. Lehander
14:00 - 14:30	Risk Management (15+15)	J. Wollberg
14:30 - 16:00	Follow Up on Issues / Subcommittee Working Session	All

Annual Review 2013 observations
Tracking of actions

ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-01	ACC	AR2013: Top 10 worries 3)	Accelerator: basic assumption of 1 W/m halo beam loss used as Level 1 requirement with major implications inter alia on licencing, shielding and operation; needs to be confirmed by realistic end-to-end beam simulations including errors, showing sufficient margin, and/or adequate scaling of experience at other facilities. The normal operation envelope should include beam loss scenarios.	Verify that ESS accelerator can provide average beam power of 5 MW with beam loss less than 1 W/m Verify shielding is adequate for 1W/m (as per Lali T. tech note)	The approach is to perform statistical error studies of the linac to define tolerances and to determine a steering scheme for beam centre correction. Then E2E error studies can be made to map beam losses, if any are found.	M.Eshraqi	Tech note	To be completed for TAC meeting 2-3 April	ESH will support with dose limits and breakdown of requirements. (PC)
					Further investigate an approach to shielding design in other (similar) labs. Assign beam spill limits to already existing event classes H1 – H5, present to SAG, modify if necessary and get an approval. Written document – due by March 1, 2014. Support continuous average 1 W/m loss limit by taking the following actions: Define guidelines for hands-on maintenance conditions at ESS (related to linac availability), present to SAG, modify if necessary and get an approval. Written document due by 14 March, 2014. Conduct linac activation simulations to show limiting beam losses (to still allow hands-on maintenance). Technical note due by May 1, 2014. Michal Jarosz in AD is providing realistic model for SCL components. Note: Part of this document would have to be generated based on input from end-to-end beam simulations.	L.Tchelidze	Tech Note	Review of progress at TAC meeting 2-3 April and Completed for 1 May 2014	
2013-02	ACC	AR2013: Critical risks..	Accidental beam loss: need to establish "worst case" scenarios based on risk analysis and to conduct simulations to determine appropriate shielding (interface with CF) and system interlocks for personnel protection	Establish and document worst case beam loss scenarios to use for shielding analysis	Verify that shielding is sufficient for all possible loss scenarios Using the available particle-matter simulation codes. Verify that shielding is sufficient for normal operations 1 W/m plus additional short-term beam loss cases as/if defined in the previous item (include both realistic and simplified geometry models). Develop Tech Note with worst case scenarios to use for shielding analysis	L.Tchelidze	Tech note	Review of progress at TAC meeting 2-3 April and Completed for 1 May 2014	ESH will support with dose limits and breakdown of requirements. (PC)
2013-04	ACC	AR2013: 1_ACCRec-1	Reassess beam instrumentation based on effective strategy of commissioning and needs of operation	Review the type, location, number and performance of beam-line instruments for: · sequence for beam commissioning . Operations mode . Maintenance mode	Started working group for commissioning with senior experts at the Accelerator Division with experience of commissioning of similar machines at CERN and SNS: T. Shea, E. Tanke, M. Eshraqi, H. Danared, R. Zeng, M. Munoz. Beam Commissioning planning Update commissioning milestones. Prepare list of measurements, procedures and techniques required in each one of the commissioning stages. Identify the Beam Instrumentation needed. Identify the software needed. Write the requirements Documentation of procedures. Prepare list of systems to be tested before each stage of Beam Commissioning.	M.Munoz	Tech. Note	To be completed for TAC meeting 2-3 April	

Annual Review 2013 observations
Tracking of actions

ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-05	ACC	AR2013: 1_ACCRec-2	Consider a faster prototyping of all accelerating structures and raster magnet system	Review the schedule to determine if the strategy for prototyping is time-efficient, and to determine which if any activity durations can be shortened and milestones moved forward. Analyse what dependent activities are impacted and how they are	Collect from WP Leaders a list of prototypes and their current completion dates - Due by December 5th WP leaders will describe if prototypes can be done more quickly, what resources will be required to accomplish this & what the impact of such a change would be. – Due Jan 14th J. Weisend will analyze the results and create a spreadsheet listing prototypes, possible schedule reductions and impacts – Due Feb 6th	J. Weisend	Tech. Note	Review of progress at TAC meeting 2-3 April and Completed for 1 May 2014	
2013-06	ACC	AR2013: 1_ACCRec-3	Establish criteria for success and formalize decision process in advance for decision of IOTs (end 2017)	Establish criteria for success and formalize decision process in advance for decision of IOTs (end 2017)	Organize discussion to suggest acceptance or rejection criteria during Jan 2014 Formalize the decision process and the criteria At least the following aspects should be part of the decision matrix: Price Performance Supplier performance Risk Summarize the process and the criteria in a tech note no later than May 1st 2014	A. Sunesson	Tech. Note	To be completed for TAC meeting 2-3 April	
2013-07	ACC	AR2013: 1_ACCRec-4	Analyse and develop IKC potential for beam instrumentation	Analyse and develop IKC potential for beam instrumentation	Contact potential in-kind partners (initial contacts already made) Determine suitable areas of in-kind contribution for each potential partner (partially done, continuing) In-person meetings with each potential partner to discuss details (by feb 2014) Formalize verbal agreements as required (e.g. LEBT by march). Integrate into Primavera plan (by April, ongoing as needed).	A.Jansson	Plan to IK manager at ACCSYS	To be completed for TAC meeting 2-3 April	Håkan Danared, IK manager at ACCSYS, will support the process
2013-08	ACC	AR2013: 1_ACCRec-5	Be aware of the critical importance and manage properly the communication of radiation-protection issues to the public	Recommendation and responsibility for actions is to be clarified with EPG	to be agreed with EPG	M.Lindroos			This is an activity for ESH and communications Division. ESS has been working with since since many years as a part of the licesning process. (PC)

Annual Review 2013 observations
Tracking of actions

ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-09	ACC	AR2013: 1_ACCRec-6	Translate high-level requirements for reliability and availability into performance figures for elementary components and systems, identify discrepancies with state-of-the-art and implement corrective / mitigating actions (overcapacity, redundancy, reparability, "hot" spares, etc.)	Develop requirements to L4 for, as a minimum, availability and for reliability. Trace requirements to L1 availability and reliability requirements to ensure the breakdown is mathematically correct.	Review L2 Definition with the Availability Cross Functional Working group to see if it makes sense – January 15, 2014 Define definitions for availability and reliability for L3 and L4 by January 15, 2014 Set place holders for L3 and L4 requirements by January 30, 2014 Review preliminary estimates from affected work packages on L3 and L4 by March 15, 2014 Review final numbers for L3 and L4 by May 15, 2014	D.McGinnis	Requirements in DOORS	Review of progress at TAC meeting 2-3 April and Completed for 1 May 2014	Develop Accelerator models for RAM (reliability, availability and maintainability). Using the RAM model, perform the following analyses: • top-down breakdown of L1 availability and related requirements to become targets for L2, L3, L4 and lower PBS systems, subsystems and components. • Bottom-up estimates for L5, L4, L3, L2 components, subsystems, systems to validate or identify need to change L1 figures Enhance the RAM model through FMEA. Design for reliability, maintainability (access, ease and complexity of maintenance, minimal skill levels for maintenance etc) Initiate operational planning using RAM-related analyses for e.g. spares assessment, maintenance task analysis, level of repair analysis. From the RAM, develop reliability and maintainability requirements at L2-L5. Include these requirements in the SOWs for IKC and supplier tenders and agreements.
2013-10	ACC	AR2013: 1_ACCRec-7	Integrate utilities into reliability/availability studies	?	This is an action for the XFWG on reliability/availability. Utilities are in CF. CF was included in the XFWG shortly before the annual review. A target for CF reliability/availability exists, but need to be refined. CF has been asked to provide feedback on the target (by January 2014), and also clarify what they consider to be a failure (note a small voltage droop may cause long downtimes if it trips vital equipment. This may lead to requirements on sensitivity of equipment to e.g. line disturbances (connected to e.g. UPS question, for which there is a coordinating activity ongoing). Spring 2014.	A. Jansson	Tech. Note	Review of progress at TAC meeting 2-3 April and Completed for 1 May 2014	
2013-11	TS	AR 2013	Only two years are being allowed for the moderator and reflector plug build; this may not be enough. Interactions with vendors may be helpful.	Procurement of this hardware has taken more than 2 years for both the initial SNS plug as well as the spare plug, whereas it took much less time for JSNS and TS2.	Attempt to understand why the SNS plug design and fabrication approach takes so much longer than for similar facilities. Also, seek input from vendors. Document findings.	R. Linander	Report and possible adjustment to plan.	01-jun-14	
2013-12	TS	AR 2013	The price of off-spec steel is important; a supplier should be located and a price negotiated. This is currently in the project schedule for 2015.	Cost of this steel is ~ 10% of the total target station cost and the price has fluctuated by ± a factor of two over the last ten years.	Better understand the availability, quantitites, and cost of off spec steel available within partner countries. Explore possibility of an in-kind partner supplying steel.	R. Linander	Report and possible adjustment of cost estimate	01-maj-14	Funds have been allocated in baseline plan to procure initial lot of material in 2015 if price is favorable.
2013-13	TS	AR 2013	The target/instrument, target/accelerator, and target/conventional facilities interfaces are important and appear to be improving. These need to continue to improve, and a timely decision on the new moderator design is a first test.	Moderator concept selection is on the critical path for the Target Station. Clear interface definitions are important at this stage of the project.	Work with NSS to finalize moderator concept and establish monthly meetings between interfacing Project Leaders to raise visibility. Continue to enhance communication with Accelerator, Instruments, and Conventional Facilities to define the interfaces, and document decisions in Interface Control Documents.	J. Haines	Submit moderator design change request package for CCB approval. Monthly Project Leader level interface management meetings established.	30-apr-14	

Annual Review 2013 observations
Tracking of actions

ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-14	TS	AR 2013	Planning of the remote-handling schemes for target & moderator-reflector replacement needs to be completed.	Remote handling approaches are being developed for all highly radioactive target components that are expected to have a limited lifetime. The Moderator-relector plug replacement is one of the most frequent operations (~ yearly replacement) and current approach is complex. Therefore, we are looking for a simpler solution.	Moderator concept will be finalized in the spring of 2014. Ease of remote handling is one aspect being considered in this selection process. Following this decision, the remote handling scheme will be established during the preliminary design process for the Moderator-Reflector Plug and Target Wheel.	M. Göhran	Report doumenting mainteninace schemes for Moderator and Reflector Plug and Target Wheel.	30-nov-14	
2013-15	TS	AR 2013	Spare components are currently delayed to operations. Make sure to manage this.	Need to identify critical spares and establish priority for purchasing spares as opearations funds become available.	Compile a list of critical spares and update periodically to be prepared to factor into operations planning. Establish priotity for purchasing based on impact on operations, lead time needed to obtain replacement equipment, and probability of failure.	J. Haines	Critical spares list documented and transmitted to Ops, ES&H, and QA Director.	28-feb-14	
2013-16	TS	AR 2013	Consider consolidating neutronics and shielding efforts into one group to avoid duplication of efforts.	Accurate shielding evaluations are critical to ensure safe operation, requiring a high degree of rigor and process control and are a cost driver in several parts of the facility.	Develop proposal for conducting neutronics and shielding analyses across all projects and establish a well-documented, rigorous process.	E. Pitcher	Proposal for EPG	28-feb-14	
2013-17	TS	AR 2013	The water-cooled target backup study of beam power versus need for emergency coolant is important. This study should be completed as soon as possible.	Using a water-cooled target as a backup in the event that an unforeeen problem occurs with the baseline He-cooled design would be more straigthforward to license if no emergency cooling is	Complete study by May 2014	E. Pitcher	Report documenting power limit	31-May-14	
2013-18	ICS	AR 2013	The WBS should be scrubbed and reviewed by the project prior to base lining the budget. This could be done in very short order by clearly identifying the staff roles from the bottom up. Some areas appear to be too high and some too low.	The structure of the WBS should be managable in the long term, therefore should be revisited and updated	Establish a new independent Work Package containing all the Equipment cost for Construction	G. Trahern	WP Description document	31-Jan-14	Created to better report on EV (filter out HW and procurement
						J. Andersson	Updated Primavera plans	13-Dec-13	
						J. Andersson	Updated Project Specifications document	31-Jan-14	
					Revisit WP2 structure, split WP into Applications and Physics	L. Fernandez	Applications: WP Description document	31-Jan-14	There is no clear scope of 'physics' work therefore the Applications WP is kept separate
						J. Andersson	Applications: Updated Primavera plans	13-Dec-13	
						J. Andersson	Applications: Updated Project Specifications document	31-Jan-14	
						G. Trahern	Physics: WP Description document	31-Jan-14	
						J. Andersson	Physics: Updated Primavera plans	13-Dec-13	
						J. Andersson	Physics: Updated Project Specifications document	31-Jan-14	
						G. Trahern	Physics: Find the interim WP Leader person	31-Jan-14	
					Revisit WP6 Integration Support structure and split Work Units into WPs	M. Rescic	WP Description documents	18-Jan-14	Scope of WP Integration support was too big and unmanageable
						J. Andersson	Updated Primavera plans	13-Dec-13	
						J. Andersson	Updated Project Specifications documents	18-Jan-14	
						G. Trahern	Assigned WP leaders	28-Feb-14	

Annual Review 2013 observations
Tracking of actions

ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-19	ICS	AR 2013	Reconsider the large outsourcing and convert contractors/managers to engineers	The ratio external/internal is too big, also, the ratio manager/engineers is too big. Also, more engineering competencies required in the staff profile.	Revisit staffing competencies and estimates in Primavera	WP Leaders, Garry Trahern	A new staffing plan for 2014, 2015+	31-mar-14	
					Establish clear competencies terms (e.g. scientist, engineer) and standardize in staffing plans	J. Andersson	A list of available competencies and associated costs	31-dec-13	
					Establish a final external/internal ratio for Construction phase	WP leaders	WP level ratios, yearly for Construction phase	28-feb-14	
					Plan the number of external staff onsite for 2014	WP leaders	A document summarizing roles and arrival dates	13-dec-13	
					Plan the number of external staff onsite for 2014	J. Andersson	Revisited Primavera plans reflecting increased onsite hourly cost	13-dec-13	
2013-20	ICS	AR 2013	Be more proactive in defining interfaces and in communication with other systems. Pursue production of ICD's with highest priority to clarify scope and interfaces with external systems		Define a list of 'other' systems	M. Rescic	Excel spreadsheet	13-dec-13	
					Appoint lead integrators to systems	G. Trahern	Excel spreadsheet	31-mar-14	
					Establish internal ICS architecture	M. Rescic	MagicDraw diagram	28-feb-14	
					Setup regular correspondence with the systems with commitment from everybody involved	WP leaders	Schedule of meetings and venues, with attendance list	31-mar-14	
2013-21	ICS	AR 2013	Be more proactive and assertive in setting standards (e.g., low energy beam transport)	Push decisions and standards to stakeholders instead of waiting for them	Make a list of standards and systems ICS has authority to standardize	WP leaders	PUBLIC list of all applicable items	31-mar-14	
					Prepare a plan and milestones when and by who the decisions should be formally approved, for ICS and ESS standards that affect ICS	WP leaders	Updated primavera plan	30-apr-14	
2013-22	ICS	AR 2013	ICS should identify resource to work with other technical groups in defining IKCs with control thereby assessing if it would be advantageous from an ESS project point of view to incorporate IKCs into ICS.	ICS should identify resources to work with other technical groups in defining IKCs with controls thereby assessing if it would be advantageous from an ESS project point of view to incorporate IKCs into ICS.	Hire the dHoD to help HoD with IKC management	G. Trahern	Filled position	30-sep-14	
					Revisit the possible IKCs for ICS	G. Trahern	List of IKC possibilities on a WP/WU/product basis with cost estimates, updated plan in Primavera	31-dec-14	
2013-23	NSS	AR 2013	Conduct a project level review of NSS budget.	Conduct a project level review of the NSS budget to reduce the risk of delivering less than 16 instruments to an acceptable level.	Started a detailed review of all NSS work packages	O. Kirstein	Revised project plan	31-mar-14	
2013-24	NSS	AR 2013	Establish an acceptable scope for NSS, consistent with budgetary constraints and seek endorsement of stakeholders		Utilize the detailed review to establish the scope of NSS	O. Kirstein	Revised project plan	31-mar-14	
2013-25	NSS	AR 2013	Establish clear agreement with other ESS sub-projects on scope boundaries (including agreement on financial responsibilities)	Establish agreements with in-kind partners for implementation of instrument development and construction, and for bringing those instruments to full potential)	Host a workshop (outside of Lund) with our partners to discuss Cooperation Centers and the implementation process for instrument projects.	D. Argyriou	Agreements with partners	31-dec-14	
2013-26	NSS	AR 2013	Conduct independent assessment of instrument construction cost, with 1st level cost differentiation (e.g. low, medium and high cost prototypes)	Reassess instrument construction costs, with due consideration of the impact of a high proportion of in kind contributions.	Utilize the full set of instrument proposals and the basis of estimations to compare with existing spallation source instruments.	R. Connatser	Revised projection of instrument costs	30-apr-14	
2013-27	NSS	AR 2013	Recruitment of key personnel for implementation of instrument construction program.	Focus existing personnel on attracting in-kind contributions and establishing interfaces /standards to accommodate those	Work with partners to develop standards and common understanding of interfaces.	O.Kirstein	In-kind agreements with partners throughout Europé	On-going	

Annual Review 2013 observations
Tracking of actions

ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-28	NSS	AR 2013	NSS should maximize consolidation of procurements for key components with other subprojects (e.g. steel, concrete…)	Maximize consolidation of procurements for key components with other subprojects (e.g. steel, concrete…)	Work with other parts of ESS to coordinate this information	R. Connatser	Consolidated procurement plan	31-dec-14	
2013-29	INFRA	AR 2013	Stronger overall Project Integration/configuration management team recommended	CF needs to allocate more resources to systems engineering	Hire consultants to support the CF design team	JMO/FÖS	Call-off contracts from framework agreements	Done	
2013-30	INFRA	AR 2013	More rigorous planning, recording and control of interface data (managed centrally)	CF shall document interface data and incorporate requirement milestones in the schedule	Incorporate requirement milestones in the schedule Produce ICD's for all interfaces	JMO/FÖS/ATH	ICD's Schedule	31-mar-14	ACC done
2013-31	INFRA	AR 2013	Better communication/understanding of "needs" between CF and other systems (informal technical seminars?)	CF needs to understand what parameters are "nice to have" as opposed to "need to have" and get other divisions to understand what decisions are needed from them in order not to delay CF design.	Value engineering sessions with accelerator, target and NSS, where we are discussing requirements and other related issues	KHE	Cost savings as compared to baseline	31-Jan-14	1st round , thereafter on-going
2013-32	INFRA	AR 2013	More detailed analysis of ground parameters and Experimental Area requirements to try to reduce the need for expensive piling.	CF shall optimise the foundation method in order to optimise the costs.	In order to evaluate the ground conditions and to select the ultimate foundation method a "Test Piling" will be performed on site. The test will commence end of November and be finished by February 2014. The test will be divided into two phases: The first phase entails drilling and installing of 26 piles from ground level to about 15-25 metres deep into the ground, some of them through solid rock. Both concrete and steel core piles in different dimensions will be used. The second phase will contain load testing of the piles to determine the load capacity of the piles in the set conditions. The test will be finalised with a written report of the completed test results.	MJA	Written report from test piling and test results	28-feb-14	
2013-33	INFRA	AR 2013	To create cost contingency, review, (possibly through value engineering), some of the requirements (stainless reinforcement, deflections, space demands temperature stability). Use this to prepare possible de-scoping list if needed after target cost established.	Go through all requirements that may be costly/excessive.	Value engineering sessions with accelerator, target and NSS, where we are discussing requirements and other related issues	KHE	Cost savings as compared to baseline	30-sep-14	Part 1 2014-09-30 Part 2 2015-01-31
2013-34	INFRA	AR 2013	Ensure rigorous and independent assessment of C101 selection process to avoid contract challenge.	Make sure that no formal mistakes are made during the evaluation	Legal brief to be held by Ohad at the start of tender evaluation process (9th December). C101 evaluation process document to be developed	MEN	Documentation from start of tender evaluation meeting C101 evaluation process document	09-dec-13	
2013-35	INFRA	AR 2013	Put in place a rigorous and independent scrutiny of sub-contracts under C101 main contract and ensure a comprehensive auditable process for the "open-book" process. Try to ensure competition at sub-contractor level.	CF needs to ensure that the procurement of sub-contracts follows regulation.	The law firm Andersson Gustafsson Advokatbyrå has reviewed the invitation to tender (ITT) documents with regards to public procurement (PP). They gave the following comment on sub-contracts: "The structure in Handling 1, SAMVERKANSAVTALET, 4 OPTIONER, which gives ESS an exclusive right to suborder the specified options in Handling 1, Section 4.3-4.7 enables ESS to both score and evaluate the Performance Plan Phase 1 ("Fas 1") and the Organization phase 2 ("Fas 2") within the legal frames of the Swedish Public Procurement Act as well as Swedish case law. Since the entire commitment of this public procurement is subject to competitive tendering due to this procedure, it is our opinion that the stipulation in e.g. 2.3.1. Handling 1.2, alllowing the ESS to influence the choice of sub-contractors would not constitute an illegal direct award."	MEN	Review of the ITT documents	Done	
2013-36	C/S	AR 2013	Recommend that if total float (schedule contingency) is included within the integrated schedule its consumption is managed under authority of the appropriate management level.	i) Introduce the float as activities in P6 ii) Integrate schdule (float) usage as part of the Change Process at CCB/EPG	i) Already introduced ii)Part of new Change Process & Variance Reporting	i) M.Jakobsson ii) J.Lehander	Updated P6 planning Updated Planning Process Updated Change Process	i) Done ii) TBD	

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ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-37	C/S	AR 2013	Recommend to use early finish versus late finish etc.., (The use of the term float can be misleading and implies an opportunity to delay schedule)	Introduce "Early finish" and "Late finish" for key milestones	Introduce milestones named "Early finish" and "Late finish" for key milestones	M.Jakobsson	Updated naming	Done	
2013-38	C/S	AR 2013	Recommend that additional float / contingency be calculated based upon a more detailed analysis of technical, schedule and cost risks at a suitable future date.	Schedule margin calculation based on risk and uncertainty	Use Acumen in combination with critical path and uncertainty calculation	M.Jakobsson	Updated Schedule Margin calculations	30-mar-14	
2013-39	C/S	AR 2013	Recommend the development of a management summary schedule and vision statement that clearly define the integration of each system, key and major milestones, senior management strategic vision etc.., This should consider triple constraints of schedule, quality and cost – what is the highest priority?	Create a vision statement including main priorities (e.g. Keeping schedule is more important than cost) for both total ESS and for each project		J.Yeck		15-feb-14	
2013-40	C/S	AR 2013	Recommend to continue development of the on-site installation activities for Instruments to ensure these are consistently sequenced with respect to constraints such as resources, work areas, procedures, materials, site materials management.		Connections in the P6 plan between: - decision points for generic instrument suite and neutronics - the neutronics calculations and final design of upstream shielding - additional neutronics calculations (once preliminary design of an instrument is complete) and the downstream shielding for the instrument - shutter/temporary shutter installation (target scope) and temporary beamstop/instrument installation (instrument scope) - installation of guide/flight tube/window/temporary window (target scope?) and upstream shielding installation - the conventional construction (the building is available, the crane is operational, etc.) and upstream shielding installation - upstream shielding installation and installation of the rest of an instrument - finalization of B10 detector designs and instrument final design [note- they should have, in a general sense, an idea of what type of instrument will go where and therefore, what type of detector would be best for that instrument] Milestones for when the detailed plan for each selected instrument is ready - Once the designs for an instrument are completed, then an integrated schedule for each instrument can be developed.	R.Connatser		15-apr-14	
2013-41	C/S	AR 2013	Recommend that infrastructure planning and scheduling be properly integrated and performed in a manner consistent with the other work packages.	Planning should for CF should include WP's (Design & Construction are sub-projects) for each building		Ö.Larsson		15-feb-14	
2013-42	C/S	AR 2013	Recommend to ensure that as each work package is further developed the performance management baseline is updated to include escalation for direct resource costs, bulk commodities, in-direct / overhead costs, and to ensure that performance reporting is consistent with escalated costs.	All cost to be escalated into "then year" money	i) Investigate in which system (P&, Cobra or both) that the escalation should be done. ii) Implement escalation	M.Palade	Escalated Baseline figures ("then-years")	15-jan-14	

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ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-43	C/S	AR 2013	Recommend to continue to develop/refine the estimates to reflect benchmarks, parametric, industry inputs, 3rd party inputs and to ensure that the basis is properly structured, and consolidated in a formalized approach.	The quality of the cost estimates should be improved. Focus should be on estimates (excluding labor) with Basis of Estimates in the category "Engineering, experienced or professional judgment (ENI)" but preferably all estimates should be updated if possible		M.Lindroos J.Haines K.Hedin O.Kierstein G.Trahern A.Weeks	Updated estimates	01-apr-14	
2013-44	C/S	AR 2013	Recommend to include a budget article for training. This could be a percentage of staff salary that is allocated to HR for the management and preparation of training programs – Project Management, Safety, Regulatory, procurement, internal processes etc..,	i) Introduce cost for Project Training (EVM etc.) ii) Introduce general training budget for all Directorates	i) Already introduced ii) Discuss with respective Directorate to ensur training cost is included	J.Brisfors	Training cost included in estimates	i) Done ii) 01-Feb-14	
2013-45	C/S	AR 2013	Recommend to consider the potential savings from early negotiations with suppliers of bulk commodities and to potentially procure early if cost benefits are identified and if this is consistent with the funding profile.			A.Weeks		15-mar-14	
2013-46	C/S	AR 2013	The lifecycle cost contingency is noted as <10% of the total project cost. Recommend to review this value considering the potential for risks that may materialize in the near term e.g. related to in-kind sharing, design maturity, staffing ramp-up, regulatory uncertainty, and past performance levels.			J.Yeck		15-apr-14	
2013-47	C/S	AR 2013	Recommend to ensure the project funding is profiled such that rolling wave planning is consistent with the coming execution year funding and the availability of resources. It may also benefit the project to establish and publish execution year +1 and +2 budgets to obtain advanced agreement on preliminary budgets/exchange rates.	Introduce a yearly budget cycle that supports the rolling wave planning (i.e. Starting budget cycle end springr and setting the budget in october for the coming year)		M.Tiirakari	Process decribed and implemented	15-feb-14	
2013-48	C/S	AR 2013	Recommend further development, control and review of requirements to ensure that these are clear and not excessive i.e. they do not imply unnecessary work leading to cost increases and schedule delays.			J.Lehander		15-apr-14	
2013-49	C/S	AR 2013	Recommend to ensure that requirements relate to quantifiable deliverables.			J.Lehander		15-apr-14	
2013-50	C/S	AR 2013	Recommend to continue the development/refinement of the WBS dictionary using PM standards / best practices.	No specific action (part of on-going daily work)	No specific action (part of on-going daily work)	J.Brisfors	No specific action (part of on-going daily work)	NA	
2013-51	C/S	AR 2013	Recommend to obtain an early-as-possible agreement on the allocations for in-kind contributions amongst the 17 nations to minimize the potential impacts of future delays: oClearly defined governance structure oClear processes oCompatibility with domestic processes and constraints oMeasurable in-kind deliverables oEarned Value / performance measurement (via milestones?)			A.Weeks		15-feb-14	

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ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-52	C/S	AR 2013	Recommend to adapt existing procedures to the requirements / constraints coming from in-kind procurement processes.	??		A.Weeks		15-apr-14	
2013-53	C/S	AR 2013	Recommend that in-kind project teams comprising multi-disciplines e.g. contracts, technical, quality, safety, and project management from ESS and also the in-kind contributor be established as soon as possible to commence early-as-possible negotiations and implementation of in-kind procurements.			A.Weeks		15-feb-14	
2013-54	C/S	AR 2013	Recommend to develop the contractual requirements and detailed procedures for receiving status reports for the in-kind scope within the PM systems on a regular (monthly?) reporting cycle to ensure that progress is accurately integrated within the scheduling system and reported. (Experience from other projects may be useful to identify the monthly reporting deliverables, follow-up tasks, acceptance criteria, payment schemes etc..,)			G.Nemeth		15-feb-14	
2013-55	C/S	AR 2013	Recommend to consider the period of time between "staff-in-post" and "staff effective / productive" to ensure the realism of the schedule and associated deliverables.	New staff effectiveness should be included in the assumptions when hiering	Phase shift staff requirements curve 3 months earlier to compensate for "staff-in-post" and "staff effective"	J.Brisfors	Updated staff plan	15-jan-14	
2013-56	C/S	AR 2013	The function of systems integration / engineering i.e. management of interfaces, configuration control, design processes etc.., should be developed / reinforced.			J.Lehander		15-apr-14	
2013-57	C/S	AR 2013	Recommend to continue the work related to constructability and maintainability studies for the early clash detection, kinematic studies etc.., and to provide early feedback to the system designs. This includes the identification and budgeting of appropriate storage, and laydown areas to support the path of construction.	Identification and budgeting of appropriate storage, and laydown areas to support the path of construction.		M.Tiirakari		15-mar-14	
2013-58	C/S	AR 2013	Recommend to review and confirm the contracts management resource requirements and the projects overall ability/capacity to prepare and place multiple contracts within a short/parallel timescale.			A.Weeks		15-feb-14	
2013-59	C/S	AR 2013	Recommend to develop a stakeholder management plan for the ESS project and also for each work package: oImpact oInfluence oHandling strategy oCommunication strategy	Stakeholder plan for ESS and for each project to be developed (and coordinated)		A.Weeks		15-apr-14	
2013-60	C/S	AR 2013	Recommend to investigate the potential impacts of export control for items that may have dual use applications.			M.Tiirakari		15-apr-14	
2013-61	C/S	AR 2013	Recommend to ensure that the definition of levels within the WBS i.e. project, sub-project, work package are clearly defined and that these are consistent with an OBS having clearly defined roles, responsibilities, accountabilities, and authorities (Responsibility Assignment Matrix)			L.Pettersson		15-mar-14	

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ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-62	C/S	AR 2013	Recommend to mandatorily prescribe account/charge number levels relative to the WBS to reduce errors in timesheet booking, charging, and cost reporting.	Uniform method for assigning charge codes should be proposed	Produce a guideline for charge number levels relative to the WBS to reduce errors in timesheet booking, charging, and cost reporting.	M.Palade	Guideline to be submitted to Planners	31-dec-13	
2013-63	C/S	AR 2013	Recommend to continue the progress made in the areas of risk management, change control, in-kind to ensure robust reporting to support the decision making process.	Continue working with and gradually improving Risk Management internally. To put requirements on collaborators, partners and vendors for robust reporting, clearer view of risks, improving decision making.	-RM requrements for IKC's (reporting, methods and tools) being defined. -RM is a standing item in EPG (weekly), EMT (quarterly) and Project review (monthly). -RM system (database) under implementation for smooth reporting and overview. -Change control is a part of the RM process. Risk analysis is a part of the change control process.	J.Wollberg	-Risk database implementation -System education - RM requirements IKC agreements - Trace linkage between risk and configuration item	31-Mar-14	-Complete Dec 2013 -Education starting Dec 2013/Jan 2014 -Started, complete Dec 2013 - Being adressed, Q1 2014
2013-64	C/S	AR 2013	Recommend to review the resources and roles dictionaries for example to distinguish technicians/crafts from engineering (Technician and craft resources are much easier to hire than mechanical/electrical engineers etc..,)	Bridge (and/or adapt) roles in P6 to closer reflect HR recruitment and R2A2	i) review current roles in P6 ii) Implement neccessary changes	J.Brisfors	New roles in P6 adapted to R2A2	15-feb-14	
2013-65	MGT	AR 2013	Ensure that the top-level agreements, arrived at through the Chief negotiators, are consistent with in-kind/deliverables agreements transferring the cost-responsibilities to the in-kind-providers	Make IKC consistent with high-level agreements between Host States and Member States	Negotiation support activities coordinating bottom level and top level negotiationsand IKRC.	CEO, IKCM	IKCM Plan, LoIs consistent with Project plans	01-maj-14	This is ongoing and was made as a point by the committee to ensure we and the negotiators are on the same page; we need highlight ongoing and established practices.
2013-66	MGT	AR 2013	Establish the procedure for the contingency management (scope & cash). Which is used first to cover increases, how is scope released, incentives for efficiency and savings?		Contingency mgt will be addressed in the Change Control process	J.Yeck J.Lehander		01-maj-14	
2013-67	MGT	AR 2013	Appoint an experienced Technical Coordinator, directly under the CEO, technically responsible for construction, integration, technical reviews, and uniform procedures. Place the relevant technical control and follow-up activities and services (Integration, Configuration control, Scheduling, Engineering data management system, Review office) directly under this Technical Coordinator.	Recruit a technical coordinator or assign a technical coordination function at ESS. Describe the responsibilities of the central technical areas identified. Point out coordinating organisation and identify its responsbiilities	Recruiting of Technical Director started	J. Yeck		NA	
				Construction, integration	Set up a Technical supporting team/function with experts from needed fields to solve technical and construction issues as part of an effective a smooth integration.	Integration group-Z. Lazic	Organize a Technical supporting team/function supporting technical integration work	01-jun-14	
				Construction, Change management	Support to ESS CCB (ESS level) with configuration control, document control, communication from the integration team	J. Lehander	Invitation and implement structuring of the work		
				Configuration control	Implement the configuration control process in the organisation	R. Duperrier	Implement processes in the organisation. Execute implementation-project in ESS platform	01-jun-14	
				Scheduling	Implement technical mile-stones and Critical Design Reviews in schedule (Primavera) to be used, by the projects and review office-function, toll-gates, risk-management etc.	????	Plan, template for different mile-stones approval	01-apr-14	
				Access control of data	Create process to give Access to ESS technical data and data-exchange between ESS and collaboration, suppliers, external review-teams etc. Implement functionality in tools and softwares to give access to required configured technical documentation	Integration group-P. Rådahl	Plan and procedure, communicate point of contact in needed approval function. Implement easy-access and sharing area in intranet.	01-mar-14	
				Engineering Data management system	Implement support for engineering and Plant/Product data management functionality (documents, design-tools, design process, change management and configuration control)	CAD/DPM Support group-H. Lindblad	Engineering support in CHESS/ ECO, Components management, release workflows, training of	01-jun-14	

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ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
				Engineering Data management system	Plan for the methods, training and support of CHESS for ESS, IKC and suppliers.	CAD/DPM Support group-A. Ehn	CAD/PDM Support page on the ESS intranet, contact information to ESS 1'st line support, roll out information etc	01-apr-14	
				Engineering Data management system	Perform meetings with all major IKC for: ESS PLM presentation, design tools, data exchange, classifications, concurrent/sequential engineering. Set up a plan for each partner to manage engineering data in the collaboration	CAD/DPM Support group-H. Lindblad	Supplier procurement, information to major IKC earlier but information to all IKC's ready to start after Roll out of Engineering	01-sep-14	
2013-68	MGT	AR 2013	Place the central SHE activities directly under the Associate Director for SHE		This will be discussed with the CEO, Infra Dir and ASS Dir. after the finilasation of the EC negotations (April/May 2014)	CEO		30-jun-14	TBD at the latest 2014-06-30
2013-69	MGT	AR 2013	Establish a way to receive personnel detached from other laboratories (as AB and as ERIC), and actively seek such contributions as in-kind	Make sure in-kind partners can legally work in SE/DK and maintain their status at hom.	Clarify with authorities and HR policy	HR	Internal document defining guidelines for IKC staff	28-feb-14	
2013-70	MGT	AR 2013	Re-look at the staff planning in numbers and competences taking into account: •The effort to be done by staff at other laboratories for in-kind •Receiving detached personnel from national laboratories, e.g. as in-kind •Restrictions by labour law •The operation phase	Have a coordinated ESS overview of engineers to optimize and to set a realistic staffing plan based on employees,IKC and contracted staff	Collect all needs of engineers and technical capabilitites over the entire ESS, develop stratetiges and overlook the rectruiment of engineers, based on EMT guidelines, for the recruitment of engineers at ESS using employees/IKC/consultants.	Engineering Support and Services group-P. Rådahl (A)	Plan based on EMT and Project Supports guidlines	01-feb-14	
					Structure a central engineering function that can support the projects with technical competences. Identify belonging of engineers to build an effective & aligned engineering function and to optimize the use of competences and resources at ESS.	Engineering Support and Services group-P. Rådahl (A)	Plan and reorganize the engineering support group	15-feb-14	
					Build a core team of engineers that can meet the needs from the ESS projects.	Engineering Support and Services group-P. Rådahl (A)	Report, coordinatition and possible recruitments	30-jun-14	
					Coordinate recruitment, allocation and procurement of technical capabilities for ESS	Engineering Support and Services group-P. Rådahl (A)	Communicate responsibilities, continuous work	15-jan-14	
					The CFWG on operations will adress the operations phase and deliver an updated plan for the May 2014 Review. Work is started.	Patrik Carlsson (leader of ops CFWG)	Report	01-maj-14	
2013-71	MGT	AR 2013	Establish an Internal Audit function. Reporting should be agreed upon between CEO/DG and ESS AB.	Set up an internal audit or process for auditiing using external resources.	Define a audit policy/function	DG/CEO	Define a audit policy/function	31-mar-14	
2013-72	MGT	AR 2013	Ensure that contracted personnel are not put into situations of conflicts of interest	Put mechanism in place to protect staff involved in procurement from conflicts of interest	Define disclosure statements, process	CEO, Legal	Define disclosure statements, process	28-feb-14	
2013-73	MGT	AR 2013	For financial management, ensure segregation of duties for Budget authorization and payment: No payment without budget authorization. Budget authorization and payment executed by different people.	Determine budget and procurement rules that separate authorizations and payment; separate responsibilities.	Budegt authorizations determined and contract award and payment responsibility determined.	Dir of Admin	Determine organizational structure and roles & responsbilities for Budget-Payment authorization	28-feb-14	
2013-74	MGT	AR 2013	Purchasing rules as ERIC: Establish procedures for outside partners to purchase through ESS for their in-kind Establish the most optimal purchasing rules under the ERIC regime Explore if there could be a different set of rules for purchases from the ESS budget proper compared with rules for in-kind-partners purchasing through ESS (supplier qualification)	Investigate the potential advantages to procurement of the ERIC	Define 'Procurement Rules' for the ERIC, to be submitted with ERIC statutes and financial rules.	Procurement & Legal	Draft ERIC Procurement Rules	28-feb-14	

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ESS ID	ESS org	Origin	Obervation / Recommendation	Interpretation	Activity	Resp.	Deliverable	Due date	Comment
2013-75	MGT	AR 2013	Make a quantitative assessment of the purchase-staff needed based on the number or purchases to be performed	Determine the size of the Procurement staff relative to work	Analyze staffing relative to procurement volume	Procurement	Procurement Staff Plan	31-mar-14	
2013-76	MGT	AR 2013	Assess and plan the staffing and effort needed for the arriving goods with respect to: •Reception •Acceptance •Storage •Identification, tracing, labeling	Settle the ESS naming convention, including identificaton and tracing	Identification: Review ESS different id/naming structures. Organise the different id:s relations to each other. Manage any meta-data between databases, tools and softwares. Investigate and collect requirements for labeling of equipment.	Integration group-Peter Rådahl	Set-up a cross-functional team and set up team, plan, scope, resoinsibility and mandates	01-maj-14	Examples: Control system, CHESS, Mechanical design tool, Electrical design tools, requirement-tools,Cable-database, analysis tools, labeling system and so forth
					Identify, list functinal and logical classifications (Meta data)	R. Duperrier	List of classification, implement rules in supporting tools and softwares	01-jun-14	
					Identify, list classifications based on systems, components, safety, barriers etc. Put requirement on meta data on ESS tools and non-ESS tools.	design support division-J. Persson	components, sub-systems, systems, barriers etc. Implement rules for identify	01-jun-14	
2013-77	MGT	AR 2013	Put in place simplified automatic procedures for low-value orders	Accepted	Put in place procedure for low-value procurement and IT support tools	Procurement	Put procurement procedure and IT tools in place	28-feb-14	
2013-78	MGT	AR 2013	Train engineers on commercial contacts and negotiations	Techincal staff may need training/clarification formulating specifications and on contract management	In-kind and Procurement training	Head of Procurement	Organize training and guidelines	28-feb-14	
2013-79	MGT	AR 2013	Make an insurance plan for received goods, including delivered in-kind equipment	Understand and have a plan for transferring and accepting risk of goods transferal	Contract templates address this point, INCOTERMS defined, and potential insurance premium	A Weeks	Insurance Task Force proposal along with reviewed IKC contracts	28-feb-14	
2013-80	MGT	AR 2013	Relook at phase-3 in the in-kind procedure. Avoid redefining the credited cost book value.	Reviewers understood the change mechanism for cost book valuues is floating and can easliy change.	Clarify communication for Phase-3	G. Nemeth	Developand communicate processes for Phase-3; clarify and communicate 'Framework for In-kind Rules'	31-mar-14	
2013-81	MGT	AR 2013	Make sure all technical personnel in leading positions understand the important on transferring WBS parts to in-kind, and have incentives to do so.	Create buy-in for technical leaders on the project to seek in-kind partners; not sure about incentives.	Identify potential IKC work packages and quantify cash-IKC savings.	J. Yeck	Complete Cost Book with identified IKC potential	28-feb-14	
2013-82	MGT	AR 2013	Organize a dedicated SHE review		Organise a 2-day workshop in the purpose of reviewing the SHE issues. Probably involving 4-5 reviewers.	P Jacobsson	Review Report	15-apr-14	At the latest
					Set up regular external ESH advisory group (ESHAC). A part of this group can form the core of a review team for Annual reviews.	Patrik Carlsson	Review team	31-mar-14	
2013-83	MGT	AR 2013	Make an overview of the combined issues of Dose constraints, Shielding and Zones: The beam loss scenarios, to be included under normal operation conditions, must be defined once and for all, in agreement with the Accelerator Division. Shielding calculations must then be based on these beam loss scenarios. Too low dose constraints may push non-radiation workers to be classified as radiation workers Insufficient shielding may transfer normal radiation-monitored areas to be classified as high radiation areas requiring additional very large investments in construction, ventilation, access, etc.	See observations for 2013-01 and 2013-02	See observations for 2013-01 and 2013-02			NA	See observations for 2013-01 and 2013-02
2013-84	MGT	AR 2013	Put in place periodic training of staff for the area of SHE: radiation, cryogenic, electrical	Make plan for the safety training of the ESS staff at different levels	Produce a Safety Training Plan, including a scehdule when the trainging must be in place	P Jacobsson	Plan	30-sep-14	
2013-85	MGT	AR 2013	Carefully review of all possible bad scenarios regarding the target	Make a riskanalysis of the target	Review and upgrade of the existing risk analysis (ESS-0001263) with focus upon the target scenarios.	T. Hansson	Updated Report	31-mar-14	
					Analyses of consequences for the target material and auxillary target systems in case of different scenarios.	Target Project	Report(s)	TBD	Not discussed with Target Division
2013-86	MGT	AR 2013	Continue the good QA development with a pragmatic approach and in dialogue with the technical activities		No specific action (part of on-going daily work)	L Berdén		NA	

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2013-87	MGT	AR 2013	For the future QC look into contracts with dedicated companies to do QC at the industrial suppliers	Proposal: Find agreement/contract with company/companies after establishment of ESS technical standards	To be evaluated during 2014	L Berdén	Report	31-dec-14	
				Establish ESS technical reference documentation dealing with design-preqrequisites, norms/standards	Implement a structure for ESS technical standards for mechanical, electrial, civil, MTO, general.	A. Seguljev (ESS general) A. Seguljev (Mech), T.	Document structure	01-mar-14	The structure will follow a framework establish togehter with procurement and QA
				Establish ESS technical reference documentation dealing with design-preqrequisites, norms/standards	Interpret safety and quality requirements to establish ESS design pre-requisites used for engineering, procurement, manufacturing, construction work and installation	Coordinators: A. Seguljev (ESS general) A. Seguljev	Released set of ESS general design-prerequisites	01-aug-14	Coordinators will coordinate each area and invite the required expertise from the ESS projects
2013-88	MGT	AR 2013	Regarding Change control: PMs should be authorized to approve Change, only within qualified unchanged overall cost and schedule for their WP		The Change Control process and associated decsion matrix will be updated	J Lehander		31-jan-14	
2013-89	MGT	AR 2013	Establish a review office for design reviews and reviews required before green light is given to significant resource-commitments (hundreds of reviews will be needed; establish a routine to mobilize experts from one part of ESS (including partner labs) to review other parts of ESS). This should be under the supervision of the Technical Coordinator	Implement a design review function Set up routines, review name-lists, mobilization and plan for up-coming activities.	Set-up ESS review function, Develop routines, plan for tasks, mobilization,responsibilities, deliverables. Identify and coordinate review activities.	Engineering Support and Services group-P. Rådahl (A)	Routine, review name-lists, activity plan	01-jun-14	
2013-90	MGT	AR 2013	Continue the nice work on risk management		No specific action (part of on-going daily work)	J. Wollberg		NA	
2013-91	MGT	AR 2013	Have a qualification step for what is entered into the register, do not allow individual uncontrolled entries		Access in the Risk tool will be set based on roles	J. Wollberg		28-feb-14	
2013-92	MGT	AR 2013	Continue to have it as a standing item on the relevant agendas		No specific action (part of on-going daily work)	J. Wollberg		NA	