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Memorandum of Understanding for ESS Instrument Consortium

VESPA, Spectrometer

between

European Spallation Source ERIC

and

Consiglio Nazionale delle Ricerche, IT



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This **MEMORANDUM OF UNDERSTANDING** dated Monday, 25th January, 2016 is made by and between:

- (1) **European Spallation Source ERIC**, Swedish Reg. No. 768200-0018, a European Research Infrastructure Consortium established by decision (EU) 2015/1478 of the European Commission in accordance with Regulation (EC) No 723/2009, having its statutory seat in Lund, Sweden ("**ESS**"); and
 - (2) **Consiglio Nazionale delle Ricerche**, P.Iva IT02118311006, a public organisation incorporated under the laws of Italy, having its registered office in Rome, Italy ("**CNR**");
- (2) – (3) are each individually referred to as a "**Collaborator**" and jointly as the "**Collaborators**".
- (3) The "instrument" VESPA is a neutron beam experimental station and is part of the ESS project plan by approval of the ESS Council.
 - (4) The "proposer(s)" have developed, designed and proposed the instrument to the ESS selection process and have argued to gain approval by ESS Council.
 - (5) The Consiglio Nazionale delle Ricerche is the Prime Contractor for the delivery of the VESPA spectrometer.

Each of ESS and the Collaborators is hereinafter referred to individually as a "**Party**" and jointly as the "**Parties**".

1. BACKGROUND

- 1.1 The European Spallation Source (ESS) is a joint European project. The ESS facility (the "Facility") will be a world-leading centre for materials research and life sciences using neutrons and will host the world's most powerful neutron source. The Facility is being built in Lund, Sweden, with a data management and software centre in Copenhagen, Denmark. Research at ESS will be conducted primarily using neutron beam instruments.
- 1.2 The European Commission has, by decision (EU) 2015/1478 of 19 August 2015, established the ESS as a European Research Infrastructure Consortium, responsible for constructing, operating, developing and decommissioning the Facility. The Swedish and Danish Governments have agreed to host ESS with Sweden as the host member state in accordance with Regulation (EC) No 723/2009.
- 1.3 The Collaborators are leading research institutes within the field of science with neutrons and experts in neutron related technologies.
- 1.4 ESS looks to identify partners with the needed experience, capability and competence with access to in-kind resources to realise the successful delivery of the ESS instrument suite, as part of a multinational and institutionally collaborative effort to construct the Facility.
- 1.5 Therefore, the Parties now wish to enter into this Memorandum of Understanding to agree on a joint organization for the realization of one of said instruments and to define certain mutual rights and obligations of the Parties.

2. DEFINITIONS

The following terms and expressions shall when used in this MoU have the following meanings, which shall be equally applicable to the singular and plural forms of such terms:

"Confidential Information" means any scientific, technical, financial, commercial or other information of any nature and in any form provided by a Party to one or more of the other Parties, prior to or after the date of this MoU, in connection with this MoU and which information is designated as proprietary and confidential by an appropriate stamp, legend or other notice in writing.

"Consortium" is defined in Section 4.1 below.

"Facility" is defined in Section 1.1 above.

"ICB" means the Instruments Collaboration Board responsible for supporting the delivery of the NSS project scope by co-ordinating efforts to deploy and maximise in-kind contributions to ESS. It comprises of ESS management and representatives of each institution contributing to the NSS project.

"Instrument" is defined in Section 4.1 below.

"MoU" means this Memorandum of Understanding, including its schedules, as amended from time to time in accordance with Section 11.1 below.

"NSS" means the neutron scattering systems project, a part of the ESS construction project.

"SAC" is defined in Section 4.7(a) below.

3. PURPOSE AND THE PARTIES' GENERAL UNDERTAKINGS

- 3.1 The main purpose of this MoU is to provide a framework for collaboration and governance between the Parties both prior to, and after, each of the Collaborators have entered into in-kind agreements (with detailed technical annexes) with ESS for delivery of their respective contributions to ESS and the Consortium. As such, each Collaborator's costs for realising the Instrument project are financed by way of in-kind agreements, which are reviewed and approved by the In-kind review committee. Therefore, this MoU is not intended to replace such in-kind agreements but shall instead form a complementary framework for governing and maximising the quality and scientific performance of such in-kind deliveries and to maximise the participation by the Collaborators in the design and construction of the Instrument and the NSS project as a whole. However, the Parties undertake to reflect the principles and responsibilities of the Prime Contractor set out in Section 4.3 below in such in-kind agreements.
- 3.2 An overview of the roles between the various bodies and functions within the NSS collaboration, as well as a summary of the general procedure for the delivery of instruments to ESS, are enclosed hereto as Schedule 1. The Parties acknowledge that this overview and summary represent the current versions as of the date of this MoU but that they may be subject to amendments, as decided by the ICB and/or ESS (as applicable) from time to time.
- 3.3 The Parties shall undertake collaborative research, design, development and construction activities for and with the ESS project. A preliminary overview of the respective contributions of each of the Parties is set out in Schedule 2 hereto, but is subject to amendment as agreed between the Parties in writing from time to time and documented by the ICEB as set out in Section 5.2 below. In addition to such contributions, each of the Parties agrees to:
- (a) liaise and communicate with the other Parties;
 - (b) participate in a cooperative manner in the meetings and other activities of the different governing bodies under this MoU; and

- (c) act in good faith and in a manner that reflects the good name, goodwill and reputation of the other Parties and in accordance with good professional ethics.
- 3.4 The Parties acknowledge and agree to in good faith update this MoU as appropriate and necessary to cover each phase of the Instrument's project, from preliminary design to installation and commissioning. This will be made either by amendments in writing or through the entry into of a revised version of the MoU.
- 3.5 ESS shall always be a member of the Instrument Consortium and this MoU both as the Facility, beneficiary of in-kind contributions and as a partner providing resources and executing scope that benefit the delivery of the Instrument.
- 4. INCORPORATION OF THE CONSORTIUM**
- 4.1 The Parties acknowledge that the success of the Facility will to a large extent depend on the delivery of instruments for the Facility. Therefore, the Parties hereby agree to establish an ESS instrument consortium (the "**Consortium**") for the design and construction of VESPA, Broadband SANS instrument (the "**Instrument**").
- 4.2 The goal of the Consortium is to realise the successful delivery of an operational Instrument as a part of the multinational and institutionally based effort to construct the Facility.
- 4.3 The Consortium is lead by a "Prime Contractor", in this case the Consiglio Nazionale delle Ricerche, that takes full responsibility and liability for the delivery of the Instrument to ESS.
- 4.4 ESS is a member of the Consortium.
- 4.5 The Prime Contractor and ESS together can and may invite additional in-kind partners to join the Consortium. The Prime Contractor and 3rd in-kind parties after consultations with ESS, will reach agreement on the cost book value of items contributed into the VESPA project and their share of the liability if any.
- 4.6 The Prime Contractor will appoint the Instrument Scientist and the Instrument Project Engineer, subject to the concurrence of ESS. More staff can be contributed to the Instrument project by the Consortium, as agreed between the Parties from time to time.
- 4.7 The Consortium shall be responsible for the design, procurement and fabrication of major components, assisting ESS on the assembly and installation of the Instrument, undertaking commissioning and the first demonstration experiments. The Consortium is also responsible for ensuring that resources are available, including in-kind resources, to support the Instrument project team in meeting scientific and technical objectives on schedule and on budget.

More specifically, the Consortium has the responsibility to:

- (a) make best efforts to deliver the Instrument, meeting the scientific and technical goals of the original instrument proposal that was endorsed by the ESS Scientific Advisory Committee ("**SAC**") and approved by the ESS Council and adhering to project schedule and budget.
- (b) seek, organise and manage in-kind resources to realise the approved scope of the Instrument as well as other resources as needed;
- (c) support the Instrument Scientist and project team in all stages of the project while keeping true to the scientific and technical objectives of the project; and

- (d) adhere to ESS policies and guidelines and take into account the advice of the ESS advisory bodies, in particular the SAC and the appropriate Scientific & Technical Advisory Panel (STAP), as well as recommendations from various ESS project reviews.

5. ORGANIZATION OF THE CONSORTIUM

5.1 Introduction

ESS recognises that Parties will or may adhere to national project structures that aim to coordinate in-kind contributions to ESS.

- 5.1.1 The Parties shall establish the following joint bodies for the governance of their collaboration within the Consortium.

5.2 The Instrument Consortium Executive Board ("ICEB")

- 5.2.1 The ICEB shall be the principal organizational entity accountable for the success of the Instrument and will consist of representatives from each of the collaborating institutions participating in the Consortium (i.e. all of the Parties, incl. ESS), regardless of size or national origin. However, this shall not limit each Collaborator's undertakings towards ESS under its respective current or future (as applicable) in-kind contribution agreement with ESS.
- 5.2.2 The ESS management or their nominees represent ESS on the ICEB as a full and voting member of the Consortium. Decisions should be arrived at on a consensus basis, however in the case of a vote, each Consortium member has a number of votes proportional to their contribution to the project.
- 5.2.3 The proposer or a nominee of the proposers will sit at the ICEB and represent the interests and intentions of the original proposal that has been approved by the ESS Council. The proposer or nominee has a single vote at ICEB. In the case that the proposer or nominee plays a dual role at ICEB, they will only possess a single vote.
- 5.2.4 The Instrument Scientist will call, organise, set the agenda and chair all ICEB meetings with a frequency matched to the demands of the project. The Project Sponsor can also ask the Instrument Scientist to convene the ICEB if needed.
- 5.2.5 The advisory body for the Instrument and the Consortium is the relevant ESS-STAP and SAC.
- 5.2.6 The ICEB is responsible for the commitment of the Consortium as set out in Sections 4.2 and 4.7 above. In addition, the responsibilities of the Consortium also encompass the following:
 - (a) Support the Instrument Scientist and project team with the guidance required to achieve the scientific and technical scope of the Instrument while meeting the approved budget and project schedule; and
 - (b) propose allocation of work packages among all in-kind partners.

6. INCLUSION OF NEW COLLABORATORS

- 6.1 Any institution that is making resources available to the Instrument project shall be a member of the Instrument Consortium as well as the ICEB. Institutions can join the Consortium on a provisional basis until they can provide resources to the Consortium. The Consortium can also allow for associated membership that supports the construction or commissioning of the Instrument. As a member of the Consortium, ESS will supply specific integration and safety work-packages to the Instrument project as well as any other agreed scope.

- 6.2 Subject to a prior decision by the ICEB, a new Collaborator may join the Consortium and enter as a party to this MoU. The Parties agree that the ICEB shall normally accept the inclusion of a new Collaborator only if such Collaborator's contribution to the Consortium represents more than one full time equivalent (FTE).
- 6.3 The inclusion of a new Collaborator becomes effective on the date decided by the ICEB and is conditional upon the new Collaborator signing a written accession agreement under which it agrees to comply with all the terms and conditions of this MoU, in the form of accession agreement enclosed hereto as Schedule 3.
- 6.4 Following the inclusion of a new Collaborator, the new Collaborator shall have all the rights and obligations conferred upon the Parties under this MoU, including the right to be represented in the ICEB as set out in Section 5.2 above.

7. COMMISSIONING- AND DELIVERY OF INSTRUMENT

- 7.1 The Consortium shall, via the Instrument Scientist, take the responsibility to technically and scientifically commission the Instrument and perform experiments that demonstrate its capabilities to the scientific community. However, this shall not affect the specific legal obligations towards ESS in this regard that each Collaborator has or will have (as applicable) under its in-kind contribution agreement with ESS.
- 7.2 The Consortium is responsible for reporting and disseminating the results of all demonstration experiments. The allocation of beam time in the Facility for these demonstration experiments starts from the date where the Instrument enters the hot-commissioning phase and consists of 100 days of beam-time distributed over three (3) years (i.e. corresponding to approximately 15% per year of the available beam time over three years). It shall be the responsibility of the ICEB to propose demonstration experiments with the concurrence of ESS.
- 7.3 The Parties acknowledge and agree that following completion of the Instrument, the delivery of the Instrument to ESS and, as deemed appropriate by ESS, commissioning etc. shall be subject to ESS' standard in-kind process and subject to a separate in-kind contribution agreement with ESS, in the form agreed between the ESS partner countries.

8. COST AND MANAGEMENT OF INSTRUMENT PROJECTS

- 8.1 Instrument projects must successfully transition through various project phases (as described in Schedule 1 hereto). At the end of each project phase there will be a tollgate review organised by ESS management with input from the ICB. With support from the ICB, ESS management will move each instrument through the project phases until the instrument is operational.
- 8.2 At the commencement of Phase-1 (see Schedule 1) each instrument team will be given a cost target for their project, in the form of a cost category. During Phase 1, the team will work towards a validation of this cost category and provide project plans that include (i) a functional instrument while retaining a 10% internal contingency within their cost category, (ii) a plan of how the internal contingency could be used towards achieving the full scope of the instrument and (iii) a staging plan that achieves an enhanced scope of the instrument. These planning requirements are outlined in the appropriate NSS documentation. At the end of Phase-1 and after the Tollgate-2 review a scope, a performance schedule and budget for the instrument will be agreed with ESS management, reported to the ICB and entered in the ESS cost book, as the value of the said instrument.

- 8.3 The Parties acknowledge that the instrument scientists will be reporting on the progress of their instrument project quarterly to ESS management and will present the conclusions of each project phase to a Tollgate Review panel.
- 8.4 The Parties acknowledge that this Section 8 gives an overview of the management process of instruments as of the date of this MoU and that this may change through decisions of the ICB and/or ESS (as applicable) from time to time.
- 8.5 The cost category for VESPA is B, 12 Million Euros.

9. CONFIDENTIALITY

9.1 General obligations

- 9.1.1 The Parties are in the possession of valuable technical, scientific and commercial information. It is anticipated that such information will be disclosed between the Parties in connection with their activities under the Consortium. As each Party considers its information to be an asset of considerable value, they hereby agree on the terms and conditions for the disclosure to and use of such information by the other Party.
- 9.1.2 If a Party (the "**Receiving Party**") receives Confidential Information from the other Party (the "**Disclosing Party**"), the Receiving Party undertakes:
- (a) to treat all Confidential Information strictly confidential as well as take any necessary steps to protect all Confidential Information;
 - (b) to use at least the same degree of care that they use with respect to their own confidential information, but in no event less than a reasonable degree of care to avoid disclosure, publication or dissemination of the Confidential Information;
 - (c) to not, whether directly or indirectly, disclose Confidential Information to any third party without having entered into an appropriate confidential disclosure agreement with that third party and having agreed in advance with the Disclosing Party in writing of such disclosure; and
 - (d) to use Confidential Information solely for the purpose of managing and conducting the operations of ESS and for no other purpose whatsoever.
- 9.1.3 Regardless of the effective date of this MoU, the Parties agree that this MoU shall extend also to Confidential Information disclosed before such date.
- 9.1.4 This Section 9 shall survive the expiration and any termination of this MoU for a period of ten (10) years.

9.2 Return of Confidential Information

Any and all documents, discs and other tangible material of whatever kind containing any Confidential Information shall be and remain the property of the Disclosing Party. If at any time and for any reason the Disclosing Party so requests in writing, the Receiving Party shall, at its own cost, promptly deliver to the Disclosing Party all such tangible material. The Receiving Party shall certify in writing to the Disclosing Party that it retains no copy (except such archival copies as may be required under law) and has fully complied with the Disclosing Party's request. The delivery of such tangible material shall not relieve the Receiving Party of its confidentiality or non-use obligations.

9.3 Permitted Disclosure

9.3.1 No confidentiality or non-use obligations shall be imposed upon the Receiving Party with respect to any portion of Confidential Information which the Receiving Party can show, through appropriate documentation:

- (a) was at the time at which it was received by the Receiving Party hereunder already in the lawful possession of the Receiving Party;
- (b) was at the time at which it was received by the Receiving Party hereunder, or thereafter becomes through no act or failure to act on the part of the Receiving Party, generally available to the public; or
- (c) was after the time at which it was received by the Receiving Party hereunder properly received by the Receiving Party from an independent third party who is not under any obligation of confidentiality to the Disclosing Party.

9.3.2 The Receiving Party shall have the right to, without the Disclosing Party's prior consent, disclose Confidential Information to those of its directors, employees and professional advisers as well as consultants and visiting staff who have a need to know the Confidential Information for the purpose of meeting its obligations under this MoU. The Receiving Party undertakes to enter into agreements with all such directors, employees and professional advisers as well as consultants and visiting staff with at least as strict confidentiality and non-use obligations as set out herein and to ensure that they comply at all times with the terms and conditions of this MoU.

10. TERM AND TERMINATION

10.1 Term

10.1.1 This MoU shall enter into force on the date set out above and shall continue in effect until the completion of the Instrument project, as determined by the ICEB.

10.2 Termination

10.2.1 Each Party reserves the right to, as set out in the last sentence below, terminate the MoU in relation to a Party (the "Excluded Party"), in which case the MoU shall continue in effect among the other Parties, if the Party is in material breach of its obligations under this MoU and the Party fails to rectify such breach (provided that the breach is such that it can be rectified) within thirty (30) days of a notice in writing from any of the other Parties. However, this MoU shall only terminate if ESS or a 2/3 majority of the Collaborators vote for such termination.

10.2.2 With reference to Section 3.5 above, this MoU shall immediately terminate if ESS, for any reason, ceases to be a Party to this MoU. However, termination of this MoU (howsoever occasioned) in general or in relation to a specific Party shall not affect such Party's rights and obligations towards ESS under an in-kind agreement concluded between such Party and ESS.

10.2.3 An Excluded Party shall return all documents, equipment or materials provided by the other Parties, or destroy them upon their written request, save for copies of documents which the Excluded Party needs to keep for archival purposes in order to comply with applicable laws or regulations.

10.3 Termination of this MoU shall not affect the rights and obligations of the Parties under Section 9 (*Confidentiality*) or under any other provisions of this MoU that by their nature or by their express terms are intended to survive the termination of this MoU.

11. MISCELLANEOUS

11.1 Amendments

Amendments to or changes of this MoU shall, in order to be valid, be made in writing and signed by authorised representatives of each of the Parties and shall be clearly stated as amendments to or changes of this MoU.

11.2 Costs

Each Party shall bear its own costs and expenses incurred in connection with the entering into of this MoU.

11.3 Entire agreement

Except for any in-kind agreements concluded between one or more Collaborators and ESS, this MoU constitutes the entire agreement between the Parties with respect to the purpose hereof and supersedes all prior agreements, whether written or oral, with respect to the purpose of this MoU.

11.4 Assignment

11.4.1 Except with the prior written consent of ESS, each Collaborator may not assign, novate or otherwise transfer partially or totally any of its rights or obligations under this MoU.

11.4.2 ESS shall have the right to assign or otherwise transfer any or all of its rights and obligations under this MoU to a successor company or other legal entity established by the partner countries in the ESS project.

12. GOVERNING LAW AND DISPUTE RESOLUTION

12.1 This MoU shall be governed by and construed and enforced in accordance with the substantive laws of Sweden without giving effect to any choice of law rules and principles thereof.

12.2 In case the Parties cannot amicably settle a dispute arising out of or in connection with this MoU, and such dispute has been handled through the ICEB without reaching an agreement, the ESS Council will make a decision on how to settle the dispute.

12.3 If the ESS Council is unable to settle any dispute by negotiation within thirty (30) days from referral from the ICEB, any such dispute shall be exclusively and finally settled by arbitration administered by the Arbitration Institute of the Stockholm Chamber of Commerce (the "SCC").

12.4 The Rules for Expedited Arbitrations shall apply, unless the SCC in its discretion determines, taking into account the complexity of the case, the amount in dispute and other circumstances that the Arbitration Rules shall apply. In the latter case, the SCC shall also decide whether the Arbitral Tribunal shall be composed of one or three arbitrators. The place of arbitration shall be Lund, Sweden. The language of the arbitration shall be English.

12.5 The Parties undertake and agree that arbitral proceedings pursuant to this MoU shall be kept strictly confidential, and all information disclosed in the course of such proceedings, as well as the contents of any decision or award made, shall constitute Confidential Information.

IN WITNESS WHEREOF, this MoU has been executed in 2 originals, of which the Parties have received one (1) each.

European Spallation Source ERIC

Date

Signature

Andreas Schreyer
Name (in block letters)
Director for Science

Position

Consiglio Nazionale delle Ricerche (CNR)

03 FEB. 2016
Date

Signature

LUIGI NICODEMIS
Name (in block letters)

PRESIDENT
Position



Schedule 1

Overview of roles in the NSS collaboration model and summary of instrument project phases

Roles in the NSS Collaboration Model

ESS. The role of ESS is to manage the NSS project while adhering to its scientific goals and objectives, following directives and budgets approved by the ESS ERIC Council and the advice of the ESS SAC. ESS will set the NSS project scope and sub-project budgets, including instrument project budgets, and apply cost controls when required. It will be the overall responsibility of ESS to ensure, as best it can, that there is a satisfactory match between available resources (including funding and manpower) and the approved instrument projects as they progress. ESS management collects advice from the SAC and the Technical Advisory Panels (TAPs) and STAPs. These bodies provide independent advice on specific scientific and technical issues associated with the realization of the NSS project. ESS approves individual in-kind contributions via the IKRC.

The Science Advisory Committee (SAC). The SAC will advise on the scientific objectives of ESS and on the setting of priorities for NSS and the instrument projects with input from STAPs. The SAC will provide independent advice, in particular on relevant scientific and technical issues related to the instrument suite and the desired characteristics of the neutron beams and the accelerator performance, as well as facilities for scientific support and the scientific operation of the facility. The SAC will monitor the scientific performance of ESS.

Scientific and Technical Advisory Panels (STAPS). The STAPs advise on how to best meet the scientific objectives of ESS by focusing directly on scientific and technical issues of instruments and critical NSS sub-projects. They provide advice to individual projects and report their findings to ESS management as well as to ICs. Their detailed input is provided to the SAC and ICB.

Annual Project Reviews. The construction of the ESS facility is assessed once a year by an external committee organized by the Director General. The Annual Project Reviews are comprehensive, lasting three to four days, and evaluate the technical, cost, schedule, and management aspects of the construction project. The review committees are organized into subcommittees with expertise relevant to the ESS technical scope with some committee members drawn from the standing ESS advisory committees. The Annual Project Reviews include a subcommittee of four to five experts that evaluate the Neutron Scattering Systems.

The In-Kind Review Committee (IKRC). The In-Kind Review Committee is a sub-committee of the STC, which reports directly to the ESS ERIC Council. The IKRC consists of delegates from the Member Countries and oversees all in-kind contributions to ESS, including the corresponding implementation of rules and legal framework for the agreement, implementation and final accreditation of in-kind contributions

The Instruments Collaboration Board (ICB) - The ICB is composed of representatives of each institution participating in the delivery of the ESS NSS scope. It is chaired by the ESS Director for Science, and will monitor and oversee resource-related matters. The ICB has the responsibility to support the delivery the NSS scope by coordinating efforts to maximize in-kind contributions to NSS including both instrument projects and the horizontal projects, which cater to multiple instruments or systems. The ICB will also keep track of non-NSS contributions to the instrument suite, such as the Integrated Control System. The ICB will contribute nominations to a committee of external experts to conduct NSS milestone reviews, including tollgate reviews for the instrument projects. The ICB is expected to meet regularly in order to ensure that the NSS project makes good progress. Two of the key meetings of the ICB will be held in association with the IKON meetings in February and September. The ICB receives advice from the SAC and STAPs. (Cf. section 2.)

Instrument Scientist (IS). This individual is the leader of the instrument project. He/she can be an ESS staff member or partner staff member and can be a secondee to ESS or a partner. The IS manages the interfaces in Lund and provides the scientific and technical leadership of the instrument project and works with the Instrument Project Engineer to deliver an instrument within a scope, budget and schedule approved at Tollgate 2. The IS chairs the ICEB and works with their consortium to ensure the resources to deliver the instrument scope. The IS and Instrument Project Engineer work as a team and are responsible for the delivery of the instrument. They are integrated into the NSS project and responsible for their project deliverables to the ESS organization, while line management accountability lies within their institution.

Instrument Project Engineer (IPE). The Instrument Project Engineer can be an ESS staff member or partner staff member and can be a secondee to ESS or a partner. The IPE manages the interfaces in Lund and provides the engineering leadership and technical project management of an instrument project through all phases. The IPE shall have responsibility for monitoring the financial aspects of the instrument project, including budget and manpower planning and the MoU, as well as for the financial aspects of the cash investments. The IS and IPE work as a team and are responsible for the delivery of the instrument. They are integrated into the NSS project and responsible for their project deliverables to the ESS organization, while line management accountability lies within their institution.

Instrument Project Sponsor: A single individual appointed by the lead institution to act as a vocal and visible champion of the instrument, articulating the project's goals and objectives, keeps abreast of major project activities, leads the effort to secure resources for the project and provides support for the Project team to deliver on its goals. The Project Sponsor takes the responsibility for risk management of the project in collaboration with ESS management and also in leading discussions on the performance budget, scope and schedule of the instrument project supported by the Instrument Scientist.

Instrument Proposer: The MoU recognises that a successful instrument proposal that has been approved to be included in the ESS project plan by ESS Council, has been designed, developed and defended by a proposer or proposers. The MoU further recognises that proposers may have different affiliations from those of the members that ensure delivery of the instrument. The instrument proposer ensures that the scientific vision of the instrument outlined in the proposal is consistent with the instrument that is delivered by the consortium.

Summary of Instrument Project Phases

PHASE 0 – Preparation for Preliminary Design

Phase 0 is a preparatory time when proposing teams continue the work on the proposals either continuing prototyping activities are responding to SAC and STAP comments. Also during this time the instrument team should be setting up its consortium and identifying and agreeing on resources to commence Phase-1 work as well as the instrument as a whole.

PHASE 1 – Preliminary Engineering Design

The objective of Phase 1 is to turn the instrument's proposal into a baseline project specification, with a well-defined scope, budget, and schedule. The Instrument Scientist is the primary source for the functional requirements and provides the vision of the instrument's operation, layout, and use, while the project engineer provides the technical project leadership, including management and integration of engineering effort. The ESS technical teams support the project by contributing to the formal definition of the relevant functional requirements and suggesting technical solutions. The Instrument Project Division is responsible for providing facility related non-functional requirements.

The output of this phase is the project baseline: a final proposed design and budget, including the detailed systems engineering documents for the instrument. This is reviewed, with emphasis on scientific parameters (will it meet the stated performance parameters), engineering (is it feasible to build and have all of the appropriate interfaces been considered), safety (does it meet the requirements for safe operations), and project/budget (can it be built within the budget).

Tollgate 2: Decision to move forward at the completion of this phase.

PHASE 2 - Detailed Design

Detailed and final design of all portions of the instrument are handled in this phase. Engineering and technical teams, following standard engineering practices, bring the design of the instrument components to a state of readiness for procurement and fabrication. All long lead procurements are identified by the instrument team and technical groups and requisition commences following ESS procedures. Installation planning begins in this phase.

Once the design has reached 85% complete, a review is held of the instrument. This review emphasizes engineering and operational details. Any re-baselining of the budget and WBS elements happens in response to this review. Safety will be additionally reviewed to ensure that comments and work from TG2 have been sufficiently developed and implemented. Successful completion of this review is required to start procurement.

Tollgate 3 – Engineering and Operation Review

PHASE 3 – Procurement, Construction, and Installation

The instrument team begins the procurement of all of the instrument components, through internal manufacturing, standard procurements, or in-kind agreements.

Construction is the building of the civil works and physical infrastructure in the experiment halls and guide hall that supports the technical equipment. ESS will coordinate this effort.

The *installation* of the technical components onto and into the physical infrastructure will be performed by the appropriate partners, vendors, and technical groups associated with the instrument. The day to day work will be coordinated by the Construction Managers.

An internal review of testing procedures and safety systems, primarily the Personnel Safety System (PSS), will be performed prior to starting beam testing or cold commissioning of instrument components tied to the PSS.

Tollgate 4 – Safety Systems Review

PHASE 4 – Beam Testing and Cold Commissioning

If desired, testing the beam transport system with neutrons (Beam Testing) may be performed after Tollgate 4. Cold commissioning will test and validate instrument components and systems without spallation neutrons. The focus is on ensuring that all components and systems work, fixing bugs, and preparing for "hot" commissioning. By the end of this phase, the instrument should be able to run as if doing an experiment and all systems engineering verification and testing possible without neutrons should be complete.

Changes and modifications made during the beam testing phase are reviewed. All operational documents are reviewed and approved. The Instrument Commissioning Plan is presented and accepted. The "Instrument Project" is completed at the end of this review.

Tollgate 5 – Instrument Readiness Review

PHASE 5 – Hot Commissioning

Any integration testing requiring spallation neutrons is performed. The Instrument Operations team executes the Instrument Commissioning Plan to document and verifies the performance and capabilities of the instrument, including test experiments and demonstration experiments. Problems and issues found in this phase are fixed with operational funds.

PHASE 6 – User Operations

Upon successful completion of the Instrument Commissioning Plan, the instrument enters User Operations, per the operational doctrines of the ESS facility.



Schedule 2

Preliminary Overview of the Parties' Contributions

Consiglio Nazionale delle Ricerche

- CNR is the lead institution (Prime Contractor) for the VESPA instrument construction project and carries the overall responsibility for delivering the instrument in accordance with the schedule and the ESS Cost Book value.
- Design, procurement, installation and commissioning of all instrument components (not delivered by other collaborators)

European Spallation Source ERIC

- ESS will assist in the integration of the instrument with the rest of the instrument suite, and provide coordination with critical technologies utilised at ESS.
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