Collaboration agreement

between

NeiC, NordForsk (NO ID: 971 274 255) – hereafter referred to as “NeiC” and

EISCAT Scientific Association (SE ID: 897300-2549) – hereafter referred to as “EISCAT”.

NeiC is the “project owner” for the project. NeiC and EISCAT are hereafter referred to collectively as the “partners”, or a “partner” (singular).

1 Definitions

1.1 The steering group is the decision-making authority to which project management turns regarding issues for which it does not have the right to make a decision. It consists of decision-makers representing the partners and other important stakeholders.

1.2 The project directive is a mandatory steering document for the project work. The purpose of the project directive is to provide a basis and pre-conditions for starting the project, and setting time and cost frameworks for the preparation work. The project directive is attached in Appendix 1. Changes to it require mutual agreement between NeiC and EISCAT.

1.3 The project manager carries out the project within the framework of the project directive and the project plan. Responsibilities include (among other things) ensuring that the organisation and working methods are suitable, documented and clear; maintaining an active requirements dialogue with reference groups; providing regular progress reports for the project; and leading project work toward deliveries and successful completion.

1.4 The purpose of the project plan is to document and agree on all the essential issues that define the commitment, before starting the execution phase. The project plan is a major result of the preparation work and is a “contract” between project management and the project owner, covering the execution of the project. The scope of the preparation work is set at a level that will allow for a controlled overall picture of the risks and optimum efficiency for the execution of the project. The project plan is drafted by the project manager and approved by the steering group.

2 The agreement - scope and purpose

2.1 This collaboration agreement regulates the reciprocal rights and obligations of the various partners taking part in the project “EISCAT_3D Support”, hereafter referred to as the “project”.

2.2 The following attached documents shall also be part of the collaboration agreement between the partners:

Appendix 1: A description of the project in form of a project directive.
Appendix 2: The partners’ interest in and competence relative to the project.
Appendix 3: The partners’ obligations to perform activity and/or provide financial resources to the project.
Appendix 4: Terms of reference for the steering group.

1 This document shall specify the individual partners’ obligations to perform work for the project and/or to provide contributions in the form of funding, infrastructure, expertise and its own efforts.

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2.3 Each of the partners is required to contribute resources to the implementation of the project pursuant to the duties and obligations specified in this collaboration agreement, the project description. With regard to one another, the consortium participants bear joint responsibility for implementation of the project and for achieving the results outlined in the project description.

2.4 The collaboration agreement includes this signed agreement document with 4 appendices, cf. section 2.2.

3 Governance and Management

3.1 The project will have a steering group\(^2\) and a project manager.

3.2 The steering group will monitor the project's progress and respond to problems as needed. The terms of reference for the steering group are given in appendix 4.

3.3 Each of the partners is entitled to appoint one member to the steering group. The partners may unanimously agree to appoint additional members of steering group. Partners are free to replace steering group members, but are required to keep the project manager apprised of who is representing the partner. The steering group is normally chaired by the project owner.

3.4 The project manager will be appointed by the project owner. The project manager reports to the steering group. The project manager is responsible for managing the project and its resources in accordance with this agreement and the guidelines given by the steering group. When appropriate, the project owner enters into a separate agreement with the employer of the project manager in a way that does not violate the terms of this agreement.

3.5 The project manager will summon the steering group to meetings with reasonable notice, usually no less than two weeks prior to the meeting date. The convening letter should be accompanied by an agenda and the documentation needed to deal with the items on the agenda.

3.6 The steering group has a quorum when more than two-thirds of the partners are present or participate in the steering group's deliberations. The steering group's decisions will normally be agreed on unanimously among the members that are present or participate in the steering group's deliberations. In ongoing matters that do not affect any of the partners' individual rights under the collaboration agreement, the steering group may take decisions by majority.

4 Partners' activities and/or financial support

4.1 The interests and competencies of the partners constitute the basis for their participation in the project. These interests and competencies are described in more detail in appendix 2.

\(^2\) Larger collaborations may find it productive to have a collaboration forum with membership from all the partners and a smaller steering group that consists of selected representatives.
4.2 Each of the partners shall perform the R&D activities, if any, that the partner in question has agreed to pursuant to the project description, and/or provide the financial support specified in appendix 3.

4.3 With the approval of the steering group, a partner may assign parts of the R&D activity for which it is responsible to an appropriate subcontractor. This does not release a partner from its obligations to the other partners.

4.4 In the event a partner does not perform the agreed R&D activity in a satisfactory manner, the steering group may decide to transfer responsibility for the work in whole or in part to one of the other partners, based on specified terms and conditions. Such a transfer does not release a partner from its other obligations pursuant to appendix 3. ③

5 Location, responsibility for human resources and agreements with employees and other affiliated partners

5.1 The partners agree to establish by contract the location of the activities and the manner in which the employer's responsibility will be handled for staff affiliated with the project. Under normal circumstances, employer responsibility and employment shall not be changed for employees who participate in the project.

5.2 The partners will sign necessary agreements with owners, employees (including individuals with dual employment), partners, sub-contractors, and others that are required to fulfill the relevant partner's obligations under this agreement, including measures to ensure the necessary transfer of intellectual property rights.

6 Project plan, ownership, reporting and publication of results

6.1 In order to render more concrete and follow up the measures in the project directive, a project plan shall be adopted by the steering group within 6 months of project start-up. The project plan serves as a point of departure for the technical and financial implementation of the project and to stipulate the obligations of the various partners, cf. section 4.2 and appendix 3. The revised annual project plan also forms the basis for reports to be submitted to the project owner.

6.2 Partners shall without undue delay submit all project results, reports, accounting documentation and other documents that the project owner requires to fulfill its obligations to its funding authorities. Project outcomes, including reports and software, will be made openly available to the public. Possibly proprietary cost information relevant to the EISCAT_3D Cost Book is not made public; this will be agreed upon on a case-by-case basis by the signatories.

6.3 Intellectual property rights of the project results shall be owned by the party or parties carrying out the work generating that result. Unless otherwise agreed in writing, any equipment purchased for the purposes of the project will remain the property of the partner making the purchase.

③ It is presumed that the partners can agree on reasonable compensation for the research contributions from which the consortium participant in question has been relieved.


7 Limitation of liability

7.1 The parties have no liability towards each other for damages or losses of any kind related to this Collaboration Agreement, unless the damages were caused by wilful conduct or gross negligence. Each partner shall be solely liable for any loss, damage or injury to third parties resulting from its actions under this Collaboration Agreement or from its use of the project results.

7.2 In respect of any information or materials supplied by one partner to another under the project, no warranty of any kind is given as to the sufficiency or fitness for purpose, nor as to the absence of any infringement of any proprietary rights of third parties. The recipient party shall in all cases be solely liable for the use to which it puts such information and materials.

8 Payment

8.1 The project owner takes the main responsibility to oversee the economic aspects of the project and remind the partners about their funding obligations if so needed. The funding will be requested by the project owner from the partners and channelled by the project owner to the home institution of the project manager. Payments between the partners are made once per three months.

9 Reservations and Termination

9.1 The agreement may be terminated by either partner for any material breach by the other partners of the obligations set out in the agreement, by giving a written notice to the other partners of the intention to terminate. The notice shall include a detailed statement describing the nature of the breach. If the breach is remedied within a period of 30 - thirty - days after delivery of the notice, the termination shall not take effect.

9.2 The partners' compliance with funding requires that the partners receive the necessary funds from their respective authorities. A partner that cannot comply can terminate this agreement with a 3 -three- months' notice.

9.3 The project owner may terminate the agreement with a 3 -three- months' notice based on a recommendation of termination by the steering group.

10 Governing law and legal venue

10.1 The agreement is governed by and shall be interpreted in accordance with Norwegian law. Any disputes shall be settled by Oslo district court, unless otherwise agreed between the partners.

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This agreement has been prepared in two (2) counterparts, of which each partner keeps one (1).

http://oeic.nordforsk.org/
For and on behalf of EISCAT:

Place/Date: [Signature]

Craig Heinselman, Director
EISCAT

Place/Date: 2015-12-07

Henrik Andersson, Head of Administration
EISCAT

For and on behalf of NordForsk/NeIC:

Place/Date: 4/11-4/5 i OSLO

Gunnel Gustafsson, Director
NordForsk

Place/Date: [Signature]

Gudmund Høst, Director
NeIC

http://nordforsk.org/
Appendix 1: Project directive, version 24.04.2015

The project directive is included on the following pages 7-18.
NeIC

EISCAT_3D Support

Project directive

1st full draft, based on input from previous discussions, by Michaela Barth and Ingrid Mann, 2014-07-01
2nd version, 2014-07-03 by Michaela Barth and Ingrid Mann
3rd version, 2014-07-04, minor correction, by Michaela Barth and Ingrid Mann
4th version, 2014-09-01, corrected version after feedback from within NeIC and EISCAT
5th version, 2014-09-05, some changes by Michaela Barth and Ingrid Mann
6th version, 2014-10-16, following comments from NeIC board
7th version, 2015-04-23, adjustments made during kickoff 2015-02-02, edited by Thomas Röblitz
8th version, 2015-04-24, comments by Craig Heinselmann and Gudmund Host, edited by Thomas Röblitz

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1. Background

With its research theme devoted to the polar atmosphere and its radar facilities located in Norway, Finland and Sweden the future EISCAT_3D research infrastructure will have a strong link to the Nordic countries. During the transition of EISCAT_3D from the preparatory phase to the implementation phase several important tasks are related to e-infrastructure: finding cost-efficient state of the art solutions for the e-infrastructure, facilitating an efficient dialogue with the stakeholders in the Nordic countries and making best use of the existing IT expertise in the Nordic countries.

EISCAT_3D is a new multi-static phased array radar system dedicated to observations of the Earth’s polar atmosphere above the northern Scandinavian Peninsula. Once implemented, EISCAT_3D will be operated by the EISCAT Scientific Association, an existing international research association that is currently funded and operated by research councils and funding organizations in Norway, Sweden, Finland, Japan, China and the United Kingdom and that has its headquarters in Kiruna, Sweden.

EISCAT Scientific Association has successfully operated incoherent scatter radars on Svalbard and on the Scandinavian Mainland for over 30 years. Its suite of instruments has maintained world leadership in terms of experimental capability through a user community which has repeatedly developed new experiments and data analysis techniques for expanding research applications. Initially intended for studies of the physics related to the aurora and the magnetosphere, EISCAT observations are strongly tied to the past and present international Solar Terrestrial Physics programmes. EISCAT science has also moved into new areas over the last three decades, most of them relevant for environmental research. These include more detailed studies of the energy coupling between the upper and lower atmosphere, the linkages between the ionosphere and magnetosphere, investigations of the importance of turbulence and small-scale structures and studies of polar mesospheric summer echoes. In addition, the sensitive detection of weak coherent targets like micrometeoroids permits studies of the meteoroid material that enters Earth atmosphere. Some of these studies also have practical importance for applications such as global positioning, communications and space situational awareness, including the capability to observe cm-scale space debris. Other studies are also of fundamental physical interest, like the processes of dusty and complex plasmas that are associated with polar mesospheric summer echoes and noctilucent clouds.

The present EISCAT is fully integrated in the global network of incoherent scatter radars and the European Strategy Forum on Research Infrastructures (ESFRI) selected EISCAT_3D for inclusion in the Roadmap 2008 for Large-Scale European Research Infrastructures as an environmental research infrastructure. The European Union has funded a design study and a preparatory phase project for EISCAT_3D that came to an end on September 30th 2014. Activities to prepare for the implementation of EISCAT_3D continue. All current EISCAT Associates are actively working towards raising funding for investment in the project in order to directly go into the implementation phase with investment possibly starting in 2015. For the parts of EISCAT_3D that concern e-infrastructure, the suggestion is to continue some of the project activities in preparation of the implementation under the NeIC umbrella.

2. Project concept

This support project will contribute to studies of how the earth’s atmosphere is coupled to space by preparing to meet the e-infrastructure and e-science needs of EISCAT_3D. It serves the following specific goals: to contribute to preparing for the implementation of EISCAT_3D by bringing together the EISCAT radar expertise with the existing IT expertise in the Nordic national e-infrastructures, to provide expert knowledge to support EISCAT_3D e-science planning and computer hardware procurement and to introduce a moderator role in the discussion of the different stakeholders in the Nordic countries.

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3. Expected benefit

The project will:
- help to provide Nordic research communities with a cutting-edge research facility with globally unique capabilities,
- strengthen the weight of the Nordic players within research communities and within the EISCAT_3D project,
- foster collaboration, at Nordic level, of national research groups and service providers,
- enable the Research Councils in the Nordic countries to make best use of their potential investment in the EISCAT_3D project,
- enable the Nordic countries to directly participate in planning the EISCAT_3D archiving strategy.

Besides the obvious benefits on profiling the Nordic research and infrastructure landscape, especially the cost-saving and optimisation effects are of interest: e.g. collaboration with existing national e-infrastructure in the Nordic countries is expected to reduce total cost for the EISCAT_3D data archive solution. Network connections between the sites of the radar facility are best developed in collaboration between the countries in order to optimize data routes across borders.

4. Basis

The system implemented in stage 1 consists of three radar sites located in Skibotn, Norway, Karesuvanto, Finland and Bergfors, Sweden. EISCAT_3D stage 1 already provides measurement capabilities that are significantly improved in comparison to the present EISCAT mainland radars and with tri-static measurement capabilities unique on an international level. First on-site construction is planned for 2016 and construction and commissioning of EISCAT_3D stage 1 being finalized in 2022.

EISCAT_3D generates a large volume of data, and thus requires a large amount of on-site computing and signal processing, reliable fast network connections to the sites, structured solutions for computing and storage for post-processing, and archiving solutions. The current plan suggests splitting the computing and storage infrastructure between an operation centre and a data centre, where the operation centre will do the bulk of the computing and post-processing and maintain a large storage capacity for short term storage. The data centre will provide computing, short-term storage and an archive for the EISCAT_3D data. Current plan is to distribute the data centre on existing national e-infrastructures. Solutions for networking and data centre require a dialogue and coordination on the Nordic level with the national e-infrastructures and network providers. This dialogue in the EISCAT_3D host countries started in the FP7-funded preparatory phase project and should be continued.

The recruitment for the implementation phase would also benefit from a close collaboration with the existing national e-infrastructures, since it comprises a large amount of programming work for which IT experts need to be hired for a limited time.

Documents serving as a basis for this project are:

<table>
<thead>
<tr>
<th>Document</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliverable 13.2 from the FP7 program EISCAT_3D: A European three-dimensional imaging radar for atmospheric and geospace research (Preparatory Phase)</td>
<td>2014-09-30</td>
<td>Final report of WP13 containing a revised specification for the realisation of the data system and a full description of the analysis system and services. This report also contains recommendations and conclusions for the long-term collaboration with the existing e-infrastructure and future directions for the data distribution, archiving, services and analysis within EISCAT 3D.</td>
</tr>
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### 5. Contact persons

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craig Heinselman</td>
<td><a href="mailto:Craig.Heinselman@eiscat.se">Craig.Heinselman@eiscat.se</a></td>
<td>Director, EISCAT Scientific Association</td>
</tr>
<tr>
<td>Ingrid Mann</td>
<td><a href="mailto:Ingrid.mann@eiscat.se">Ingrid.mann@eiscat.se</a></td>
<td>Head of Projects, EISCAT Scientific Association</td>
</tr>
<tr>
<td>Åke Sandgren</td>
<td><a href="mailto:ake.sandgren@hpc2n.umu.se">ake.sandgren@hpc2n.umu.se</a></td>
<td>Senior Research Engineer, HPC2N, Umeå</td>
</tr>
<tr>
<td>Esa Turunen</td>
<td><a href="mailto:et@ssr.fi">et@ssr.fi</a></td>
<td>EISCAT Finland Host: Institution Contact</td>
</tr>
<tr>
<td>Cesar La Hoz</td>
<td><a href="mailto:cesar.la.hoz@uit.no">cesar.la.hoz@uit.no</a></td>
<td>EISCAT Norway Host Institution Contact</td>
</tr>
<tr>
<td>Lars Eliasson</td>
<td><a href="mailto:lars.eliasson@irf.se">lars.eliasson@irf.se</a></td>
<td>EISCAT Sweden Host Institution Contact</td>
</tr>
<tr>
<td>Anders Tjulin</td>
<td><a href="mailto:Anders.Tjulin@eiscat.se">Anders.Tjulin@eiscat.se</a></td>
<td>EISCAT_3D Project Office, EISCAT Scientific Association</td>
</tr>
<tr>
<td>Maria Hall</td>
<td><a href="mailto:maria@SUNET.SE">maria@SUNET.SE</a></td>
<td>Managing Director, SUNET</td>
</tr>
<tr>
<td>Borje Josefsson</td>
<td><a href="mailto:big@SUNET.SE">big@SUNET.SE</a></td>
<td>Contact SUNET</td>
</tr>
<tr>
<td>Arild Halsetronning</td>
<td><a href="mailto:arild.halsetronning@unicett.no">arild.halsetronning@unicett.no</a></td>
<td>UNINETT Sigma2</td>
</tr>
<tr>
<td>Gunnar Bae</td>
<td><a href="mailto:gunnar.boe@unicett.no">gunnar.boe@unicett.no</a></td>
<td>Director UNINETT Sigma2</td>
</tr>
<tr>
<td>Vidar Faltinsen</td>
<td><a href="mailto:Vidar.Faltinsen@unicett.no">Vidar.Faltinsen@unicett.no</a></td>
<td>Contact UNINETT and Norwegian Networking</td>
</tr>
<tr>
<td>Lars Fischer</td>
<td><a href="mailto:Lars.Fischer@nordu.net">Lars.Fischer@nordu.net</a></td>
<td>Contact NORDUnet</td>
</tr>
<tr>
<td>Ingemar Haggström</td>
<td><a href="mailto:ingemar.haggstrom@eiscat.se">ingemar.haggstrom@eiscat.se</a></td>
<td>Head of Operations, EISCAT Scientific Association</td>
</tr>
<tr>
<td>Carl-Fredrik Enell</td>
<td><a href="mailto:carl-fredrik.enell@eiscat.se">carl-fredrik.enell@eiscat.se</a></td>
<td>Staff Scientist, EISCAT Scientific Association</td>
</tr>
<tr>
<td>Assar Westman</td>
<td><a href="mailto:assar.westman@eiscat.se">assar.westman@eiscat.se</a></td>
<td>Acting Site Leader, Svalbard, EISCAT Scientific Association</td>
</tr>
<tr>
<td>Ville Savolainen</td>
<td><a href="mailto:ville.savolainen@csc.fi">ville.savolainen@csc.fi</a></td>
<td>Contact CSC</td>
</tr>
<tr>
<td>Janner Kanner</td>
<td><a href="mailto:janne.kanner@csc.fi">janne.kanner@csc.fi</a></td>
<td>Director, FUNET</td>
</tr>
<tr>
<td>Juha Oinonen</td>
<td><a href="mailto:juha.oinonen@csc.fi">juha.oinonen@csc.fi</a></td>
<td>Contact FUNET, CSC</td>
</tr>
<tr>
<td>Jacko Koster</td>
<td><a href="mailto:jacko.koster@it.uu.se">jacko.koster@it.uu.se</a></td>
<td>Director, SNIC</td>
</tr>
<tr>
<td>Ann-Charlotte Sonnhammer</td>
<td><a href="mailto:ann-charlotte.sonnhammer@it.uu.se">ann-charlotte.sonnhammer@it.uu.se</a></td>
<td>Contact SNIC, SNIC Technical coordinator</td>
</tr>
<tr>
<td>Gudmund Hest</td>
<td><a href="mailto:Gudmund.Hest@nordforsk.org">Gudmund.Hest@nordforsk.org</a></td>
<td>Director, NeIC</td>
</tr>
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6. Timeframe and estimates for the preparations

<table>
<thead>
<tr>
<th>Commitment up to</th>
<th>Date</th>
<th>Estimated effort</th>
<th>Estimated expenditures</th>
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<tr>
<td>DP3 - Decision point type 3; steering group decision to approve the project plan developed during the preparation phase. Typically this is tied to a DP4 decision to start the execution phase.</td>
<td>14/07/2015</td>
<td>-1 PM</td>
<td>Covered by EISCAT, NeIC EISCAT_3D Support PM and NeIC ENV coordinator</td>
</tr>
</tbody>
</table>

7. Project goals

7.1. Result goals

EISCAT Scientific Association operates a project office for the preparation and implementation of EISCAT_3D. Within the proposed project NeIC will collaborate with the EISCAT project office in order to:

Find workable and cost-efficient solutions for the EISCAT_3D computing, storage and archive

Support EISCAT in planning and specification of the IT solutions required to make EISCAT_3D a successful research infrastructure including specific solutions for the on-site processing. Provide, through the participation of the Nordic e-infrastructure providers, expert knowledge in technology choices and support for procurements. Take into account ongoing e-infrastructure developments during transition from the preparatory phase to implementation of EISCAT_3D: network, computing, storage and archiving.

Facilitate an effective dialogue on the implementation of EISCAT_3D with the stakeholders in the Nordic countries

Manage the dialogue with NORDUnet and with the HPC centres within the Nordic countries: The dialogue and coordination on the Nordic level is needed to develop the network connections between the sites and of the sites to the data archive and the operation centre. A particular goal is to define locations and distribution of the components making up the operation centre and data centre, investigate means for user access to HPC in the Nordic countries and the participations in European projects (if coordinated on a Nordic level).

Make best use of the existing expertise in the Nordic countries for implementing EISCAT_3D

Establish a NeIC – EISCAT collaborative project on developing solutions for recruitment of IT experts needed for construction and commissioning of EISCAT_3D. The EISCAT staff is usually hired directly by EISCAT or by the host institutions. The most recent estimate assumes that up to 13 additional staff members will be needed during the commissioning phase, many of them IT experts. It is unlikely that EISCAT and host institutions can offer long-term career perspectives to all of them. We suggest that NeIC collaborates with EISCAT in developing solutions for the recruitment of IT experts needed for construction and commissioning of EISCAT_3D. One

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possible solution that will be investigated is that IT experts from national e-infrastructures are seconded to EISCAT for the duration of construction and commissioning work.

7.2. Project tasks

Expressed in explicit tasks, milestones and deliverables the goals of the project are listed below.

If not mentioned otherwise, the default recipient of milestones and deliverables is the project’s steering group and deliverables are to be approved by the steering group. All tasks start at the beginning of the project. Dates of milestones and deliverables are denoted by Mn referring to the n-th month of the project. For example, M1 is from 15.1.2015 to 14.2.2015.

Note, milestones/deliverables to be revised in July 2015 (pending funding situations).

Exact deliverables and goals will be refined in the Project Plan, taking into account the links between tasks.

Task A: Preparing and planning of the EISCAT_3D data-handling and processing

Update the plans for the short-term storage and computing within the operation centre and data centre. Identify workable and cost-efficient solutions. Finalize EISCAT_3D network plans. Develop possible solutions for locating the EISCAT_3D data centre within the existing e-infrastructures in the Nordic countries and for implementing the operation centre. These plans will be presented to EISCAT Council for consideration.

Milestone MA-1: Describe/update requirements and their implications for EISCAT_3D data-handling and processing at the operations centre

- M5 [June 2015] presentation of the progress at June NeIC board OR provider forum meeting
- M8 [September 2015] refined report

Milestone MA-2: Describe/update requirements and their implications for EISCAT_3D data-handling and processing at the data centres

- M11 [December 2015] presentation of a progress at December NeIC board OR provider forum meeting
- M14 [March 2016] refined report

Milestone MA-3: Network plan for the EISCAT_3D sites

- M10 [November 2015] preliminary plan only including sites and operation centre requirements
- M15 [April 2016] refined plan

Deliverable DA-1: Updated report to the EISCAT council

- M15 [April 2016] or later

Milestone MA-4: Report describing recommended solutions for the operation and data centre to the NeIC board

- M18 [July 2016] or later according to implementation plan

Milestone MA-5: Coordinate the requirements with potentially participating e-infrastructure centres

- M18 [July 2016] or later according to implementation plan

Task B: Preparing of the on-site data handling for EISCAT_3D

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Support EISCAT in updating the preparation of the on-site data handling by establishing links to related expertise in the North (e.g., Computer Science Departments). Explore and recommend robust software tools and languages for on-site data handling hardware components in view of the latest design and the time line for construction. Explore on-site networking solutions and develop a procurement plan for on-site e-infrastructure. In parallel EISCAT will update estimates of the required computing and storage capacity and identify commercially available hardware components.

**Milestone MB-1:** Describe on-site computing requirements for a test-subarray

- M2 [March 2015]

**Milestone MB-2:** Evaluation of technologies for 1st stage beam-forming (for example, FPGA, GPU, Xeon Phi, standard server, x86 ARM) incl plan for test-bed

- M6 [July 2015]

**Milestone MB-3:** Project revision after EISCAT counsel meeting

- M5-6 [late June 2015] refine milestones/deliverables

**Milestone MB-4:** Update requirements and provide input to procurement plan for EISCAT_3D core site (test-subarray); input to project for subarray

- M9 [October 2015] or later

**Milestone MB-5:** Update requirements and provide input to procurement plan for EISCAT_3D core/remote site

- M15 [April 2016] or later

**Task C: e-science work during commissioning for EISCAT_3D**

Update related e-science packages within the work plan of EISCAT_3D in view of the IT expertise required for the different tasks of the construction and commissioning work. Develop a break-down in e-science work packages with well-defined interfaces including an evaluation/recommendation which work-packages need to be prepared by radar experts, which work-packages need to be prepared by radar and IT experts in collaboration and which work packages can be prepared by external IT experts. Required IT expertise will be identified in close dialogue with EISCAT_3D project engineers and scientists to ensure that all real requirements are covered and well-defined.

**Milestone MC-1:** Report identifying work packages and interfaces, required IT expertise at different stages of the implementation for the test-subarray

- M6 [July 2015]

**Milestone MC-2:** Report identifying work packages and interfaces, required IT expertise at different stages of the implementation

- M12 [December 2015]

**Milestone MC-3:** Report on possible solutions for recruitment of the different experts needed for construction and commissioning of EISCAT_3D

- M18 [July 2016], TBC

**Deliverable MD-1:** Final Document including suggestions for implementation

- M36 [December 2017]

**Task D: Archiving solution for EISCAT_3D**

Plan for the long term operation and curation of the EISCAT_3D data archive. Investigate possible collaborations with international e-science projects and e-science initiatives, e.g., within the large e-science initiatives in Europe. This task should also plan and describe the support for user's access to the archived data.

**Milestone MD-1:** Report on the requirements for the EISCAT_3D data archive

- M18 [July 2016]
Milestone MD-2: Report on requirements for user's access to the data archive, including a description on how users can get access to adequate computing facilities
- M24 [December 2017]

Deliverable DD-1: Final report on EISCAT_3D data archive organization and implementation
- M36 [December 2017]

Task E: Contact with stakeholders through regular physical or virtual meetings
During the project regular meetings with the stakeholders to enhance communication, spread information (on general project status and e.g. on sites and network requirements) and guarantee anchoring of the project are necessary. Identified stakeholders are: NORDUnet and national network providers, the HPC centres within the Nordic countries, EISCAT host institutions and EISCAT Council.
The frequency of the meetings should be at least every six months. The meetings should be documented and identified action points within those meetings should be followed-up.

Milestones ME-1: collected stakeholder meeting minutes
- every six months

7.3 Time goals
The project will run in parallel to the beginning implementation of EISCAT_3D. The project is intended to start with only NeIC and EISCAT Scientific Association. From July 2015 or later also CSC, SNIC and UNINETT Sigma2 may join the project as partners upon approval by the steering group.
- Project start: January 15th 2015.
- Project end: January 14th 2018.

The earliest possible time line of the project is given below based on the present planning for the implementation of EISCAT_3D including the anticipated support from EU through EISCAT3D_PfP (see below). This 2 year project contains research, development and engineering work jointly with industry in order to quickly reach a mass producible instrument configuration for EISCAT_3D. To reach this goal the project will construct, test and operate a test subarray unit of the future EISCAT_3D that is as close as possible to final configuration. The project is at present in the negotiation phase with an anticipated start September 2015 and it will overlap in time with the construction of the full EISCAT_3D. The timing of the first milestones listed above is adjusted to the time line of EISCAT3D_PfP. The rest of the time line will be adjusted to investment timing later during the project.

EISCAT3D_PfP
(Installation and operation of a Test Subarray to reach production readiness)
- September 2015: Kick-off EISCAT3D_PfP
- April 2016: Contracts Test Subarray signed with vendors
- November 2016: Site for Test Subarray prepared
- August 2017: Final report on Test Subarray Performance

Construction EISCAT_3D
(Timeline proposed in October 2014 to the Research Council of Norway)
- October 2015: Full Construction kick-off

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October 2018  EISCAT_3D core-site installed and ready for operation test
March 2019  EISCAT_3D operation center ready to use

Timelines for the remote sites depend on investment from other countries.

7.4 Cost goals

The aim of EISCAT_3D Support is to provide advanced user support for the implementation of the EISCAT_3D research infrastructure. We first describe the overall prospects for EISCAT_3D funding as of April 2015 and then describe the funding for the EISCAT_3D Support project. The contribution from EISCAT Scientific Association to this project described below does not include any construction, development or other work related to the implementation of EISCAT_3D but is restricted to work directly to facilitate the progress of the support project including the dialogue with the e-infrastructure stakeholders.

Within EISCAT, direct activities for securing funding for the project on a national level are ongoing in Norway, Sweden, Japan, Finland, and the United Kingdom. The work toward the implementation of the project is actively supported in Sweden by Vetenskapsrådet (VR) through two planning grants to EISCAT, VR has also initiated a round table discussion of the potential investors. During the June 2014 round table discussion EISCAT Headquarters was asked to prepare a cost book detailing investments, further design works, etc., for EISCAT_3D. This was prepared and presented to the roundtable in November 2014 and will serve as a basis for negotiations between the investing parties.

First funding decisions on stage 1 are expected for spring/summer 2015. In particular the funding conditions from one partner could possible require a steep two year investment profile with the goal to have “first light” in the system within this time span.

A potential opportunity for EU funding application offers the INFRADEV-3 call “Individual implementation and operation of ESFRI projects”. The call targets the implementation and initial operation of new research infrastructures which are identified by ESFRI. A project proposal by EISCAT (EISCAT_3D_Pp) was submitted January 2015. It is at present under negotiation and its time line is considered in the planning of this collaboration.

Intended budget for the NeIC EISCAT_3D Support project:

- NeIC: 0.5 FTE (January 15th 2015 – January 14th 2018) for project management, for finding workable and cost-efficient solutions for the EISCAT_3D computing, storage and archive, for making best use of the existing expertise in the Nordic countries, and for facilitating an effective dialogue on the implementation of EISCAT_3D with the stakeholders in the Nordic countries
- EISCAT: 0.5 FTE (January 15th 2015 – January 14th 2018) for providing expert knowledge on the EISCAT_3D instrumental design, science case and user requirements and for providing the interface to the EISCAT_3D project office.
- CSC, UNINETT Sigma2 and SNIC: 0.25 FTE each (July 2015 or later – January 14th 2018, TBC) for making best use of the existing expertise in the Nordic countries

7.5 Project objective priority

<table>
<thead>
<tr>
<th>Priority</th>
<th>Result</th>
<th>Time</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. Other

The Steering Group should consist of representatives nominated by the funding partners. Potential future funders may be invited to nominate members to participate as observers in the Steering Group, until they become funders. In order to make the initial Steering Group richer the initial funding partners NeIC and EISCAT Scientific Association could appoint one additional person each.

Suggestion for what the initial Steering Group could look like:

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas Röblitz</td>
<td><a href="mailto:thomas.roblitz@usit.uio.no">thomas.roblitz@usit.uio.no</a></td>
<td>NeIC ENV area coordinator, (Chair)</td>
</tr>
<tr>
<td>Ingrid Mann</td>
<td><a href="mailto:Ingrid.mann@eiscat.se">Ingrid.mann@eiscat.se</a></td>
<td>Head of Projects, EISCAT Scientific Association</td>
</tr>
<tr>
<td>Yasunobu Ogawa</td>
<td><a href="mailto:yogawa@nirr.ac.jp">yogawa@nirr.ac.jp</a></td>
<td>EISCAT Associate Representative, National Institute of Polar Research, Japan</td>
</tr>
</tbody>
</table>

The Steering Group and the Project Manager might be supported in their decisions by the Reference Groups. Two possible reference groups are suggested:

- A technical Reference Group consisting e.g. of experts that were already involved in the WP13 Preparatory Phase or experts that have experience with leading technical operations in a Nordic context like within the NeIC Nordic Tier-1 area.
- The NeIC Provider Forum consisting of representatives from the different National e-infrastructure providers, normally giving advice to the Generic Area in general, to give advice on decisions on a higher level and to facilitate anchoring in the respective National e-infrastructure organisations.

Risks that have been identified are:

<table>
<thead>
<tr>
<th>Description of risk</th>
<th>Probability</th>
<th>Impact</th>
<th>Priority</th>
<th>Responses and person responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not all intended project partners can participate due to internal funding problems.</td>
<td>low</td>
<td>medium</td>
<td>high</td>
<td>Has to be compensated by other project partners. Responsible: Steering Group</td>
</tr>
<tr>
<td>Project takes longer to complete than foreseen, leading to higher costs for EISCAT 3D.</td>
<td>medium</td>
<td>high</td>
<td>high</td>
<td>The project manager has to take care to stay within the time line and plan with large enough marginals. Responsible: Project Lead, Steering Group</td>
</tr>
<tr>
<td>Computing requirements are not specific enough, leading to a vague procurement plan which again leads to higher costs than necessary.</td>
<td>medium</td>
<td>medium</td>
<td>medium</td>
<td>The project manager has to take care to communicate and circulate draft versions. The project members should try to collect as much expertise as possible. Some parts of the on-site computing equipment will be replaced during the total life-time of the project. Responsible: Project Lead</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Work-packages and interfaces and required expertise for the commissioning phase of EISCAT_3D not sufficiently described, leading to reduced project efficiency within EISCAT_3D.</th>
<th>low</th>
<th>high</th>
<th>high</th>
<th>This should be a main point of concentrated attention of the whole project since it effects the quality, costs or possible delays of the EISCAT_3D commissioning phase. Responsible: Steering Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not finding a viable long-term solution for the data archive leading to a higher total cost for the EISCAT_3D project.</td>
<td>low</td>
<td>medium</td>
<td>medium</td>
<td>Responsible: All stakeholders</td>
</tr>
<tr>
<td>Note: This can be critical long-term but not within the timespan of the support project.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder engagement not sufficient, leading to a diminished overall acceptance for the project within the community and overall latencies.</td>
<td>medium</td>
<td>medium</td>
<td>low</td>
<td>The project manager has to ensure that stakeholder engagement happens in regular intervals and that communication is really seen as essential part of the project. Responsible: Project Lead</td>
</tr>
<tr>
<td>Political considerations biasing the final technical solution towards an economically expensive alternative.</td>
<td>medium</td>
<td>medium</td>
<td>high</td>
<td>Transparency of governance structure with decisions to be taken at the appropriate levels, i.e. Steering Group, EISCAT Council, etc. Responsible: All stakeholders</td>
</tr>
<tr>
<td>Practically not possible to engage enough competent people in the procurement: Finding the right people for the tasks and them having free capacities.</td>
<td>medium</td>
<td>medium</td>
<td>medium</td>
<td>Trying to take contact soon, to ensure that people that have competence are aware of possible future engagement. Responsible: Project Lead</td>
</tr>
</tbody>
</table>
Annex 1 - Terminology

11 Decision points

During the life span of the project from start-up to termination, a number of formal decisions must be made by the steering group. These fall into eight different types; which are numbered in the chronological order in which they are typically made.

DP1 – Decision point type 1; steering group decision to start the project, based on the project directive.

DP2 – Decision point type 2; steering group decision to continue, change or interrupt the project based on findings during the preparation phase. A project may have multiple DP2.

DP3 – Decision point type 3; steering group decision to approve the project plan developed during the preparation phase. Typically this is tied to a DP4 decision to start the execution phase.

DP4 – Decision point type 4; steering group decision to start the execution phase.

DP5 – Decision point type 5; steering group decision to continue, change or interrupt the project based on findings during the execution phase. A project may have multiple DP5.

DP6 – Decision point type 6; steering group decision to approve the result of a delivery, for example to end users. A project may have multiple DP6.

DP7 – Decision point type 7; steering group decision to transfer the responsibility for a delivery, typically to operations in a receiving organization.

DP8 – Decision point type 8; steering group decision to approve the final report and terminate the project.
Appendix 2: The partners' interest in and competence relative to the project

The partners are described in the following:

- NeIC (the Nordic e-Infrastructure Collaboration) is funded by national research funding organisations in Denmark, Finland, Iceland, Norway and Sweden. The vision of NeIC is to facilitate the development and operation of high quality e-infrastructure solutions in areas of joint Nordic interest. The legal representative of and hosting organisation of NeIC is NordForsk, which is an organisation under the Nordic Council of Ministers. There is joint Nordic interest from the national e-Infrastructure providers (particularly, SNIC/Sweden, CSC/Finland and Uninett Sigma2/Norway) to bring in expertise in the design, implementation and operation of the EISCAT_3D e-Infrastructure. This demanding facility will be hosted to a large extend in the Nordic countries which already host a distributed e-Infrastructure – the Nordic Tier-1 – contributing to the computing and storage capacity for data from LHC experiments. The Nordic countries also possess extensive knowledge in providing network capacity, easy-to-use web-based portals and skilled IT professionals needed in the construction of the e-Infrastructure. NeIC will serve as the connecting facilitator and consultant in this project.

- EISCAT (EISCAT Scientific Association) is an international research organisation operating three incoherent scatter radar systems, in Northern Scandinavia. It is funded and operated by research councils and funding organisations in Norway, Sweden, Finland, Japan, China, and the United Kingdom to provide access to radar, and other, high-latitude facilities of the highest technical standard for non-military scientific purposes. EISCAT is also the coordinator of EISCAT_3D – The next generation European incoherent radar system, an ESFRI Roadmap project in the area of environmental sciences, studying how the Earth’s atmosphere is coupled to space. The organisation and management of EISCAT_3D will be based on the structure of the present EISCAT Scientific Association. EISCAT is registered as a non-profit organisation (ideell förening) in Sweden, established in 1976. The EISCAT Associate Members and prospective future Affiliate members have recently confirmed their interest in the EISCAT_3D project and their intentions to support the project. The formal members (Associates) of EISCAT Scientific Association are: CRIP, China Research Institute of Radiowave Propagation, China; NERC, Natural Environment Research Council, United Kingdom; NFR, Norges forskningsråd, Norway; NPR, National Institute of Polar Research, Japan; SA, Suomen Akateemia, Finland; STEL, Solar Terrestrial Environment Laboratory, Nagoya, Japan and VR, Vetenskapsrådet, Sweden.

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Appendix 3: Budget and resources

Nordic e-Infrastructure Collaboration

Project manager: salary totalling an effort of 0.5 FTE (full time equivalent) per year plus travel costs

Physical meetings steering group: two travels per year for up to two NeIC appointed members

EISCAT

In-kind contributions with EISCAT staff working with the project manager totalling an effort of 0.5 FTE (full time equivalent) per year plus travel costs for this staff.

Physical meetings steering group: two travels per year for up to two EISCAT appointed members
Appendix 4: Terms of Reference for the Project Steering Group

The project is governed by a steering group appointed by the partners, with the authority to make decisions on behalf of the partners within the project. The steering group is chaired by the NeIC representative. The steering group has the following responsibilities.

- Ensure the success of the project, by
  - Understanding and communicating the expected benefit.
  - Ensuring that the project results contribute to the expected benefit.
  - Making decisions in steering group meetings.
  - Actively supporting project management.
  - Making decisions regarding issues where project management has no authority.
- Approving the detailed project plan and any additional deliverables described therein.
- Monitoring the project and approving progress reports.
- Approving deliveries.
- Understanding the responsibilities associated with the task and reserve sufficient time to execute them.

Actively supporting project management entails

- Marketing the project and acting as its ambassador.
- Being available, and acting as a “sounding board” between steering group meetings.
- Staying constantly informed about the project’s status.
- Ensure availability, competencies and quality for the resource categories concerned.

NeIC coordinates the project. Project coordination includes the responsibility to find an adequate project manager being able to carry out the agreed work. When appropriate, NeIC enters into a separate agreement with the employer of this project manager in a way that does not violate the terms of this agreement.

A full quorum is required for the steering group to take decisions. The steering group should strive for agreement, but may reach decisions by voting. In these cases, each partner gets a vote. The steering group may at their own discretion invite observers. With a uniform decision a major stakeholder (who agrees to deliver something to the project) may become a full member of steering group. With uniform decision they may be given a voting right.