



Project Number: 672008

Project Acronym: EISCAT3D_PfP

Project title: EISCAT_3D: Preparation for Production

Periodic Technical Report

Part B

Period covered by the report: from 01/09/2015 to 31/08/2016

Periodic report: 1st

1 Explanation of the work carried out by the beneficiaries and Overview of the progress

The EISCAT3D_PfP project started on 1 September 2015 and will continue until end of August 2017. The project activities are being carried out as project tasks, milestones and deliverables under six work packages (WPs). The WP1 (Project Management), WP2 (Coordination and Outreach), WP3 (Design Finalisation for Critical Subsystems), WP4 (Procurement of Production-Ready Designs and Hardware) and WP5 (Engineering-level software) has started in the first year of this project whereas the WP6 (Test Subarray Integration and Compatibility Verification) will start in the second year. This periodic report focuses on the tasks performed during the first year of this project.

As a first step towards the smooth start of this project, Dr Sathyaveer Prasad was hired, as the Chief Engineer, one month prior to the start of this project. In the first half of 2016, Mr Robert Juhlin and Mr Harri Hellgren were hired as Electrical and Software engineer, respectively. Further, the internal EISCAT staff comprising of Mr Henrik Andersson, Mr Peter Bergqvist, Dr Carl-Fredrik Enell, Dr Ingemar Häggström, Mr Lennart Löfqvist, Prof Ingrid Mann, Mr Jussi Markkanen and Dr Anders Tjulin have been working in the project during the first reporting period. The project is also supported by the EISCAT administrative staff in Kiruna and the EISCAT Director, Dr Craig Heinselman.

A kick-off meeting and a technical workshop were held at EISCAT headquarters in Kiruna to start this project. This double event was attended by the EISCAT staff, Swedish Space Physics (IRF) employees, Luleå Technical University representative and representatives of consulting and manufacturing firms. At the meeting, the presentations and discussions were about the overall project, its connections to the other EISCAT activities, and the present status of the technical design of the EISCAT_3D system.

During the first reporting period of this project, Consoden AB, a Swedish company, was selected, after a tendering exercise, as the manufacturing consultant contractor. This consultant firm is supporting the procurement activities in this project as detailed in Work Package 2, Coordination and Outreach.

The design and technical specifications of the critical sub-systems of the EISCAT_3D instrument, the beamformer, antenna unit and pulse and steering control unit have all been finalised and are now, October 2016, in various stages of procurement. All procurement activities have been openly advertised and promoted via e-mails and social media channels.

The procurements were initially intended to be opened, and contracts signed, early in the project followed by periods of setting specifications and interfaces together with the selected suppliers. This approach was later seen as sub-optimal. Instead, it was decided to largely finalise the system interfaces and specifications beforehand by using a system modelling approach and only then open the procurement phase. This means that Milestone MS3, planned for month 8, is still open. The target for MS3 is now month 15 (November 2016).

Further, quarterly newsletters are published on the project home page to publicise the project activities.

1.1 Objectives

The overall objective of this project is to facilitate a smooth and swift transition of the EISCAT_3D project from the FP7 Preparatory Phase to its implementation. The main tasks that are achieved to reach this objective during the first reporting period are:

- The technical specifications of the critical subsystems of the EISCAT_3D Test Subarray have been finalised.
- The procurements of the main items for the Test Subarray are underway.
- The sub-systems will have a sub-system manager (SUBMAN) interface and the required engineering-level software needed to communicate with the different SUBMAN's will be developed by the staff in this project. The process of developing this software has started.

1.2 Explanation of the work carried per WP

EISCAT Scientific Association is the sole beneficiary in this project, and all work is thus performed by EISCAT. The work in this project is organised into six work packages (WP). The status of each WP is listed as follows:

1.2.1 Work Package 1 (Project Management)

The work package 1 (WP1) started in the first month and runs throughout the project. WP1 manages the project. The WP has no milestones or deliverables. Currently, Dr Sathyaveer Prasad and Mr Henrik Andersson are involved in this WP.

1.2.2 Work package 2 (Coordination and Outreach)

The work package 2 (WP2) started at the start of the project will continue till the end. This WP deals with the coordination of the technical procurement activities and effective interfacing with manufacturing firms. Most of the project staff is involved in this WP.

This WP also handles the outreach of the project. The outreach activities during this period have consisted of participation and presentations in meetings with the scientific community, with policy makers and with industry. The general public has also been reached through coverage in local newspapers and a news item broadcast in Swedish national public radio.

WP2 has 7 tasks, 3 milestones and 3 deliverables.

Task 2.1 and Milestone 1

The kick-off meeting and technical workshop of this project was organised at EISCAT headquarters in Kiruna, Sweden on 22–23 October 2015.

Task 2.2 and Milestone 2

Consoden AB was selected as the manufacturing consultant contractor on 15 February 2016. Consoden has primarily been supporting EISCAT on system modelling and tendering preparations. The signing of the manufacturing consulting contract was marked as the completion of the second task and second milestone of this WP.

Task 2.3, Task 2.4 and Milestone 3

Task 2.3 runs as planned though the timing has changed. Task 2.4 has changed focus somewhat to primarily work with open tenders, though a company list was compiled. Due to these changes, Milestone 3 will only be reached later. The target is now month 15.

Task 2.5 and Task 2.6

These tasks include developing a test plan for the test sub-array and preparing/updating the tendering documents based on the results of the test sub-array. These tasks are initiated but will be completed in parallel with WP6 activities. These tasks will be marked as completed by submitting second and third deliverable reports in this WP.

Task 2.7 and Deliverable D2.1

This project takes part in the Pilot on Open Research Data. Thus, an initial data management plan (DMP) was developed and published as Deliverable D2.1 on 23 February 2016. The submission of the DMP report was marked as completion of this task.

1.2.3 Work package 3 (Design Finalization for Critical Subsystems)

The work package 3 (WP3) started in the first month of this project and is mostly completed by mid-April 2016. The work done in this WP has resulted in finalising the design decision for the sub-array beam-former by considering the cost, complexity in implementation, power consumption and commercial availability of the hardware and software/firmware.

Dr Sathyaveer Prasad has been involved in this WP from the first month of this project and carried out the engineering assessment of possible sub-array beam-forming approaches.

WP3 has 2 tasks and 1 deliverable.

Task 3.1, Task 3.2 and Deliverable D3.1

The engineering assessment of sub-array beam-forming approaches is finalised. The assessment is done by specifying the technical requirements of the sub-array beam-former, identifying the possible vendors of solutions to this requirement and requesting limited demonstrations of technological solutions. The identified possible vendors for the test sub-array beam-forming solution are Astron (Astrotech Holding B.V.) from Netherlands, National Instruments, Sweden and Siru Innovations Oy, Finland. A detailed technical report, Deliverable D3.1, was published after completion of the tendering for this subsystem, on 5 September 2016. The publication was postponed since it was decided by the project

management to only publish this report after the closing date (31 August 2016) for tenders of the beam-former for the project. Reason being that this deliverable focuses on solutions from three identified vendors and it could have been interpreted that a decision had already been made on the technology, or vendor, if published before the tendering activity.

1.2.4 Work package 4 (Procurement of Production-Ready Designs and Hardware)

This WP started in December 2015 and the main tasks in this WP are coordinated with WP2 tasks. All the tasks in this WP have started and are expected to be completed as per the work plan. The staff has mainly been involved in WP2 activities so far. WP4 kicks-off in full only when the direct industry work starts. Mr Lennart Löqvist has charged some hours onto WP4.

WP4 has 7 tasks, 2 deliverables and 2 milestones.

Task 4.1

Site preparation and R&D. The design work relating to the test-site configuration will primarily be done after the main industry contracts have been agreed since it is only at that time the environmental and power requirements, etc., are known. It is anticipated that this work can mostly be done in-house.

Task 4.2 and Task 4.3

Sub-array hardware: Antenna element R&D + prototype (Task 4.2) and structure R&D + prototype (Task 4.3). It was decided to procure these items as one single article: an Antenna Unit (AU). The Enquiry package for the AU was prepared in WP2 and the RFQ was opened for tenders on 1 September 2016 with a closing date on 30 September 2016.

Task 4.4

Sub-array hardware: instrument container R&D + prototype. The procurement of this item will be done only after the three main industry contracts have been agreed since it is only then the size constraints, environmental requirements, etc. are known. It is not anticipated that the procurement will be difficult.

Task 4.5 and Task 4.6

Sub-array electronics: front end R&D + prototype (Task 4.5) and beam former R&D + prototype (Task 4.6). It was decided to procure these items as one single article: the First Stage Receiver Unit (FSRU). The Enquiry package for the FSRU was prepared in WP2 and the RFQ was opened for tenders on 1 July 2016 with a closing date on 31 August 2016. Four offers were received. One offer had to be rejected since it was not responsive to the enquiry. After evaluation, contract negotiations with the top-ranked vendor have been initiated with a planned signing of the contract during October 2016.

Task 4.7

Sub-array electronics: pulse and steering control R&D + prototype. The Enquiry package for the Pulse and Steering Control Unit (PSCU) was prepared in WP2 and the RFQ was opened for tenders on 8 September 2016 with a closing date on 31 October 2016.

Deliverables D4.1 and D4.2

These deliverables will summarise the activities in the WP and both are scheduled towards the end of the project.

Milestones MS5 and MS6

These milestones relate to deliveries of the WP4 items to the test site, which will happen a few months before the end of the project.

1.2.5 Work package 5 (Engineering-Level Software)

This WP started in May 2016. The newly hired software engineer, Mr Harri Hellgren, is involved in this WP together with Mr Peter Bergqvist and Mr Jussi Markkanen. The work towards the development of engineering-level software has started and an expanded version of the existing EISCAT Real Time Operating System (EROS) will be used in this project. This software will be used to control and monitor each of the sub-systems in the test sub-array through the sub-system manager (SUBMAN) interface.

WP5 has 1 task and 1 deliverable.

Task 5.1

Development of low-level software interfaces for the chosen hardware. This work is ongoing and will end with the summary report, Deliverable D5.1: Software interface control documents, scheduled for two months before the project ends.

1.2.6 Work package 6 (Test Subarray Integration and Compatibility Verification)

WP6 has 5 tasks and no deliverables or milestones (reporting and milestones are handled in the other WPs).

This WP will start in the autumn 2016 with a few contracting activities (site preparations, electrical installation, etc) followed by on-site assembly and tests starting spring 2017.

1.3 Impact

The main goal of this project is to address bottlenecks for the implementation of a full EISCAT_3D system by moving from prototypes to manufacturable sub-systems. The project is on target and the information on section 2.1 of the description of the action (DoA) is thus still relevant as it will contribute to the expected impacts. Hence, no updates are required.

2 Update of the plan for exploitation and dissemination of result

There is no need to update the original plan for exploitation and dissemination of results.

3 Update of the data management plan

The initial data management plan developed in Task 2.7 does not require any further updates.

4 Follow-up of recommendations and comments from previous reviews

This is the first review and there are no recommendations or comments to follow up on.

5 Deviations from Annex 1

There are no major deviations from Annex 1 though the changes in the procurement strategy and the decision to wait with the publication of deliverable D3.1 in WP3 means that some outputs from the project comes later than initially planned.

5.1 Tasks

The changes to the procurement strategy meant that the initial tasks of WP2 took longer than initially planned. This effects also the industry activities in WP4. The earlier withheld delivery of WP3 (D3.1) will not have any effect to the project.

5.2 Use of resources

The changes to the procurement strategy means that industry contracts will be signed later than initially planned and this means that some spend planned in the first period is delayed to the second period. Staff resources have much been spent according to plan.