

# EISCAT\_3D competence centre

## **Call for Competence Centres**

for inclusion in the EGI-Engage proposal, Call 3, EINFRA-1, Activity 6

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Deadline for submission: 04 July, h 24:00 CEST

<b>Type of Competence Centre</b> <i>(science-oriented/technology-oriented)</i>	Science-oriented
<b>Target user communities</b> <i>(for science-oriented CCs only)</i>	EISCAT_3D users
<b>List of organizations representing the user communities</b> <i>(for science-oriented CCs only)</i>	EISCAT Scientific Association
<b>Duration of the CC</b> <i>(from 3 to 30 PMs)</i>	30
<b>Starting at Project Month</b>	PM 1
<b>Ending at Project Month</b>	PM 30
<b>Contact e-mail addresses</b>	<a href="mailto:ingemar.haggstrom@eiscat.se">ingemar.haggstrom@eiscat.se</a> <a href="mailto:nylen@tp.umu.se">nylen@tp.umu.se</a>

## List of participants

Table . List of participants to the Competence Centre

<b>Participant No *</b>	<b>Participant organisation name</b>	<b>Role in the CC (user community/technology provider/service provider) <i>choose one or more roles can be selected as applicable</i></b>
1 (Coordinator)	SNIC	technology and service provider
2	CSC	technology and service provider
3	UNINETT Sigma	technology and service provider
4	EISCAT Scientific Association	User Community

## **1. Excellence**

### **1.1.1 Objectives**

The design of the next generation incoherent scatter radar system, EISCAT\_3D, opens up opportunities for physicists to explore many new research fields. On the other hand, it also introduces significant challenges in handling large-scale experimental data which will be massively generated at great speeds and volumes. This challenge is typically referred to as a big data problem and requires solutions from beyond the capabilities of conventional database technologies.

Within the ENVRI FP7 project, a pilot study was setup to identify existing services and new services that can tackle the EISCAT\_3D big data challenge. A collaboration was formed among EISCAT\_3D, EGI and the EUDAT infrastructures, and the first steps towards the EISCAT\_3D big data strategy were taken.

The result of the pilot, a small set of EISCAT level 1 (raw samples) and level 2 (spectral data) data, were transferred into the EGI and EUDAT federated clouds. A test portal was setup with crude MetaData parameters and are able, using OpenSearch, to deliver data from the different storages within the clouds as well as from the EISCAT archive. The access rights of the were taken into account based on EISCATs normal IP based rights as well as using certificates.

We consider the objectives of the projects are:

- 1) To build common e-Infrastructure to meet the requirements of a big scientific data system such as EISCAT\_3D data system
- 2) To demonstrate the developed e-Infrastructure can support the EISCAT science community in their acquisition, curation, access to and processing of the data
- 3) To train data scientists who can explore new approaches to solve problems via new data-centric way of conceptualising, organising and carrying out research activities, which will lead to new discoveries and significant scientific breakthroughs.

### **2.1.2 Concept and approach**

The pilot developed as part of the case study will be developed into a fully functional portal with improved possibilities to access and work with the archived data of EISCAT. The three mini-projects suggested contribute in different ways towards this goal. Training activities are included so that users can benefit from the portal and its advanced features.

### **3.1.4 Ambition**

The overall ambition is to provide the users of incoherent scatter radar with tools that improves opportunities for scientific discovery. This competence centre is also important for the build-up towards EISCAT\_3D and the tools developed will form a base for further development.

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## **2. Impact**

### **4.2.1 Expected impacts**

With the development of a functional archive for the EISCAT data, this competence centre will make a foundation for new discoveries and significant scientific breakthroughs.

The system will be robust and allow refinements and further developments of the access of data. Important is also the training of the users, with valuable feedback, making the updated system ready for wider use.

The system is also expected to lay a foundation for the development of a data archive for EISCAT\_3D.

### **5.2.2 Key Performance Indicators**

The only relevant performance indicator is user satisfaction. User satisfaction will be reported as part of Task 1 below.

**Table . Key Performance Indicators of the Competence Centre**

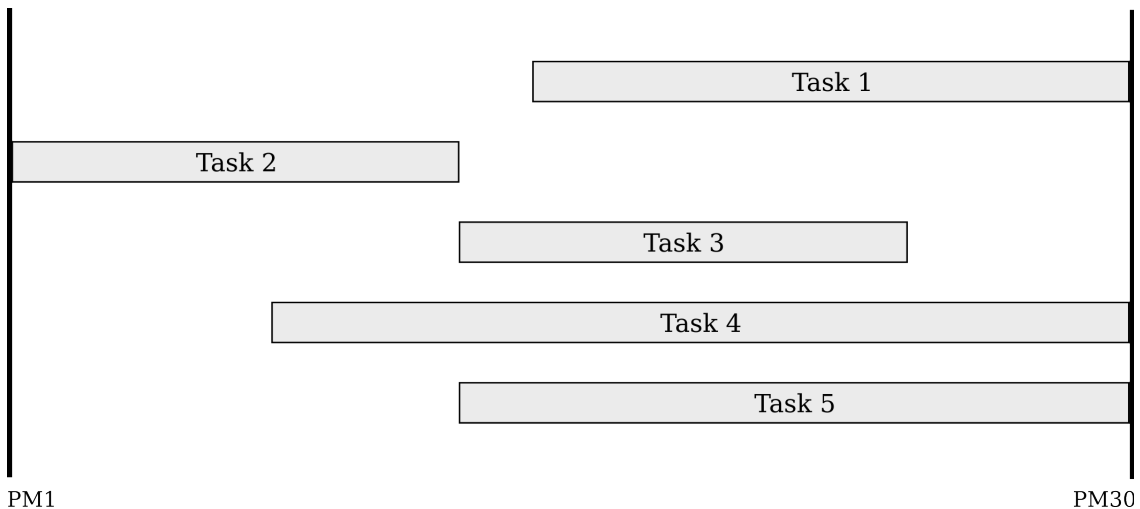
<b>Key Performance Indicator</b>	<b>Description</b>	<b>Values: Foundation/Ideal/Stretch</b>
User satisfaction	Users opinion about the delivered system.	Grade from 1 to 5 (Stretch)

### 3. Implementation

#### 6.3.1 Work plan – tasks, deliverables and milestones

The work plan of the competence centre includes two path-finder mini-project and one light-path mini-project. In addition to these mini-projects there is one task for user-support and training and one task for exploitation.

The work plan starts with Task 2, which runs for the first 12 months, most of the rest of work depends on the final milestone of this task, with exception of the first four months of Task 4. The rest of the work runs in parallel. The following Gantt chart illustrates the layout in time of the tasks



#### 7.3.3 Consortium as a whole

The consortium consists of EISCAT Scientific Association together with three Nordic e-Infrastructures: UNINETT Sigma from Norway, SNIC from Sweden and CSC from Finland, with SNIC as the coordinator. EISCAT and the future EISCAT\_3D is distributed over the same Nordic countries where also a substantial fraction of the EISCAT users are located. Thus, the e-infrastructures in these three Nordic countries will play a substantial role in the build-up towards EISCAT\_3D and this competence centre will strengthen the collaboration and make import contributions to the build-up.

EISCAT Scientific Association provides the in-depth expertise about EISCAT and EISCAT\_3D radar systems and applications as well as representing the users' interests. The outcome of the mini-projects included as part of this competence centre will provide significant advantages for the user community.

## 8. Task 1: User Support and Training

<b>Task number</b>	1	<b>Start Date or Starting Event</b>	Month 15				
<b>Task title</b>	User Support and Training						
<b>Participant number</b>	3	4					
<b>Short name of participant</b>	Sigma	EISCAT					
<b>Person/months per participant:</b>	2	1					

### Objectives

Disseminate the possibilities for users with the portal.

### Description of work

Arrange training events co-located with other activities for EISCAT users. The yearly radar-school and the yearly EISCAT\_3D user meeting are suitable for co-location of training events. Two training events are planned. The first focuses on the basic functionality of the portal and is held after the portal is available on a production platform. The second training event focuses on the new features implemented in the mini-projects (Task 3 and 4).

Sigma is the lead partner, will provide the training and the training material. EISCAT will contribute with relevant use-cases for the training.

### Deliverables/milestones

**Milestone 1.1:** One half-day training event co-located with the 2016 radar school. An event to train the users in the basic use of the portal. Month 19.

**Milestone 1.2:** One half-day training event co-located with the 2017 EISCAT\_3D user meeting. An event to train users in the more advanced, newly developed features of the portal. Month 29.

**Deliverable 1.1:** Report on user satisfaction survey. Month 30.

## 9. Task 2: Deploy the portal as a production system

Type of mini-project: path-finding

Duration: 12 Months

Start: PM 1

End: PM 12

<b>Task number</b>	2	<b>Start Date or Starting Event</b>					Month 1
<b>Task title</b>	Deploy the portal as a production system						
<b>Participant number</b>	3	4					
<b>Short name of participant</b>	Sigma	EISCAT					
<b>Person/months per participant:</b>	3	3					

### Objectives

Deploy the pilot as a production system.

### Description of work

Develop the pilot into a portal that is of production quality. Include all of the existing EISCAT data in the archive.

Sigma leads this project, and provides the development effort. EISCAT provides the data, and testing of the portal.

### Deliverables/milestones

**Milestone 2.1:** Production version of the portal. Month 11.

**Deliverable 2.1:** Documentation of the portal. Month 12.

## 10. Task 3: Basic reanalysis within the portal

Type of mini-project: path-finding

Duration: 12 Months

Start: PM 13

End: PM 24

<b>Task number</b>	3	<b>Start Date or Starting Event</b>					Month 13
<b>Task title</b>	Basic reanalysis within the portal						
<b>Participant number</b>	2	4					
<b>Short name of participant</b>	CSC	EISCAT					
<b>Person/months per participant:</b>	3	3					

### Objectives

Enabling basic reanalysis within the portal.

### Description of work

Basic reanalysis within the portal with user-specified constraints. Instead of downloading large sets of data, it is desirable to be able to do some basic reanalysis of the low levels of data with other constraints than were used in the standard analysis. Basic constraints are defining the volumes of space and the time intervals to integrate. In total there are about 100 analysis parameters to set, and the portal should identify them and provide tools to change them.

EISCAT leads this task providing specifications for the new capabilities. CSC provides the development effort to integrate these into the portal.

### Deliverables/milestones

**Milestone 3.1:** Release of portal with basic reanalysis implemented. Month 23.

**Deliverable 3.1:** Documentation for the upgraded portal. Month 24.



## 11. Task 4: Use level 3 data as metadata

Type of mini-project: lighthouse

Duration: 23 Months

Start: PM 8

End: PM 30

<b>Task number</b>	4	<b>Start Date or Starting Event</b>				Month 8
<b>Task title</b>	Use level 3 data as metadata					
<b>Participant number</b>	1	3	4			
<b>Short name of participant</b>	SNIC	CSC	EISCAT			
<b>Person/months per participant:</b>	4	2	6			

### Objectives

Enable the use of level 3 data of EISCAT as metadata.

### Description of work

Setup the level 3 data of EISCAT to complement the radar metadata. The level 3 data of EISCAT are the derived ionospheric physical parameters like densities, temperatures and drifts at selected volumes of space. The data is currently stored in a separate database, Madrigal, with no connection to the lower levels of the data. This task should complement the radar metadata, parameters of the radar hardware, with the physical parameters. Currently the only link between the data sets are the time stamps, but it's desirable to use a set of identifiers to more clearly follow how the different levels of data have been formed, exactly which set of level 1 data were used to derive the level 2 and finally level 3 data. Expand the portal of the pilot to be able to search the data based on the expanded metadata set, and allow download of selected levels of data. Investigate further how the access rights of the data should be followed.

EISCAT leads this complex task, specifying how to implement these advanced features. SNIC and CSC provides the development and testing resources.

### Deliverables/milestones

**Deliverable 4.1:** Define identifiers for the different levels of data and the connection between them. Month 13.

**Milestone 4.1:** First version of portal ready for tests by selected users. Month 20.

**Milestone 4.2:** Second version ready after user feedbacks and ready for production. Month 28.

**Deliverable 4.2:** Documentation of the new enhanced portal. Month 30.

## 12. Task 5: Exploitation

<b>Task number</b>	5	<b>Start Date or Starting Event</b>					Month 13
<b>Task title</b>	<b>13.</b> Exploitation						
<b>Participant number</b>	1	4					
<b>Short name of participant</b>	SNIC	EISCAT					
<b>Person/months per participant:</b>	1	1					

### Objectives

Maintain the portal on a production platform

### Description of work

Deploy, maintain and update the production version of the portal.

SNIC leads this task providing suitable resources for operating the portal. EISCAT provides new data to be added to archive.

### Deliverables/milestones

**Milestone 5.1:** Production version of portal deployed on a production platform. Month 13.

## 14. List of tasks

Table

<b>Task No</b>	<b>Task Title</b>	<b>Lead Participant No</b>	<b>Lead Participant Short Name</b>	<b>Person-Months</b>	<b>Start Month</b>	<b>End Month</b>
1	User support and training	3	Sigma	3	15	30
2	Deploy the portal as a production system	3	Sigma	6	1	12
3	Basic reanalysis within the portal	4	EISCAT	6	13	24
4	Use level 3 data as metadata	4	EISCAT	12	8	30
5	Exploitation	1	SNIC	2	13	30
				29		

## 15. List of Deliverables

Table

Deliverable (number)	Deliverable name	Task number	Short name of lead participant	Type	Dissemination level	Delivery date
2.1	Portal documentation	2	Sigma	R	Public	12
4.1	Definitions of identifiers for the different levels of data	4	EISCAT	R	Public	13
3.1	Upgraded portal documentation	3	EISCAT	R	Public	24
1.1	User survey report	1	Sigma	R	Public	30
4.2	Enhanced portal documentation	4	EISCAT	R	Public	30

### KEY

Type:

*Use one of the following codes:*

R: Document, report (excluding the periodic and final reports)

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

OTHER: Software, technical diagram, etc.

Delivery date

Measured in months from the CC start date (month 1)

**Table 3.2a: List of milestones**

<b>Milestone number</b>	<b>Milestone name</b>	<b>Related task(s)</b>	<b>Estimated date</b>	<b>Means of verification</b>
2.1	Production portal	2	Month 11	Software released and validated
5.1	Portal deployed on production system	5	Month 13	Validated by users
1.1	Half-day training	1	Month 19	User participation
4.1	First version of enhanced portal available for testing	4	Month 20	Evaluated by users
3.1	Upgraded portal released	3	Month 23	Software released and validated
4.2	Second version of enhanced portal released	4	Month 28	Software released and validated
1.2	Half-day training	1	Month 29	User participation

**KEY**

Estimated date

*Measured in months from the CC start date (month 1)*

Means of verification

*Show how you will confirm that the milestone has been attained. Refer to indicators if appropriate. For example: software released and validated by a user group; field survey complete and data quality validated.*

## 16. *Critical risks for implementation*

Table

<b>Description of risk</b>	<b>Task(s) involved</b>	<b>Proposed risk-mitigation measures</b>
New functionality require more time Than estimated to specify and install.	3 and 4	Ambitions can be lowered. Part of the intended functionality can be left out.

## 17. Summary of staff effort

Table

	<b>Task 1/ Role</b>	<b>Task 2/ Role</b>	<b>Task 3/ Role</b>	<b>Task 4/ Role</b>	<b>Task 3/ Role</b>	<b>Total Person/ Months per Participant</b>
<b>1/SNIC</b>				4/ TP/SP	1/SP	5
<b>2/CSC</b>			3/ TP/SP	2/ TP/SP		5
<b>3/Sigma</b>	2/US	3/TP				5
<b>4/EISCAT</b>	1/US	3/TP	3/ TP/US	6/ TP/US	1/TP	14
<b>Total Person/ Months</b>	3	6	6	12	2	29