EISCAT_3D Competence Centre

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Consortium
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Introduction

- **EISCAT_3D** is a project that aims at constructing a new generation of **ionospheric and atmospheric radar** in the auroral zone in the Fenno-Scandinavian Arctic.
  - EISCAT_3D will also have **an operations centre** (computation) and **two or more data centres** (long term archive).

- **EGI-Engage** project is providing a EISCAT_3D prototype in pre-production. The prototype is being designed together with the specification of the computing and data model.
  - **EISCAT-3D Competence Center** has adopt **dirac.egi.eu** suite:
    - An specific EISCAT_3D web **frontend** based in the DIRAC web framework
    - The connection to dirac.egi.eu **backend** to support distributed computing
    - The necessary **third party systems** integrated in dirac.egi.eu backend (storage, auth, cloud, grid...)

The prototype in a pre-production stage
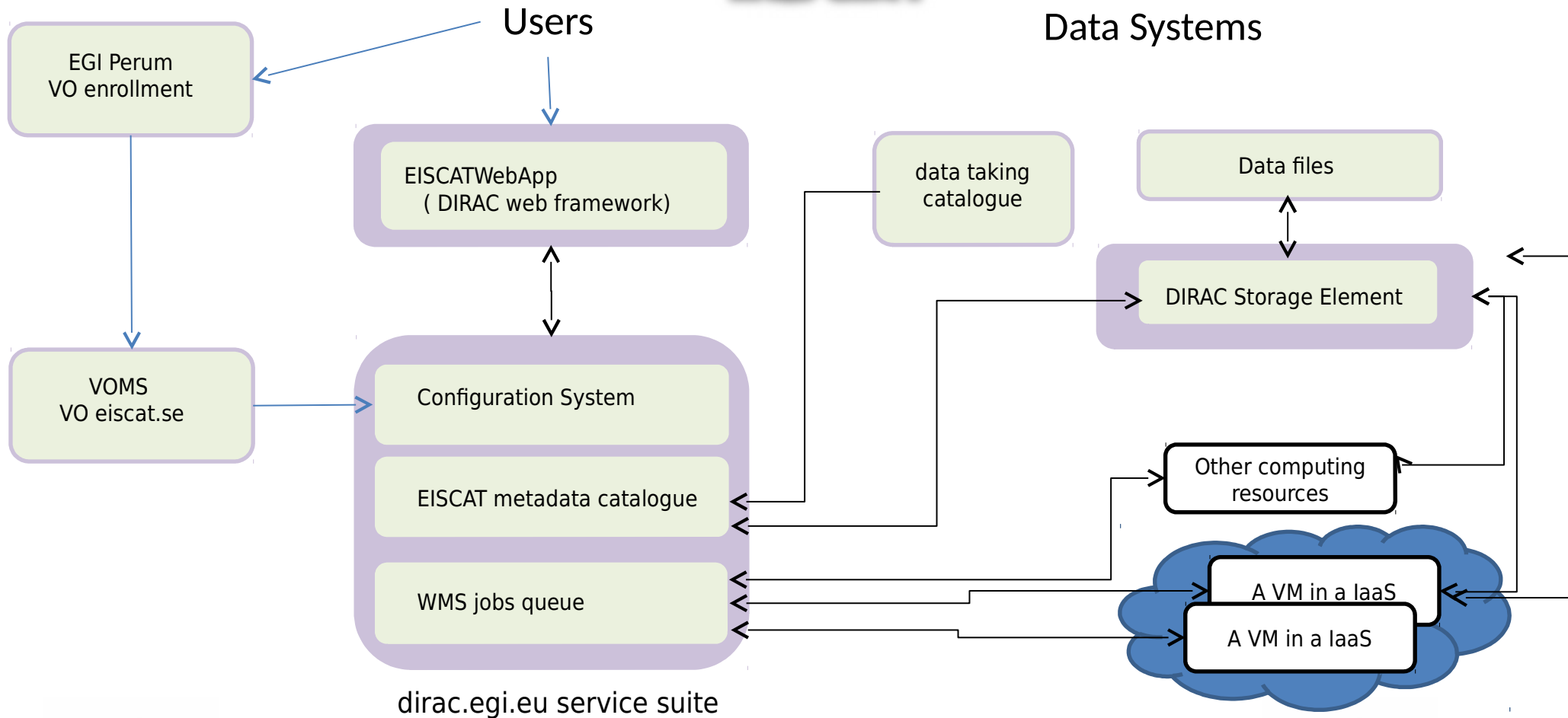
Prototype DIRAC portal for EISCAT data

- The DIRAC portal system for EISCAT data at this allows authenticated users to download as well as make RTG visualisation of the standard correlated data, archived in Matlab-compatible format.
  - Virtual observatory management system (VOMS) User access to the EISCAT DIRAC
    - portal is managed through membership in groups in the EGI virtual observatory (VO) eiscat.se.
    - The VO management system (VOMS) used by EGI is called Perun and runs at Cesnet, accessible to VOMS managers through a web GUI at https://perun.cesnet.cz
  - Storage element
    - This is a Python program that runs on a dedicated port on a Linux computer at EISCAT Headquarters. It reads and serves data files from a top level directory, where the 2007 and 2014–2016 data directories are linked from an NFS mount to the main data server.
  - File catalogue
    - This database runs on EGI resources at Cyfronet (http://www.cyfronet.krakow.pl) and allows users to list and search the data with a command-line client and the file catalogue application in the web portal.
    - It is updated by a Python script that runs monthly (from cron) on the DIRAC server at EISCAT Headquarters.
  - Web interface
    - A web interface is the main point of access for users. It also runs at Cyfronet and is accessible at http://dirac.egi.eu:8090/DIRAC/.
    - This web interface presents the user with a desktop that looks much like the desktop of any modern computer environment1. It has applications for file catalogue search, job submission, and more.

The DIRAC web GUI
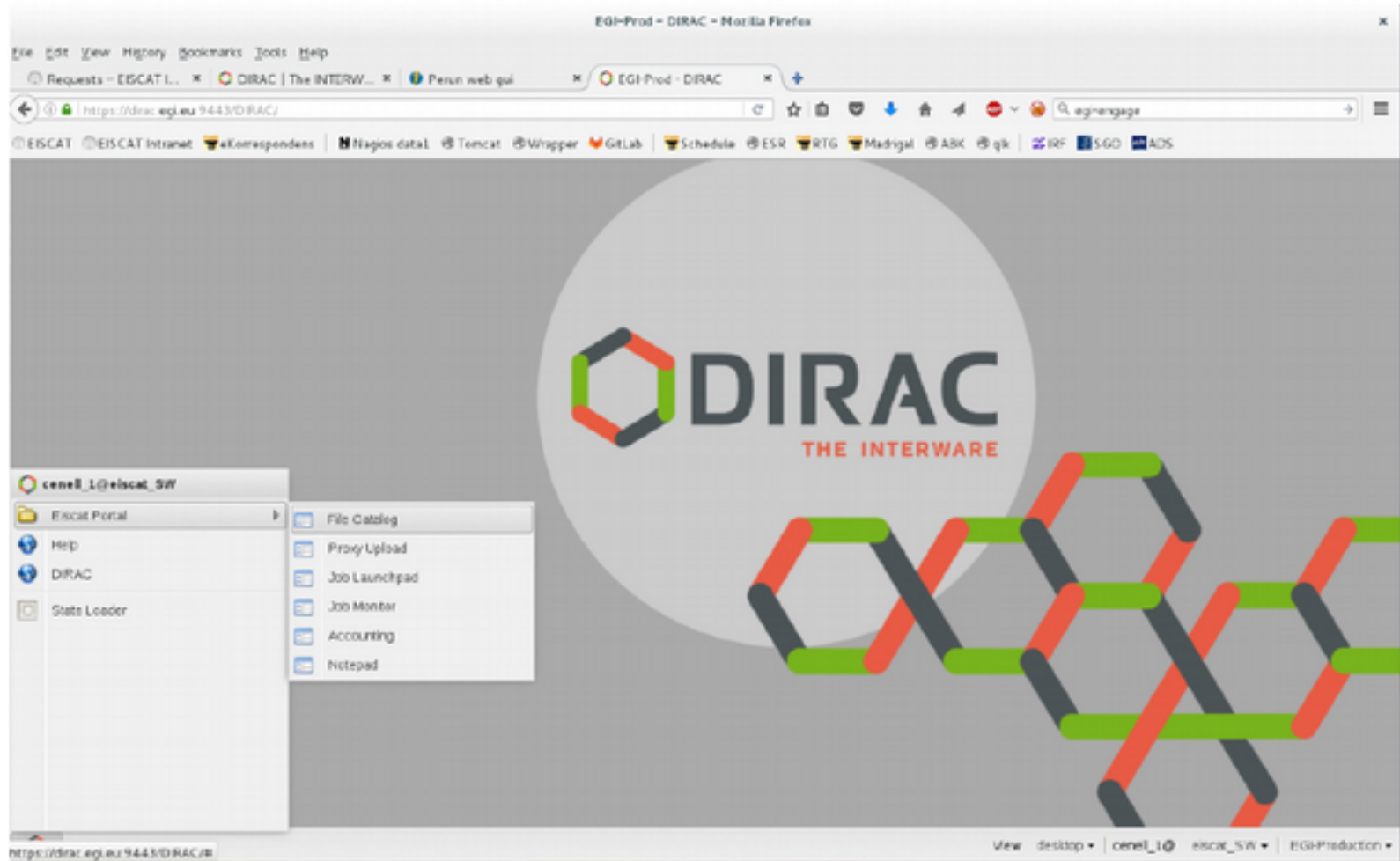
Getting access to the DIRAC portal

- Requires authentication with X.509 certificates.
  - This has proven to be a difficult hurdle for most users to overcome.
- Described in Users Guide
  - Log in to your certificate authority.
  - Request a Grid Premium certificate
  - Register to the eiscat.se VO through the Perun service at https://perun.metacentrum.cz/cert/registrar/?vo=eiscat.se
  - Ask a VO manager (e.g. the author) to add your VO user to the access groups that you are entitled to
    - usually your EISCAT associate country and common programme data)
  - Upload your certificate to the DIRAC proxy, which is the gateway that allows you access the DIRAC grid services.
    - DIRAC command line tools.
      - Python and UNIX (bash) shell scripts.
    - GUI
      - proxy upload app.
  - Install the DIRAC client tools
  - Export your X.509 certificate in P12 format
 - Install the certificate for the DIRAC service

Searching EISCAT data

- Basic search
  - The file catalogue GUI will look much like any file browser.
  - Set the starting path, search criteria via the GUI
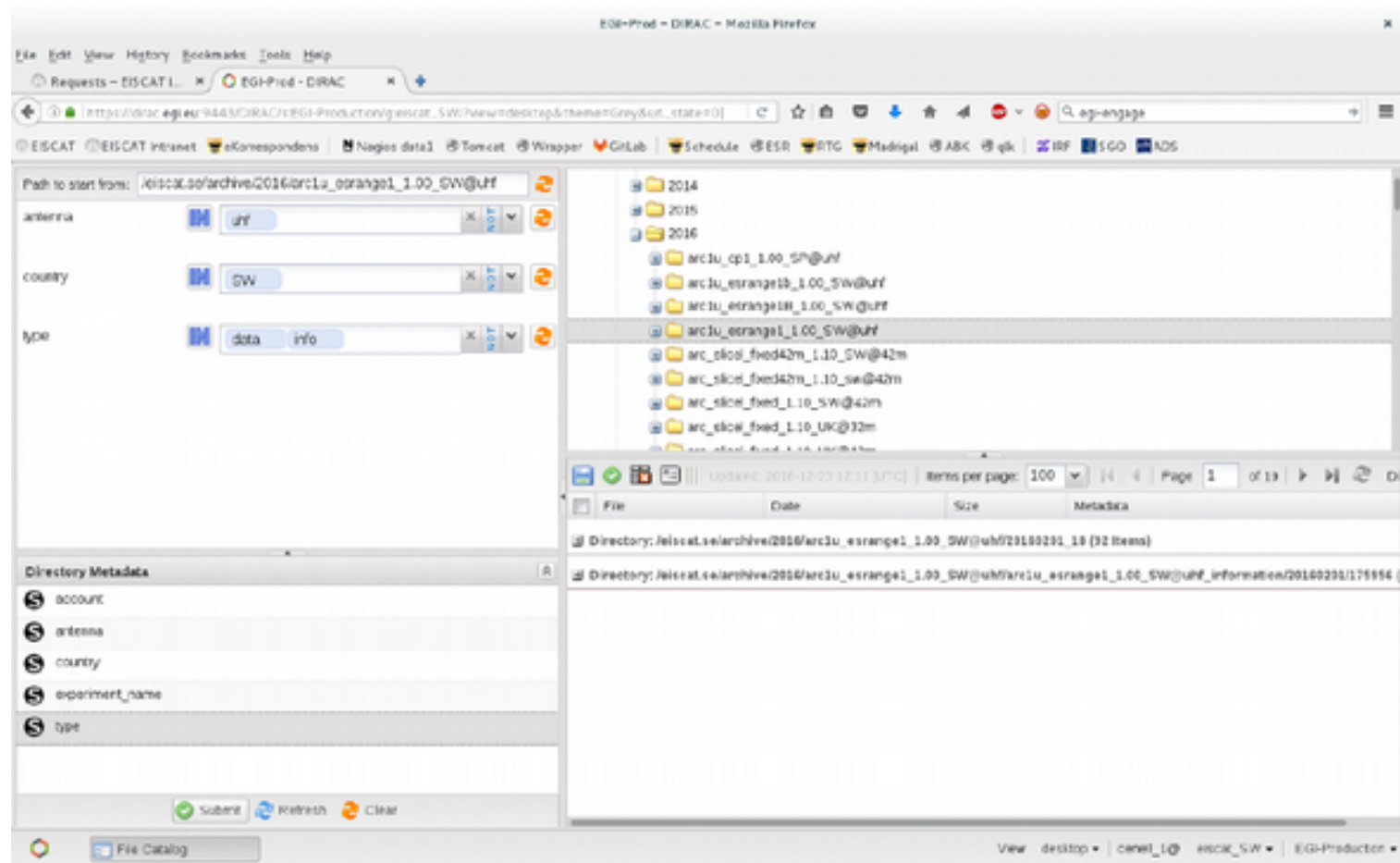
Handling EISCAT data

- Download
  - Zip archive
- Process data
  - Plotting of EISCAT data files
  - Submit processing jobs to the EGI grid.
    - start a virtual machine on grid resources
    - run the specified software with the selected files as input.
    - Standard EISCAT RT graph has been implemented and will plot the content of selected data files
      - by running the RTG script on the open source Matlab-compatible software Octave
- Procedure
  - Select files as for download
  - Open the job launchpad GUI
    - EISCAT png maker
    - Apply   selected parameters
      - Executable webtg4dirac.
  - Submit
  - Job monitor
 - The output will be in the Sandbox
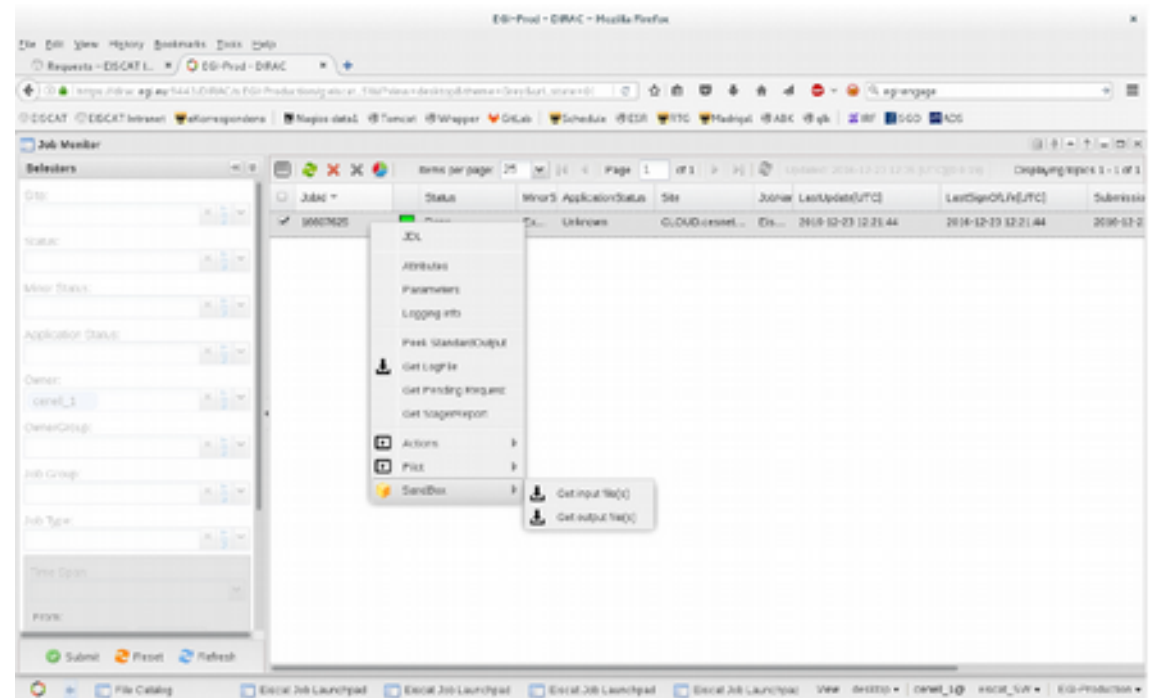
Feedback

- EGI RT tracker system
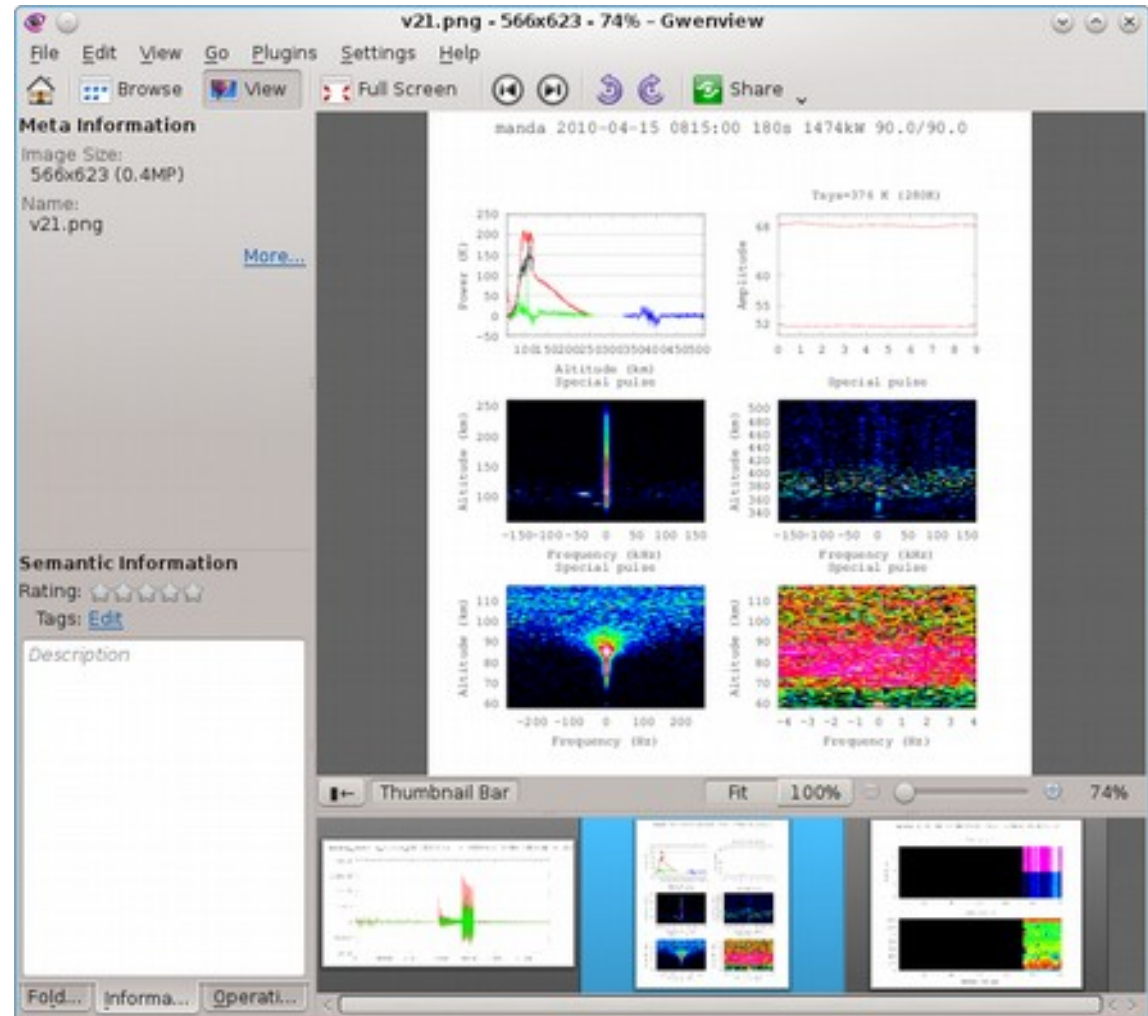
EISCAT_3D CC

- New features have been added to the EISCAT_3D portal
  - Data access based on EISCAT data access policy
  - Data downloading refined
  - Submitting files for processing

- Data Model for EISCAT_3D adopted to the present EISCAT data for evaluation of Dirac
  - Present formats collected into hdf5 format files
    - Resembling EISCAT_3D
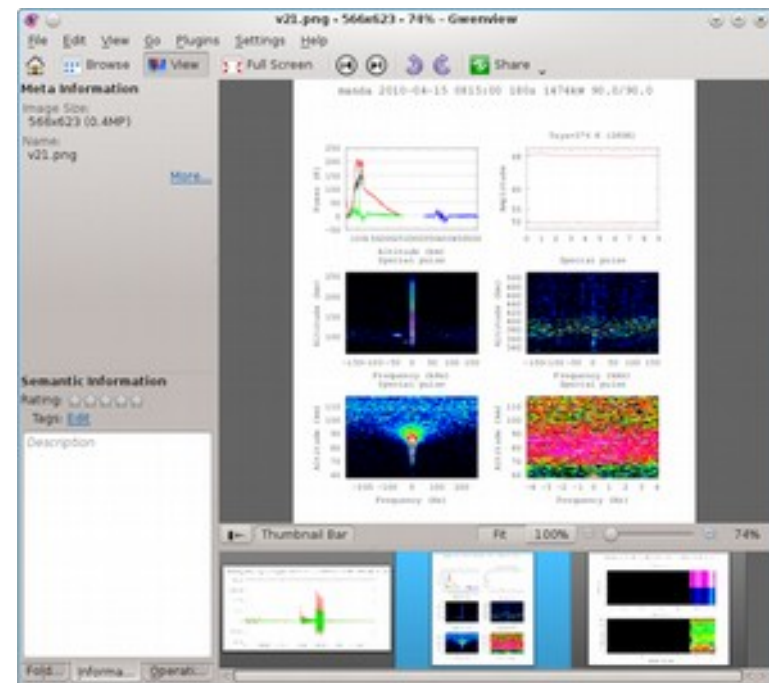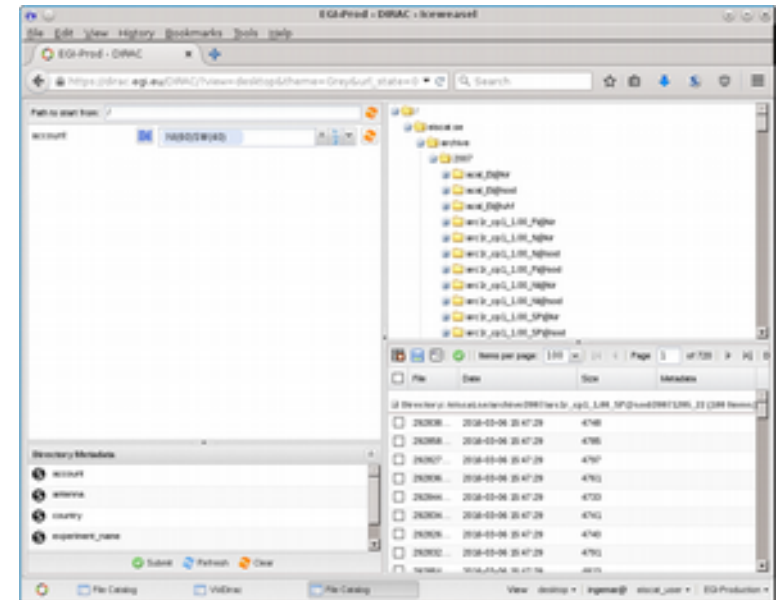
EISCAT_3D CC

- Early adoption within the community
  - Step-by-step users guide is prepared: https://www.eiscat.se/wp-content/uploads/2016/03/DIRAC-instruction.pdf
  - Active tests for debugging the DIRAC portal
    - Internal feedback from EISCAT HQ staff
    - one tester at the Swedish Institute of Space Physics
    - Discussion to add two more from NIPR in Japan and SGO in Finland
- Presentations in community:
  - EISCAT_3D user meeting and Optical meeting 2016
  - Smaller meetings: SGO observatory days 2017, NEIC user group, EISCAT Scientific Committe

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Prototype DIRAC portal for EISCAT data — Short instruction

Carl-Fredrik Enell

January 19, 2017

1 Introduction

1.1 DIRAC

EGI, first European Grid Initiative, later European Grid Infrastructure, and now simply EGI, http://www.egi.eu, is an organisation sited in Amsterdam that federates access to computing and storage facilities in Europe. The H2020 EINFRA-1-2014 project EGI-Engage supports a number of competence centres (CC), one of which is the CC for EISCAT 3D.

The EISCAT_3D CC aims at developing the user portal, which is to be the primary interface through which users will browse, download and analyse EISCAT 3D data. We are investigating several options and have chosen to work closely with the developers of the Distributed Infrastructure with Remote Agent Control (DIRAC) project, http://diracgrid.org, which was originally developed for distributing data from the LHCb project at CERN. DIRAC is an interware, mostly written in Python, that provides command-line, web and API interfaces to grid computing and storage resources. A major task in the EISCAT 3D CC has been to implement a prototype DIRAC portal for legacy EISCAT data from the years 2007 (IPY) and 2014 through 2016.

1.2 Layout of the EISCAT DIRAC service

The DIRAC portal system for EISCAT data at this allows authenticated users to download as well as make RTG plots of the standard correlated data archived in Matlab-compatible format. The prototype system consists of:

Virtual observatory management system (VOMS) User access to the EISCAT DIRAC portal is managed through membership in groups in the EGI virtual observatory (VO) **eiscat.se**.

The VO management system (VOMS) used by EGI is called Perun and runs at Cesnet, accessible to VOMS managers through a web GUI at https://perun.cesnet.cz

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It is updated by a Python script that runs monthly (from cron) on the DIRAC server at EISCAT Headquarters.

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