The Multimission National Center of the Italian Space Agency

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Multimission National Center (CNM): status of the activities

- In March 2008 ASI signed a contract with Advanced Computer Systems (ACS) for the implementation of the CNM;
- CNM is based on a 6.1 meter antenna, installed at the Matera Space Geodesy Center;
- Activities have a duration of 36 months and are developed through 2 phases of 18 months;
- At the end of phase-1, CNM shall be ready to be operated;
- During the phase-2, CNM shall be capable to operate with reduced functionalities;
- Implementation of the functionalities developed during the phase-2 shall not affect operations;
- Phase-2 shall begin within the current year.
CNM is a facility devoted to receive and to ingest data downlinked by remote sensing satellites;

CNM shall have the following main functions: processing, archiving, data and products distribution;

In order to support the external users (mainly scientific and institutional), also one help desk function is foreseen during the operational phase;

Through its Interoperability Protocol, CNM is capable to access Ext. Catalogues.
Capabilities

CNM shall be capable to receive and to process data downloaded by the following Earth Observation satellites:

- RADARSAT-1;
- OCEANSAT-2;
- ALOS (only reception and Direct Ingestion);
- ENVISAT;
- AQUA;
- TERRA;
- SAC-D (implementation during the phase-2);

CNM shall catalogue and archive also MSG products;
A data mining tool shall be developed and installed during the phase-2 of the contract.
Main subsystems

- Antenna (Ant);
- Reception, Archive & Distribution (RAED);
- Processing Subsystem (PS);
- User Interaction Subsystem (UIS).
Subsystems Functional Overview

- The **Antenna (ANT)** Subsystem is devoted to track and receive data transmitted by the OT satellites in X-Band;

- The **Reception, Archive and Distribution (RAED)** Subsystem, is in charge of:
  - Receiving satellite downstream from the antenna and generate raw data.
  - Receiving data/products from external via media and/or network.
  - Archive acquired, received and processed data; provide them to the processing system.
  - Distribute products to end-users (both institutional and private) on media and or network.
  - Feed the User Interaction Subsystem with inventoried metadata and quick looks.
  - Implement data mining techniques to define and extract higher level features from EO products.

- The **Processing Subsystem (PS)**, integrates higher level instrument science processors:
  - Processing Infrastructure (Thin Layer)
  - Level 0 Processing
  - Quick Look Processing
  - Level 1 / Level 2 Processing

- The **User Interaction Subsystem (UIS)**, provides all end-user web-based interfaces for:
  - Catalogue browsing and navigation
  - Interoperability services
  - Product generation/distribution orders management
  - Help desk
  - User management
  - Online Navigation Facility
  - Data Mining product generation/distribution (e.g. thematic maps)
Key drivers for the development

1. Low cost;
2. Minimize new developments;
3. Use of open source and freeware SW;
4. Capability to archive and catalogue “external data”;
5. Easy “integration” of new processing chains;
6. Interoperability with external catalogues.
Key drivers for the development

Minimize new developments:
- Re-use of SW already developed for the Direct Ingestion SS;
- Re-use of SW already developed for the processing chains (Radarsat-1, Envisat, AQUA/TERRA);
- Re-use of SW already developed for the Antenna control system;
- Re-use of the SW already developed for the Cataloguing SS;

Use of open source and freeware SW:
- Linux is the OS adopted for the CNM;
- Wide utilization of open source and freeware packages (ex. eGroupWare for Help Desk component, ER viewer for image visualization, Deegree for Catalogue server etc.);
- On-line documentation utilizing wiki philosophy.

Capability to archive “external data”:
- Archive of the CNM shall be used to archive geodetic data (coming from GeoDAF);
- CNM shall have the possibility to archive external data and product of Earth Observation (e.g. Envisat, SRTM, etc.);
Key drivers for the development

Easy integration of new processing chains:
- CNM shall include external processing chains (ex. Processors for Oceansat-2 shall be furnished by ISRO, Processors for SAC-D shall be furnished by CONAE);
- External processing chains shall be integrated by means of a thin layer;
- Thin layer represents the component of the CNM that knows if a specific processor can be executed: in particular, it checks the availability of all inputs needed to the processor, prepares the working directory in which the processor will run, track the processor activities and uploads the products in the local inventory;
Interoperability with external catalogues:
- One of the CNM subsystems is the Interoperability server;
- Through this component it is possible to browse the local catalogue as well as partners catalogue in a transparent, distributed way;
- External entities that have been considered are the COSMO-SkyMed catalogue and the ESA Remote Sensing (PAF/PAC configuration) Catalogue;

- Development of the Interoperability server has been done according to the interoperability protocols described into the relevant documentation;

- Interface between the Interoperability Server and the Catalog Client (CC) is OGC compliant.
Some notes about the implementation

Status of the activities:
- CNM shall be qualified through a test session;
- It is foreseen to close TVVR for phase-1 within next July.
- During the session also the interoperability server shall be tested;
- Interoperability with the ESA and CSK catalogues shall be tested;

Comments/considerations:
- At present (TVVR phase-1) interoperability with external catalogues shall be tested only by simulation;
- “Real testing” should be done during the phase-2 of the program;
- We had some problems to identify applicable documents;
- We had some problems to obtain data and relevant documents;
- Due to these problems, some delay could affect the program.
Future Plans: integration of PRISMA

- Italian Space Agency decided to use CNM as GS facility devoted to the PRISMA mission exploitation;
- PRISMA is an Italian mission based on a satellite equipped with hyperspectral payload;
- Launch of the satellite is foreseen for the year 2011;
- Integration of the PRISMA processors into the CNM architecture is possible;
- Thanks to the “encapsulator” and the thin layer components, integration of PRISMA processors shall be an easy process.
Thank you!