→ SENTINELS COLLABORATIVE GROUND SEGMENT WORKSHOP #11

7 December 2015 – Executive Summary

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BACKGROUND

The Sentinel family of satellites is being developed to meet the operational needs of Europe's environment monitoring programme, Copernicus. The firsts in the fleet, Sentinel-1A and Sentinel-2A, were launched in April 2014 and June 2015 respectively. Sentinel-3A is planned for launch in early 2016.

Copernicus is the European Union's Earth Observation and Monitoring Programme, headed by the Commission (COM). ESA coordinates the delivery of data from upwards of 30 satellites, comprising the Copernicus dedicated missions (Sentinels) and the Copernicus Contributing Missions. The Commission is responsible for the overall initiative, setting requirements and managing the Copernicus services.

The Copernicus Space Component (CSC) – coordinated by ESA – includes the development and operations of the Sentinel satellites, as well as the distribution of the acquired Earth observation data. All Sentinel products are currently freely accessible online for the worldwide user community at www.copernicus.eu and sentinels.copernicus.eu

In addition to that, ESA facilitates cooperation activities with its Member States participating to the ESA GSC programme (including Canada) for direct and efficient access to Sentinel data. In the framework of the Sentinels Collaborative Ground Segment, potential activities of those countries are the set-up of a national mirror site, employment of own local passive receiving stations, development of innovative data processing tools and applications and complementary calibration/validation activities. In any Participating State, various initiatives and entities can be involved in the cooperation. Therefore a National Point of Contact bundles the flow of information between the national entities and ESA.

Under the lead of the Commission, ESA implements a similar cooperation scheme also with Copernicus Participating States, and with international partners.

WORKSHOP CONTEXT

The Sentinels Collaborative Ground Segment (CollGS) workshops provide a platform for information and discussion between ESA, the National Points of Contact, national entities involved in the cooperation and the Commission. The workshop succeeds the yearly meetings of the "GMES Operations Consultation Group", which started in 2010. In order to foster coordination among the CollGS initiatives, workshops are organised by ESA twice a year.

The workshop #11 objectives were to:

- Present the latest Copernicus Space Component (CSC) status (programmatic & technical)
- Update on the various Member States Sentinels Collaborative Ground Segment initiatives
- Promote the coherence between the CSC ground segment, and MS's collaborative initiatives
- Provide a forum for participants to harmonise their plans
- Address specific issues in plenary and bi-laterals

In particular the workshop focused on Member States initiatives addressing higher-level products and services. In addition, the workshop addressed the QRT/NRT products as well as the Data Access Network initiative.

The workshop took place on the 7th December 2015 and was hosted by the European Commission in Brussels. The workshop saw attendance by 55 national participants representing 17 countries. The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) was also represented as per previous GOCG meetings.

During the first part of the meeting, ESA introduced the workshop objectives and reported on the status of implementation of the recommendations from the GOCG workshop #10. The Commission presented the overall programmatic status of the Copernicus programme, including in particular the coordination

of Integrated Ground Segment activities in the frame of a dedicated Copernicus Task Force.

ESA provided an overview of the latest status of the Copernicus Space Component, including the current programmatic set-up, the overall technical implementation status, the Sentinels latest observation scenarios, and the status of the Sentinels and Copernicus Contributing missions' data access.

There was a particular focus on the data access enhancements introduced over the past six months in the CSC (core) ground segment. In this respect, the major evolution in terms of data access architecture achieved was underlined, coherent with the scalability needs of Copernicus.

The second part of the workshop was dedicated to presentations from Member States regarding progress of own CollGS initiatives. Ten presentations provided details on the various ongoing and planned national activities.

The third part of the workshop was dedicated to the presentation of CSC ground segment evolution towards an integrated approach. In this context two specific topics were addressed: the QRT/NRT product handling, and the Data Access network initiative.

The final round table provided the occasion to summarise the workshop conclusions and recommendations.

WORKSHOP HIGHLIGHTS

Participants emphasized the usefulness of the workshop, as the technical forum to coordinate the various CollGS initiatives. The main highlights of the workshop are summarized below.

The status of the recommendations from CollGS workshop May 2015 was reviewed. Most actions have been implemented, with only two recommendations remain to be completed in the coming months.

Both the Copernicus Space Component ground segment and the national Sentinel CollGS initiatives have undergone further developments over the last months.

In particular, as concerns the data access infrastructure provided by the CSC (core) ground segment, major enhancements have been introduced over the past months. The current infrastructure allows to disseminate approx. 30 TB of Sentinel-1 core products a day to end users, a figure which is equivalent to what distributed by NASA for all their EO data holdingd (i.e. according to NASA annual 2014 data access report).

CollGS agreements between ESA and nine Participating States have been signed to date. Further signatures are planned to the take in the first quarter 2016.

Many national activities, in particular Sentinel data mirror sites, generation of high-level products and services, and local passive acquisition stations have reached operational status or are close to it. Sentinel data is being used operationally by services from many different application fields. In particular, the workshop presentations highlighted some notable examples:

- German CollGS: a QRT demo was performed in October 2015 using Sentinel-1 and TDP-1 optical data relay; the associated high-level product was made available within 18mn from on-board sensing.
- Greece CollGS: is providing operational services in several areas including e.g. flood monitoring. A specific service

based on Persistent Scatterers determined from Sentinel-1 data, is being introduced. Federated single sign on as well as hosted processing are additional functions available from the national CollGS data portal.

- **Norway CollGS:** several operations services are currently supported. Significant activities are related to QRT products. A specific service based on Persistent Scatterers determined from Sentinel-1 data, is being pursued.

- **Italy CollGS:** the opening of the first version of the national mirror site is upcoming. Deployment of a local Ka-band user ground station for reception of Sentinel data via EDRS is envisaged in Matera.

- **Austria CollGS:** good progress has been made in setting up the CollGS agreement with ESA, whose formalisation is expected in the coming weeks. The dedicated EODC national initiative is in progress gathering several stakeholders and providing, among other functions, major ICT infrastructure for hosted processing.

- **Canada CollGS:** the national mirror site was opened in November 2015 following signature of the CollGS agreement with ESA. Several operational services are supported (e.g. ice service).

- **Czech CollGS:** initiative is under consolidation, with a strong interest in several specific domains e.g. forestry and agriculture applications. The intention is to organise national activities via 2 main blocks: a CollGS and a Science GS.

- **Finland CollGS:** local passive X-band station has been deployed as well as national mirror site. Several operational applications are already supported, e.g. baltic sea ice monitoring service, flood detection.

- **Slovenia CollGS:** national initiative is under consolidation. Development is foreseen to be based on the use of Geopedia, with a strong focus on S2 data

- **France CollGS:** PEPS mirror site platform is open with approx.. 300 registered users so far. The next phase will feature hosted processing starting early next year with a target for operations to be fully available in September 2016. High interest was indicated in QRT products via active X-band local stations.

- **UK CollGS:** deployment in-progress featuring two mirror sites for academia and commercial use respectively.

Beyond the presentations, it was noted that several plans for new CollGS by various Participating States are being refined.

The complementarity of the CSC (core) Ground Segment and Sentinels Collaborative Ground Segment frameworks enables the definition and implementation of large-scale European proposals to maximise the exploitation of the Sentinel missions within the Copernicus programme. Two specific cases, presented at the previous workshop, have been further consolidated over the past months:

- The 'Sentinel-1 European WW Persistent Scatterers (PS)', with an overarching objective to prepare and maintain a European datasets and database of World Wide Persistent Scatters (PS) for public usage.

ESA has released a dedicated technical note including a proposal for the PS Journal scope and implementation approach.

During the workshop, participants recommended preparing a presentation to the Copernicus User forum addressing how the Journal could support the generation of value-added products and services as well as research activities and the general public/private sector.

- The integration of the data hub relays and CollGS mirror sites, with an overarching objective to implement a Data Access Network.

This initiative, including scope and implementation approach, has been further consolidated as is now documented in a dedicated Annex of the Copernicus Integrated Ground Segment (IGS) Roadmap.

A specific discussion addressed the status of the ICT infrastructure required to maximise the exploitation of Copernicus data and information. In particular the following was noted:

- ICT and cloud providers are facing difficulties handling EO space data due to the associated very specific characteristics (e.g. large files)
- ICT requirements for EO data and services are unique and require tailored solutions
- Many techniques necessary to fully exploit EO space data are unique, with still remaining gaps between the existing know-how and the avaikable industrial expertise
- Many of the advanced EO techniques cannot be run today on the infrastructure provided by the major US ICT providers (e.g. InSAR). There is therefore a unique opportunity for European providers to exploit this advantage. As example the InSAR tools and applications were noted.
- Some of the ICT offered by major providers imply a lock-in effect, e.g. code developed on a ICT platform is not easily portable to a different provider.
- Many users (researchers) have no budget to pay ICT resources

WORKSHOP RECOMMENDATIONS

It was noted that implementation of two recommendations from the workshop #10 are still in-progress, and should thus be further tracked, namely:

- It should be possible to access Sentinel-3 Marine L2 products from the Collaborative data hub
- The management of configuration control and versioning of core and collaborative products should be consolidated and standardized

The following new recommendations were identified:

1. It is recommended that workshop participants coordinate with own Copernicus Committee delegates and representatives to the Copernicus IGS Task Force, to provide comments to the Annexes of the Copernicus IGS Roadmap document. Note: comments deadline is 8 January 2016.

2. It is recommended to increase the possibility to generate more Sentinel-1 QRT products, in particular over Europe. Note: this typically requires Sentinel-1 data to be downlinked in pass-through mode over Europe.

3. It is recommended to continue to pursue the CSC data access enhancements in particular as concerns the functionality, performance and reliability of the Collaborative data hub.

4. It is recommended to announce to users the completion of the deployment of the dedicated network connectivity between the Copernicus WAN and GEANT (currently foreseen in Q1 2016).

5. It is recommended to assess the use in Sentinel-2 of specific DEM addressing national needs. Furthermore it is recommended to assess the release of Level-1B core products in order to respond to the needs expressed by relevant Participating States.

6. It is recommended to prepare a dedicated presentation to the Copernicus User Forum on the opportunities in terms of value-added products/applications that the Sentinel-1 PS Journal could support.

7. It is recommended to continue the regular holding of the Sentinel collaborative GS workshops (GOCGs) with a frequency of twice a year, in order to support the close synergy/coordination between the CSC (core) Ground Segment and the Sentinel Collaborative Ground Segment initiatives.

8. The Commission and ESA should continue the jointly coordinated efforts to address the overall vision of creating an E2E industrial eco-system comprising e.g. data provider, ICT industry, EO industry and users. To this end it is recommended to engage key ICT players to identify aspecific gap filling activities to support the handling of large EO data

9. It is recommended to define specific eligibility criteria to be used to support local active X-band stations. Note: these criteria should be presented at the IGS Task Force and approved by the Copernicus Committee.

10. For the next CollGS workshop, it is recommended to include in the agenda a presentation on the scope of the technical operating arrangements being defined with International partners, as well as to provide an overview of the International partners own cooperative initiatives.

11. For the next CollGS workshop, it is recommended to include in the agenda the discussion on the technology, the challenges and lessons learnt by Participating States during the deployment and initial operations of their own mirror sites.

ESA, in close coordination with the Commission, will follow up these recommendations and report on the status of their implementation at the next Sentinel CollGS workshop, GOCG #12, foreseen to take place in mid 2016.

collgs
sentinels collaborative ground segment