



→ SENTINELS COLLABORATIVE GROUND SEGMENT

WORKSHOP #20

11 OCTOBER 2022

EXECUTIVE SUMMARY



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BACKGROUND

The Copernicus Space Component has been established as one of the largest and most proficient Earth Observation infrastructures in the world. With six high-performance satellites in orbit, the system has evolved at a breath-taking pace.

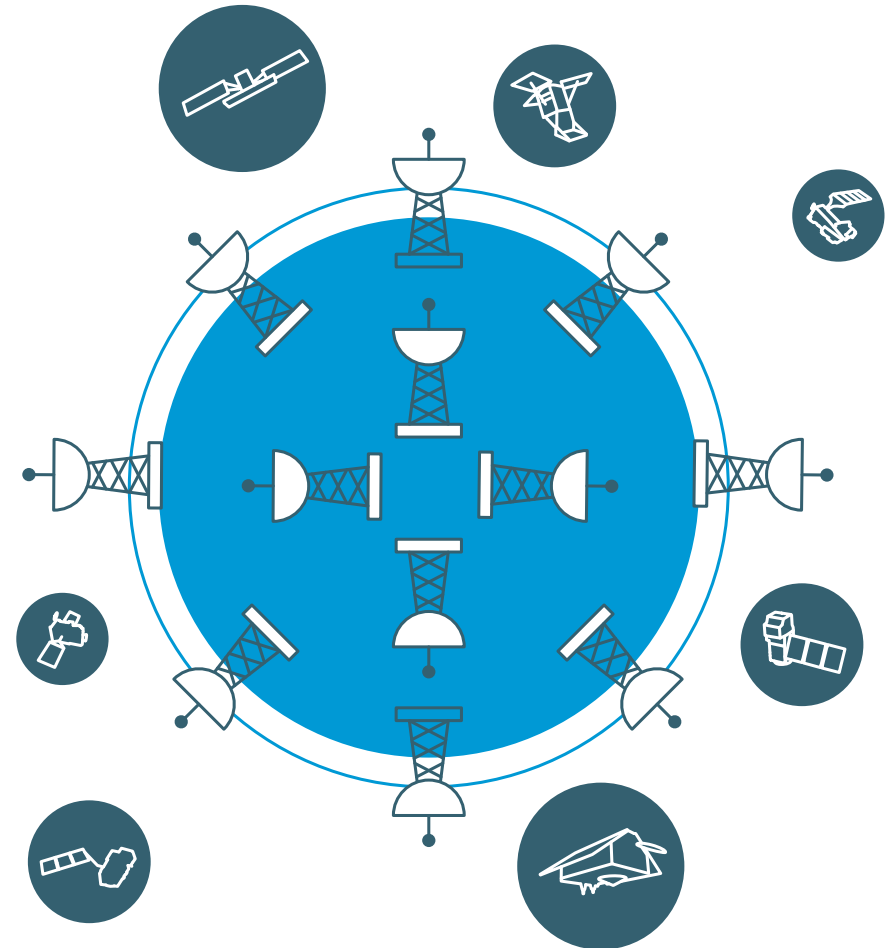
Copernicus is the European Union's Earth Observation and Monitoring Programme, headed by the Commission (COM). The Commission is responsible for the overall initiative, setting requirements and managing the Copernicus services.

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 freely accessible online for the worldwide user community at www.copernicus.eu and sentinels.copernicus.eu.

In addition to this, and in close coordination with the Commission, ESA facilitates cooperation activities with Participating States contributing to the Copernicus Space Component Programme (including Canada), providing for direct and efficient access to Sentinel data.

In the framework of the Sentinels Collaborative Ground Segment (CollGS), potential activities of those countries are the set-up of a national mirror site, employment of their 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 further European countries and international partners.



WORKSHOP CONTEXT

The Sentinels Collaborative Ground Segment workshops provide a platform for information and discussion between ESA, the National Points of Contact, national entities involved in the cooperation and the European Commission. In order to foster coordination among the CollGS initiatives, workshops are organised by ESA at least once a year.

The objectives of workshop #20 were to:

- Report on the latest Copernicus Space Component status and developments: programmatic and technical including the context of the evolution of Data Access and upcoming reprocessing of the Sentinel-2 mission data
- Update on the latest status of the various Collaborative initiatives established by the GMES Space Component (GSC) and Copernicus Participating States
- Promote the coherence between the CSC Ground Segment and Participating States collaborative initiatives
- Provide a forum for participants to harmonise their plans

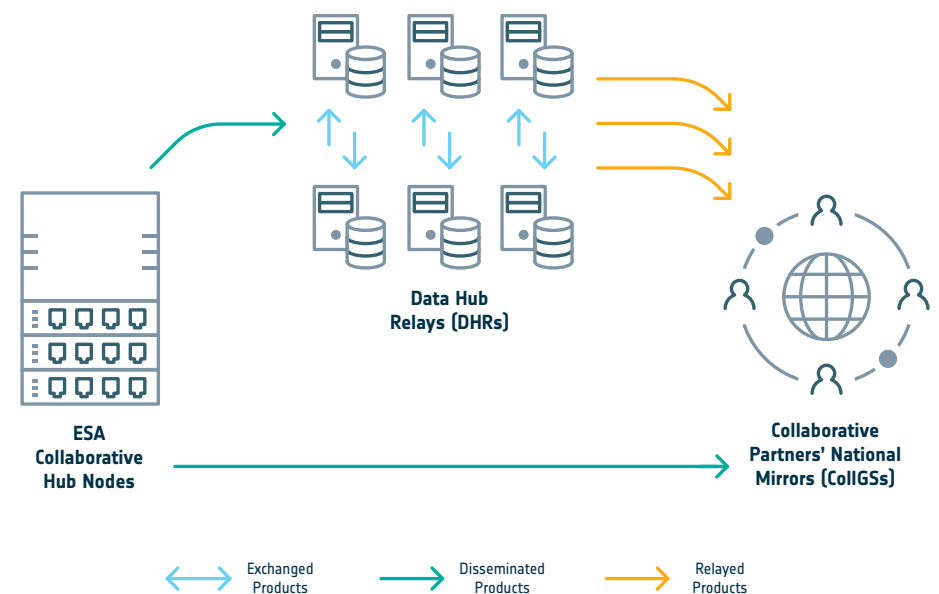
The workshop took place on 11 October 2022 in Prague, Czech Republic, as well as online via web conferencing. Over 80 external participants attended the workshop.

WORKSHOP HIGHLIGHTS

Participants perceived the workshop as very useful to ensure coherence between the CSC development and national CollGS initiatives. The main highlights of the workshop are summarised below.

ESA COLLABORATIVE SUPPORT

Since 2014, the CollCG has been instrumental in the up-take and valorisation of Copernicus Sentinels data, contributing to the overall success of Copernicus and helping establish the Copernicus Space Component as one of the largest distributors of Earth observation data worldwide.



Collaborative agreements have contributed in multiple ways, such as providing a framework for Sentinel data acquisition and quasi-real time products via local stations and enabling mirror sites to improve CSC core data product dissemination and access.

Agreements have fostered the growth of complementary collaborative data products and algorithms, as well as leading to the development of innovative tools and applications. Here are some highlights from the workshop:

- Processors: Access to the Sentinel-1 instrument processing facilities is enabled via the CSC Sentinel Data Processors Publication Service. CollGS will also provide access to the Sentinel-2 Packaging software, which ensures continuity of access to Sentinel-2 Level-1B data.
- Access points: Fundamental to the overall uptake of Copernicus data is the success of access points. Since 2015, over 20 Collaborative Access Points - such as National Mirror Sites - have been in operation, providing a focal point for local and global user communities.
- Collaborative Relays: Collaborative Relays have been put in place to help the operation of these National Mirror Sites. Data Hub Relays (DHR) initially benefited distribution by increasing capacity but now serve a continued operational role, coordinating systematic synchronisation and redistribution. DHRs serve as trusted partners for the prototyping of new operation concepts and workflows. They also provide redundancy and capacity.
- Data Transformation: The next focus for DHRs is to serve a role in data transformation activities, by giving support to complementary collaborative data products and helping further innovative tools and applications.
- Transformation Framework: The Transformation Framework can provide integrated processing elements for on-demand processing (e.g. Sen2Cor). The framework provides an opportunity for pre-operations of product format conversions, as well as enabling plug-in of external processors, such as those from National Member States. It integrates a traceability service, which is needed as CollGS evolves into an ecosystem of service providers.
- Tailoring Systematic Data flow: The reference system software provides an

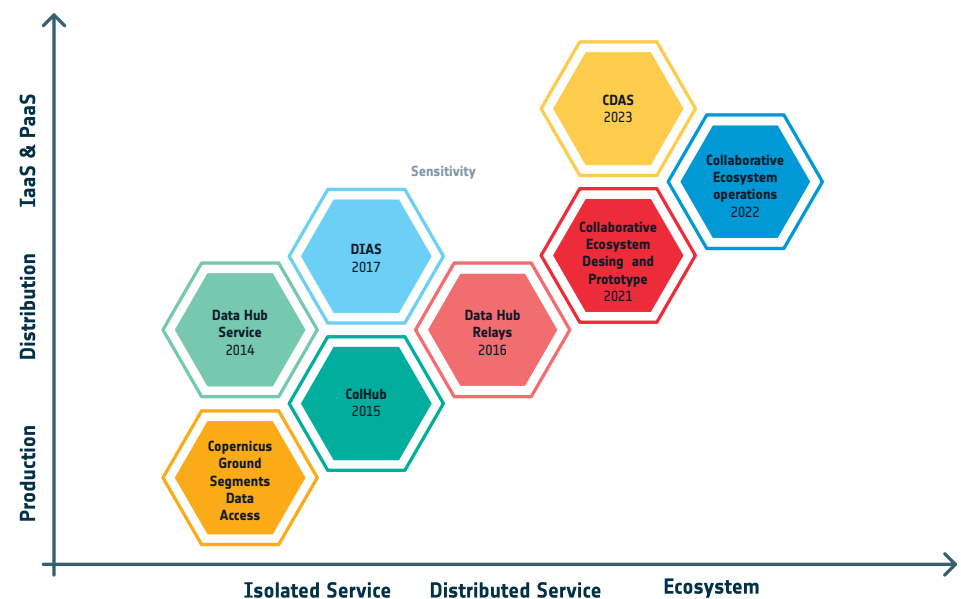
opportunity for CollGS, especially with the open source re-engineering of the data processors. It allows the tailoring of systematic data flow for national priorities and will ensure integration with traceability.

- Evolution to new Copernicus Data Access Service: ESA proposes dedicated CollGS support for on boarding and federation with the new Copernicus Data Access Service (CDAS). ESA will facilitate this transition by ensuring continuity of service through the well-known Data Hub Software, which will work in parallel with the new CDAS. Different frameworks are being put in place to ensure evolution of the eight-year-old open source Data Hub Software. Furthermore, ESA propose a dedicated engineering activity (open competition mid-2023) to implement this support.

DATA HUB AND COLLABORATIVE SOFTWARE EVOLUTION

Collaborative services Evolution chart

From the Collaborative Network to the Collaborative Ecosystem



Collaborative services have transitioned from its origins of isolated services, with the Data Hub Service and Copernicus Ground Segments Data Access network, to distributed services in the form of the Data Access and Information Service (DIAS) and DHRs. The next evolution is towards Collaborative ecosystem operations, as illustrated in the first step of the Collaborative ecosystem design and prototype of 2021. The planned migration to the new Copernicus Data Access Service in 2023, will support further the evolution towards an ecosystem.

As part of this transition there has been a move from a one block software solution to the Data Hub Software (DHS) suite, which is an open source platform designed to support data discovery, distribution, processing and dataflow control for Earth observation data. DHS is highly reliable and scalable and includes frameworks dedicated to data ingestion, search and processing for multi-mission data management.

The identity of the Collaborative ecosystem is being built by enhancements to the CollGS ecosystem website. The website is the entry point for all stakeholders of the CollSG and functions as an aggregator of information concerning CollGS nodes and the DHS suite. It showcases CollGS services and operations.

The Collaborative Ecosystem defines a governed perimeter encapsulating Earth observation data and services. It is based on data sovereignty with autonomy and self-determination in terms of data exchange, whereby all participants may moderate the interactions of the data exchange. The ecosystem supports federations, meaning partnerships where members – so-called federation users - may share data and services, while still applying policies and maintaining sovereignty over the data.

The objectives of the ecosystem are to enhance the opportunities for the Collaborative to share services and data by federating users, foster the establishment of new operation concepts and also facilitate CollGS centre operations. The heart of the ecosystem is the Identity and Access Management system.

As the Data Hub System (DHuS) supports the evolution of Collaborative users network into an ecosystem of service providers, service consumers and data producers. Another driver for this change is that it facilitates the management

of Collaborative centre operations, thus leveraging the awareness of the operational challenges faced by CollGS. It also leads to the extendable and re-usable application solutions.

As part of this evolution, the DHuS software will switch to a new data access solution, with a multi-modular structure – GSS software stack. The benefits of this switch will be multi-fold, including modularity, wider scalability, simpler maintenance and product trace generation. The new GSS software will inherit datastore and metadata store technologies and provide new Graphical User Interfaces, as well as being fully open source. The switch to GSS shall start in Q1 2023 and will be ready for deployment in Q3 2023.

The transformation framework is intended to provide CollGS users with data processing capabilities, while introducing an extendable framework for data transformations. It shall provide the possibility to extend the set of processing capabilities (plug-ins) with minimal or no modification of the transformation framework core component.

Upcoming software evolutions include the DataFlow Network Environment (DAFNE), which provides users with a strong dataflow visualisation and control solution. It is designed as a powerful plug-and-play visualisation tool for managing the dataflow in terms of archive status, retrieved and distributed data, number of products and measurements of service performances. DAFNE aims to be compatible with the new Copernicus Data Access Service in Q2 2023, and provide a monitoring, reporting and control of data transformation service by the third quarter of 2023.

Another new component in the Collaborative DHS Service – the Semantic Framework – shall be responsible for semantically representing metadata related with Earth-Observation and earthquakes events. Its objective is to enhance the capabilities of processing natural language data for semantic search, with implementation of Natural Language Processing (NLP) capabilities for semantic search expected and analysis enhancement of SPARQL syntax usage by the third quarter of 2023.

ESA COPERNICUS DATA ACCESS UPDATE

The status of the Data Access operations and the Collaborative Hub was presented. The Data Access Services are a key element of the Copernicus Space Component providing a front-end service to access Copernicus Sentinel user level data free of charge. It is one of the largest distributors of Earth observation data worldwide, with over 600 thousand registered users accessing about 55 million published products of user level data.

Since the start of operations eight years ago (as of this workshop), there has been 480 PB of data downloaded. In 2021 alone, the service provided 185.7 million downloads, which corresponded to 25% of total download volume. The service is also experiencing an increase in the number of active users. As more data are made available there is a gradual increase in the volumes of downloaded user level data per year. There is a growing interest in Sentinel-2 data downloads.

The Collaborative Hub (ColHub) continues to provide products to 10 Collaborative Ground Segment users and eight Data Hub Relays. Over 230 million products have been downloaded with a volume of about 148 PB. There has been a steady increase in the volume of disseminated products to the CollGS and Data Hub Relays, as well as more products exchanged among Data Hub Relays. The ColHub is second in importance to the Open Access Hub in terms of volume of data downloaded.

Some highlights of the New Copernicus Data Access Service (C-DAS) were also presented. It is an open ecosystem on a public cloud with unified user management, giving users access to complementary services. It will provide cloud infrastructure services for user data processing and third party applications and will make available Sentinel user level data, as well as Copernicus Contributing Mission data. It will also have a marketplace and support third-party services, applications, services, documentation and software repositories.

The main service offering will be data discovery and retrieval, streamlined data access, traceability services and on-demand production services. ESA shall monitor the performance of the service in terms of its operational services portfolio offering.

In terms of the CollGS continuity, the existing ColHub will continue in the coming years until C-DAS becomes fully operational. There will be a designated node for providing Sentinel-2 reprocessing data, planned for completion by July 2023. The completion of reprocessed Level-1C and Level-2A data (combined volume 20 PB) is expected to take a further six months.

Enhancements of the Sentinel-2 reprocessed data will include reprocessing with the Copernicus 30 m Digital Elevation Model (DEM). Furthermore, Sentinel-2 Data Packaging for CFI file management will be made available.

COPERNICUS DESTINE

The status of ESA's Destination Earth Core Service Platform was presented. Destination Earth (DestinE) is a European Commission initiative, which aims to develop a very high precision digital model of Earth – a digital twin – to monitor and predict environmental change.

Similarly to the Copernicus Collaborative Ground Segment, DestinE offers access to large volumes of high quality data through industrial services scalable to support large user communities, while also providing frameworks for autonomous third-party services.

The three implementing entities of DestinE - ESA, ECMWF and Eumetsat – designed the system top down with three main components: ECMWF Digital Twin Engine (DTE), Eumetsat Data Lake (DEDL) and ESA's Core Service Platform.

DTE hosts digital twins and basic associated services, including data production. DEDL stores data from DTW and complementary sources and provides data retrieval and access services. The DestinE Core Service Platform (DESP) is the single access point for users who interface with DTW and DEDL and provides advanced data exploitation services.

As DestinE delivers a very large flow of high-quality data, this puts demands on data archiving for the data to be accessed by users. Various archive scenarios are under consolidation.

In terms of providing the data to the users, DESP procures support for platform validation and verification, while also using this information to plan the evolution of the platform and support the onboarding of Earth System applications. The Platform and Data Management Services procurement covers all necessary services to manage user access, such as DEDL and DTE interfaces.

Finally, the platform procures advanced applications for users, which support DestinE data exploitation, such as modelling and analysis. The DESP procurement process started in January 2022, and the end of the first phase will be August 2024.

DestinE Core Service Platform aims to offer a wide set of services for a large community of users and aims to progressively allow users to customise the platform by integrating their own data and developing their own applications.

To guarantee the development is fit for purpose, lessons learned from Copernicus CollGS can be leveraged in DestinE by tracking certain indicators, such as number of registered users. It is also useful to understand whether the two systems will influence each other and whether DestinE will experience a similar evolution to CollGS, such as user growth and worldwide adoption.

Lessons learned

As DESP moves forward, it aims to use lessons learned from the previous eight years of Copernicus user services. The initial effort in establishing Copernicus user services was largely underestimated. It was expected that the introduction of further services, such as DIAS and Collaborative international sites, would lead to less activity from registered users, but this was not the case.

Systems developed shall be prepared for high variability and scalability and initiatives are not always large enough to support prediction of user scenarios based on historical data. There is inherent complexity in the systems and it takes time to understand trends to make suitable adaptations to larger systems. For example, it is difficult to reach user communities and it has become apparent that user communities are larger and more dynamic than estimated. Furthermore, resilience should be built into the systems to deal with macro-events, which can impact the services and users.

Ecosystem approach

The standard approach is where the platform is attracting user communities for data exploitation, either locally on the platform or on remote environments. The ecosystem approach uses third party services and takes into consideration different user communities. Gradually, the platform generates a set of user services, some of which may be free. This approach creates dependencies while fostering development of services.

In Copernicus Data Space (DAS) collaborative services, there are several MS mirror sites connected, either directly or indirectly. In the evolution of Copernicus DAS, it is expected that MS mirror sites will link to one of the systems or exist externally, which will favour overall user community growth and the adoption of services.

The DESP will adopt an ecosystem approach by actively supporting third party services integration using AI frameworks, advanced visualisation and modelling environments. When the Copernicus DAS and DestinE DESP ecosystem co-exist they will be federated and mutually authorised. Effort will be made to ensure the interoperability of Copernicus and DestinE, while utilising technological synergies and supporting governance.

NATIONAL COLLABORATIVE GROUND SEGMENT HIGHLIGHTS



1 FRANCE

The Sentinel Product Exploitation Platform (PEPS) was opened in September 2015, and now has over 9000 registered users. This French ground segment catalogue is operated by CNES and provides free Copernicus Sentinel-1 and Sentinel-2 products for scientific and business use. The platform is widely used globally, with half of registered users being French and almost 70% European.

There are over 30 million products in the PEPs catalogue, with daily acquisitions in the order of 9 TB and a bandwidth of up to 1.8 GB per second. The platform offers a mirror site for Sentinels-1 and -2 data products (with global coverage and from the start of operations) and a library of processing tools allowing 17 different 'first level' treatments. Popularly used processing tools include atmospheric correction processing of Sentinel-2 products, ortho-rectification and tiling of Sentinel-1 GRD and Sentinel-2 grid products and water mask. In September 2022 alone, a total of 6174 Sentinel images were processed.

It was noted that PEPS also functions as an incubator for laboratories and companies, both in public and private industries. The eligibility requirements for users are that PEPS data must be used for R&D activities for a limited duration of six months. Among planned evolutions by 2023, it was noted that PEPS plans to transition shortly to a new architecture, offer a virtual environment for PEPS users and provide Sentinel-2 reprocessed archive reingestion. The main recent development is the planned integration of PEPS data and services in GEO Data Hub, where there is a renewed way of processing PEPS data. From the user perspective, this will lead to the added advantage of data comparison.

2 LUXEMBOURG

The LSA Data Centre is the Luxembourg entry point for data products of the Copernicus Sentinel missions. It is a cornerstone of the Luxembourg Space Agency and its goal is to accelerate the development of the downstream value-added applications and services by facilitating access to Sentinel data.

The LSA Data Centre has been open to the public since May 2019, and allows users to search, discover and download data. The Data Centre does not currently operate a rolling policy, thus 36.2 PB of data, equivalent to 46.89 million products, are available online. Full collections of Sentinel-1 and Sentinel-2 products are available, without time or spatial restrictions, and all products are available online to authenticated users.

In this 5th year of operation, the Centre decided to examine the user experience in terms of quality. The LSA Data Centre has been benchmarked using the methodology of the Copernicus Data Access Benchmark (CDBA) initiative. The CDBA is based on two tools, namely the CDBA test suite, which performs test scenarios and generates metrics, and the CDBA service, which uses metrics from the test suite to produce performance indices and quality of experience indicators.

CDBA assesses the service data access quality as perceived by the users in terms of Quality of Experience (QoE), by producing the following indicators:

- Q1 – Richness - how rich the Copernicus data offering is
- Q2 – Site reactivity - how reactive the target site is in responding to users' requests
- Q3 – Discoverability - how efficiently users can find products of interest
- Q4 – Data download - how quickly users can download products of interest

For all four indicators, the LSE Data Centre received the highest possible rating.

3 GREECE

Launched in 2014, the Hellenic Sentinel Data Mirror Site is the result of a partnership between the National Observatory of Athens (NOA) and the Greek Research and Technology Network (GRNET). It offers a 21-day rolling archive of Copernicus Sentinel-1, -2, -3 and -5P data covering the Mediterranean region. Approximately 55900 products are published per month, which equates to around 37.5 terabytes. The Mirror Site currently has a total of 814 users, 65% of which are based in Greece.

As part of the Mirror Site, GRNET oversees the operation of 100 virtual machines to host eight CollIGS hubs. These include the Collaborative Hub (Node 3), the International Hub, the DIAS Hub (Node 3), the AfricaCast Hub, S5Pre-Ops Hub and the S5P Expert Hub.

The Mirror Site supports numerous downstream projects, including:

- E-shape, which provides information such as crop classification and yield predictions to support agriculture
- The Early Warning System for Mosquito Borne Disease (EYWA), which covers 10 European regions
- The Burnt Scar Mapping Service, which delivers precise diachronic burnt area and damage assessment products

After securing an ESA contract, NOA hosts the Greek Relay Data Hub, which offers a 9-day rolling archive of global Copernicus Sentinel-1, -2, -3, and -5p data to selected users not eligible for the Collaborative or International Hubs. Through the Greek Relay Data Hub, over 12 000 000 products are ingested and published each year.

Another pillar of NOA's data services is the provision of access to data from Copernicus Contributing Missions. This consists of a live archive of more than 200 000 products, which is available to search and download via a web application.

In addition, NOA is modifying its Umbrella Access Point Application. The application connects to ten hubs, acting as a single point for the efficient provision of Sentinel metadata.

4 SWEDEN

In 2019, Sweden began to develop its Space Data Laboratory, which is a collaboration between Lindholmen Science Park, Research Institutes of Sweden, Luleå University of Technology and the National Swedish Space Agency.

Using data delivered by the Copernicus Sentinels, the goal is to prepare the data, technology and methodology that is needed to systematically develop services and applications that use space data. The purpose of this activity is to increase the use of data from space for the development of society and industry and for the benefit of citizens.

The lab uses the Open Data Cube (ODC) platform, which is an open source project for geospatial data analysis.

The first phase of the Data Lab project included the development of the platform, as well as pilots and hackathons. Moving to phase two, there will now be a focus on the development of the service ecosystem, and the introduction of AI and edge computing.

As part of a new activity called Digital Earth Sweden, The National Swedish Space Agency and RISE Research Institutes of Sweden are extending their cooperation with the common goal to scale up the platform for the Swedish hub for space data, enabling Space Data Lab innovation activities for the benefit of society.

In addition, the National Swedish Space Agency is developing a Phi-Lab in Sweden to accelerate the use of AI in new applications for Earth observation.

5 AUSTRIA

FFG (Austrian Space Agency) affirmed that Earth observation activities and Copernicus ground segment collaboration are a cornerstone of Austrian national space ambitions.

ZAMG (Austrian Met Office - to be renamed Geosphere Austria) hosts a Data Relay Hub and the National Mirror, a service focused on data download for end users. Copernicus Sentinel-1, -2 and -3 data are provided with a rolling archive of 15 days and, in the current phase, extension to include the provision of Sentinel-5P data is planned. Over the past year about 2000 users have downloaded some 185 terabytes of data.

As part of EODC's efforts to develop services based on distributed datasets, the organisation is continuing to assimilate Sentinel data to maintain its data archives, which are growing year by year.

As part of an ESA contract – and in collaboration with its partners – EODC is developing the openEO platform, which provides intuitive programming of libraries to process a wide variety of Earth observation datasets. A previous contract with ESA – called the ESA Missions Data Hub Relay – has come to end, but the service developed continues to be operational.

EODC is working on two new ESA activities, the 'A(SAR) data series over Austria' pilot project and the development of Data Hub Relay services in Austria. Another main activity of EODC is the maintenance of a global Sentinel-1 data cube, for the processing of Sentinel data into Level-2 products, both for real-time data and data archives.

EODC is also providing data services for activities related to the Copernicus Global Land Service, the Copernicus Climate Change Service and Copernicus Marine Service, as well as the Digital Twin and Digital Europe programmes.

6 GERMANY

DLR is continuing to develop the Copernicus Data and Exploitation Platform (CODE-DE), which provides public authorities in Germany with quick and easy access to all national Sentinel data and the Copernicus core services, free of charge.

There are currently some 3300 users, with more than 470 of these running virtual machines. The data portfolio includes four Sentinel Level-2 products (FORCE and C2RCC on demand), monthly Sentinel-1 and Sentinel-2 (WASP) images, and a harmonised Landsat and Sentinel-2 Datacube.

Through ESA, DLR is participating in the Copernicus Sentinel Data Access Worldwide Benchmarking Target Specific Assessment, which is helping to demonstrate the performance of CODE-DE. The platform is also listed in ESA's Network of Resources to facilitate the use of cloud environments.

CODE-DE is focused usability by public authorities, and efforts are being made to promote the development of further user-based services. Future updates to CODE-DE include the implementation of a Web GIS system, which will improve the capability to use GIS features to intersect with Copernicus data directly.

DLR's receiving station in North East Germany is continuing to provide near real-time acquisition of data from Sentinel-1. Numerous activities are being completed at this facility and, recently, its services contributed to mapping the impact of the damage caused to the Nord Stream pipeline.

Other activities at DLR include INPULS, in which Sentinel-5P Level-3 data are being processed and made available by the DLR Geo Service, which is a portal for data download. Several other Sentinel Data products are also available on the Geo Service.

DLR is also contributing to the HPDA Terrabyte Project, which will develop a high-performance Earth observation analytics platform for scientific use. It is a collaboration between DLR Research and Development and the Leibniz Supercomputing Centre, Munich.

7 CZECH REPUBLIC

The Czech CollGS is managed by the Ministry of Transport and developed and operated by the association of universities of the Czech Republic and the Czech Academy of Sciences (CESNET). A National Mirror has been available since late 2016, and a DataHub Relay (DHR) since spring 2018.

The number of registered users for the service are relatively stable, however, registered users are increasing their use of the service. In 2022, the Czech CollGS has shown a threefold increase in the number of downloads compared with 2021. There are currently 574 registered users and over 337,000 product downloads, mainly in the Czech territory.

CESNET also participates in several scientific projects with technical partners. One such project is C-SCALE – the Copernicus eoSC analytics Engine, which aims to create a global archive based on existing ground segment sources.

The Czech CollGS is currently addressing accessibility to data by developing an “analytics engine”, which via authentication protocols enables various federated identities to be recognised by both computational and data providers. Discoverability is also being addressed by providing a common interface for each participating site and a common endpoint.

8 BELGIUM

The Belgian CollGS agreement was signed with the Belgian Science Policy Office (BELSPO) in 2017. In March of the following year, the Flemish Institute for Technological Research (VITO) – selected as the designated entity for the Belgian CollGS – released the Terrascope platform, which was onboarded into the Network of Resources in 2020.

The Terrascope mission has several key areas of focus:

- The provision of analysis ready data
- Delivering unique long term global vegetation datasets
- Ensuring a strong focus on Belgian users
- Advancing Terrascope as a federated node in EU infrastructure

Multiple datasets are available via Terrascope, from Sentinel-1, -2, -3, -5P, as well as Spot Vegetation, PROBA-V, the Copernicus Global Land Service, and Copernicus Digital Elevation Model. In the past year, ESA's World Cover project was added to Terrascope, which resulted in a surge in user numbers.

These data are offered through various interfaces, such as Terraviewer, which caters to novice users. Other interfaces – including virtual machines, Jupyter Notebooks, web services, and EOPlaza – are focused on expert users.

Terrascope is part of a federated European ecosystem, including the openEO platform, C-SCALE, the European Open Science Cloud, and the Wasdi cloud system.

In the past year, there were 40,000 visitors to the platform, with more than 8000 registered active users, made of up of 173 nationalities. Terrascope currently has 32 unique datasets (i.e. datasets that are not mirrored) and an online capacity of 7.5 petabytes.

The short-term plans for Terrascope include adding Sentinel-5P HCHO (formaldehyde), CH₄ (methane), SO₂ (sulfur dioxide) composite products, and ESA's World Cover 2021 update.

In the long term, framework agreement negotiations are taking place with BELSPO, to promote the optimal use of future Copernicus Data Access Space to extend coverage and services to users, as well as to support the new Belgian Climate Center Initiative and Destination Earth activities.

9 NETHERLANDS

At present there is no Copernicus Ground Segment collaborative agreement with the Netherlands, but since 2012, the country has operated a Satellite Data Portal, which provides Dutch users access to commercial high resolution and very high resolution (VHR) optical data.

Going forward, the Netherlands plans to continue the provision of VHR products (from contributing missions) as part of geo-registrations related to aerial photography; focus on the processing and analysis of open Earth Observation data in federative cloud platforms; and promote existence of Earth observation data platforms and the Network of Resources to Dutch users.

In addition, the Netherlands will cooperate with existing member state Copernicus Ground Segments operating in the same geographical, thematic or scientific domain; share its knowledge – related to processing, domains and HPC – in cooperation with Copernicus Ground Segments; facilitate the formation of a multi-domain scientific Earth observation user community; and use destination Earth as linking pin in the Earth observation user community and national data infrastructures.

In the future, the Netherlands will consider a Copernicus Ground Segment collaborative agreement based on the emerging user needs from the EO platform community.