



Report on the 2nd GEO Data Providers Workshop

20 – 21 April 2017 Florence, Italy



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1 Executive Summary

Two successful GEO Data Provider Workshops (St. Petersburg, November 2016 and Florence, April 2017) highlight the depth and breadth of the GEOSS ecosystem and how it is continuously developing and improving. In particular, the 2nd Data Providers Workshop, focused on and discussed both the Technology Ecosystem, built around the GCI, and the Community Ecosystem, focusing on GEOSS Data Providers and Users.

1.1 GEOSS Community Ecosystem

The GEOSS Community Ecosystem includes several parties with Data (and more generally Resource) Providers and Users as the main stakeholders. Data Providers explained that they perceive GEOSS as a major meeting point for the EO community and that their greatest expectations of GEOSS include improved visibility for organizations and individuals, and access to new users and use-cases through multidisciplinary GEOSS communities.

Data Providers recognize that GEOSS is already meeting some providers' expectations by increasing data value through their dissemination in a multidisciplinary context, and offering the possibility of data integration with other resources accessible through a single point of access. However, in the GEOSS framework data best value strongly depends on providers' compliance with the GEO data sharing and data management principles. Indeed, the GEOSS Community has outlined data continuity, accessibility, reusability, cost and, in general sustainability, as major issues for Data Providers. In this context there are existing experiences and certification processes to implement data management that can provide valuable lessons learned.

Data value is also dependent on their impact for decision making and a major change requested by decision-makers to Data Providers is focusing on data impact more than simply on data provision.

In order to better support its activities and operation, the GEOSS Community Ecosystem suggested some improvements both on the Data Providers side, especially on resource description (e.g. metadata for quality and semantics) and on the GEO/GEOSS side including documentation, reporting on data access and usage, as well as acknowledging the Data Providers' requests for visibility.

The GEOSS Community also discussed the role of the private sector due to their significant involvement on the application side, but also providing valuable input on cloud services and contributing data from private companies.

1.2 GEOSS Technology Ecosystem

The GEOSS Technology Ecosystem underpins the GEOSS Community Ecosystem operation. It builds on the GEOSS Common Infrastructure (GCI) and its major components: the GEOSS Portal, the GEO Discovery and Access Broker (DAB) and the GEOSS Yellow Pages.

The GCI has been greatly enhanced during the last year and a roadmap is defined for the upcoming years. Recent improvements include the new GEOSS Portal with reusable widgets, the DAB APIs, the GEOSS Views and the new GEOSS Yellow Pages. It is worth noting that GCI enhancements are strongly based on user feedback including those from Data Providers (e.g. 1st GEO Data Provider Workshop).

There are success stories by communities building portals and services based on the GCI, which demonstrate the usability, scalability and flexibility of the current GCI. However, research and pilot projects should turn in operational services, e.g. for the GEO Flagships.

There is a clear need to avoid duplication of efforts. GEOSS can be the entry point for data provision and access.

Success stories also demonstrate how Data Providers and Application Developers can contribute to the GEOSS Technology Ecosystem, building new components e.g. community portals and apps, services, etc.

GEO is pursuing the increased and sustained use of the GCI with dedicated initiatives like the upcoming "GEO in Action" call.

Future GCI improvements should be targeted to supporting new requirements from the GEOSS Community Ecosystem including reporting on data access and usage, quality and semantics.

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3 Introduction

The “GEO Strategic Plan 2016-2025: Implementing GEOSS” [1] builds on a strong GEO foundation and proven successes of the previous decade. It identifies improvements necessary to achieve the primary goal of building a Global Earth Observation System of Systems (GEOSS). They include strengthening the Societal Benefit Areas (SBAs), engaging more broadly with stakeholders, the United Nations and the private sector, establishing a robust, steady resourcing mechanism within the voluntary framework of GEO and identifying new opportunities for GEO.

Earth observations are an indispensable component to measure and monitor our progress towards addressing societal challenges. Earth observations from diverse sources, including satellite, airborne, in-situ platforms, and citizen observatories, when integrated together, provide powerful tools for understanding the past and present conditions of Earth systems, as well as the interplay between them. Through the provision of open, timely and reliable data and information, Earth observations are an opportunity to supplement statistical analyses in the assessment of indicators towards the attainment of the Sustainable Development Goals (SDGs) defined by the United Nations and thus have a critical role to play in support of their monitoring frameworks.

In this view, Data Providers and, more generally, resource providers¹, play a fundamental role in the effective and efficient realization of GEOSS, and in the success of GEO. The GEO 2017-2019 Work Programme [2] mentions the important role of resource providers in many community activities, GEO initiatives and tasks. In particular the GEO Foundational Task on GEOSS Common Infrastructure (GCI) Operations has a specific objective to maintain partnership with Data and Service Providers and ensure resources are discoverable and accessible through the GCI in mutually agreed methods.

The GCI Task plans the GEO Data Provider Workshops as some of the “Annual Events in support of the Operations”.

The First GEO Data Providers workshop was held as a side event at the GEO-XIII Plenary in St Petersburg [3], Russia, to strengthen dialogue with Data Providers and to improve the discoverability, accessibility and usability of GEOSS resources. Given the high level of interest and success of the initial workshop, a more comprehensive two day event was organized and hosted by the Italian National Research Council (CNR) in Florence, Italy, from 20th to 21st of April, 2017, in collaboration with the European Space Agency (ESA).

This report documents the objectives and results of the 2nd Data Providers Workshop.

¹ Including data providers, application providers, service providers, computing resource providers, platform providers, etc.

4 Organization

The event was co-organized by the GEO Secretariat, the Institute of Atmospheric Pollution Research of the National Research Council of Italy (CNR-IIA) and ESRIN the establishment of the European Space Agency (ESA) in Frascati, Italy.



The GEO Data Providers Workshop Organizing Committee was composed by:

Stefano Nativi – CNR-IIA

Joost van Bemmelen – ESA-ESRIN

Steven Ramage – GEO Secretariat

Guido Colangeli – ESA-ESRIN

Esa Falkenroth - SMHI

Mustapha Mokrane - ICSU-WDS

Rich Frazier - USGS

Kenneth McDonald - NOAA

Gregory Giuliani - UNIGE

Lionel Menard - MINES ParisTech

Osamu Ochiai - GEO Secretariat

Mattia Santoro - CNR-IIA

Paola De Salvo - GEO Secretariat

Wenbo Chu - GEO Secretariat

Maria A. Liberti – CNR-IIA



5 Sponsors

Two sponsors kindly provided resources for the organization of the event: development SEED and Amazon Web Services and the organizers would like to reiterate their thanks for support from these sponsors.



development SEED



6 Objectives

The overarching objective of the 2nd GEO Data Provider Workshop was, on the one hand, to provide Data Providers a comprehensive overview of what GEOSS offers today and what is planned tomorrow and inform them on how they can participate and, on the other hand, identify what, according to the Data Providers, the current drawback/constraints are of GEOSS and identify what would be needed to overcome this.

In particular, the workshop had the following specific objectives:

- Share more about GCI operations and success stories;
- Dialogue on key elements: Standards, Data Quality and GEOSS Data Management Principles;
- Learn about the brokering process, how to contribute data and resources to the GCI;
- Break out session: discuss and identify benefits and issues related to the GCI;
- Enhance the use and applications of the GCI and resources; and
- Continue to develop the GEO Data Providers community.

7 Intended Participants

The workshop was targeted at both established and potential GEO Data Providers.



8 Agenda

The event lasted two days and the agenda included more than 20 presentations, 17 lightning talks, 4 break out sessions, one live demo session and one panel discussion, covering multiple aspects of Data Providers' contributions to GEO/GEOSS.

Agenda Geo Data Providers Workshop, Florence, Italy, 20-21 April 2017

Thursday 20 April 2017

09:00-10:00 Registration

<p>10:00-10:10 Welcome note from CNR, GEO Secretariat, ESA,</p> <p>10:10-10:20 Message from the DG research and Innovation of the European Commission</p> <p>10:20-10:30 Structure and Objectives of the Workshop (Steven Ramage)</p>	<p>Speaker/Moderator Nicola Pirrone & Stefano Nativi (CNR-IIA) Steven Ramage (GEO Secretariat), Guido Colangeli (ESA), Gilles Ollier (EC)</p>
<p>10:30-11:40 GEO and GEOSS Common Infrastructure (GCI) information session</p> <ul style="list-style-type: none"> • GEO Strategy and Vision (Steven Ramage) (10 min) • New GCI developments: <ul style="list-style-type: none"> ○ GEOSS Portal (ESA: Guido Colangeli); (30 min) ○ GEO DAB (CNR: Stefano Nativi);(20 min) ○ Registration (UNIGE: Gregory Giuliani).(10 min) 	<p>Chair Osamu Ochiai</p>
<p>11:40-12:40 GCI Success Stories: (10 min each)</p> <ul style="list-style-type: none"> • GCI-WIS interoperability (Thorsten Büßelberg, WMO); • "Monitoring Essential Climate Variables and Essential Biodiversity Variables" (Gregory Giuliani, UNEP GRID); • Making CEOS Agencies Assets Discoverable and Accessible in the GCI ... 280+ Million Records and Counting' (Richard Moreno, CEOS); • A GEO Community Portal & Spatial Data Infrastructure for Energy (Lionel Menard, Webservice-Energy.org); • GCI Infrastructure support Story: Amazon: AWS support to GCI infrastructural services (Joe Flasher, Amazon); • GCI Community Application Story: GCI and ArcGIS Online interoperability, story map. (Roberto Lucchi, Esri). 	<p>Chair Osamu Ochiai</p>
<p>12:40-13:00 Questions & Discussion</p>	
<p>13:00-14:00 Hosted Lunch</p>	
<p>Experiences and suggestions from existing, new GEO GCI data providers</p>	
<p>14:00-14:15</p> <ul style="list-style-type: none"> • Introducing GEOSS Data Providers: summary report on Statements received and Data providers presence at the workshop. <p>Each Data provider is requested to send a Statement to be received by GEO Secretariat before 31 March and it will be included in the web.</p>	<p>Chair: Osamu Ochiai</p>
<p>14:15-15:15 (1 Hour)</p> <ul style="list-style-type: none"> • Break out session in 4 groups <p>(Benefits and Challenges)</p>	<p>Moderators Osamu, Paola, Guido, Esa</p>

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<p>15:15-16:00 <i>Coffee Break: Lightning talks (5 min each)</i></p> <ol style="list-style-type: none"> 1. Anna Maria Trofaier, “Fourteen institutes, one goal – How to establish the Svalbard Arctic Earth Observing System” (SIOS); 2. Ana Pinheiro Privette, Enabling access to Climate-Relevant Data Through the Partnership for Resilience and Preparedness (PREP); 3. Bart De Lathouwer, Next GEOSS wants to engage with the (current and new) Data Providers OGC, Next GEOSS; 4. Vanya Nikova, Liberating Sentinel Data, 1 PB at a time, Cloudsigma; 5. Erwin Goor, VITO as GEOSS Data Provider & Further Involvement, VITO. 	<p>Chair: Paola De Salvo</p>
<p>16:00-16:30 (30 Min) Reporting session with Recommendations</p>	<p>Moderators Osamu, Paola, Guido, Esa</p>
<p>16:30-16:40 “Developing Engagement between GEO and the Private Sector” EARSC</p>	<p>Emmanuel Pajot, Earsc</p>
<p>16:45-17:30 Register to become a Data Provider, How to contribute to GCI (live session) 17:30 – Group Photo</p>	<p>(Mattia Santoro, Esa Falkenroth Paola De Salvo.)</p>
<p>Evening <i>Social event (No Host) – Pre-Registration is compulsory if willing to participate</i></p>	

Friday 21 April 2017

<p>09:00-9:40 GCI and its Potential – Open Data Access Beyond Discovery</p> <ul style="list-style-type: none"> • Overview of the Data Management Principles and their importance for GEOSS and the GCI (Mustapha Mokrane) 20min • Story from the GEOSS Portal: What Happen if Metadata are not implemented correctly – with focus on Metadata Essential Fields & Responsibility of Data Provider & GCI Implementers (Guido Colangeli – with Gregory Giuliani) 20 min 	<p>Moderator: Osamu Ochiai</p>
<p>9:40-11:00 Panel Discussion “Stories from Data Providers, their best practices and challenges in Data Management. Towards Sustainable solutions in providing data and maintaining over time and their impact on decision making.”</p> <ul style="list-style-type: none"> • Mark Iliffe University of Nottingham / The World Bank • Daniel Quintart, Copernicus; • Julia Wagemann, ECMWF; • Asanobu Kitamoto DIAS; <p>Presentations focused on how the Data Providers deals with Metadata, Tools, Standards, Open Data Access, Issues and gaps.</p>	<p>Moderator: Esa Falkenroth</p>
<p>11:00-11:45 <i>Coffee Break: Lightning talks (5 min each)</i></p> <ol style="list-style-type: none"> 1. Mariya Urazaeva, Deimos Imaging: The unique Earth Observation portfolio of UrtheCast/Deimos Imaging: Present and Future; 2. David Patterson, WWF-SIGHT “why spatial data transparency is vital for 	<p>Chair Osamu Ochiai</p>

<p>WWF as a conservation NGO and why we need GEO”;</p> <ol style="list-style-type: none"> Nate Smith, Humanitarian Open Street Map, ““OpenAerialMap: Connecting open satellite, UAV, and other aerial imagery to humanitarian partners”; "Unleashing the power of GEOSS for every child" Valeria Groppo, UNICEF; Peiliang Shi, WIS2.0, WMO; Tim Duffy, “OneGeology as a GEOSS Data Provider”, One Geology. 	
<p>11:40-12:45 Data Management Principles Implementation and Practices: Hands on session</p> <p>This session will introduce the certification of data repositories as one of the practical mechanisms to assess implementation of GEOSS Data Management Principles (DMPs). As a practical exercise, GEO data providers are invited to test the core level certification for data repositories by completing a self-assessment against the Core Trustworthy Data Repositories (Core TDR) Requirements developed by the World Data System (WDS) and Data Seal of Approval (DSA). The self-assessment form is available here: https://goo.gl/ipEBmW</p>	<p>Moderators: Michael Diepenbroek, Mustapha Mokrane and Wim Hugo</p>
<p>12:45-13:00 Ian, Schuler, Publishing your EO data for use in modern applications, Development Seed</p>	
<p>13:00-14:00 <i>Hosted Lunch</i></p>	
<p>How Communities can benefit of GCI and its resources</p>	
<p>14:00-14:40</p> <p>How to Interface with GCI – GEO DAB APIs-VIEWS</p> <p>Why we need APIs and VIEWS? (30 min)</p> <p>14:40-15.10</p> <p>Users stories: How community can use them to leverage GCI Resources (10 min each)</p> <ul style="list-style-type: none"> Vassilliss Tsironis “The GEO-CRADLE Regional Data Hub tool: Utilising the GEO DAB APIs for easy access and discovery of regional EO data”;(NOA) Enrico Boldrini "Accessing global monthly variables: Net Photosynthesis (PSNet) and Gross Primary Production (GPP) through GEODAB." (CNR). Aditya Agrawal “Connecting Networks to Make Earth Observation Data More Accessible for the SDGs “(GPSDD) 	<p>Moderator: Mattia Santoro (CNR)</p>
<p>15:10-15:40 Deliver GEOSS Portal widgets (30 min)</p>	<p>Guido Colangeli (ESA)</p>
<p>15:40-15:50 Questions</p>	
<p>15:50-16:00 How GCI is making a difference in Decision Making: Call for Applications from the community, using GCI resources : Disaster, Climate, SDGs.</p> <p>16:00-16:40 <i>Coffee Break: Lightning talks (5 min each)</i></p> <ol style="list-style-type: none"> Jay Matta, “The Groundwater Assessment Platform (GAP) – taking measurement points and readily available geo-spatial data to produce prediction maps using statistical modelling.” EAWAG; Ian Schuler, “Creating cloud-based data distribution / discovery tools, like MODIS on AWS or NASA's Cumulus Platform for processing and distributing EO data on the cloud”, Development seed; Hironori Yabuki, ADS's contribution to GEO, ADS; Yasunori Hanafusa JAMSTEC’s Contribution to GEO, JAMSTEC; The GEO-CRADLE Regional Data Hub tool: A vision for a regional GEOSS Portal, National Observatory of Athens (NOA). 	<p>Chair Osamu Ochiai</p>

6.	Marc-Elian Bégin, “Platforms to ignite open data exploitation in the cloud” sixsq	
16:40-17:10	Clarifying role / relevance of statistical information (ESA and CNR)	Guido Colangeli (ESA) Mattia Santoro (CNR)
17:10	Closing Session	

9 Attendance

132 people registered from 93 different organizations and 95 people actually attended with approximately 40 organizations that were new to GEOSS.



The participants represented the following types of organizations and institutions:

- Not for profit research and innovation companies;
- National and International research institutes;
- National Research Council;
- Humanitarian and Environmental NGOs:
- United Nations and World Bank;
- Governmental and Intergovernmental Agencies;
- National Geographic and Research Institutes;
- National Space and Specialized Agencies;
- Private sector such as Amazon Web Services, CloudSigma, DEIMOS Engenharia, Deimos Imaging, Deltares; Development seed, EARSC, Esri, ETT, Google, VITO

10 GEO Data Providers Statements

Existing and potential GEO Data Providers were requested to provide a statement about their vision and interest in GEO.

In particular potential GEO Data Providers gave interesting answers to the questions “Why you are interested to join GEO – GCI?” and “How GEO could benefit your organization?” which are of particular interest for the objectives of the 2nd GEO Data Providers Workshop (the full list and content of statements is available at http://www.earthobservations.org/me_201704_dpw.php):

From **Jamstec**: Contribution to GEOSS is one of the important missions of JAMSTEC and we expect more users of our data/samples from international research communities.

From **Copernicus**: The free and open data access policy of Copernicus is in-line with GEO open data policies and thus CEMS becoming a Data Provider for GEO is very relevant. We believe that this will not only raise awareness about the service in the GEO community but also provide possibilities for collaboration including data and knowledge exchange.

From **China GEOSS**: GEO provides a platform to make the GCdataPR well-known and make the staff communicate with other Data Providers.

From **Webservice Energy**: Provide a means to disseminate at a larger scale data for the good of the renewable energy community.

From **SIOS**: SIOS would like to contribute to GEO as a Data Provider as we believe that it is in SIOS interest to make the data more widely available, which in turn will promote the SIOS research infrastructure.

From **ECMWF**: GEO brings together many different communities and it increases the visibility of a data organisation.

From **Eurac**: In joining the GCI there could be more options to share the research result, gaining more visibility, fostering further research and innovation activities.

From **NEXT Data**: Because it is one of the main ways to distribute data and knowledge in an open and world-wide setting.

From **HOT**: Through our participation in GEO, we want to continue to advance the use of open source tools for applying OpenStreetMap and other open data to solve humanitarian and global development issues. We see our membership as a way for us to continue progress toward achieving the Sustainable Development Goals.

From **Ecopotential**: Wider visibility and link with a larger set of open-access data.

From **NODC**: The participation of RNODC in the workshop will enable to enter into the data exchange, to receive the information on the development and application of software tools created within the GEOSS system.

From **INGV**: GEO would give us visibility and opportunity to share data with a great number of users and Institutions.

11 Report on activities

All the presentations given during the event are available at http://www.earthobservations.org/me_201704_dpw.php

11.1 Day 1 – Session 1 – Welcome session

The Welcome Session includes welcome speech from event co-host organizations.



Stefano Nativi from CNR-IIA, welcomed attendees to the 2nd Data Provider Workshop in Florence as the event host.



Nicola Pirrone, Director of CNR-IIA, welcomed attendees as the GEO Principal of Italy reminding participants about some major initiatives contributing to GEO and coordinated by GEO-Italy partners.



Gilles Ollier from the European Commission gave his welcome message to the attendees (see full text in Annex I). He thanked the GEO Secretariat, CNR-IIA and ESA for the co-organization of the event. He reminded participants about the long-term commitment to GEO sustainability by the European Commission through major EU programmes such as Copernicus - the EU EC programme - and Horizon 2020 - the EU Research programme. In particular, he highlighted that the European Commission was proactive since the beginning of GEO to encourage Earth observation data owners, in particular in Europe, to share their data through GEOSS. Mr. Ollier also recalled current and upcoming European contributions to GEO, such as the Copernicus Data and Information Access Services (DIAS), also anticipating the European regional initiative within GEOSS possibly to be called EuroGEOSS.



Guido Colangeli from ESA-ESRIN, welcomed attendees as co-host of the event reminding participants about the major contribution to GEO by ESA in the dual role of Data Provider and GEOSS Portal developer.



Steven Ramage from the GEO Secretariat, welcomed attendees to the event as a co-host and introduced the structure, objectives and logistics of the workshop. Mr. Ramage introduced the status of GEOSS with statistics on GEO Data Providers and GEOSS resources.

11.2 Day 1 - Session 2 - GEO and GEOSS Common Infrastructure (GCI) Information session

The GEO and GEOSS Common Infrastructure (GCI) information session include an introduction to GEO and GEOSS and the presentation of recent advances in the development of the GEOSS Common Infrastructure (GCI).

- **Steven Ramage** from the GEO Secretariat presented the GEO structure, organization and activities. Mr. Ramage presented the GEO Strategic Plan 2016-2025, the GEO Work Programme 2017-2019, and the GEO stakeholder engagement priorities in support of major international initiatives including the UN 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction and the Paris Agreement on Climate Change.
- **Guido Colangeli** from ESA-ESRIN presented the GEOSS Portal enhancements, status and future plans. Mr. Colangeli described the three phases of enhancements: a) restyling (during 2016), b) major upgrades (2017-2018) and c) operation and evolution (since 2019). The focus is to keep the GEOSS Portal user-centric taking into account community requirements, also from GEO Flagships, ESA Thematic Exploitation Platforms (TEPs) and Copernicus services. Mr. Colangeli also presented enhancements on social functionalities (GEO Likes) and online workshops oriented to different communities (users, developers and providers). Mr. Colangeli gave a live demonstration showing major GEOSS Portal capabilities.
- **Stefano Nativi** from CNR-IIA presented the GEO Discovery and Access Broker (DAB) providing information on its capabilities, the enabling technology and some statistics. Mr. Nativi described the three-tier approach of the GCI architecture mapping upstream (providers), mid-stream (GCI and DAB) and downstream (users) services. He showed the evolution of the GCI from a Software-as-a-Service to a complete software ecosystem., stressing the need to leverage efforts on innovative approaches and technologies such as data cubes.
- **Gregory Giuliani** from the University of Genève (UNIGE) and United Nations Environment Programme - Global Resource Information Database (UNEP GRID) presented the two-step process for registering as a contributor to GEOSS:
1) Provide Data Provider administrative information, according to the new Yellow Pages approach; 2) Engage with the GEO DAB team.

11.3 Day 1 – Session 3 - GCI Success Stories

The GCI Success Stories session included six short presentations about valuable examples of the use of information provided by the GEOSS Common Infrastructure (GCI).

- **Stefano Nativi** from CNR-IIA presented on behalf of **Thörsten Büsselberg** from Deutscher Wetterdienst (DWD) their activities to establish interoperability between the World Meteorological Organization (WMO) Information System (WIS) nodes and GEOSS.
- **Gregory Giuliani** from UNIGE and UNEP GRID presented UNEP GRID's activity for monitoring Essential Climate and Biodiversity Variables.
- **Richard Moreno** from the Committee on Earth Observation Satellites (CEOS) presented the CEOS activity for making their assets - about 300 million records - discoverable and accessible in the GCI.
- **Lionel Menard** from MINES ParisTech and Webservice-Energy.org presented their activity to build the GEO Community Portal and Spatial Data Infrastructure for Energy.
- **Joe Flasher** from Amazon presented the activities of Amazon Web Services to support access to Planetary-Scale Data in collaboration with private companies from the Earth observations sector.
- **Roberto Lucchi** from Esri presented the activities of Esri in the integration of their applications such as ArcGIS with the GCI.

11.4 Day 1 – Discussion, Questions & Answers

The Q&A session touched several aspects including:

- Relationships between the current GCI and existing or potential cloud-based data hubs.

- *Semantic capabilities.* The area of semantics is becoming more and more important. The current GEO DAB implementation already provides semantic functionalities based on public knowledge bases. However, communities have developed several knowledge assets (e.g. ontologies) and the GCI could leverage them. The GEO DAB extensibility allows enabling semantic extensions.
- *The role of public funding in keeping data online.* In the recent years, the European Commission (EC) funded data collection with millions of Euros. The EC sees GEOSS as a way to create synergies between projects avoiding duplication of efforts and allowing better mobilization of resources based on public funding.

11.5 Day 1 – Session 4 –Introducing GEOSS Data Providers

- **Paola De Salvo** from the GEO Secretariat presented the extensive list of current GEO Data Providers, informing the audience about the role of GEO Data Providers and their potential benefits in contributing to GEO and GEOSS. Ms. De Salvo pointed attendees to the GEO Data Providers' statements received in preparation of the event and available on the official GEO website at: http://earthobservations.org/me_201704_dpw.php

11.6 Day 1 – Breakout sessions

Four breakout sessions took place. The participants were split into four groups. Each group took part in a session relating to one of the following topics concerning GEO/GEOSS: Benefits, Challenges and Issues, Communication and the Role of Private Sector. Every 15 minutes each group moved to a different topic covering all topics in one hour. A chairperson coordinated the activity by introducing the session, answering questions and then collecting suggestions from participants through post-it/sticky notes stuck to the session poster. The chairperson was in charge of collecting and discussing the suggestions as the session rapporteur.



11.7 Day 1 – Session 5 - Lightning talks

Short talks were given during the coffee break.

- **Anna Maria Trofaier** from the Svalbard Integrated Arctic Earth Observing System (SIOS) presents “Fourteen institutes, one goal – How to establish the Svalbard Arctic Earth Observing System (SIOS)”;
- **Ana Pinheiro Privette** from the U.S. Global Change Research Program presents “Enabling access to Climate-Relevant Data Through the Partnership for Resilience and Preparedness (PREP)”;
- **Bart De Lathouwer** from Open Geospatial Consortium (OGC) presents “NextGEOSS wants to engage with the (current and new) Data Providers OGC”;
- **Vanya Nikova** from CloudSigma presents “Liberating Sentinel Data, 1 PB at a time”;
- **Erwin Goor** from VITO presents “VITO as GEOSS Data Provider & Further Involvement”.

11.8 Day 1 – Session 6 – Report on break out session

Chairpersons provided a preliminary report on the outcomes of the four breakout session.

- **“Benefits” session** - **Esa Falkenroth** from the Swedish Meteorological and Hydrological Institute (SMHI) reports on. Major benefits identified by attendees are listed below (the full list of contributions is available in Annex IIa):

- Getting out of the silo approach
 - GEOSS helps Data Providers to gain more visibility, provides arguments to obtain continued funding and answers the requirements of many research councils
 - Internal benefits
 - Providing structured metadata as part of the GEOSS requirements actually improves the quality of data for Data Providers
 - Use cases help a number of different stakeholders understand the value of GEOSS
 - Understanding the users is very important to understand requirements
 - A Google search is vast and vague compared to searching for Earth observation (EO) data and information resources in the GCI
 - The GCI provides functionality tailored to EO users, such as specialized queries and map visualization
 - Visibility
 - The GCI provides access to data from many different providers to different users
 - Brand and other awareness
 - Measuring benefits
 - Highlights the importance of statistics for providers (user contacts, search hits)
 - Driver towards harmonisation
 - Vision
 - Facilitates running applications worldwide which need geospatial data
- **“Key Issues and constraints” session - Guido Colangeli** from ESA-ESRIN reported on. The identification of main issues and constraints was guided by a set of questions that attendees answered during the session as listed below (the full list of contributions is available in Annex IIb):
- Do you (Data Provider) see the connection with the user of your data missing at the moment, through the GEOSS Portal? How do you see this being improved?
 - Attendees cited several possible improvements including an effective link to Yellow Pages and effective feedback, for example relating to who is searching/accessing Data Provider’s resources
 - Would you be ready to improve the metadata of your catalogues, (if needed) to ensure Discoverability, Accessibility, Usability?
 - General agreement on need to provide metadata, especially for improving data search, standard compliance and semantics.
 - What the GCI needs to improve to best serve out your data resources? (e.g. functionalities, visibility etc.) API, Open Source, Manuals? Single Sign On? Ranking? Community Services (e.g., analysis tools) GEO Likes (similar to Facebook) for good resources
 - Attendees cited ranking, Digital Object Identifier (DOI), links to models.
 - Would you consider it useful to have a GEOSS Quality Assessment process for data and related services?
 - General agreement on the importance of quality and quality assessment.
 - Would you consider it useful to have GCI providing data processing capabilities (to improve usability) in addition to data discovery and access?
 - Attendees have different positions with importance of processing ranging from secondary to crucial
 - Would you consider it useful to have periodic reports about the GCI operation and its users activity?
 - General agreement that periodic reports are necessary. Also knowing what users search in general could be useful for Data Providers.
 - Would you consider it useful to have more documentation about the GCI components and its functionalities?
 - Yes, especially concerning the DAB functionalities.
 - Would you consider it useful/opportune to be connected to regional and/or national levels of GEOSS rather than directly to the GCI?
 - Attendees expressed different opinions ranging from negative to positive. For some providers it is considered unavoidable.

- Anything else you would like to raise to GCI Operations attention?
 - Attendees cited some aspects including visibility of Data Providers and the request of more in-situ data.
- **Osamu Ochiai** from the GEO Secretariat reported on “Communication with the GCI Operations team” Session. The discussion was guided by a set of questions that attendees answered during the session as listed below (the full list of contributions is available in Annex IIc):
 - Are you satisfied with the overall communication with GEO - GCI: For new Data Providers: essential steps to become a GEOSS Data Provider, is the process clear?
 - Many attendees reported that the 2nd Data Provider Workshop helped a lot to clarify the provider registration process.
 - What do you think we should improve in our communication with you as Data Provider?
 - Attendees cited different aspects including improvement of provider visibility, highlighting benefits and drawbacks in being a provider, webinars, etc. Also, a process for informing about changes in the Data Provider system was requested.
 - How do you want us to communicate with you? Establishment of reporting mechanisms on errors, e.g. when a given data resource is searched by the user and cannot be downloaded, visualized errors?
 - The question raised many answers and proposals by attendees, mostly requiring clear reporting on data usage and error reporting, for example through a specific dashboard.
- **Steven Ramage** from the GEO Secretariat reported on “Commercial Sector and GCI” session. The discussion was guided by a set of questions that attendees answered during the session as listed below (the full list of contributions is available in Annex II d):
 - Where do you see the value for the commercial sector to contribute to the GCI? (Tier 3 Application e.g. contributing through applications that use GCI resources; Tier 2 Infrastructure e.g. contributing with cloud services; Tier 1 data e.g. contributing with EO data and information resources; based on the Tier, please specify why and how?)
 - Tier 3 Applications e.g. contributing through applications that use GCI resources.
 - Attendees reported that this tier is the most important for the private sector. The GCI facilitates app development by the private sector which, in turn, can bring new users. The EO app framework could include a paid version.
 - Tier 2 Infrastructure e.g. contributing with cloud services.
 - Attendees considered that the private sector may be able to provide some lessons learned including data processing or proposing funding models.
 - Tier 1 Data e.g. contributing with EO data and information resources.
 - Attendees see the major contribution to tier 1 in terms of EO datasets e.g. satellite imagery from private companies.
 - General comments
 - The importance of the GCI to provide datasets from both public and private sector from a single point of access was highlighted.
 - What can the GCI do for the commercial sector?
 - Attendees provided many answers, in particular citing the provision of innovative use cases, access to new markets, improved visibility and connection to research and scientists.
 - How can the GCI benefit from cooperation with commercial sector and vice versa?
 - One of the main benefits would be for private companies to make part of their data/products freely available through GCI.
 - In what areas do you see commercial sector innovation based on GEOSS data?
 - Application development was the most cited aspect.
 - What changes need to happen to create working ecosystems for data, what obstacles need to be removed?
 - Most answers reported non-technical aspects such as political will unlocked by the commercial sector and generally a willingness to share by Data Providers.
 - Anything else you would like to raise to GCI Operations attention
 - A number of commercial sector organisations are already working with GEO.

11.9 Day 1 – Session 7 - Developing Engagement between GEO and the Private Sector

Emmanuel Pajot from the European Association of Remote Sensing Companies (EARSC) presented the EARSC vision about the engagement between GEO and the private sector. Mr. Pajot introduced EARSC, its vision and related initiatives such as eoMALL, and its contribution to GEO also through existing projects like NextGEOSS and GEO-CRADLE. Mr. Pajot informed participants that according to an EARSC survey 66% of companies were aware of GEO in 2016.

11.10 Day 1 – Session 8 – Live session on how to contribute to GEO

A live session about how to become a Data Provider and contribute to GEO took place. The live session was structured in a theatrical style with **Esa Falkenroth** from SMHI playing the role of a Data Provider willing to contribute to GEO and GEOSS, **Paola De Salvo** from the GEO Secretariat playing the role of GEO and **Mattia Santoro** from CNR-IIA playing the role of the GCI provider.

Mr. Falkenroth introduced the initial Data Provider status as an institution already providing data through an open service, but not yet contributing to GEOSS.

The first step is the registration of the organization in the [GEO Yellow Pages](http://www.earthobservations.org/gci_yellowpages). (www.earthobservations.org/gci_yellowpages) The process is straightforward. The Data Providers do not need to register data, only the organization. The most important part is the technical contact point, the person who will take care of interoperability tests. Questions are raised about how GEO uses the information about relevant sustainable development goals (SDGs), which is requested during the registration process. Mrs. De Salvo and Mr. Nativi explained that the information is tagging to help the discovery process. Without that information GEOSS would have to mine the data abstracted and try to guess which SDGs are relevant for the dataset. For that reason providers should indicate only the most relevant SDGs.

The second step is the interoperability test for connecting the existing service to the GCI. Mr. Falkenroth highlighted that no change was required to the service, and the full process required a few person-hours of technical personnel.

Mr. Santoro presented the activities of the GEO technical team in support of the Data Provider, including reporting about the interoperability tests and interaction with Data Provider's technical personnel. In some cases the GEO Portal development team is also involved. Interoperability tests are carried out on a GEOSS test instance and only when the new service passes all the interoperability tests it is moved to the GEOSS operational instance.

Roberto Roncella from CNR-IIA finally presented activities to broker new data sources including those just completed (Finnish Open Data, Swedish Open Data from SMHI, Danube Open Data), those in progress (Dynamic Ecological Information Management System – DEIMS, Japan Agency for Marine-Earth Science and Technology – JAMSTEC and CEOS WGISS Integrated Catalog – CWIC - update) and those scheduled (European Centre for Medium-Range Weather Forecasts – ECMWF, Emergency Copernicus, Moldova Geoportal, China GEOSS Update).

11.11 Day 2 – Session 1 - GCI and its Potential – Open Data Access Beyond Discovery

- **Mustapha Mokrane** from ICSU World Data System (WDS) introduced the GEOSS Data Management Principles discussing their implementation in Trustworthy Data Repositories (TDRs) with different levels of certification: Core certification, Extended certification, Formal certification. Mr. Mokrane debunked some myths about Core TDR certification: that it is costly, that it is a pass or fail process, that it is difficult for small Data Providers and that it is in some cases a time consuming process – for example when the Data Providers have not documented their internal processes.
- **Guido Colangeli** from ESA-ESRIN and **Gregory Giuliani** from UNIGE and UNEP-GRID presented a Story from the GEOSS Portal. In a theatrical style, they showed what happens in GEOSS if metadata are not correctly provided. They showed an example taken from the enviroGRIDs catalogue. In the old catalogue, missing metadata quality check, the title is not understandable and the abstract results are poorly documented. On the contrary, in the new version based on the GEO DAB technology, after a metadata quality check making the title informative, improving the abstract and providing a legend, data discovery and evaluation are greatly

improved. The approach is based on metadata enrichment by a third party. A discussion then took place about the role of third parties, which can help to overcome difficulties for the benefit of GEO and GEOSS.

11.12 Day 2 – Session 2 - Panel Discussion on Stories from Data Providers

There was a panel discussion on best practices and challenges in Data Management, towards sustainable solutions in providing data, maintaining those data long-term and their impact on decision making.

Esa Falkenroth from SMHI chaired the panel composed of:

- **Mark Iliffe** from the University of Nottingham and the World Bank;
- **Gilles Ollier** from European Commission and Copernicus;
- **Julia Wagemann** from the European Centre for Medium-Range Weather Forecasts (ECMWF); and
- **Asanobu Kitamoto** from Data Integration and Analysis System Program (DIAS).

The panel initially discussed several topics related to data management, sharing and use:

- a. Engagement with the SDGs
- b. Need for expert systems: this means you need to be an expert to use the data
- c. Move from an EO niche market to an EO mass market. The huge amount of EO data available now allows us to create services for individuals

Sli.do was used to obtain questions from the audience and the most popular ones, as well as those from the moderator, were used to stimulate the discussion.

Q. What are the benefits of data sharing?

- Data sharing increases data value
- Data sharing increases the integration of data
- Data sharing is not sufficient. We need to mainstream data to specific entities for serving them.
- There is a need to separate the data producer role and the data provider role. There are data centers for data provision and long-term preservation.
- Reproducibility is a major requirement.
- The role of funding agencies is fundamental.
- Sustainability of EO data is one of the major challenges. In the EC it was an issue in all the Framework Programmes. There are activities around the creation of archives and repositories. Some initiatives like Copernicus Data and Information Access Services (DIAS) will help to address the current fragmentation.
- Sustainability should be considered with respect of the impact it will have on decision-makers.

Q. What are the challenges for high impact?

- Scientists need to be part of the decision-making process.
- It is important to identify and recognize different user communities. Data producers can contact user communities asking about how they use data for maximizing impact.
- Producers do not need to transfer data globally. They can transfer data to specific institutions.
- Data producers are not paid to generate data, but to have impact.

Q. What are the major obstacles to achieving high impact?

- Technology training, human resources and suitable involvement of the private sector
- The role of public agencies is important. In the past, national libraries collected information (books), but editors had a fundamental role. National libraries in Tuscany also collected temperature series though there was not any commercial interest. This information is now very important for climate change studies.

Q. Suggestions from experience

- The increasing role of information provided by citizens.
- Be careful of different perspectives and ideals on data. In some cases, archivists plan to remove 90% of data that are considered useless.
- Users need to see the advantages of new platforms. Data users and Data Providers can learn from each other.

Q. What is mostly needed for improving usage?

- Impact, outreach communities and secure funding.

11.13 Day 2 – Session 3 – Lightning Talks

Short talks were given during the coffee break.

- **Mariya Urazaeva** from Deimos Imaging presented “The unique Earth Observation portfolio of UrtheCast/Deimos Imaging: Present and Future”;
- **David Patterson** from WWF-UK presented “WWF-SIGHT - Why spatial data transparency is vital for WWF as a conservation NGO and why we need GEO”;
- **Nate Smith** from Humanitarian Open Street Map presented “OpenAerialMap: Connecting open satellite, UAV, and other aerial imagery to humanitarian partners”;
- Emily Garin from UNICEF presented “Unleashing the power of GEOSS for every child”;
- **Peiliang Shi** from WMO presented “WMO Information System Strategy WIS 2.0”; and
- **Tim Duffy** from OneGeology presented “OneGeology as a GEOSS Data Provider”.

11.14 Day 2 – Session 4 – Hands-on session on Data Management Principles: Implementation and Practice

A hands-on session was dedicated to introducing the certification of data repositories as a practical mechanism to assess implementation of GEOSS Data Management Principles.

Michael Diepenbroek from Marum/PANGAEA, **Mustapha Mokrane** from ICSU-WDS and **Wim Hugo** from SAEON presented the self-assessment form for the Core Trustworthy Data Repositories Requirements.

The following discussion highlights some points related to the need for and strategies of data management.

- Continuity
 - Should a data producer trust a Data Provider without a continuity plan?
 - The Belmont Forum has a strong statement about sustainability: continuous access must be guaranteed, e.g. through the provision of a Digital Object Identifier (DOI).
 - A big issue on data continuity is related to the data owner’s end service. Plans for taking over control are necessary. It is important to save data in case of data centers disappearing. For example, climate change studies require long time series information. A possible approach can be to establish links with existing data centers.
 - Uncommon data could be saved on inexpensive media and not kept online. This would help to reduce costs in maintaining data that are not frequently accessed.
 - Financial sustainability depends on usage and it is difficult to estimate. The real question for providers is, if funds end what is your plan? (For example NASA and NOAA have a mutual agreement)
- Data management workflow
 - The transition of data from producer to curator should be documented. Best practices need to address the three main actors: producer, curator and provider.
- Reusability
 - When data is produced and used in a context there is some associated knowledge. Reusability can suffer from that knowledge being lost. We must preserve the whole context of use, including to rebuild the necessary tools. For example, at the minimum, the version of an artifact (standard specification tool) should be provided as metadata.

11.15 Day 2 – Session 5 on Earth Data on the Cloud

- **Ian Schuler** from Development Seed presented their activities to *Get Ready for the Data Revolution* showing the importance of integrating data discovery and processing with advanced interface capabilities including vocal commands. Mr. Schuler demonstrated an advanced application enabling search of Landsat data

through voice recognition using Apple's Siri intelligent personal assistant. Next step is searching EO data using GCI as a repository.

11.16 Day 2 – Session 6 on How Communities can benefit from the GCI and its resources

The session presents aspects on the benefit of GCI and GEOSS resources for different users.

- **Mattia Santoro** from CNR-IIA presented the technical enhancement of the GEO DAB to facilitate access to the GCI by multiple communities. Mr. Santoro introduced the different DAB Application Programming Interfaces (APIs) that developers can use for machine-to-machine interaction: a) standard geospatial interfaces, b) Restful API and c) Web API (Javascript library). Mr. Santoro then introduced the concept of a GEOSS View (subset of all GEOSS resources) which can be defined server-side by the DAB Manager or client-side by the developer.

Examples of GEO DAB use by communities followed:

- **Vassilliss Tsironis** from National Observatory of Athens (NOA) presented "The GEO-CRADLE Regional Data Hub tool: Utilising the GEO DAB APIs for easy access and discovery of regional EO data";
- **Enrico Boldrini** from CNR-IIA presented "Accessing global monthly variables: Net Photosynthesis (PSNet) and Gross Primary Production (GPP) through GEODAB."
- **Aditya Agrawal** from Global Partnership for Sustainable Development Data (GPSDD) presented "Connecting Networks to Make Earth Observation Data More Accessible for the SDGs"

The following discussions touched on some relevant points.

- There is a clear need to avoid duplication of efforts. Many initiatives build their own database. For that reason the EC, as a funding agency, plans to put an explicit constraint in future calls to not create new databases. GEOSS could be used as a data provision infrastructure allowing to book/reserve space for data. GEO Flagships may explore this approach. It would be useful to have a storage component in the GCI for initiatives that do not have an available data center.
- The development of APIs should be coordinated. For example, the Open Geospatial Consortium (OGC) has a whitepaper on geo APIs as they relate to open geospatial standards.

11.17 Day 2 – Session 7 on Deliver GEOSS Portal widgets

- **Guido Colangeli** from ESA-ESRIN presented the modular structure of the new GEO Portal developed by ESA. Portal components are widgets that communities can reuse to build their portals.
- **Jonas Eberle** from University of Jena presented the GEO-Wetlands Community Portal as an example of community portal developed using GEO Portal widgets.

11.18 Day 2 – Session 8 on How GCI is making a difference in Decision Making

- **Paola De Salvo** from the GEO Secretariat informed the audience about the upcoming call "GEO in Action" on the use of GCI components. The focus will be on applications for Sustainable Development Goals, Climate and Disaster. The results will be showcased in the GEO Plenary in Washington.

11.19 Day 2 – Session 9 - Lightning Talks

Short talks were given during the coffee break.

- **Joel Podorski**, from the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) presented "The Groundwater Assessment Platform (GAP) – taking measurement points and readily available geospatial data to produce prediction maps using statistical modelling.";
- **Ian Schuler** from Development Seed presented, "Creating cloud-based data distribution / discovery tools, like MODIS on AWS or NASA's Cumulus Platform for processing and distributing EO data on the cloud";
- **Hironori Yabuki** from the Arctic Data archive System (ADS) presents "ADS's contribution to GEO";

- **Yasunori Hanafusa** from the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) presents “JAMSTEC’s Contribution to GEO”;
- **Anna Polychroniou** from the National Observatory of Athens (NOA) presents “The GEO-CRADLE Regional Data Hub tool: A vision for a regional GEOSS Portal”;

11.20 Day 2 – Session 10 - Clarifying the role and relevance of statistical information

- **Guido Colangeli** from ESA-ESRIN presented GEOSS Portal statistics on registered users, geographical distribution, most searched terms, most searched locations, most searched catalogues and the number of downloaded datasets.
- **Mattia Santoro** from CNR-IIA presented the GEO DAB statistics collected from GCI activity. Mr. Santoro showed the beta version of the GEO DAB statistics website accessible at <http://www.geodab.net/usage-statistics>

12 Feedback from workshop participants

The organizers of the 2nd GEO Data Providers Workshop received feedback from participants expressing their appreciation for participating in the workshop:

“Congratulations on a fantastic meeting of Data Providers. The energy and enthusiasm for the meeting was palpable. You clearly hit on something that really resonates, and pulled in the right groups to be there.”

“I enjoy this opportunity to thank you again for the great workshop you have organized in Florence. It was all the more valuable to me that I am new in this community and it was really giving a good global view to the subject from Data Providers to data users going through technology highlights.”

“Thank you very much to you and your team for organizing such a great event.”

“Thanks a lot for the great organization of the workshop. It was great to get to know the GEO community.”

“Great meeting! Very happy that I joined and thanks a lot to you and the organizers :)”

“Thanks for all the hard work to make it happen!”

“It was a fabulous 2nd day at the GEO Data Providers Workshop in #Florence, #Italy! Thanks @GEOSEC2025! #GeoDATA17 #DEIMOS2”



13 Acknowledgements

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GEO Secretariat Team: *Steven Ramage, Osamu Ochiai, Paola De Salvo, Henrik Baeyens*

ESA Team: *Joost Van Bemmelen, Guido Colangeli, Piotr Zaborowski*

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15 Annexes

15.1 Annex I

15.1.1 Message from the Director General of Research and Innovation of the European Commission (delivered by Mr. Gilles Ollier)

Geo Data Providers Workshop, Florence, Italy, 20-21 April 2017:

Thursday 20 April 10:10-10:20 Message from the DG research and Innovation of the European Commission

Application of the GEOSS Data Sharing Principles within EC programmes

- Thank CNR, ESA, and GEO Secretariat for inviting the Directorate General in charge of Research and Innovation at the European Commission to participate to this second GEO Data Providers Workshop
- This series of workshop is a very timely initiative in view first of ensuring that GEOSS is regularly updated with new EO datasets becoming available and second that the access to those data is organized in a convenient manner for those users
- The European Commission (EC) was proactive since the beginning of GEO to encourage Earth Observation data owners, in particular in Europe, to share their data through GEOSS.
- As a consequence major EU programmes such as Copernicus, the EU EO programme, and Horizon 2020, the EU Research programme, are applying the GEOSS data sharing principle of free, full and open access to Earth observation data.
- For instance the data produced through the Copernicus Space Infrastructure, the Sentinel satellite data, is available open and free of charge through the website 'Copernicus.eu', which is quite a significant contribution to the Global Earth Observation System of Systems.

Involvement of the EC in the development of the GEOSS Common Infrastructure (GCI)

- Now an open data policy such as the GEO free, full and open access to EO data is a necessary condition to facilitate the use of Earth observation data but it is

not sufficient to allow discovery and access to GEOSS information resources in a practical way for the users.

- This is the reason why we have invested EU resources in collaboration with ESA, the JRC, and CNR, to support the development of the GCI which currently interconnects more than 140 major EO data providers and allows access to millions of resources worldwide.
- More specifically we have supported several FP7 projects, notably EuroGEOSS and GEOWOW, that have contributed to the development of the GEOSS Data and Access Broker (DAB) and of the GEOSS WEB Portal (GWP).

Future actions foreseen by the EC to facilitate the access to and exploitation of Earth Observation Data through GEOSS

- We are now launching several actions in collaboration with various partners in order to facilitate the access of European Earth observation data through GEOSS and to encourage the exploitation of GEOSS for the benefit of European users
- The first action is a collaboration we have started with ESA so that the GEOSS Web Portal is evolving into a more user-oriented facility. We will provide within few months, through Horizon 2020, a grant to ESA to co-fund the enhancement of the GWP.
- We are specifically attentive through this collaboration that the portal will be upgraded to ensure full alignment with the evolution of the various GCI components (essentially the DAB).
- We also want to make sure that the portal enhancement will be conducted taking full account of major European EO data and information platforms such as the Copernicus Data and Information Access Services (DIAS) and the Infrastructure for Spatial Information in Europe (INSPIRE)
- A second action that we have launched within the Commission is the establishment of a closer collaboration between DG RTD, and the DG in charge

of the implementation of the Copernicus programme, DG GROW. We have agreed between the two DGs that all the Copernicus resources (data and services) should become systematically discoverable through the GEOSS Common Infrastructure.

- Some of the Copernicus resources, such as Sentinel 1 and 2 are already accessible through the GCI but we are proceeding now with an inventory of the Copernicus services, products and data already discoverable through the GCI and are planning to set up a process for a more systematic registration of the Copernicus resources into GEOSS.
- A third action we are currently preparing is intended to support the improvement and evolution of the GCI as foreseen in the GEOSS-EVOLVE initiative of the 2017-2019 GEO Work Programme. To this effect we are making provision in the Work Programme 2017 of Horizon 2020 to support the Joint Research Center (JRC) in its contribution to the GEOSS-EVOLVE initiative to adapt the GCI in view of the delivery of EO services and products in the different GEO SBA's. This contribution should include addressing the needs of GEOSS users particularly in the GEOSS initiatives and "flagships" and defining measures to sustain the GCI on the long term

Downstream exploitation of data provided through GEOSS

- As indicated previously the Commission supports the development and the evolution of the GCI as well as calls to GEO data providers such as the one that has been launched on the occasion of this workshop with the view that the sharing of Earth observation data, information and knowledge at global level is a necessity for Europe to gather intelligence to realise the goals of resilient societies, sustainable economic growth, and a healthy environment.
- In this context we have initiated through the Horizon 2020 project NextGEOSS the creation of European GEOSS Data Hub that is intended to provide an R&I

platform for the exploitation of Earth Observation data in Europe. NextGEOSS will implement a federated data hub for access and exploitation of Earth Observation data, including user-friendly tools for data mining, discovery, access and exploitation with the view of delivering innovative and business oriented applications through 10 pilot projects (*e.g.* agricultural monitoring, air pollution and urban growth, or smart cities and energy)

- As I draw to a close I would like to mention that we have started to discuss with the European GEO caucus the concept of a European regional initiative within GEOSS possibly called EuroGEOSS. This should be an application-oriented initiative, aiming to showcasing and promoting existing European "GEOSS" actions and scaling them up to deliver real services relying on existing strengths in specialised European organisations and agencies. This initiative would obviously comply with the aspiration of the GEO members to move onto a more user oriented GEOSS and we plan to support it through the next phase of Horizon 2020 in 2018
- EuroGEOSS will be a central theme of the annual European GEO Workshop due to take place this year on 19-21 June in Helsinki. The workshop will the opportunity to discuss the EuroGEOSS concept and in connection with the GEOSS data provider workshop today the requirement for data provision within such a regional initiative. You are then most welcome to attend the workshop in Helsinki.

I wish you all a fruitful workshop.

15.2 Annex IIa

15.2.1 Notes from “Benefits” parallel session

Rapporteur: Esa Falkenroth

Getting out of the SILO

- More visibility
- Wider use -> Argument to get continued funding
- Publishing data is a requirement of many research councils
- It is a way to distribute my data to another audience (not close to space activities). Data out of silo
- Exposure to other communities than our own
- Build new collaborations (research)
- Benefits to science: As a research scientist, data sharing is important for scientific integrity and reproducibility.
- It allows others to build on existing work too. It is important to scientific progress
- Open data make data public (CC licence). (allows to..) combine and compare to other SBAs.
- By being able to compare data sets from different sources.
- Geo label recognised on the political level

Internal benefits

- Structuring metadata for GEOSS is indeed a good exercise which improves our quality

Use-cases

- Emergency plans for industrial plants
- Improve knowledge of risk areas existing on territory
- Let world learning China and the job of the researchers in China

Understanding the users

- Understand how people use data (fitness for purpose)
- Get feedback from wider audience (benchmarking)

Google search compared to GCI

- Specialised search engine and map visualisation is relevant. Google results could be linked.
- Prefer GEOSS for ability to programmatically access the results of the search
- Google is not GCI. Search results in GCI has a bit more credibility
- Geoss portal is not Commercial (Google is commercial)
- Google has a different biz model than GEO. For Google, EO is a by-product.
- Visibility of data requested by member state
- Meet the needs of EO users
- Neutrality – data can be managed responsibly by specialists
- Expertise in the complexity of data, the data models and structures.
- TBH I dont see the benefit (of GEOSS). Google is faster and more effective at prioritising results

Visibility

- Possibility to use data from other for research purposes
- Expose data to bigger audience -> be cited more often
- Introducing EO to new industries. Expanding the market.
- Much awareness of your capacity in EO data management -> more EU funding , consortium participation
- We can have access to data otherwise not available
- The measure of benefit could be the number of collaborations with other research groups
- Benefits are related to sharing data with other organisations
- We will accumulate the experience on the base of using our resources by the other organisations: feedback, rating and so on

- Benefits: share open data w GEOSS/GCI enable global development community
- Having global statistics on data search (data type and location)
- Visibility
- Bring scientists in different sectors together through data of common interest
- To have a single place where search for data set, but having so many datasets can you a data set unfindable
- Only the public has a real advantage when accessing data from a single entry point. Experts prefer to use specialised tools.
- Depending on the SLA which may not fit your requirements
- Benefits of GEOSS Domain expertise
- Can find specific data with accurate filters relevant to spatial data community, quality, ontologies
- Google stole customers from the private sector, but at the same time much innovation appeared
- Google = security issue = patriot act. Difficult to trust.
- GEOSS recommendation on interoperability make it possible to be "jant" (???) of GEOSS/GCI use of standard
- Google is better of finding the datasets I could actually use
- GEOSS "uure" (???) customised for types of info data, geospatial search, metadata elements (ISO/TC211)
- Using GEOSS portal is possible to find data specific to EO
- (GCI has) Aimed search spatially and temporally. Clarity in search results
- (GCI do not) have (spatial) data sets mixed with other data typology (e.g. links, documents) (in search results)
- As research centre, more visibility may rise the number of users of research results, improving the quality of them, if a feedback system is in place

Brand and other awareness

- More specific search/filter capability and built fro specific workflow
- Domain expertise on data is still limited in public search engines like Google
- Nearby I.G. found in the geoss portal datasets more likely to follow same global standards.
- For education purpose it may be better to have selected or curated data like geoportal
- Possibility to share information of search and view
- Have a better tune and focuses infrastructure (???)
- Register this Hits of our data + who (- help with DOI)
- Disseminate results of the research with the scientific community
- Encourage Data Providers
- Improve data quality over time
- Fulfils requirement To openly share data is useful ("lambert"???)
- Geo is improvement project. Geo is many users; so many users; search and use our data
- Metadata critical to building global models w/ many data sets (Mosaics, co-registration)
- Geocradle regional data hub for geosis data portal
- Share data and contribute new Data Providers to GEOSS
- With increased sharing of data more stakeholders will be able to research on well-being of children and households. This will help policy makers to develop informed-based policies.
- Making your data more visible on the web
- Wider discovery and related themes/datatypes
- We would get access to more users that can process data that we have available on our institute
- Number of research results will strengthen our existence in community
- Gates foundation mapping Malaria
- Be published and cited in data journals (nature sc. Data)
- Is increasing the visibility of the data to other communities making the data discoverable
- More visibility to the un-spider portal as the portal is not widely know – no resources to better promote
- DOI of data which enables results connected to the data
- Larger visibility of our data and products
- Potentially creates another source of users to discover NASA data.
- Contribute to global effort, benefits in return of the global contributions and save time and energy in discovering using existing data
- Google is not equal to GCI (credibility, affiliation and more control)

- Improve discoverability (semantics) show usability of data (WDS/RDA Data fitness of use WO)
- Our data site stopped used google, because google is a private company. So more time policy is changed.
- GEOSS metadata and categorisation can help better targeting
- Should "harmonise" search results so that GEO offers better EO search returns
- Benefit is quick access
- Only one interface to interact with
- GEOSS returns a huge data set which need to be better filtered by geographic/thematic area
- Constrain: scalability. Single point of failure
- More efficient data can be accessed in a harmonised way
- One stop shop – potentially avoids duplication
- No different standards to handle, unique data formats
- Benefits: Users have one-stop shop for all data if the data exists. They will find A in one spot. If A is not in the one stop then it probably doesn't exist.
- Too much data – a robust effective search mechanism needed to sort through all the data
- Potentially avoids duplication of data sources. Can help by being authoritative single search source
- Sharing resources increases the level of harmonisation of data
- DOI and system of citation for data
- Make our own thematic products visible to a larger community. If they are good, others may request updates leading to a business model.

Measuring benefits

- Counting user contacts
- Counting search hits
- Counting access (clicks)
- Measuring compliance with ISO-standard
- Counting users
- Counting number of different users
- Counting retrievals per day/month

Driver towards harmonisation

- Exposing my data to other new communities
- Wider use of data = convincing argument for continued funding
- May result in new collaborations/friends
- A good way to share/distribute my data to research community
- Data on GCI is considered "better" than random data on webservers
- Making research data referenceable. Think about DOI to make it really useful?
- Specific benefits mentioned:
- The world can learn about the job of researchers in China
- Emergency plans for industrial plants
- New research collaborations

Vision

- Facilitate running applications which need geospatial data worldwide

15.3 Annex IIb

15.3.1 Notes from “Key Issues and Constraints” parallel session

Rapporteur: Guido Colangeli

Do you (Data Provider) see the connection missing at the moment with the users of your data, through the GEOSS Portal? How do you see this being improved?

- Effective link to Yellow Pages
- Yes please, effective feedback
- The fact that the GCI is supported mostly by one GEO region is a weakness
- Yes, monthly reporting, from what community, keywords used
- No clear identification of users; test GEOSS with a variety of users in real use cases
- Method to identify who is consuming my data
- List of users who searched for my resources
- Feedbacks from users of their research result
- Evaluation of data from users
- Nothing implemented so far that gives us feedback
- I do not see a clear identification of users. Perhaps you should test GEOSS with a variety of users in real use cases
- It would be interesting to get a list of users who searched for my data via a dashboard

Would you be ready to improve Metadata of your catalogues, (if needed) to ensure Discoverability, Accessibility, Usability?

- Yes, Yes, Yes
- Data need to be public domain, no restriction
- Yes, including Semantics
- Ready to improve metadata
- GCI to ensure existing standard metadata to be fully and properly exploited
- Yes, Provide good ontologies for semantic testing
- Yes, especially if there are specific requirements to respect standards
- Results from search more accurate
- Location filter to be improved
- Accuracy assessment is crucial in any application area whether it be check points or reference data

What does the GCI need to improve to best deliver your data resources? (e.g. functionalities, visibility etc..)

- API, Open Source, Manuals?
- Single Sign On
- Ranking?
- Community Services (e.g., analysis tools)
- GEO Likes (similar to Facebook) for good resources
- Suggest ranking to change to relevancy, ranking denotes good versus bad. User wants relevant returns to queries
- Application Gallery
- Provide a rating for metadata that you send to the providers
- Provide a DOI
- Provide more consistent view on data
- Better description on how to use the API
- How data was used – statistics by who, from where
- SSO may help
- Helper application
- Models and links to data as model input
- API manuals, GEO Like, global registration to all Data Providers at once

- Data comparison (charts, layers), data in time, direct data (not bundles)
- Advertising material, PR, community webinars hosted via GCI, ranking
- We discussed internally that ranking for lowering registration makes visibility of our data lower, but that factor is not controllable by us
- I'd rather have rankings based on discovery and actual usage rather than a GEO like function
- Ranking about view, download
- Report about missing or broken links
- Improve training package to facilitate community effort
- How to inform GEO to find our local GEO information?
- Feature A from external source. Some feature A build in DAB. Who decides which one will be used?

Would you consider it useful to have a Quality Assessment process by GEOSS on data and related services?

- Quality assessment useful and crucial
- Yes and this is fully in line with the CEOS/WGIS System level team
- Yes, it is crucial for the reusability of data
- Yes, it would be interesting to know how complete is our metadata
- Yes, Next GEOSS is looking at this. How can we contribute this?
- Yes, and more generally information on quality, uncertainty and compliance with GEO DMP

Would you consider useful to have GCI providing data processing capabilities (to improve usability) in addition to data discovery and access?

- Yes useful
- No, first basic things
- I see it secondary. Take data easy discoverable and easy to access is the priority
- No processing. But statistics about number of dataset clustered by topic/region
- Data processing would be an added value
- Data processing crucial
- Useful to have processing capabilities next to the data so that users can bring their own algorithm and operations to the data rather than bringing the data to them
- Regional approaches help organising better the access to EO data at global level
- As long as provenance is considered

Would you consider it useful to have periodic reports about the GCI operation and user activity?

- Yes, yes, yes
- According to user selection
- Monthly
- Quarterly
- Whole pineapple, not just my data to see what the users search for
- Live reports online and always available
- Number of users, requests, data accessed monthly
- Yes, Monthly reporting would be useful on how many users, from what community, type of keywords used.
- Newsletter
- Usability statistics

Would you consider it useful to have more documentation about the GCI components and functionality?

- Yes, yes, yes
- On more technical aspects
- How can I contribute to the DAB (it is a closed source)
- The DAB is fantastic but the roadmap is managed by a single organisation

- Documentation on GCI filtering processing
- Documentation is always welcome

Would you consider it useful/opportune to have regional and/or national levels of GEOSS to be connected to rather than directly to the GCI?

- Yes Yes Yes
- No
- Yes, this could attract more users
- Rather per community
- Unavoidable
- I prefer being connected to GCI and filters to convert to appropriate country region
- Strongly support! See GEO cradle data hub facilitator/filters data on geographic/thematic/regional priorities
- Only if makes sense politically
- Community filtering as well
- Centralized is better
- Governance is important
- How do you envision engaging organizations no providers nor user but broker facilitator?
- Regional approach help organizing better
- How to manage the contrast between data and the need of research for some kind of information
- The fact that GCI is supported mostly by one GEO region is a weakness!
- Maybe not. It might increase redundancy. Could focus on searches that allow regional data
- Regional level would help finding the data one needs

Anything else you would like to raise to the attention of GCI Operations?

- What about Data Providers visibility?
- Availability of an open source package to install in-house could possibly be a solution to performance
- Commercial licenses, data more where some data are free
- Stability of the user interface is important. So complexity of software development should be manageable
- Provide access to data to build value added products services
- Add more in-situ data
- What about Data Providers' visibility?

15.4 Annex IIc

15.4.1 Notes from “Communication with the GCI Operations team” parallel session

Rapporteur: Osamu Ochiai

Are you satisfied with the overall communication with GEO - GCI: For new Data Providers: essential steps to become a GEOSS Data Provider, is the process clear?

- The communication should be selective e.g. large EO programs, Research, Citizens, etc..
- A Clear downloadable manual is needed
- Instructions and manuals on APIs
- Have the GEO by laws been updated with the new registration process
- Yes The process is clear
- Yes steps are clear
- Essential steps are not clear for new comers
- Yes: regular participation of GEOSS to all WGISS meetings
- It is clear, since this morning session
- Need better feedback on data usage: metrics, stats
- Since this morning the process is very clear!
- Is it scalable?

What do you think we should improve in our communication to you as a Data Provider?

- Outline pro and cons to become a Data Provider
- Organize regular webinars explaining to potential new providers the process, like this morning, Coach them if is needed
- “Add the possibility to provide «reserved data»
- You should ask who the potential users of my data are and be more focused on their use cases
- Reporting on data usage
- Build a simple dashboard pointing clearly the benefits of sharing the data
- More feedback on usage and on ongoing developments
- Can you email us, once every 6 months on which resources have been read, used from the GEOSS portal?
- Highlight better who is contributing as Data Provider

How do you want us to communicate with you ? Establishment of error reporting mechanisms, e.g. when a given data resource is searched by the user and cannot be downloaded, is visualizing errors useful?

- Have a common support function to turn to it, or use a common error ticketing system like JIRA
- Errors should be reported
- Real time reporting on errors
- Maybe an API endpoint for errors
- YES include steps in website – send alerts through e mail in case of errors
- Monthly reports
- Important to have statistics and origin request
- Reporting mechanisms on errors is very important to keep credibility of data and services in GEOSS. Automatic reports would be great.
- A Data Providers dashboard showing statistics on my data catalogue including usage, data metadata quality metrics would be nice
- Build a dashboard with notifications and remove Data Providers if errors are not solved in one month
- Errors reporting should be automated, notified to providers asap via online or emails.
- Usage statistics sent via e mail to each provider including all errors regarding the datasets
- Email from the GEOSS Portal to the Data Provider highlighting the given problematic resource.
- The communication should be shaped to a much broader outreach exercise going beyond the GEO circle
- Whom and what query has been requested is important to better enhance our data
- Yes monthly reports on any errors would be very useful
- GEOSS have to check on broken links

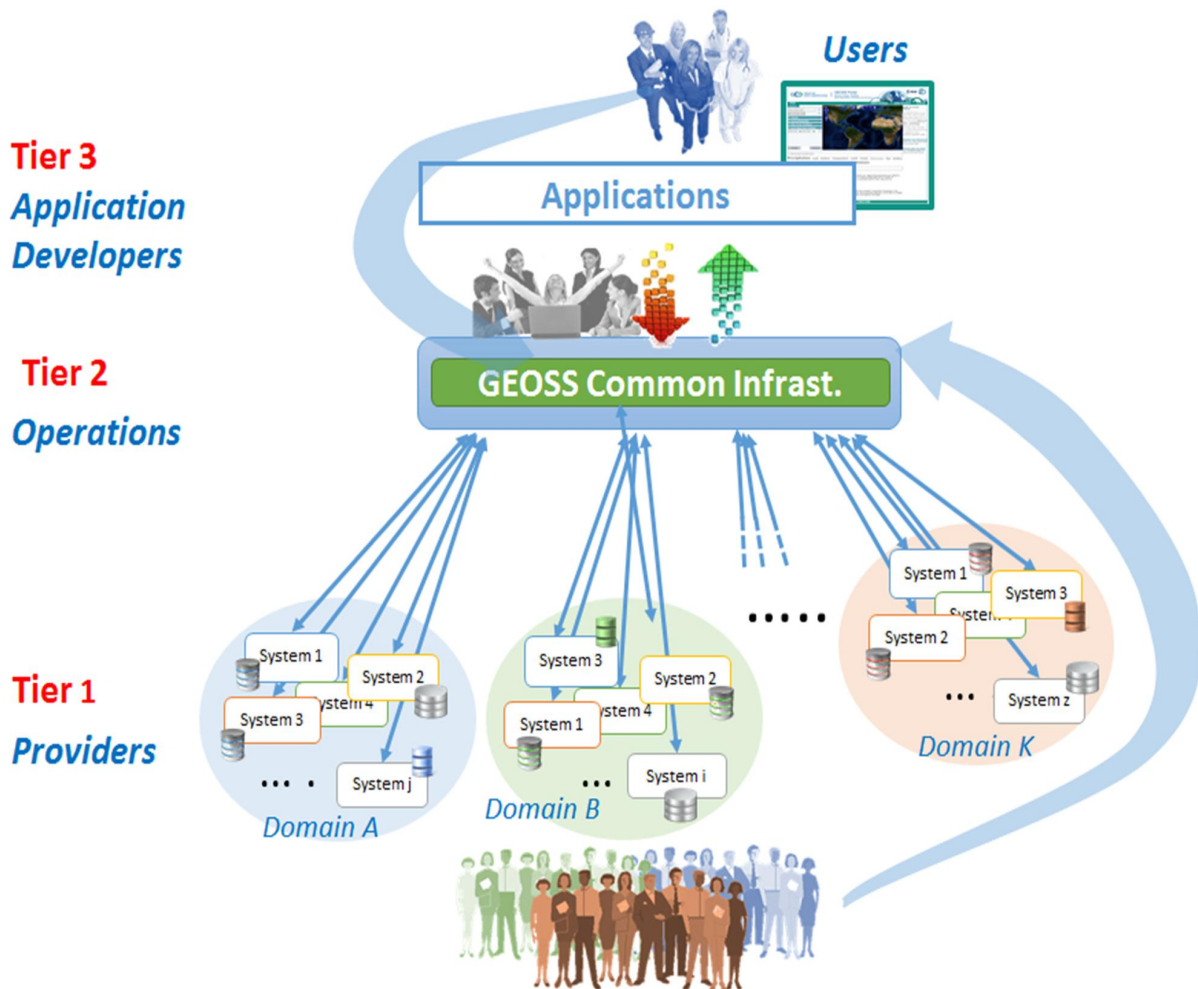
- Statistics: what type of users access which resources...
- Build a dashboard that can be consulted and monthly email to raise awareness
- Real time visualization is better than summarized report which comes later
- Needed asap users content details.
- Statistics: no. of users accessing a given resource?
- How often do you want us to communicate with you? Real-time or monthly communication?
- Inform on numbers of users of the GEOSS portal (n. of users per day, month, year) that access, download and transform data
- APIs for notifying GCI of changes
- Monthly summary (x9) n. of users, type of data etc..
- Compulsory: Access to the statistics has to be in real time for the Data Provider and for the operations
- It could be either digest or real time
- Sustainability: How do you inform the GCI Operations team if any changes occur on your side e.g. Change of URL end service, or change of technical staff
- Process to become a Data Provider is not easy, please simplify
- Monitor GCI Development- issue reports, versioning tools
- A defined procedure from GCI like: e mail with defined structure – web form
- An authenticated access to change the url endpoint if needed
- REST APIs
- «Use count»on the road map for 6 years (?)
- Anything else you would like to bring to the attention the GCI Operations team

15.5 Annex IId

15.5.1 Notes from “Commercial Sector Benefits” parallel session

Rapporteur: Steven Ramage

Where do you see value for commercial sector to contribute to the GCI?



Tier 3 Application e.g. contributing by building applications using GCI resources.

Tier 2 Infrastructure e.g. contributing through cloud services.

Tier 1 Data e.g. contributing with EO data and information resources.

Based on the tier, please specify why and how?

Tier 3 Application e.g. contributing by building applications using GCI resources.

- Commercial sector is currently more innovative and can bring in a variety of end users;
- Easy access to EO data has been a challenge for private sector who develop Applications. GCI will greatly facilitated their access;
- Application deployed on or using infrastructure providing niche products;
- Provide access to commercial data;
- Promote EO App framework - free version, - paying version;
- Support developers serving end users;
- Only if stable enough SLA needed may be problem;

- Yes, help with the most mile problem of user access;
- Application is the most important thing for commercial sector;
- Mentoring, fellowships and data science;
- Most valuable added value for Tier 3 - Reference to EARSC “Product of the Year Contest - use of GCI for business oriented Apps;
- Application developers - Raw data rarely answers high-level decisions. A need of clearing, completing good knowledge of main datasets could require support from private companies;
- Tier 3 will be the best for commercial sector.

Tier 2 Infrastructure e.g. contributing through cloud services

- But how will it be found;
- Cloud services on more and more used by research institutions to store data;
- Providing services for “user friendly” time-series access services - pre-processed – xxxx area of interest – xxx-compliant!;
- Data storage like processing - Google Earth Engine - massive data storage;
- Contributing in infrastructures;
- The value is especially in providing cloud services and processing capabilities, but also to take advantage of creating applications for end-users;
- Access to more Data Providers and markets;
- Standardized architecture – reuse of lessons learned from industry;
- Inventing a funding model for sustainability e.g. Fintech, social funding;

Tier 1 Data e.g. contributing with EO data and information resources

- Most user sat. imagery is from private sector data access – connect their data access and discovery portals to GCI;
- High-resolution data;
- Provide certain data licenses for wider use;
- Promote company - free data to promote processing functions (models);
- Value for commerce, acts as a shop window for licensed data sets that may help address SDGs;
- Quality assessment by users would push toward higher standards for EO Data Providers;
- Infrastructure, feedback on data quality;
- Support Data Providers (Tier 1) showing products.

General comments

- Being able to support one large repository of data use cloud services;
- Not: slow moving, wasting time too much politics;
- Identify new data/service which could create/upgrade a commercial service;
- Patented technology;
- At the application level because users can easily search among several datasets the desiderated one;
- Support development of products for end users;
- Realize downstream apps and services starting from GEOSS data;
- Get input from the user to GCI functionality;
- More data made available - Find data from both private and public at same time;
- Make data available - accessible - see xxx. The cost of tracking down the right data sets is enormous;
- Provide feedback to develop better applications;
- They have to receive funds for keeping the infrastructure running;
- Promoting innovation;
- From collaboration with commercial sector GCI can use services that already exist and standard architecture;
- Great value - added on top of existing data resources;
- Automated application area workflows;
- Interoperability development;

- If a data store is implemented where you can sell data;
- Contribution of end products;
- Improve and (board) the service range, but it is a difficult to enhance the awareness to provide their data. We need to think an effective measure;
- Providing tools and workflows into cloud deployment (pre-processing).

Private Sector and GCI (2)

What can the GCI do for the commercial sector ?

How can the GCI benefit from cooperation with commercial sector and vice versa?

How can the commercial sector benefit from cooperation with the GCI?

In what areas do you see commercial sector innovation based on GEOSS data?

What changes need to happen to create working ecosystems for data. Obstacles removed?

Anything else you would like to bring to the attention of the GCI Operations team?

- Machine learning;
- GCI can help her commercial sector to better focus on future need and objective;
- B to C services;
- Highlight datasets and the private providers;
- Provided easily data sources for running applications in EO. Data filtering tools and semantic based to queries if available will facilitate more making business on top of the return data;
- Outside of the box thinking,
- More focus on APIs and common metadata standards;
- Be made more visible and “exemplified” with market ready Apps;
- Get top notch technology and inter-operability with big systems;
- Awareness on product/data;
- Better understand needs of commercial space;
- Marketing and exposure;
- Researching the statistics of using of services – feedback;
- Marketing: name association with GEO;
- Big data principles - new data - new business;
- Adoption of more (=fewer) common global standards;
- Recommendation of experts groups for solving the problem;
- Connect the user to the right expert/provider;
- Make it easier for me to build my service on EO data across providers;
- Identify needs, develop partnership;
- Data analysis, access to new market;
- Common data repository(s) will not cause Intelligence Property Issues;
- Use GEOSS portal and info to find data gaps to fill, commercially;
- Ideas must move;
- In area already providing products and that have a significant market: Energy;
- Analysis and derived added value .. ;
- Being able to access more data more effectively is better for everyone;
- Giving indications for the right localization of new industrial plants;
- Data needs to be continuously available;
- Minimizing environmental impacts due to events;
- Energy Health;
- GCI may help you inform selection of key data and information and perhaps fitness for purpose;
- Public and private environment of climate;
- Uniformity securability;
- Visibility impactful applications and use cases;
- Reduction of risks from IP issues;
- Many commercial groups are concerned about more than the bottom line or a bigger slice of the apple pie. Already aligned with your core values;

- One concern: with Big Data how is possible GCI is helping in bringing user and SME applications where the data are?;
- How do (GEO) drive users back to a single portal?;
- GEO could help to bridge private sector (Amazon) and Data Providers setting good prices to outsource services *competitive;
- The private sector gets data for free for their services;
- Obtain products more suitable to its mission;
- Useful applications for society in the areas of health, transport, energy, etc;
- Be connected to scientists and researchers;
- May be the key conduit of data to end users outside of the government research communities;
- More adoption of data and tech standards (ISO/TC 211, OGC), - Willingness to share! (hardly there...);
- Application development -Data is available but tools for extracting information from the vast amount of data is missing, -Also they can earn money by creating data processing applications;
- Use Web-as-a-Platform;
- Working ecosystem can be enhanced when political will is unlocked by private sector;
- Creation of open platforms (governance!);
- Data format Homogeneity;
- Facilitate the use and exploitation of data, -Bring “New Ideas”;
- Improve discoverability. The problem right now is to find what you were looking for;
- Making part of their data/products freely available through GCI;
- GIS Implementation;
- Advancing modern data standards and distribution channels that move at the speed of users demand;
- Standards for Open Data Licenses.

Attendance - List of participants

95 people from 75 Organizations actually attended with approximately 40 organizations that were new to GEOSS whereof 11 Private sector companies.

First Name	Last Name	Organization
Emmanuel	Pajot	EARSC
Aditwa	Agrawal	GPSDD
Marco	Alba	ETT
Nuno	Almeida	DEIMOS Engenharia
Umberto	Apponi	SpacEarth Technology/INGV
Antonio	Arozarena	Instituto Geográfico Nacional
Enrico	Boldrini	CNR-IIA
Thorsten	Büßelberg	Deutscher Wetterdienst (DWD)
Bente Lilja	Bye	BLB
Gabriele	Coccia	Princeton Climate Analytics
Guido	Colangeli	RHEA System
Lorant	Crazan	UNOOSA
Simone	Dalmaso	European Commission JRC
Bart	De Lathouwer	Open Geospatial Consortium
Paola	De Salvo	GEO Secretariat
Carsten	Dettmann	D-GEO Germany + GEO Programme Board
Gianpiero	Di Girolamo	ESA
Michael	Diepenbroek	PANGAEA, MARUM - University Bremen
Tim	Duffy	OneGeology
Jonas	Eberle	Friedrich Schiller University Jena
Marc	Elian Bégin	SixSq
Mariya	Fabrizi	Deimos Imaging
Esa	Falkenroth	SMHI
Andrea	Fiorentino	Geological Survey of Italy - ISPRA
Joe	Flasher	Amazon Web Services
Terri	Freemantle	Satellite applications catapult
Gregory	Giuliani	University of Geneva
Erwin	Goor	VITO
Noel	Gorelick	Google
Valeria	Grosso	UNICEF
Richard	Gross	Global Geodetic Observing System
Yaniss	Guigoz	University of Geneva and GRID-Geneva
Yasunori	Hanafusa	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Theresa	Hartmann	WEF
Wim	Hugo	SAEON
Ingrid	Hunstad	istituto Nazionale di Geofisica e Vulcanologia
Mark	Iliffe	University of Nottingham/World Bank
Asanobu	Kitamoto	National Institute of Informatics
Alexandr	Kobelev	Russian National Oceanographic Data Centre (NODC) All-Russian Research Institute of Hydrometeorological Information - World Data Center
Haris	KONTOES	National Observatory of Athens
Daria	Kralik	Meteorological and Hydrological Service of Croatia
Christian	Langer	GEO BON
Maria A.	Liberti	CNR - IIA
Francis	Lindsay	NASA
Dan	Lopez	Radiant
Roberto	Lucchi	Esri
Vladimir	Malović	Meteorological and Hydrological Service of Croatia
Massimo	Mari	Italian Ministry of Environment
Joan	Maso	CREAF
Jay	Matta	Eawag
Paolo	Mazzetti	CNR-IIA
Paul	Mc Ginnity	IAEA
Lionel	MENARD	MINES ParisTech
Mustapha	Mokrane	ICSU World Data System
Roberto	Monsorno	Eurac research
Richard	Moreno	CNES

Report on GEO Data Providers Workshop, 20 – 21 April 2017, Florence, Italy

Michele	Munafo	ISPRA
Stefano	Nativi	CNR-IIA
Vanya	Nikova	CloudSigma
Osamu	Ochiai	GEO Secretariat
Gilles	Ollier	EC
Viola	Otieno	icpac/Mesa
David	Patterson	WWF-UK
Ana	Pinheiro Privette	USGCRP
Nicola	Pirrone	CNR-IIA
Joel	Podgorski	Eawag, Swiss Federal Institute of Aquatic Science and Technology
Anna	Polychroniou	National Observatory of Athens
Hussein	Ramadan	IAEA
Steven	Ramage	GEO
Roberto	Roncella	National Research Council of Italy (CNR-IIA)
Claudio	Rossi	Istituto Superiore Mario Boella
Stefano Salvi	Salvi	ingv
Mattia	Santoro	CNR-IIA
Jaap	Schellekens	Deltares
Gunter	Schreier	DLR - German Aerospace Center
Ian	Schuler	Development seed
Christian	Seip	Federal Agency for Cartography and Geodesy (BKG), Germany
Mr Peilang	Shi	WMO
Ruixiang	Shi	Institute of Geographic Sciences and Natural Resources Research
Nate	Smith	Humanitarian OpenStreetMap Team
Floriant	Teichert	WMO
Anna Maria	Trofaier	Svalbard Integrated Arctic Earth Observing System
Eugenio	Trumpy	IGN_CNR
Vassilis	Tsironis	National Observatory of Athens
Maryia	Urazaeva	Deimos Imaging SLU
Elisa	Valli	UNICEF
Joost	Van Bemmelen	ESA
Marie-Françoise	Voidrot	NEXT GEOSS
Julia	Wagemann	European Centre for Medium-Range Weather Forecasts
Christoph	Wohner	Environment Agency Austria
Hironori	Yabuki	National Institute of Polar Research
Piotr	Zaborowski	Outsourcing Partner
Lianchong	Zhang	Institute of Remote Sensing and Digital Earth, CAS
Emily	Garin	UNICEF

Attendance - List of Registered Organizations

Amazon Web Services
ARPA
BLB
Canadian Space Agency
CloudSigma
CNES
CNR-IIA
Copernicus
CREAF
Crop Performance Ltd.
DEIMOS Engenharia
Deimos Imaging
Deltares
Deutscher Wetterdienst (DWD)
Development Seed
D-GEO Germany + GEO Programme Board
Disaster Prevention and Management National Centre
DLR - German Aerospace Center
EARSC
Eawag, Swiss Federal Institute of Aquatic Science and Technology
EC
Environment Agency Austria
ESA
ESIPPS International Ltd
Esri
ETT
eurac research
European Centre for Medium-Range Weather Forecasts
European Commission JRC
Federal Agency for Cartography and Geodesy (BKG), Germany
Friedrich Schiller University Jena
GEO BON
GEO Secretariat
Geological Survey of Italy - ISPRA
GIS Ltd; UK GEO/CEOS Office
Global Geodetic Observing System
Google
GPSDD
HAROKOPIO UNIVERSITY/ DEP. OF GEOGRAPHY
Humanitarian OpenStreetMap Team
IAEA
ICPAC/MESA
ICSU World Data System
IEEE / OMS Tech
IGN_CNR
Institute of Geographic Sciences and Natural Resources Research
Institute of Remote Sensing and Digital Earth, CAS
Instituto Geográfico Nacional
IRD - ESPACE-DEV
ISPRA
Istituto di Geoscienze e Georisorse - CNR
istituto Nazionale di Geofisica e Vulcanologia
Istituto Superiore Mario Boella
Italian Ministry of Environment
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Kenya Agricultural and Livestock Research Organization
Meteorological and Hydrological Service of Croatia
MINES ParisTech
Ministry of Environment and Natural Resources of Guatemala
NASA
NATIONAL CENTRE FOR REMOTE SENSING, NIGERIA
National Institute of Informatics
National Institute of Polar Research
National Meteorological Service of Belize

National Observatory of Athens
NEXT GEOSS
NOAA/RTI
OneGeology
Open Geospatial Consortium
Outsourcing Partner
PANGAEA, MARUM - University Bremen
PCI - Geomatics
Princeton University, and Princeton Climate Analytics, Inc.
PWC
Radiant Earth
RHEA System
Russian National Oceanographic Data Centre (NODC) All-Russian Research Institute of Hydrometeorological Information - World Data Center
SAEON
Satellite applications catapult
Segeplan
SixSq
SMHI
SODEXAM
SpacEarth Technology/INGV
State Hydrological institute, International Data Center for Hydrology of Lakes and Reservoirs (HYDROLARE)
State Hydrometeorological Service
Svalbard Integrated Arctic Earth Observing System
Twenty First Century Aerospace Technology Co., Ltd.
UCV
UN Environment
UNICEF
University of Basilicata
University of Cagliari
University of Geneva
University of KwaZulu-Natal
University of Nottingham/World Bank
UNOOSA
USGCRP
VisioTerra
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