GROUP ON
EARTH OBSERVATIONS

GEO and QA4EO

Yasukuni Okubo
GEO Secretariat

QA4EO workshop,
Harwell Oxford 18 - 20/10/2011

Overview

- GEO Activities
- Current GEOSS
- New GEO Activities

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History of GEO

- The 2002 World Summit on Sustainable Development in Johannesburg highlighted the urgent need for coordinated observations relating to the state of the Earth.
- The Group of Summit Eight(G8) in June 2003 in Evian, France, affirmed the importance of Earth observation as a priority activity.
- The First Earth Observation Summit convened in Washington, D.C., in July 2003 adopted a Declaration establishing the ad hoc intergovernmental Group on Earth Observations (ad hoc GEO) to draft a 10-Year Implementation Plan.
- The Second Earth Observation Summit in Tokyo, Japan, in April 2004 adopted a Framework Document defining the scope and intent of a Global Earth Observation System of Systems (GEOSS).

History of GEO

- The Third Earth Observation Summit, held in Brussels in February 2005, endorsed the GEOSS 10-Year Implementation Plan and established the intergovernmental Group on Earth Observations (GEO) to carry it out.
- The G8 Heads of State supported GEOSS in the Gleneagles Plan of Action released in July 2005.
- The G8 Heads of State also pledged to continue exercising leadership in the development of GEOSS in their June 2007 Summit Declaration adopted in Heiligendamm, Germany.
- The G8 leaders further agreed to accelerate efforts to strengthen observation, prediction and data sharing within GEOSS in their Declaration on Environment and Environment adopted in Hokkaido, Japan in July 2008.

The Cape Town Ministerial Summit, 2007

The Summit was the opportunity:

- To highlight **early progress** of GEO and **key achievements** in the Implementation of GEOSS (The First 100 Steps to GEOSS, The Full Picture)

- For Ministers to commit to emerging priorities through **The Cape Town Declaration**.

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Declaration on Environment and Climate Change

To respond to the growing demand for Earth observation data, **we will accelerate efforts within GEOSS,** which builds on the work of UN specialized agencies and programs, in priority areas, inter alia, climate change and water resources management, by **strengthening observation, prediction and data sharing**. We also support capacity building for developing countries in earth observations and promote interoperability and linkage with other partners.

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G8 L'Aquila Summit 2009
RESPONSIBLE LEADERSHIP FOR A SUSTAINABLE FUTURE

Natural disasters

To address the increased threats of **natural disasters** and **extreme weather phenomena** caused by **climate change**, such as increased flooding, storm surges, droughts and forest fires, we will act to **improve risk preparedness,** prevention, **monitoring** and response times, particularly in **developing countries,** by:

a) defining common guidelines for disaster prevention and management to be used in developing national plans, in collaboration with the UN International Strategy for Disaster Reduction (UNISDR) and the World Meteorological Organisation (WMO), building on the Hyogo Framework for Action and on national experiences, as well as improving management of risks, awareness raising and training of the population and civil protection real-time response, such as logistical support for emergency situations;

b) supporting the ongoing work on the development of GEOSS.

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2010 Beijing Ministerial Summit

- **Mid-Term Evaluation of GEOSS implementation**
- **Beijing Declaration**

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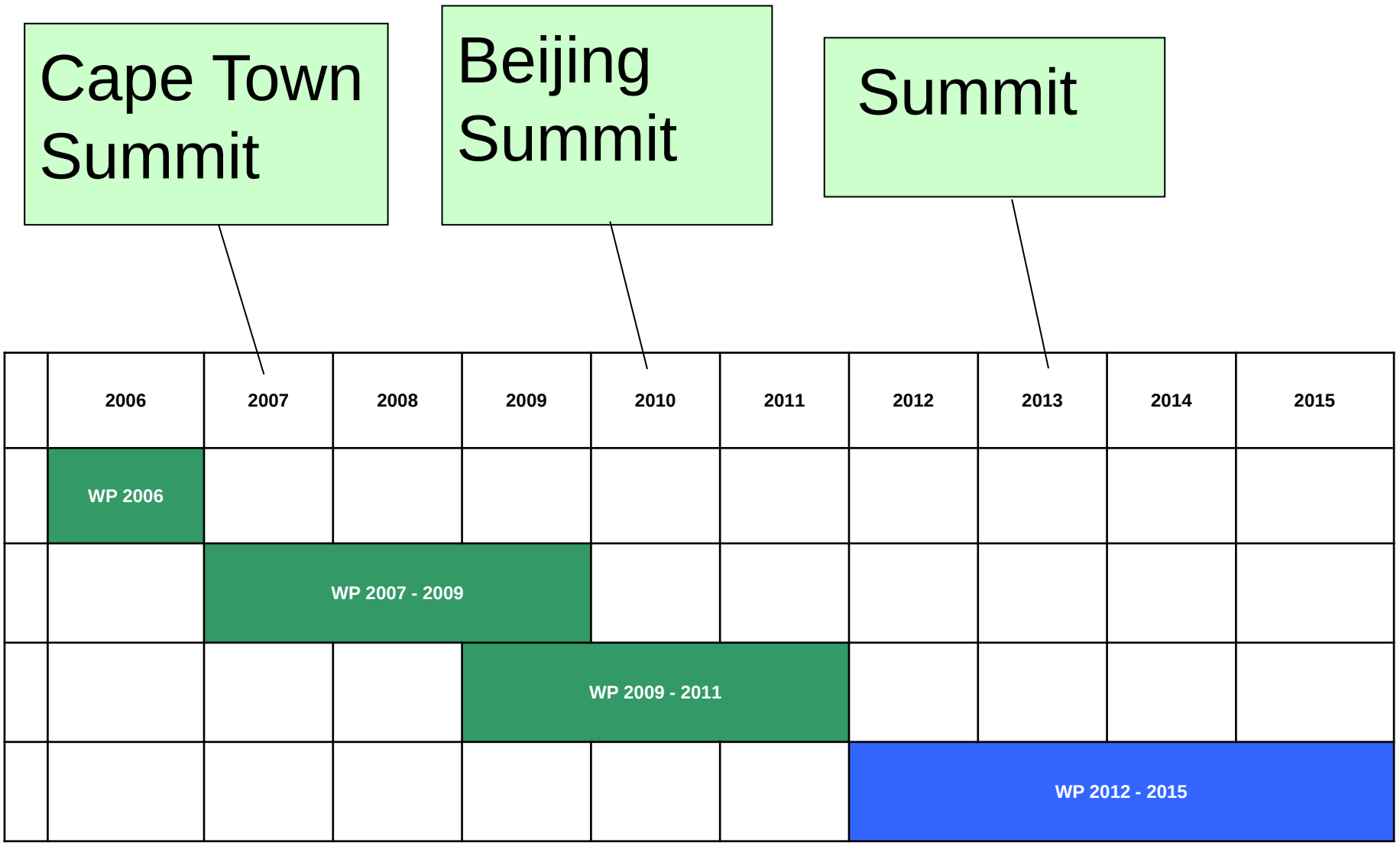
Mandate: To coordinate efforts to build a GEOSS

An Intergovernmental Organization with 87 Members and 61 Participating Organizations

GEO Work Plan History & Future



Overview

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- Current GEOSS
- New GEO Activities

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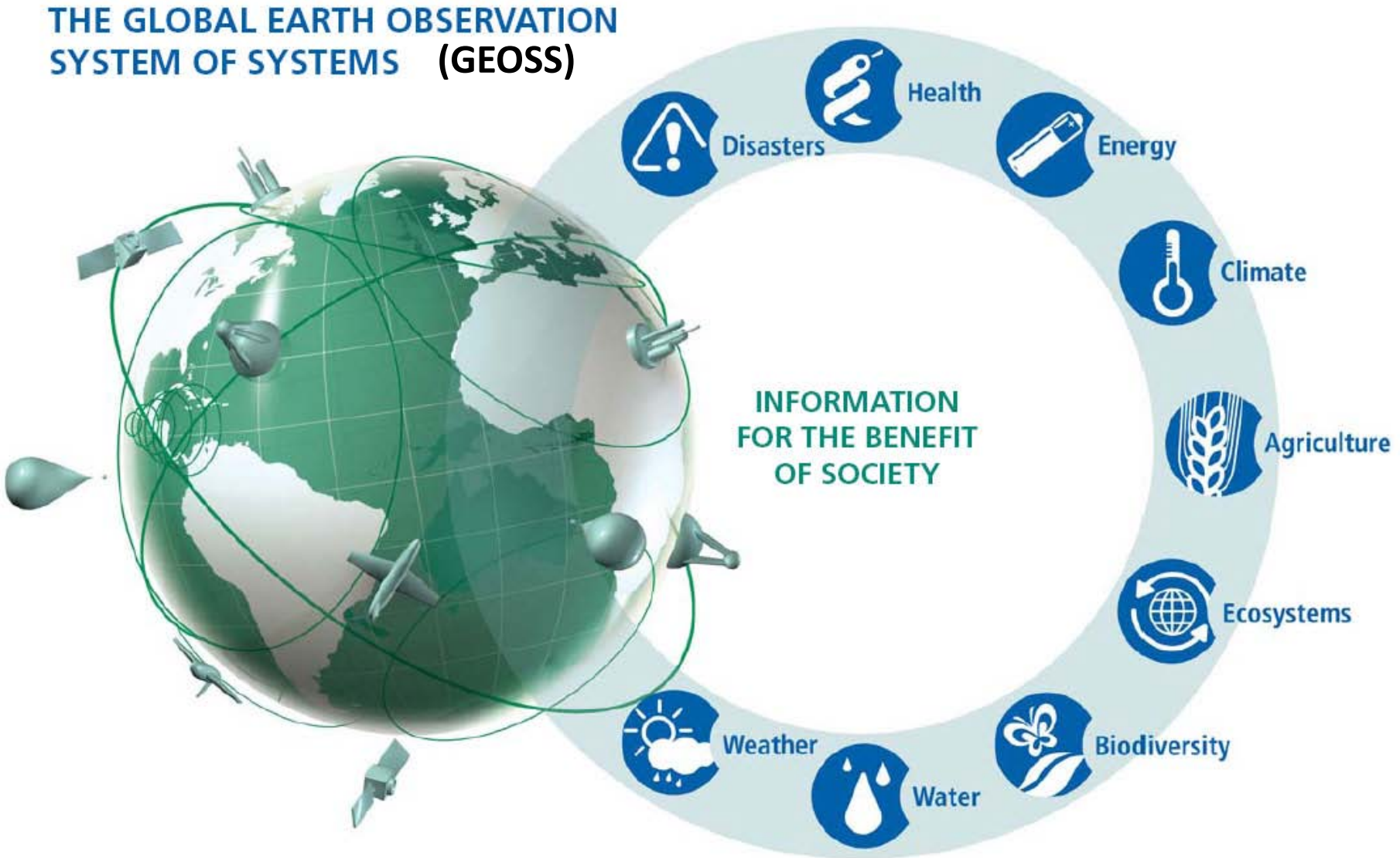
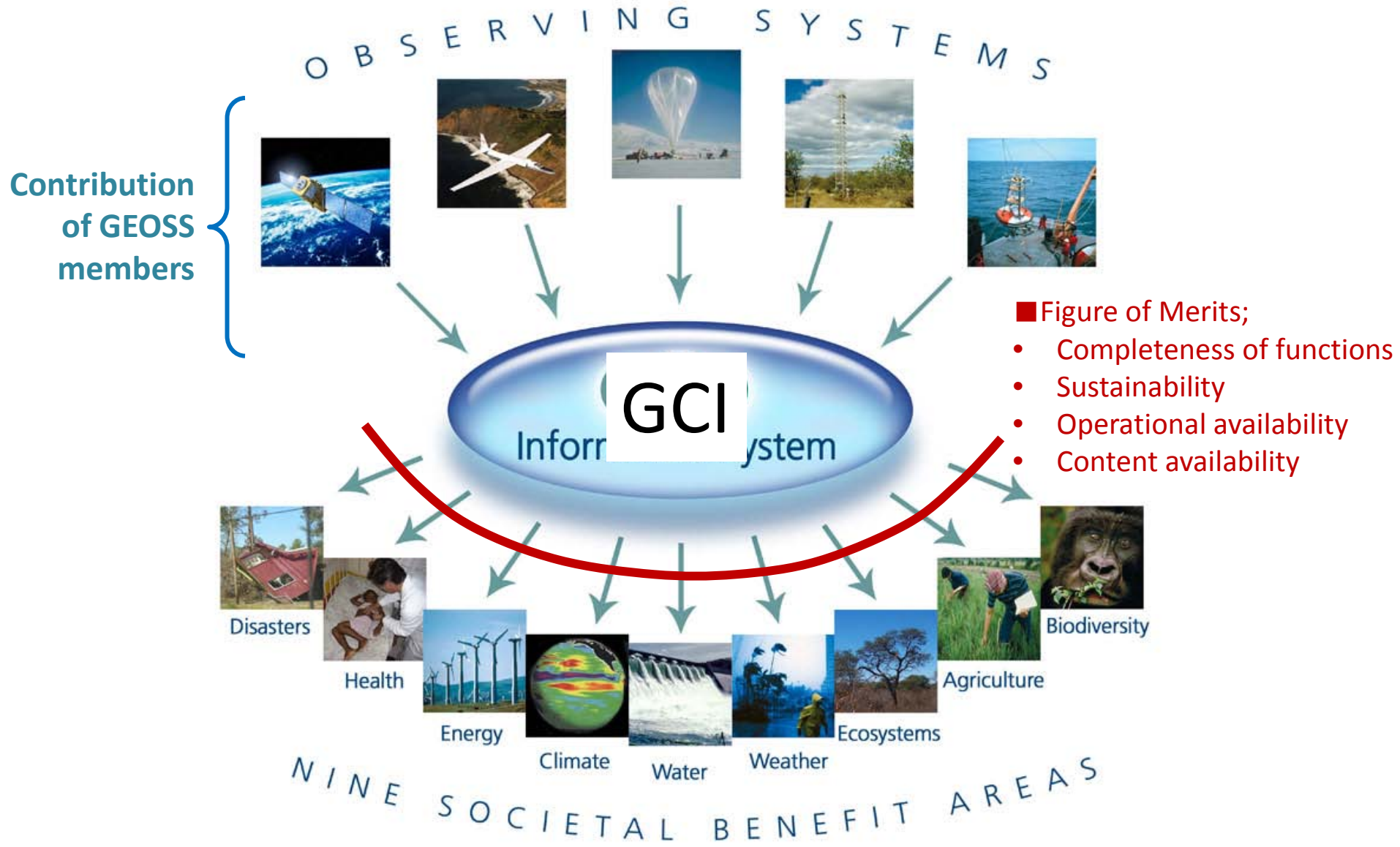
Decision-support tools to a wide variety of users



GCI: GEOSS Common Infrastructure



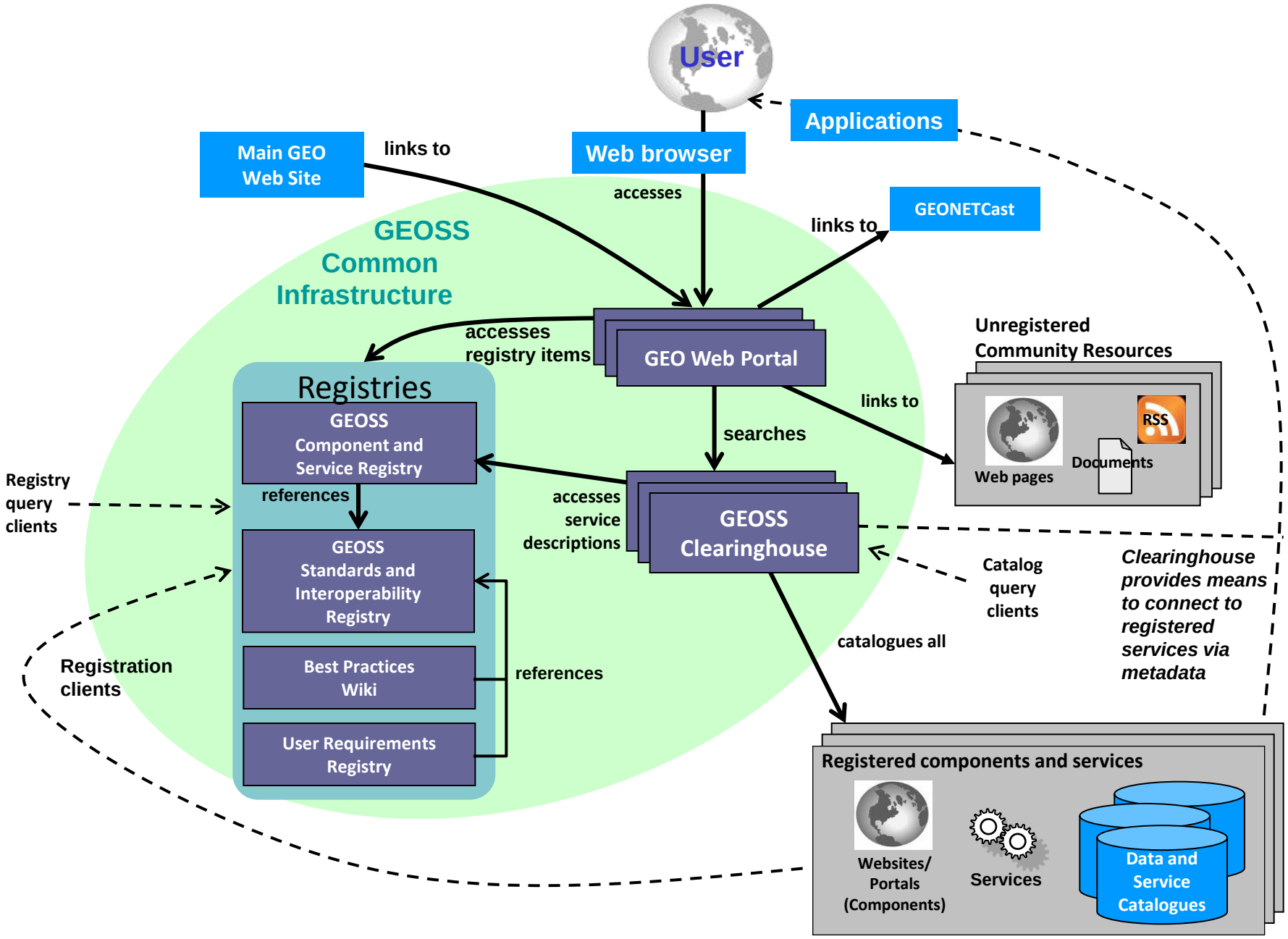
GEOSS Common Infrastructure (GCI)

Access
Search
Use

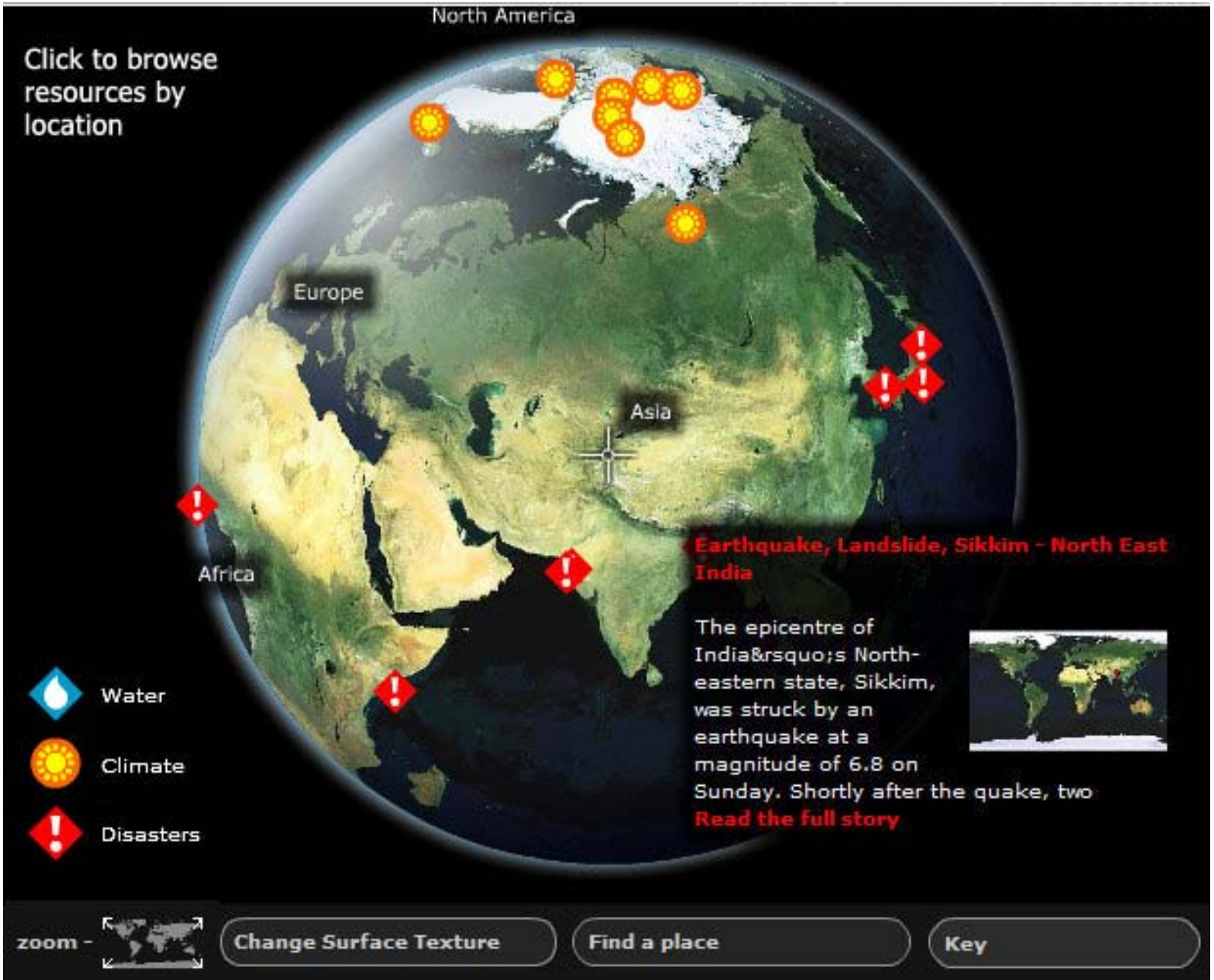
Data
Information
Tools
Services

Includes:

- Component and Service Registry
- Standards and Interoperability Registry
- User Requirements Registry (in development)
- Best Practices Wiki
- GEO Web Portals
- GEOSS Clearinghouse


User
Applications
Main GEO Web Site
links to
Web browser
accesses
GEONETCast
links to
GEOSS Common Infrastructure
accesses registry items
GEO Web Portal
Unregistered Community Resources
links to
Registries
GEOSS Component and Service Registry
searches
Registry query clients
references
accesses service descriptions
GEOSS Clearinghouse
Web pages
RSS
Documents
GEOSS Standards and Interoperability Registry
Catalog query clients
Clearinghouse provides means to connect to registered services via metadata
Best Practices Wiki
references
catalogues all
Registration clients
User Requirements Registry
Registered components and services
Websites/ Portals (Components)
Services
Data and Service Catalogues

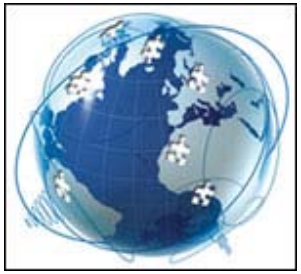
GEO Web Portals



GEO Web Portals

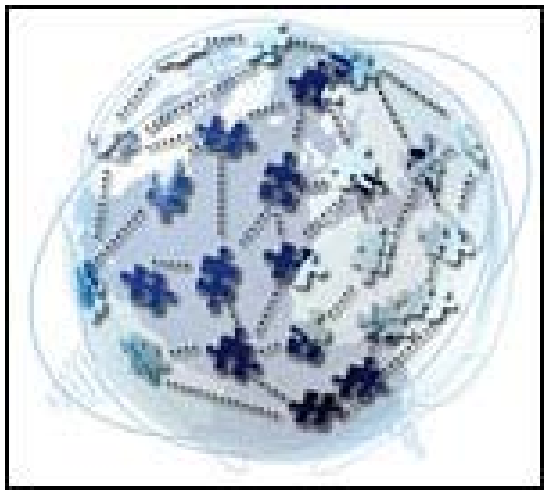
- Supports client access to catalogues, map services, and data services through standards-based interfaces
- Provides user interface for search on the GEOSS Registries
- Low/minimal cost of re-deployment, readily customizable and extensible
- Includes community management tools
- Content management capabilities including teaching materials, documents
- Ability to integrate and visualize disparate resources and services through Web Map Service and KML/RSS viewers
- Place to reference (link to) or host (embed portlets for) end-user support applications

Component and Service Registry



- Provide a formal listing and description of all the Earth observation systems, data sets, models and other services and tools that together constitute the Global Earth Observation System of Systems (GEOSS).
- These various components are being interlinked using standards and protocols that allow data and information from different sources to be integrated.
- The components and services listed on the Registry can be searched and explored by decision-makers, managers and other users of Earth observations via the GEO Portal.

Standards and interoperability Registry



GEOSS is building upon, and adding value to, planned and existing Earth observation systems by connecting them to one another. This requires making these systems and components interoperable, so that the data and information they produce can be pooled and combined.

GEOSS will become a system of systems by adopting appropriate standards for the interfaces through which the various GEOSS components exchange data and information.

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Standards and Interoperability Registry

- A collection of standards and community practices that are nominated through the registration process by GEO individuals
- Nominations are processed by the Standards and Interoperability Forum (SIF) and are classified as:
  - Standards: if maintained by a standards development organization, or
  - Special Arrangements: *ad hoc* community practices, methods, techniques
- Standards and Special Arrangements are established as a pick-list for use elsewhere in GEOSS and include IDs, names, descriptions, and links to the owning authority

GEOSS Clearinghouse

- An all-of-GEOSS search facility that provides Application Programme Interface (API) access to metadata on all services and systems from the Component and Service Registry
- Registered catalogue services, in turn, are inspected and their inventory of records is also made searchable
- Metadata may describe systems, services, data, documents, or more specific file types
- Access to Clearinghouse is provided through a search API based on OGC CSW 2.0.2 and is implemented by GEO Web Portals and other client applications

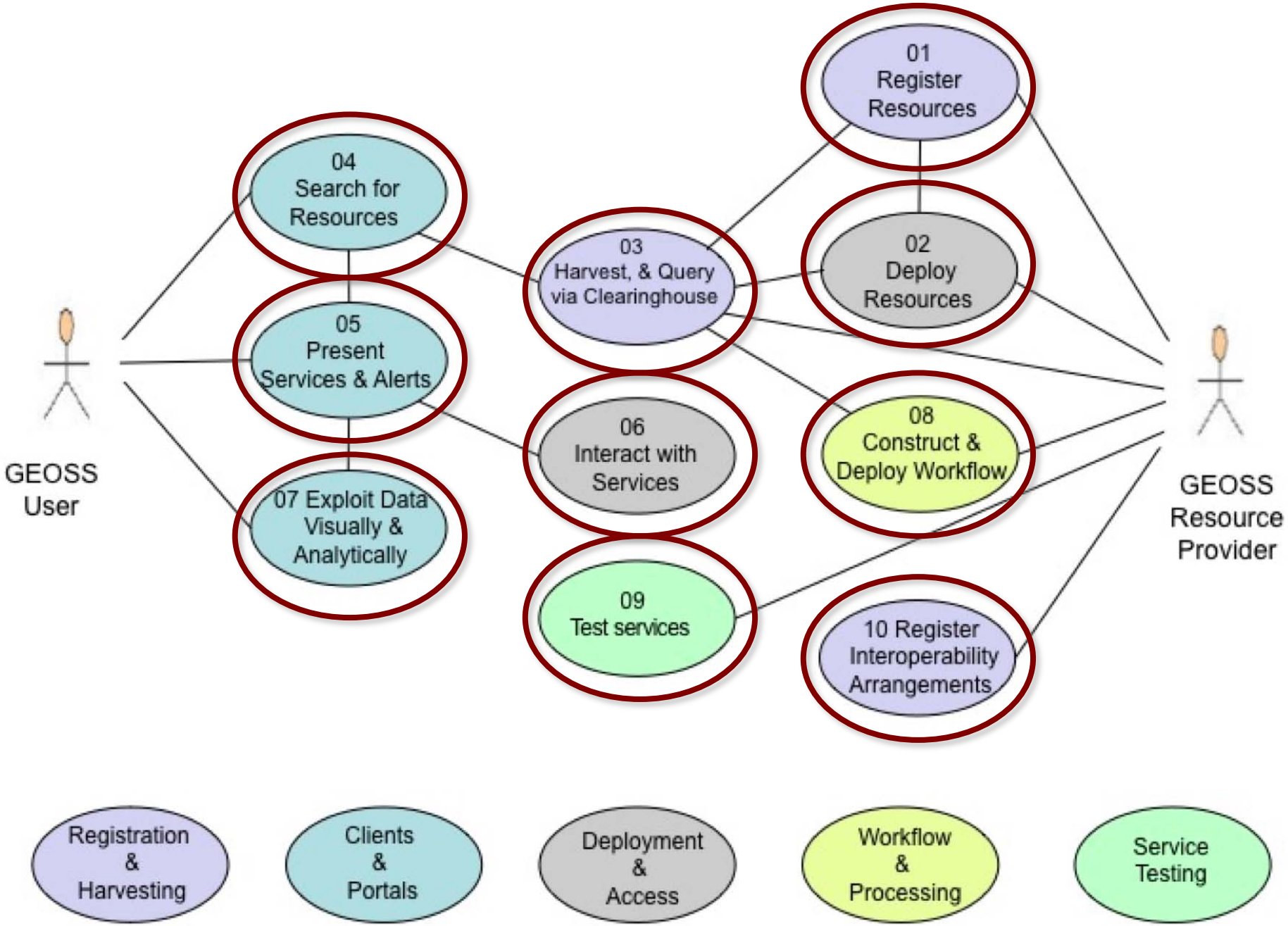
Best Practices Wiki

- View best practices
- Share registered service instances and standards

QA4EO Guidelines is here

User Requirements Registry

- Stores requirements by generalized user types that identify observables and their properties (e.g. values, quality, resolution, frequency, units of measure) with respect to a domain of application
- Matching of requirements to service offers can be made in the future as a common vocabulary of observables is developed for GEOSS to:
  - Identify coverage and popularity of observations, and
  - Identify gaps in coverage of observations


01
Register
Resources
04
Search for
Resources
03
Harvest, & Query
via Clearinghouse
02
Deploy
Resources
05
Present
Services & Alerts
06
Interact with
Services
08
Construct &
Deploy Workflow
07 Exploit Data
Visually &
Analytically
09
Test services
10 Register
Interoperability
Arrangements
GEOSS
User
GEOSS
Resource
Provider
Registration
&
Harvesting
Clients
&
Portals
Deployment
&
Access
Workflow
&
Processing
Service
Testing

User Context for GEOSS

- ***Publisher point of view*** – a GEO member or participating organization has a resource of interest to share with GEOSS
- ***User point of view*** – a potential consumer interested in finding information and services related to earth observation (ocean, land, atmosphere) data

Architecture and Data Committee (ADC) Achievements 2011

- Discovery and access (e.g. download) of broader and more heterogeneous EO data products with current technology
  - *"Sprint to Plenary (StP)"*
    - Prototyping of New GCI with EuroGEOSS, GENESI DEC and FedEO
    - Facilitating access to GEOSS Data CORE
  - Architecture Implementation Pilot (AIP)-4: supporting StP
    - Access to Priority EO Data Sources (direct data access)
    - Deployment of Clients and mediated components
  - Standard and Interoperability Forum (SIF)
    - Tutorial; *"How to use GEOSS"*
- *"Interoperability Assessment White Paper"* based on GCI analysis to provide a sound basis for the improvement plan
  - looking at problems with, and recommending resolutions for, the ways in which the GCI functions.

Monitoring and Evaluation (M&E) WG Report on Architecture and Data Management (ADM)

Planning and Management

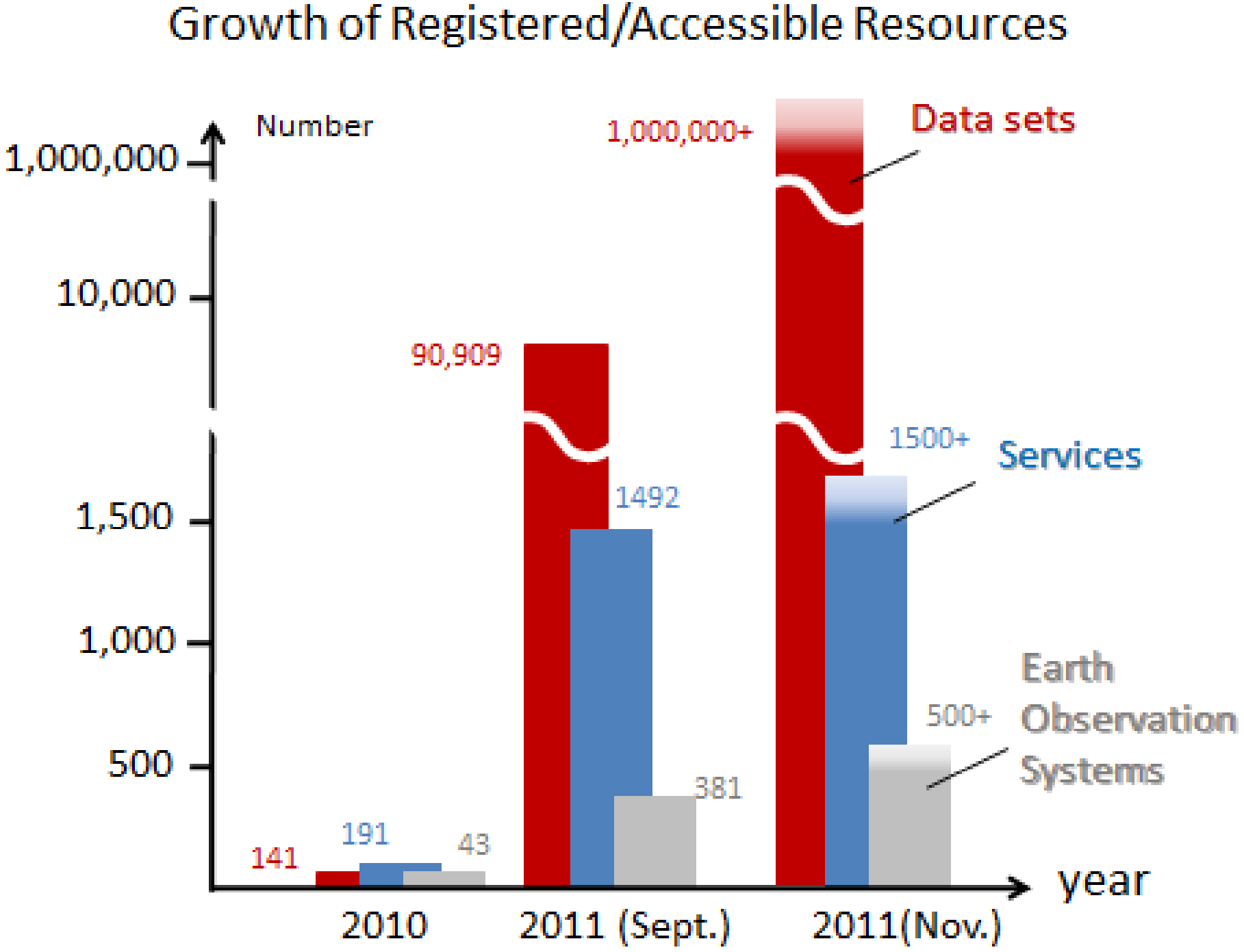
- No clear evidence that the ADM Strategic Targets will be met by 2015.
- No formal process for Gap Analysis between Targets and Tasks.
- The present progress report does not allow for a quantitative evaluation of progress.

Technical

- User Interface is difficult to use.
- No consistent way that data are registered, stored and accessed.
- Lack of Systems Engineering Rigor.
- Technology employed is not current.
- Data may exist but difficult to find.

Communication

- The GEOSS capabilities are not well communicated to global community.
- Commercial and intellectual property rights are perceived as a barrier to publishing data in GEOSS.


Growth of Registered/Accessible Resources
Number
1,000,000
10,000
1,500
1,000
500
1,000,000+
Data sets
90,909
1492
1500+
Services
141
191
43
381
500+
Earth Observation Systems
year
2010
2011 (Sept.)
2011(Nov.)

Next Steps for ADC

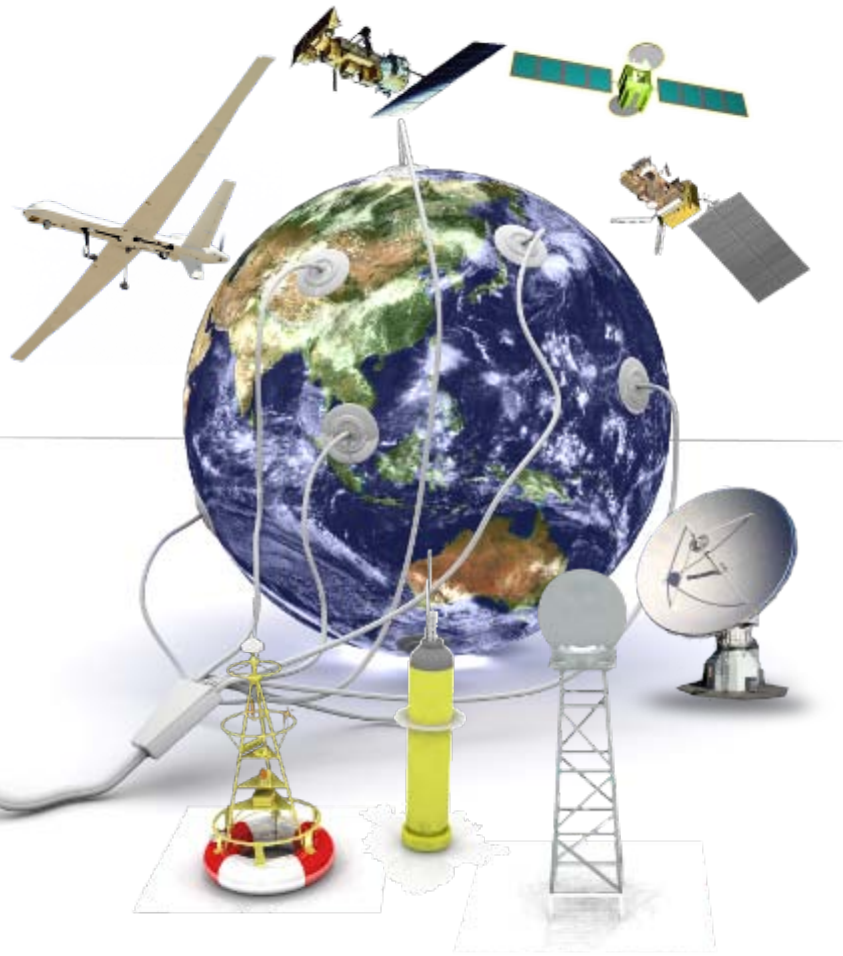
- Establish "Action Plan" for 2015 with clear definition of targets, milestones of ADM tasks.
- Support the following overarching activities with the other committees or implementation boards
  - Improve task reporting system to enable quantitative evaluation of progress
  - Conduct Gap Analysis
    - ADC can provide a part of necessary information using registries of data/service resources and user requirements.
  - Create a communication plan (e.g. Tutorial on "How to use GEOSS")
  - Enhance "raising-awareness" activities for the implementation of the GEOSS Data Sharing Action Plan.

Data Sharing Task Force (DSTF) Work

- Legal interoperability research
- Legal liability research
- Studying licensing frameworks consistent with GEOSS Data-CORE
- Continuing to reach out and collect data provider pledges to GEOSS Data-CORE
- Reaching out to ADC regarding the registration of these pledges

GEO Data Sharing Principles

- **Full and Open Exchange of Data, recognizing Relevant International Instruments and National Policies**
- **Data and Products at Minimum Time delay and Minimum Cost**
- **Free of Charge or minimal Cost for Research and Education**



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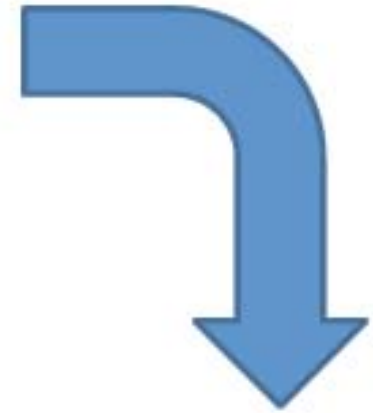
GEOSS Data-CORE list

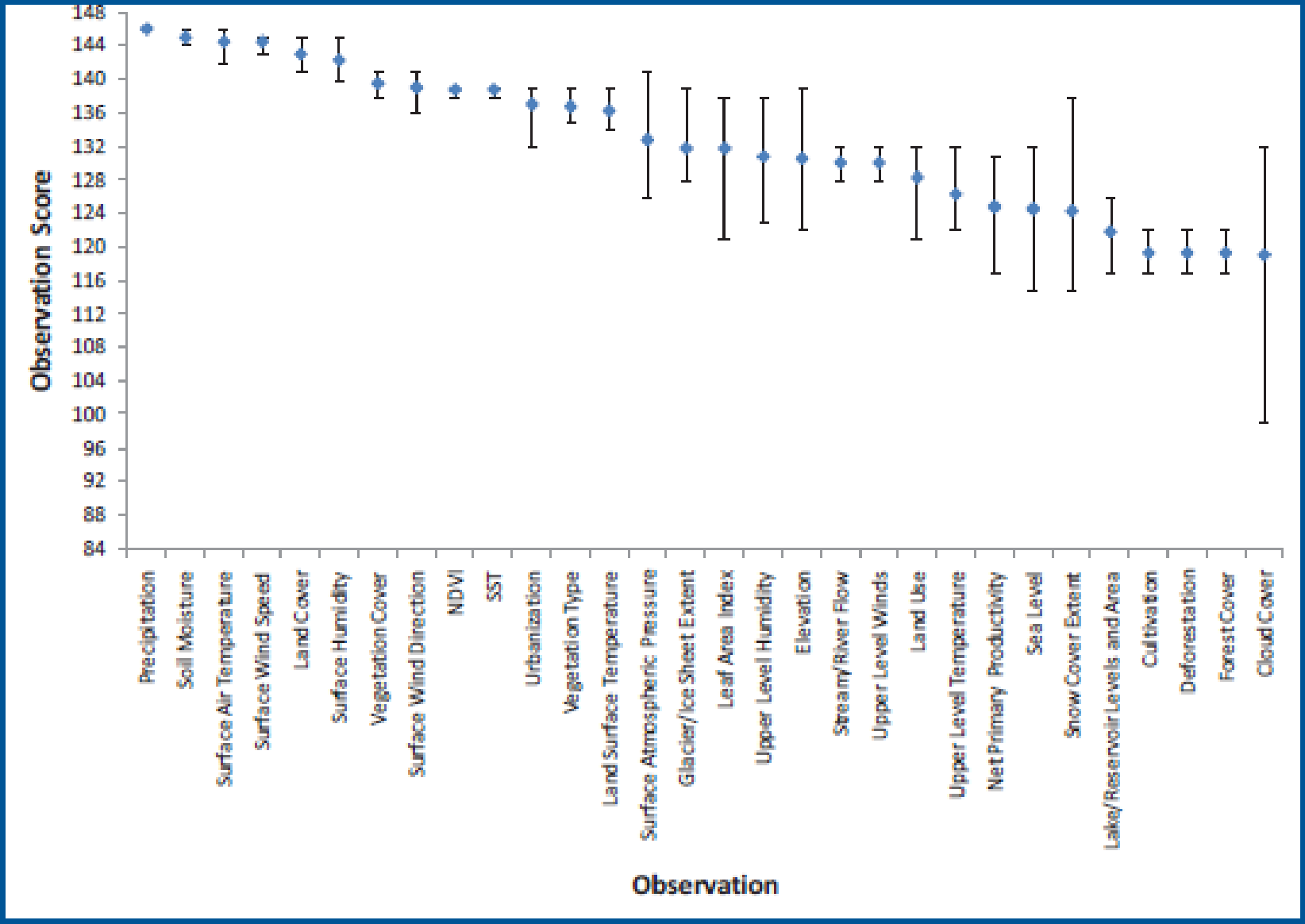
Resource Name	Description	GEO Member/PO	Responsible Organization
Datasets registered in the Global Change Master Directory (GCMD)	The GCMD/CEOS IDN, already registered in the GCI, contains US agency datasets that are contributions to the GEOSS Data-CORE. These have been "tagged" by the GCMD according to USGEO member agency contributions. The total number of unique entries in the GCMD contributed by USGEO to the GEOSS Data-CORE is 8,026. (See attached spreadsheet)	US	USGEO
Carbon Dioxide Information Analysis Center (CDIAC)	Included in GCMD above	US	Department of Energy
AIRNow	Included in GCMD above	US	EPA
Standard Earth science products	Included in GCMD above	US	NASA
NOAA datasets	e.g. Integrated Ocean Observing System and the Argo global ocean array of free-drifting profiling floats (included in GCMD above)	US	NOAA
Foreign Agriculture Service Crop Explorer interface	Included in GCMD above	US	DoA
Global Seismographic Network (GSN)	The IRIS Data Management System is comprised of eight nodes of data collection centers and a Data Management Center (DMC) that provides open and easy access to all IRIS data holdings and data products along with even larger quantities of other seismological data and virtual pathways to international data archives at no cost. (included in GCMD above)	US	Incorporated Research Institutions for Seismology (IRIS)

“New” GCI

System of Systems



30 Highest-Ranked Earth Observations by Cross-SBA Score



Discovery by EO parameters

Steps in the “New” GCI

- Discovery by EO parameters
  EO parameters
- Resources categorization
  Location and time
- GEOSSDataCore
  Data
- Drilling down a catalogue
  Search in the collection
- Viewing the data
- Improved Data Access
- Semantic Search capabilities
  More search

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GEO 2012-2015 WORK PLAN

(i) Target-Driven Approach – Targets to Tasks

(ii) 3-Part Structure

"Infrastructure"

"Institutions and Development"

"Information for Societal Benefits"

(iii) Streamlined Number of Tasks

26 Tasks implemented by Components

(iv) Improved Work Plan Management

GEO 2012-2015 WORK PLAN

Infrastructure

Description

- Promote and coordinate surface-based and space-based observing systems to provide long-term continuous observations of all components of the Earth.
- Ensure that the Earth and its physical processes are monitored globally across spatial and temporal scales.
- Identify critical gaps in existing observational networks with particular focus on: the needs of developing countries, the need for continuity of observations, the need for increased development of in-situ networks, and the potential benefits of enhanced observing systems.
- Individual Earth observing systems operated by national, regional and international entities are integral to GEOSS.

GEO 2012-2015 WORK PLAN
Proposed Structure

INFRASTRUCTURE

IN-01 Earth Observing Systems

Mix of space-based, airborne and in-situ observing platforms enabled by the interoperability framework

C1 Development, Maintenance and Coordination of Surface-based Observing Networks

C2 Development and Coordination of Space-based Observing Systems

C3 Advocacy and Coordination across Surface- and Space-based Observing Systems

C4 Radio-Frequency Protection

GEO 2012-2015 WORK PLAN
Proposed Structure

INFRASTRUCTURE

IN-02 Earth Data Sets

Enhancement of local data to the global data and support development and harmonization of global data

C1 Advances in Life-cycle Data Management (QA4EO)

C2 Development of Regional/Global Information and Cross-cutting Datasets

GEO 2012-2015 WORK PLAN
Proposed Structure

INFRASTRUCTURE

IN-03 GEOSS Common Infrastructure

Establishment of user-friendly and user-accessible GCI

C1 Evolution and Enhancement of the GEOSS Common Infrastructure (GCI)

C2 Operations and Maintenance of GCI Components

GEO 2012-2015 WORK PLAN
Proposed Structure

INFRASTRUCTURE

IN-04 GEOSS Communication Networks

Timely and reliable data access in any place, especially in developing countries

C1 Worldwide Communication Network of Networks

C2 GEONETCast

GEO 2012-2015 WORK PLAN
Proposed Structure

INFRASTRUCTURE

IN-05 GEOSS Design and Interoperability

Updates GEOSS with the evolution of technology

C1 Technical Design of GEOSS and Contributed Resources

GEO 2012-2015 WORK PLAN

Institutions and Development

Description

- Support and advance the Declaration of the Group on Earth Observations Ministerial Summit in Beijing, China (2010), which committed to:

(i) Maximize the number of documented datasets made available on the basis of full and open access;

(ii) Create the GEOSS Data Collection of Open Resources for Everyone (GEOSS Data CORE), a distributed pool of documented datasets with full, open and unrestricted access at no more than the cost of reproduction and distribution; and

(iii) Develop flexible national and international policy frameworks to ensure that a more open data environment is implemented.

GEO 2012-2015 WORK PLAN

Information for Societal Benefits

Description

- Provide sustained ocean observations and information to underpin the development, and assess the efficacy, of global-change adaptation measures.
- Improve the global coverage and data accuracy of coastal and open-ocean observing systems.
- Coordinate and promote the gathering, processing, and analysis of ocean observations.
- Develop a global operational ocean forecasting network.
- Establish a global ocean information system by making observations and information, generated on a routine basis, available through the GEOSS Common Infrastructure.
- Provide advanced training in ocean observations, especially for developing countries.
- Raise awareness of biodiversity issues in the ocean.

GEO-VIII Plenary in Istanbul, Turkey

15-17 November, 2011

ADC Demonstration

GEO ADC sprints to the Plenary

Demonstration :

GCI link with EuroGEOSS and GENESI-DEC, showing capability of infrastructure, benefits for wide audiences

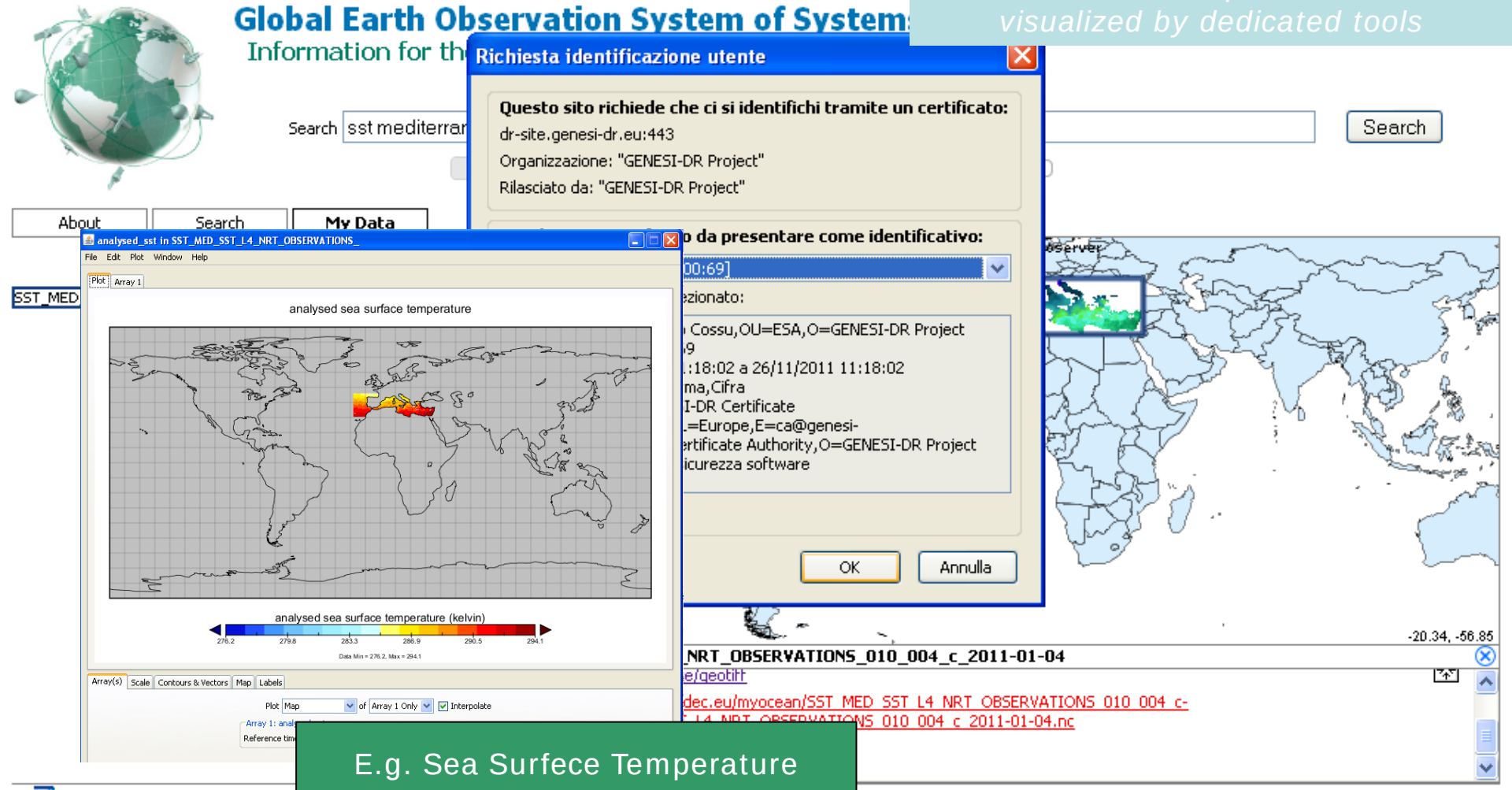
Target: Policy making and decision

Tentative Program (30 minutes in total):

- **Introduction**
- **Two senarios including disaster by video demo**
- **Recap**
- **Open discussion**

Demo Setup
Data Handling Tools

The downloaded product can be visualized by dedicated tools



E.g. Sea Surfece Temperature

powered by gridify - © 2006 - 2011 Terradue srl.

This is the end of my presentation

I hope you join the Plenary and discover the progress of GCI

Thank you for your attention