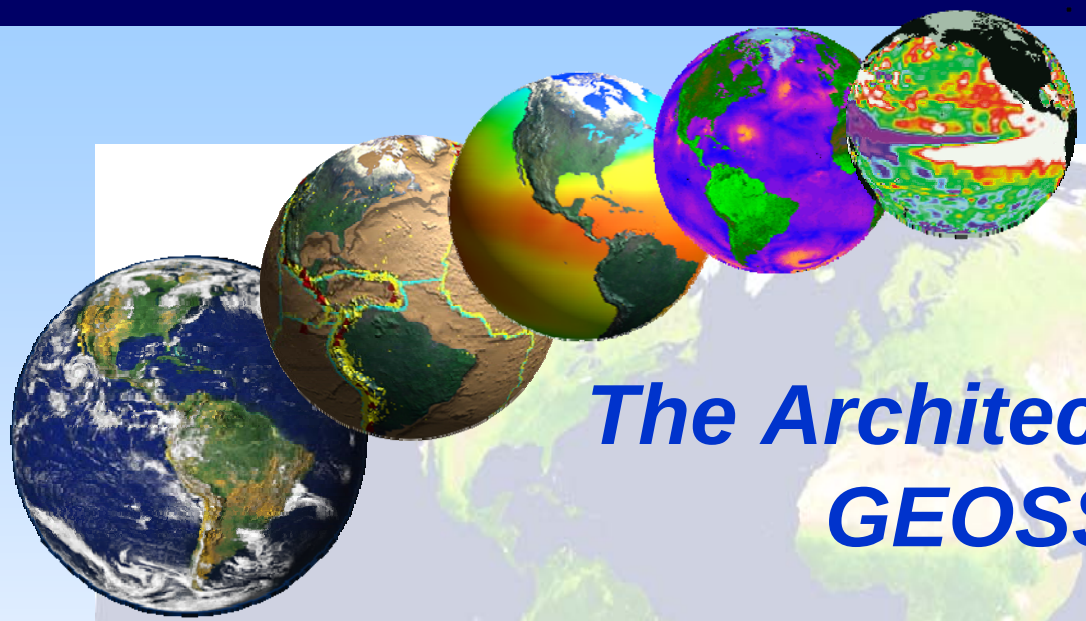
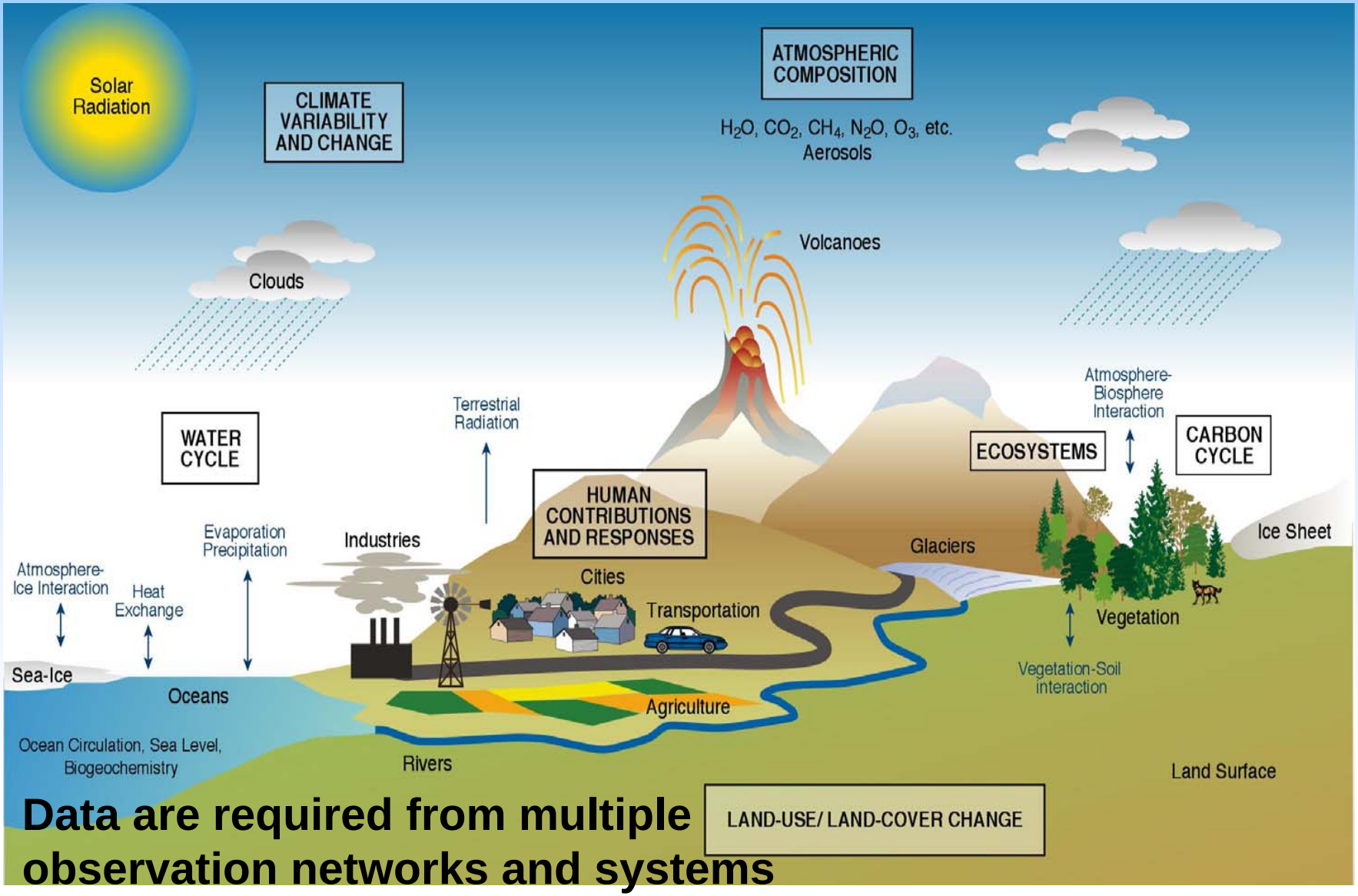


The Architecture of GEOSS

Doug Nebert
U.S. Geological Survey
GEOSS Architecture and Data Committee

The Earth is a complex system of systems



Data are required from multiple observation networks and systems

What is a "System of Systems?"

- *Definition:*

  A System-of-Systems (SoS) is a "super-system" comprised of elements that are themselves complex, independent systems which interact to achieve a common goal.

- *Common Characteristics:*
  - The component systems achieve well-defined objectives for purposes in their own right even if detached from the overall system
  - The component systems are managed in large part for their own
  - It exhibits behavior, including emergent behavior, not achievable by the component systems acting independently
  - Component systems, functions, and behaviors may be added or removed during its use

Not just a large, complex system

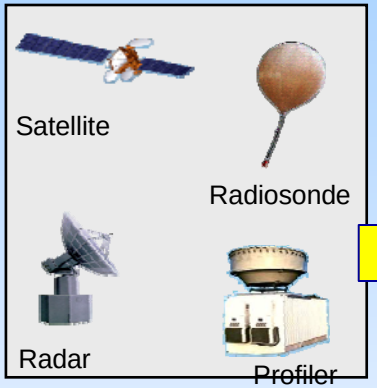
Constructed of Independent systems

Value of the synergy

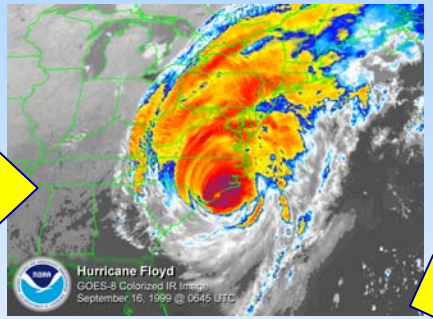
Dynamic, open environment

SoS Example - Weather Ocean and First Responders Systems

Measurements & Analysis



System Products



Responders' Information

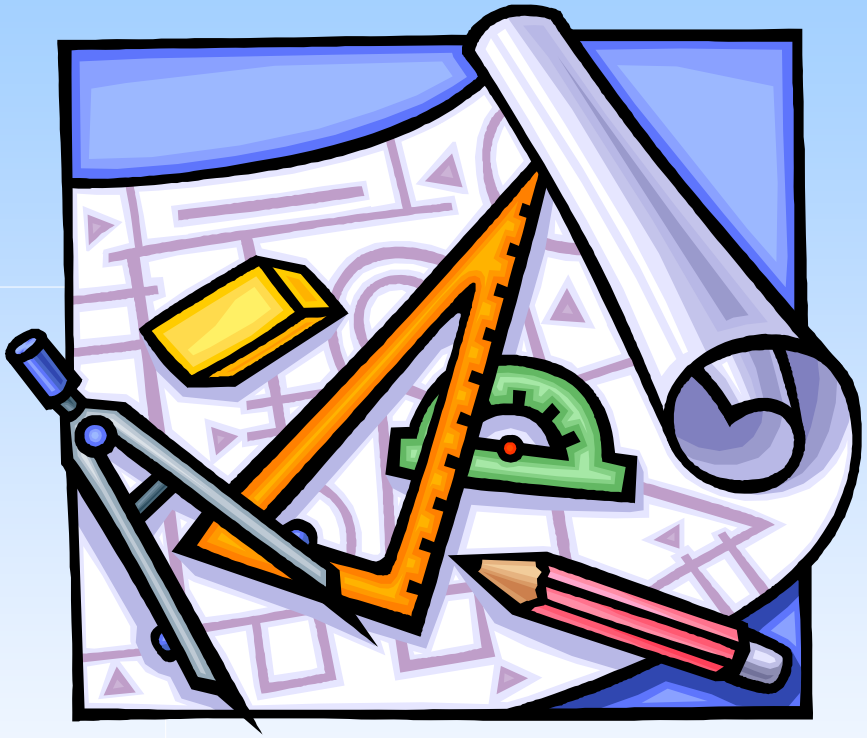
Integrated Storm Impact & Response

Weather Systems

California Pictures

Ocean State Systems

Interoperability Objective



What few things must be the same so that everything else can be different?

GEOSS Challenges

- Interoperability – what is it and how do we address it
- Integration of Human factors – broader influence means more impacts
- Dynamic participation
- End to end integration – what does it mean??
- Multiple ownership/prioritization
- Understanding system of systems concepts

Differences in scope

Corporate SoS

Uniformity of objectives

- Single corporate direction
- Cultural "uniformity"
- Common Technology
- Data standards and quality established
- Process for encouraging or enforcing participation

GEOSS

Disparate motivations

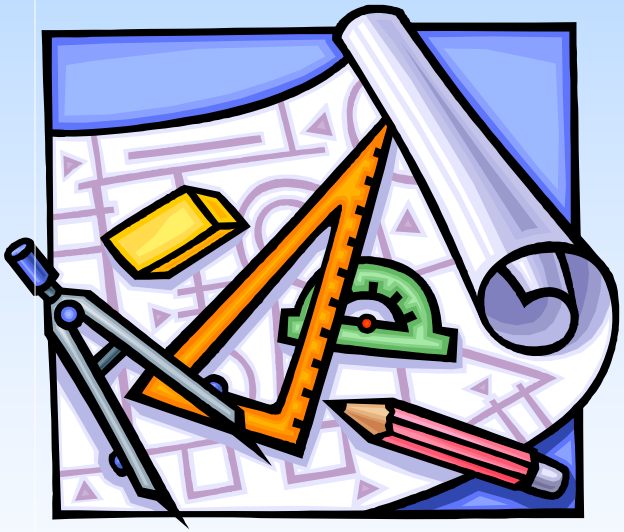
- Competing agendas
- Diverse backgrounds
- Varying technology levels
- Multiple views of data standards and quality

Architecture and Interoperability Approach

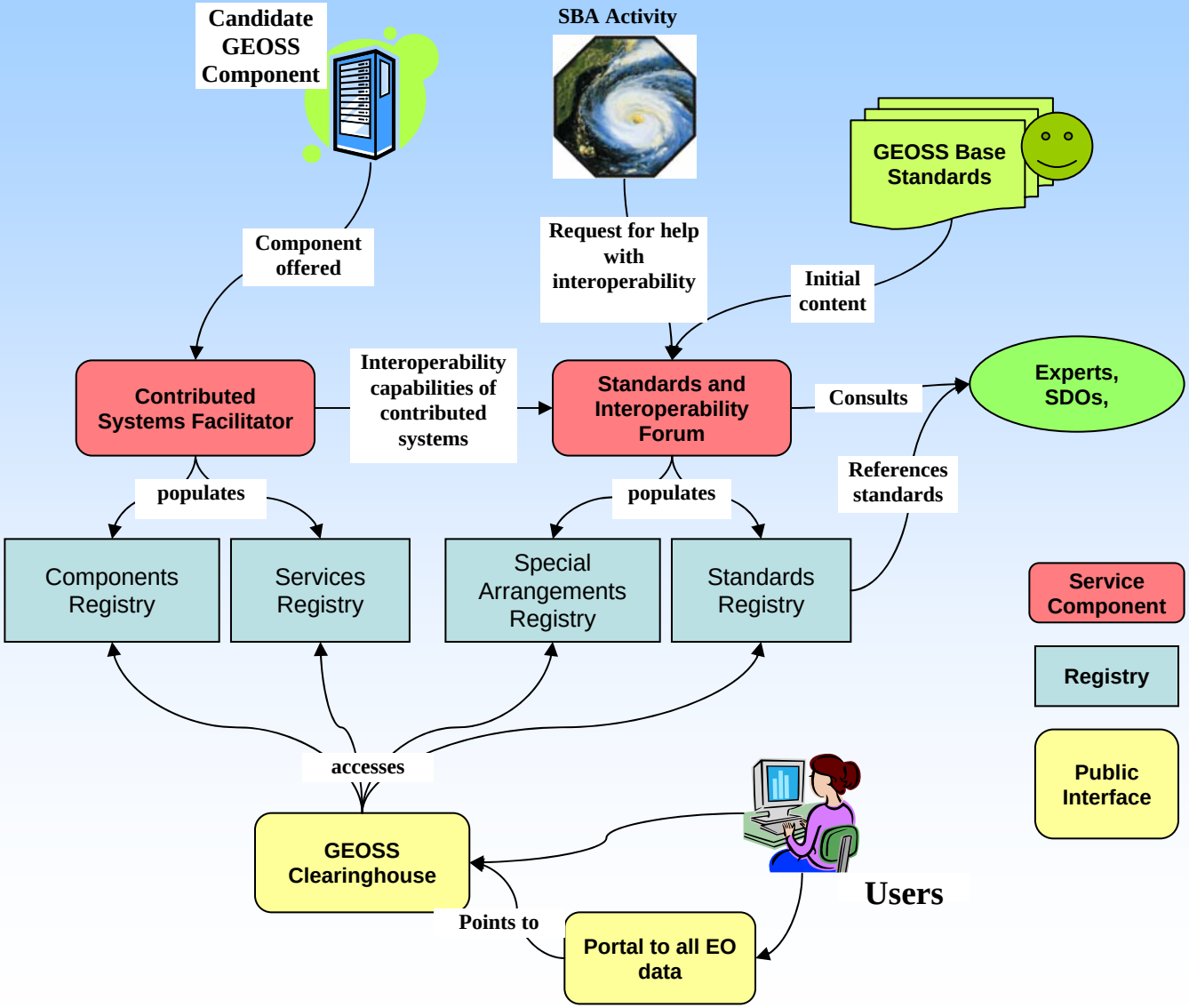
- Build a flexible architecture and Integration framework on a set of reusable components
- Leverage existing external and internal standards, architectures, and models
- Capture future capabilities through open architecture
- Support wide range of processes and environments
- Integrate development through a service oriented architecture (SOA)

Architecture Implementation Objectives - 2006-7

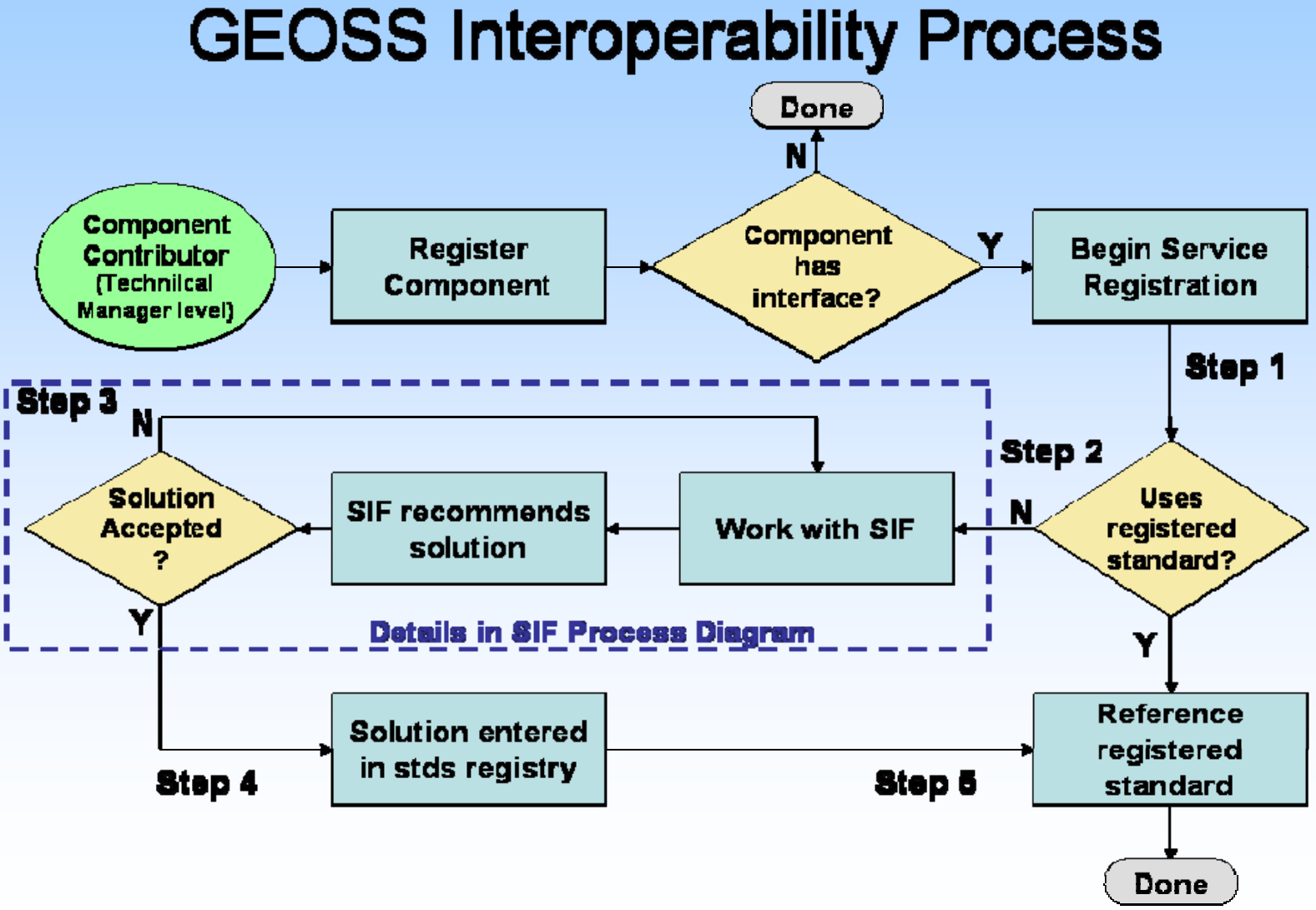
- Create an interoperability structure
- Implement Registries for Components, Services, and Standards
- Identify web portal technology capabilities
- Develop a clearinghouse for data and information
- Prototype GEOSS architecture through applied scenarios



Core Architecture



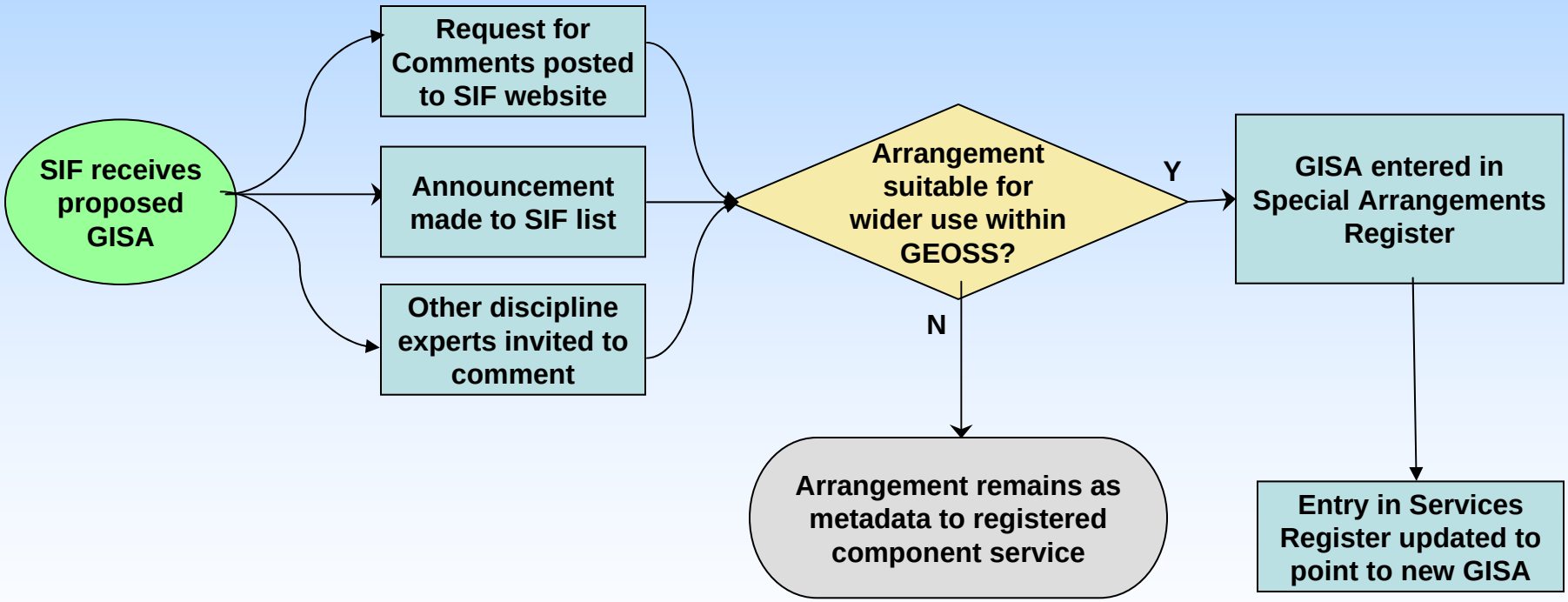
Interoperability



The Standards and Interoperability Forum

- **Provides advice, expertise and impartial guidance on issues relating to standards and interoperability" for GEOSS.**
- **Its objectives include:**
  - help in the identification and adoption of standards required to achieve GEOSS interoperability objectives
  - facilitate cooperation among the many organizations, and national agencies of member countries, in selecting, developing and using standards applicable to GEOSS
  - support education and outreach for international participants and help increase technical and public awareness

Standards and Interoperability Forum Process



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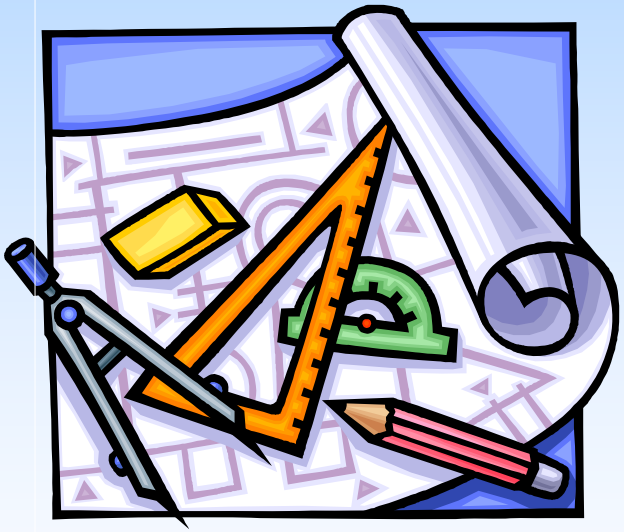
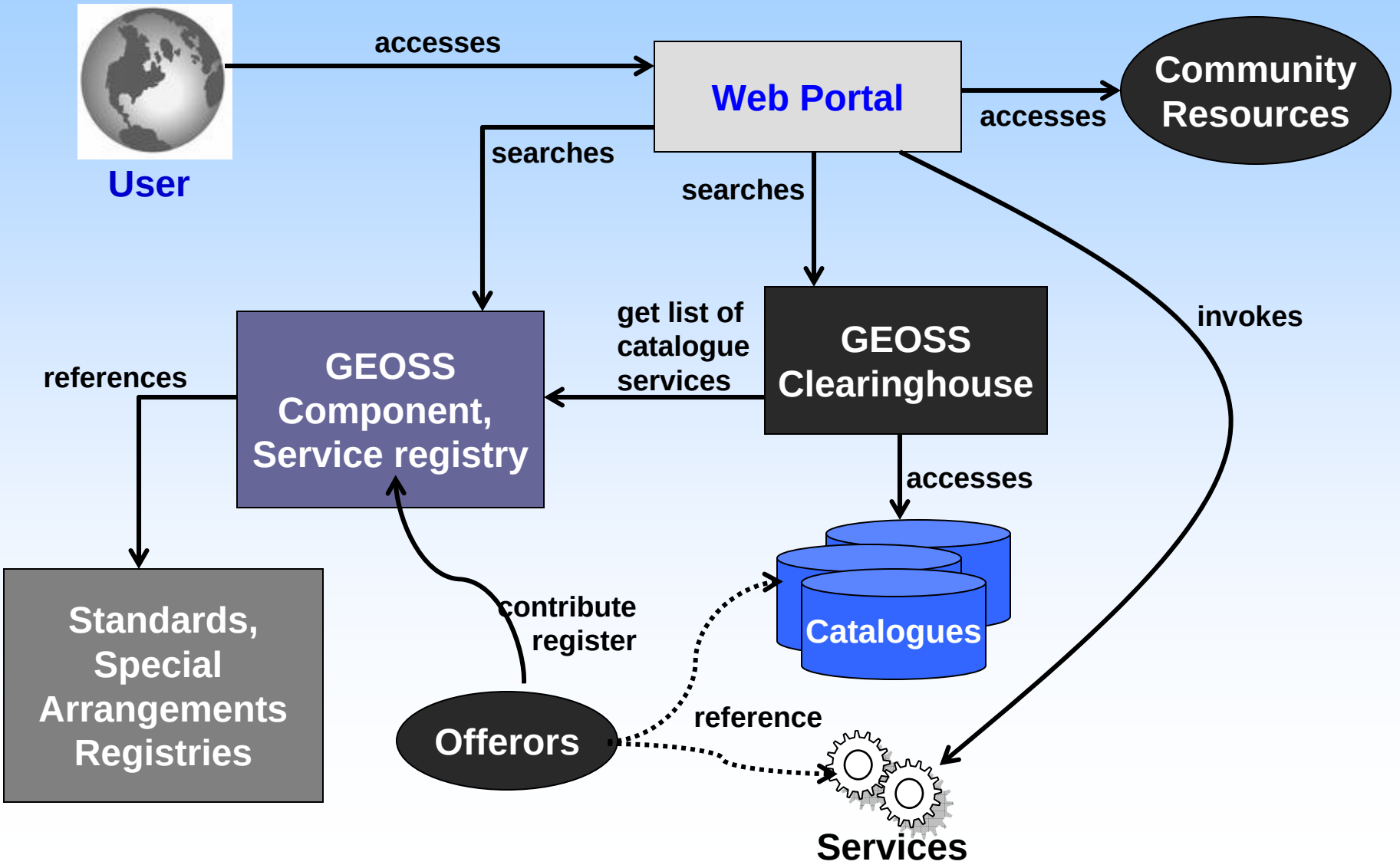


Registries Context



GROUP ON EARTH OBSERVATIONS

Welcome ddnebert [logout]

GEOSS Registry Publication Portal

Feedback for this page

GEOSS Component Registration

* Required Fields

Component Basic Infomation

Component Name*:	U.S. Geospatial One-Stop
Abbreviation:	geodata.gov
Description*:	This Component provides comprehensive access to U.S. geospatial data and services. It enables publishing of data sets through the collection or harvest of descriptive metadata and enables search and visualization of geospatial data through certain standards-based services.
GEO Sponsor*:	United States
Responsible Organisation:	U.S. Geological Survey
URL to Component Information:	http://geodata.gov

Register Information on Component

Component Contact Information

Contact Name*:	User Support
Contact Email*:	support@geodata.gov

Register Information on Services (1/2)

GROUP ON EARTH OBSERVATIONS

GEOS

Feedback for this page

GEOSS Service Instance Registration

* Required Fields

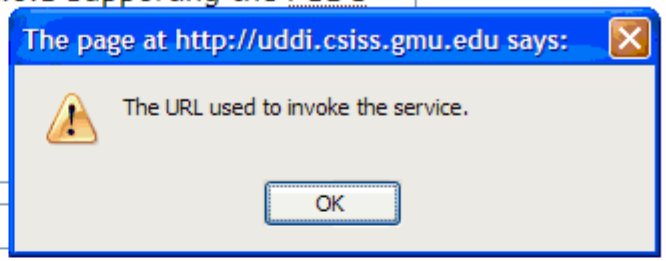
Service Basic Infomation

Component ID*: urn:uuid:4509b59b-ce95-4d71-ae1c-a7dc04867606

Service Instance Name*: Geospatial One Stop Catalog Service (OGC CSW FGDC)

Abbreviation: gos-csw

Description*: This interface provides standard access to the Geospatial One Stop national metadata catalog through the Open Geospatial Consortium (OGC) Catalogue Service interface, Version 2.0.1 supporting the FGDC Profile.



Information URL*: http://geodata.gov

Interface URL* : ta.gov/aimscsw/csw2.0?service=CSW&request=getcapabilities

Service Contact Information

Contact Name*: User Support

Contact Email*: support@geodata.gov

Service Geographic Extent (Click in the box to enter value in decimal format, e.g. 37.234)

- Service Geographic Extent is specified in EPSG:4326

Architecture Implementation Objectives - 2006-7

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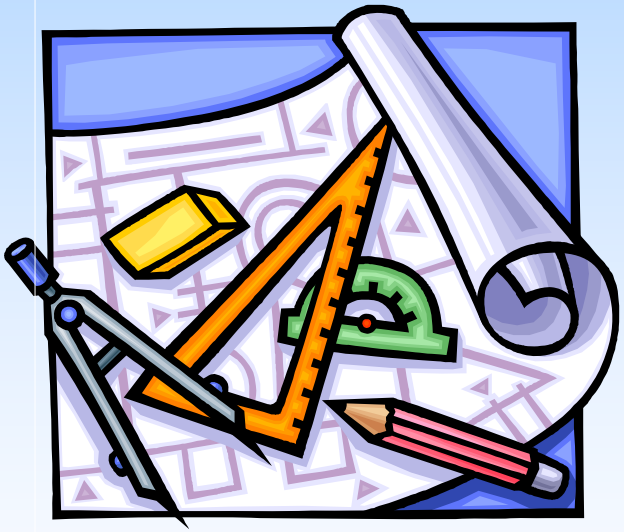
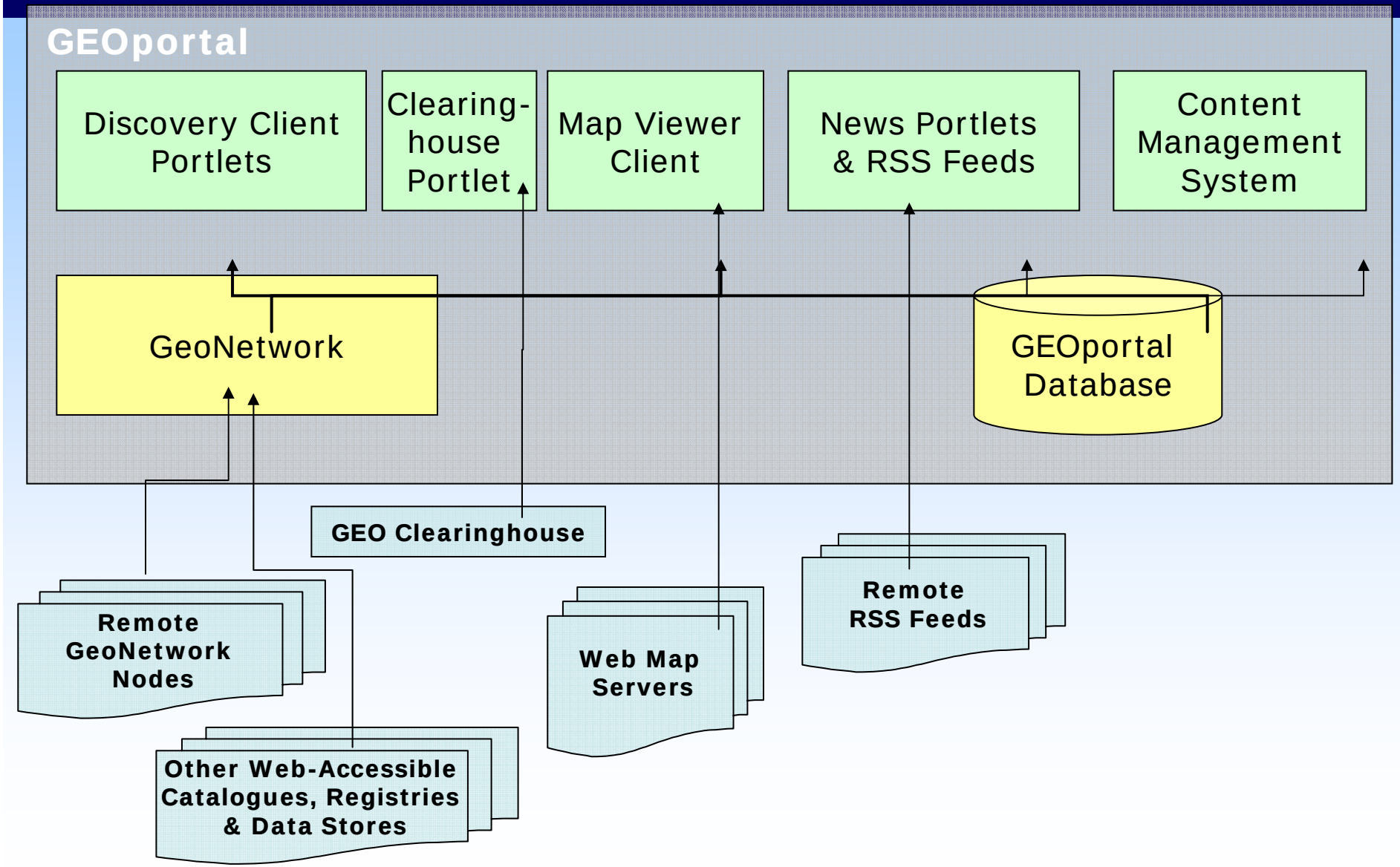


GEOportal Architecture



ICEO
IEEE Committee on Earth Observation

IEEE

GEOSS Architecture

GROUP ON EARTH OBSERVATIONS

Component Register

The following table details the major events associated with this CFP:

CFP Issued	13 April 2007
CFP Responses Due	11 May 2007
Kickoff Meeting at ESA-ESRIN, Frascati, Italy	5-6 June 2007
Demonstration, Washington DC, USA	September 2007
EO Summit and GEO Plenary, Cape Town, South Africa	November 2007

Architecture Implementation Objectives - 2006-7

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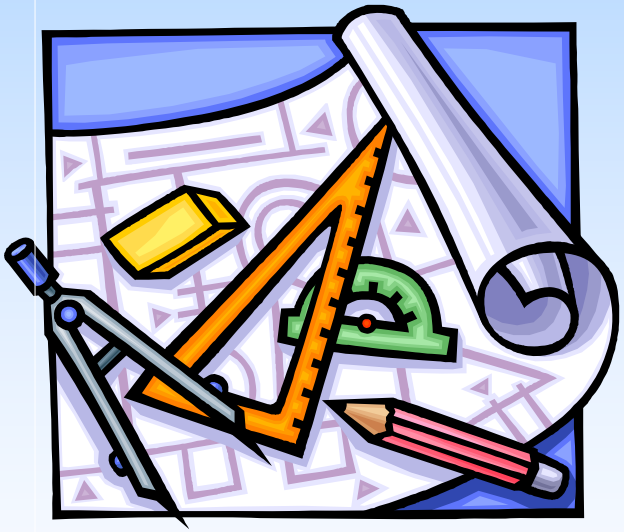
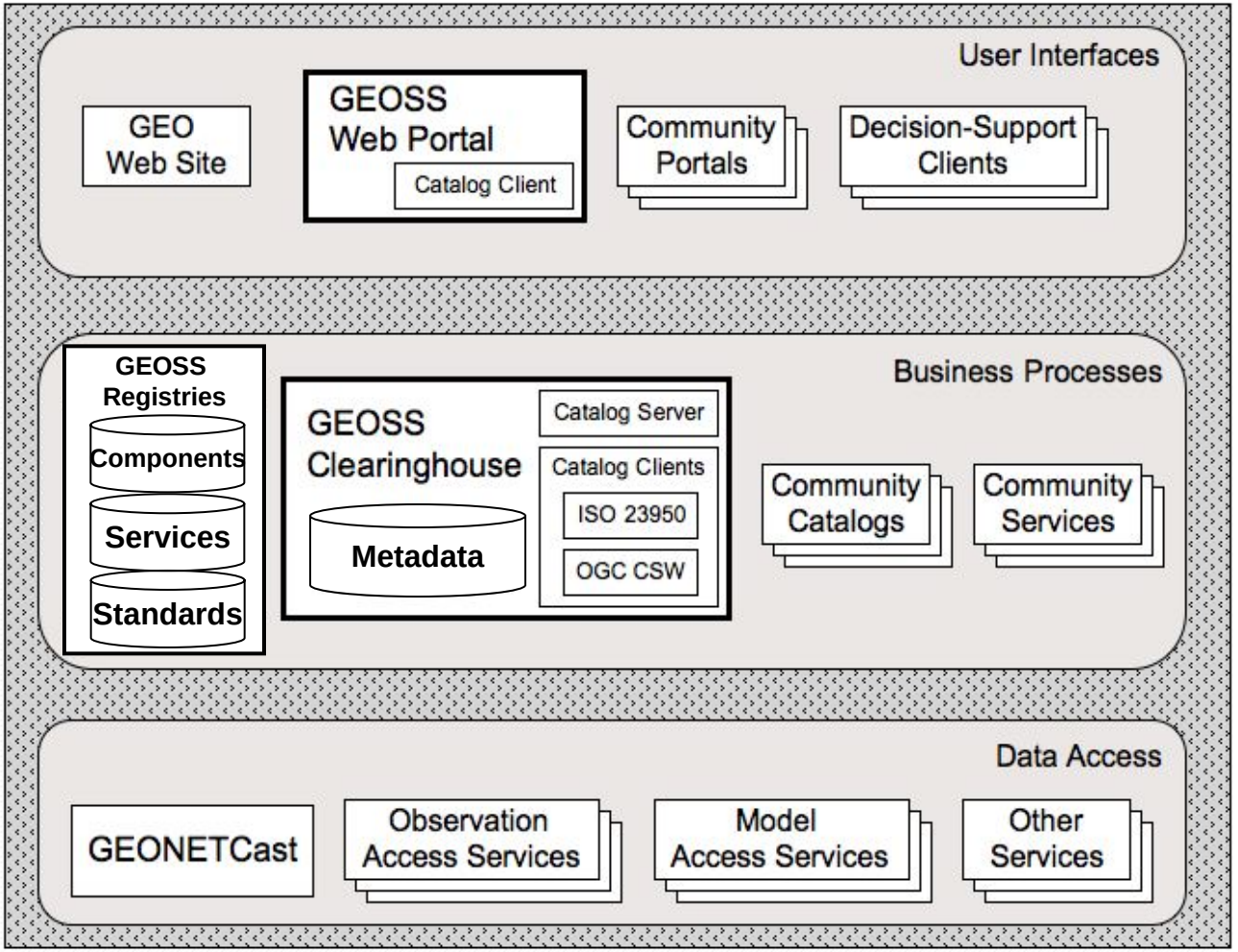


GEOSS Notional Architecture



Documentation for contributors

Contributing to and Benefiting from GEOSS, the Global Earth Observations System of Systems

Strategic Guidance for current and potential contributors

Purpose of this Document: This document answers strategic questions for current or potential contributors of GEOSS systems, from the perspective of high-level systems architecture and data management. A companion 'Tactical Guidance' document provides more technical information for managers and implementors of systems, data centres, etc. For additional information about GEO and GEOSS, see http://earthobservations.org

What is the Global Earth Observations System of Systems (GEOSS)?

As a "system of systems", GEOSS is composed of contributed Earth Observation systems, ranging from primary data collection systems to systems concerned with the creation and distribution of information products. Although all GEOSS systems continue to operate within their own mandates, GEOSS systems can leverage each other so that the overall GEOSS becomes much more than the sum of its component systems. This synergy develops as each contributor supports common arrangements designed to make shared observations and products more accessible, comparable, and understandable.

How is GEOSS managed by the Group on Earth Observations (GEO)?

GEOSS is overseen by the Group on Earth Observations (GEO), an intergovernmental organization at the ministerial level. The GEO vision is to realize a future wherein decisions and actions for the benefit of humankind are informed via

D R A F T

Contributing to and Benefiting from GEOSS, the Global Earth Observations System of Systems

Tactical Guidance for current and potential contributors

urpose of this Document: *This short document is for technical managers (eg of rmation systems or data centres) seeking to contribute to and benefit from the GEOSS - xplains the 'interoperability process' to be followed to ensure that systems are compatible uitably interfaced to the GEOSS. A companion 'Strategic Guidance' document provides -level advice on systems architecture and data management. For additional information about GEO and GEOSS see http://earthobservations.org*

duction

erall GEOSS is a federated system that grows ever more useful over time as stituent GEO Members and Participating Organizations link their contributed S components together. More details may be found in the "Strategic nce" document.

GEOSS Components and Services need to be registered respectively in the onent Registry and the Service Registry. This registration process for the new nents & services provided by the GEO Members and Participating zations is described further down in the present document. Following the ation, the components & services need to be linked to the existing GEOSS s (they are not linked to systems as much as they are accessible from a ized or distributed portal/clearinghouse through interoperability ements) respecting some constraints like the interoperability standards or the

Architecture Implementation Objectives - 2006-7

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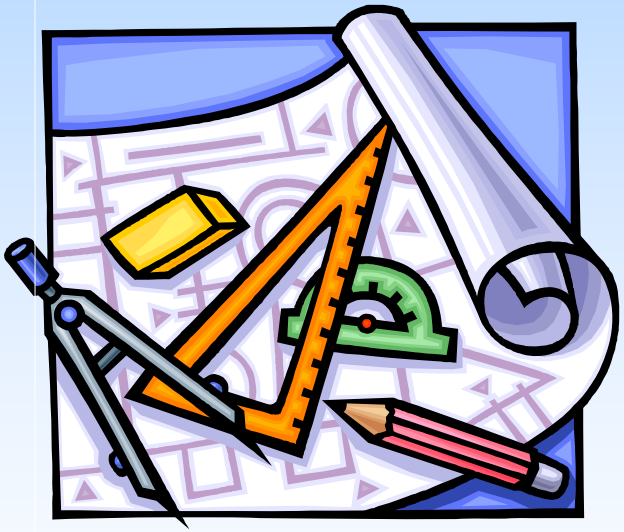


Prototyping through scenarios

- **Architecture Implementation Pilots**
  - Scenario-based test of the GEOSS architecture underway with 50 participating organizations
  - Scenarios will exercise GEOSS Registries, data and services discovery, visualization, and decision support using a variety of client applications
- **IP3**
  - Interoperability Process Pilot Project (IP3)
  - Biodiversity, Seismology, WTF-CEOP, WMO WIS

Potential Plans 2008-9 more details (1)

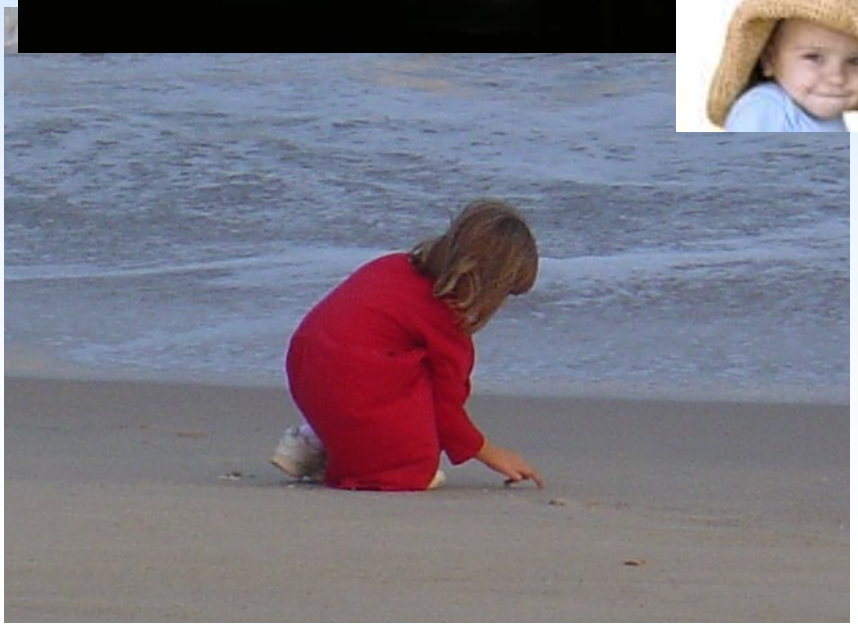
- **Operations**
  - **Institute Operational Capability – Phases 1,2**
    Portal, Clearinghouse, SIF, Registries
  - **Maintain Reference Cases – IP3, …**

- **Interoperability**
  - **Metadata, data harmonization**
  - **Quality Assurance approach and processes**
  - **Data Sharing Principles**

Potential Plans 2008-9 more details (2)

- **Horizontal Development**
  - **Observations – sensor web, virtual constellations, imaging spectrometry**
  - **Advanced Data Management Approaches**
  - **Best Practices (Populate Registry)**
- **Capability Maintenance**
  - **Radio Frequency Protection**
  - **Global Geodetic Ref Frames**

What we do in this generation will determine the destiny of our children's children



Courtesy of
Rick Anthes