

GEOSS

Architecture Implementation Pilot

AIP-2 Results

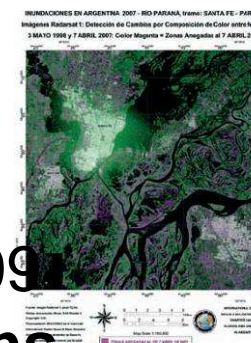
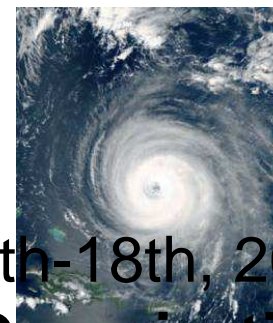
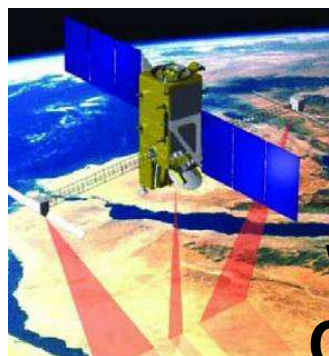
Hervé Caumont
ERDAS and OGC IP Team

2nd ECMWF Workshop
November 24th, 2009





The GEOSS collaboration



GEO-VI Plenary
Washington DC, November 17th-18th, 2009
Countries and Participating Organizations



Support local decision making, at the global scale
Preparing Ministerial Summit in Nov. 2010





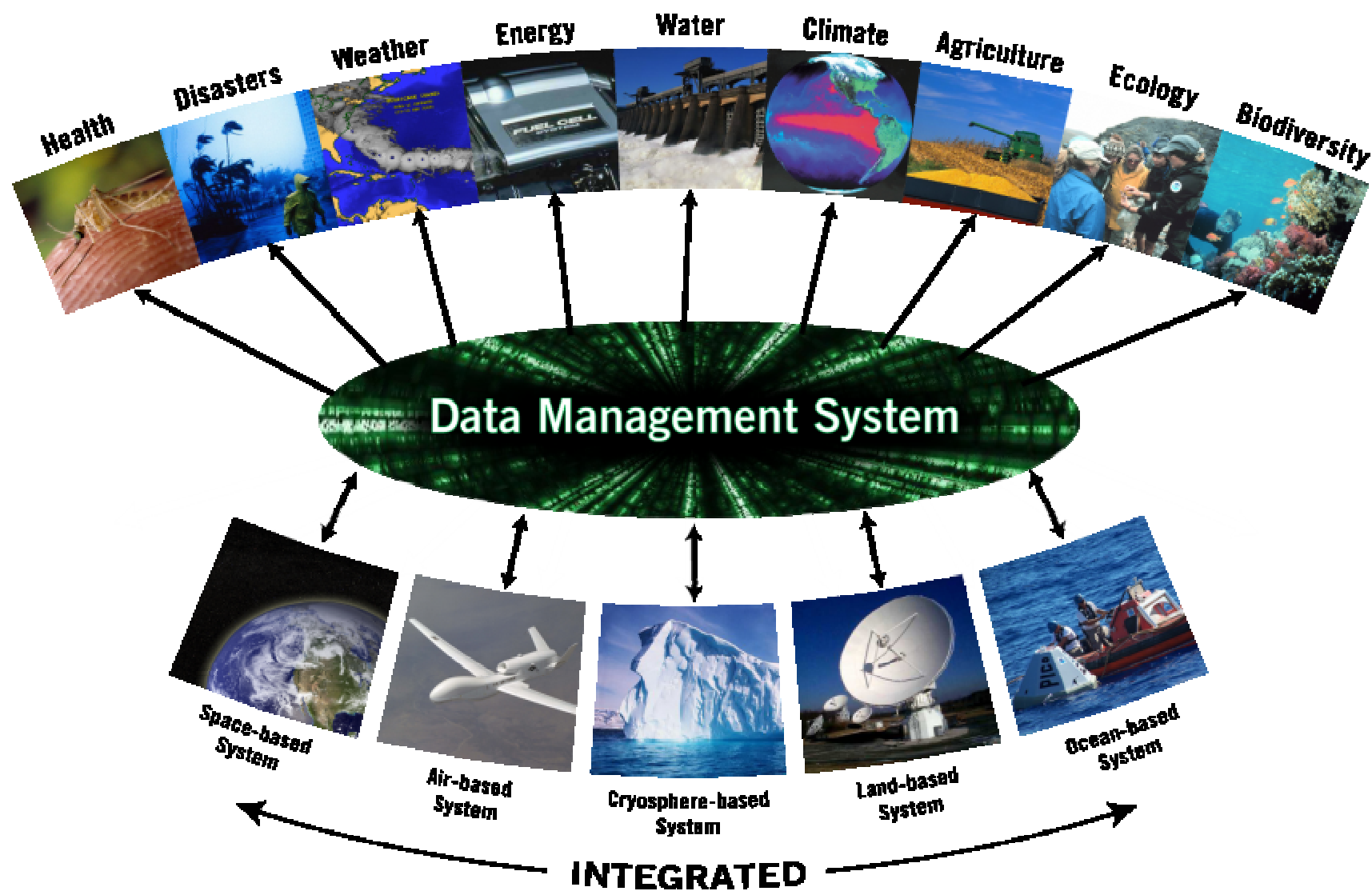
GEOSS Architecture Implementation

1. What is GEOSS ?

2. The Architecture Implementation processes
3. Pilot phase 2 (June 2008 - September 2009)
4. Targeting persistent, reusable components
5. Applications
6. Pilot phase 3 perspectives



GEOSS connects Observations to Decisions



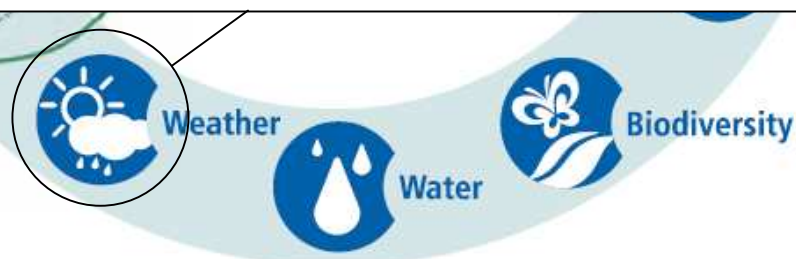


THE Global Earth Observation System of Systems



Weather

- 78 Ensembles of Global Weather Forecasts (TIGGE)
- 79 Megha-Tropiques, GPM and the Precipitation virtual constellation
- 80 Sand and Dust storm monitor
- 81 Weather Demonstration Project for the Beijing 2008 Olympic Games
- 82 YEOS Yellow Sea Observation, forecasting and information System





GEOSS Architecture Implementation Pilot

GEO Task AR-09-01b

- Develop and pilot new processes and infrastructure components for the GCI and the broader GEOSS architecture
- Continuation of existing efforts, and also new activities, solicited through AIP Calls for Participation (CFPs) and other means
- In support of interoperability arrangements amongst contributed GEOSS components

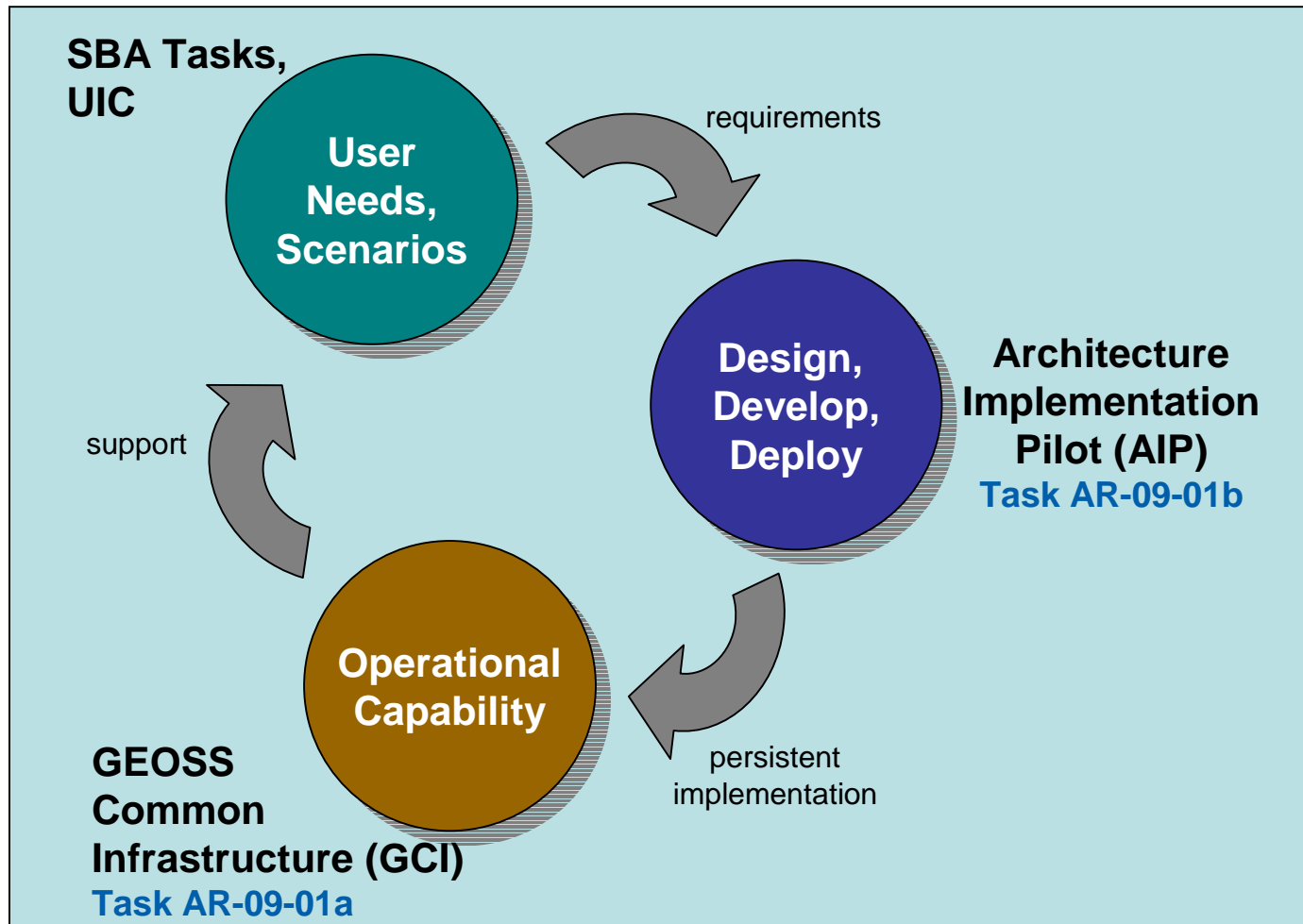


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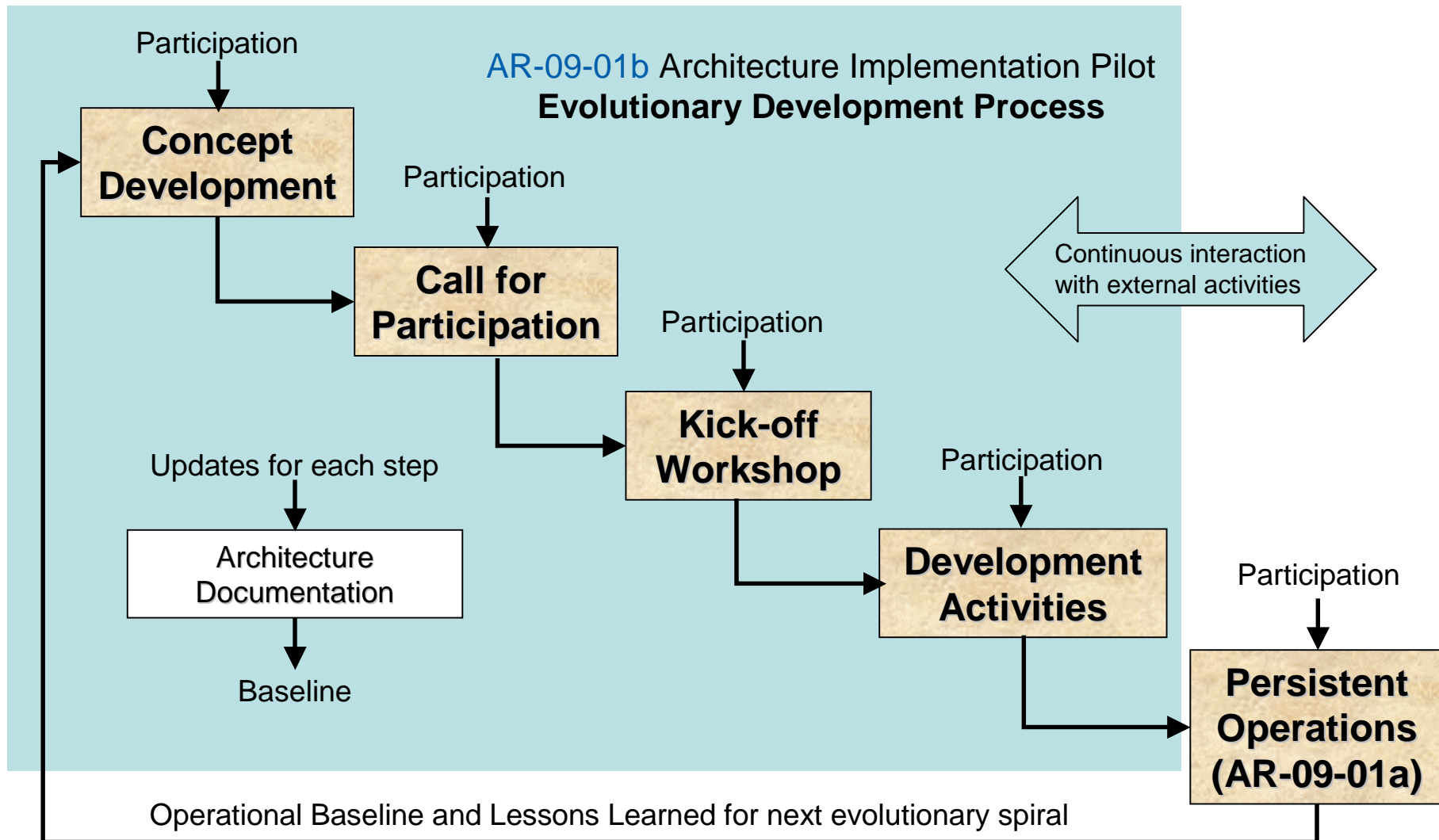


Elaboration of GEOSS Architecture



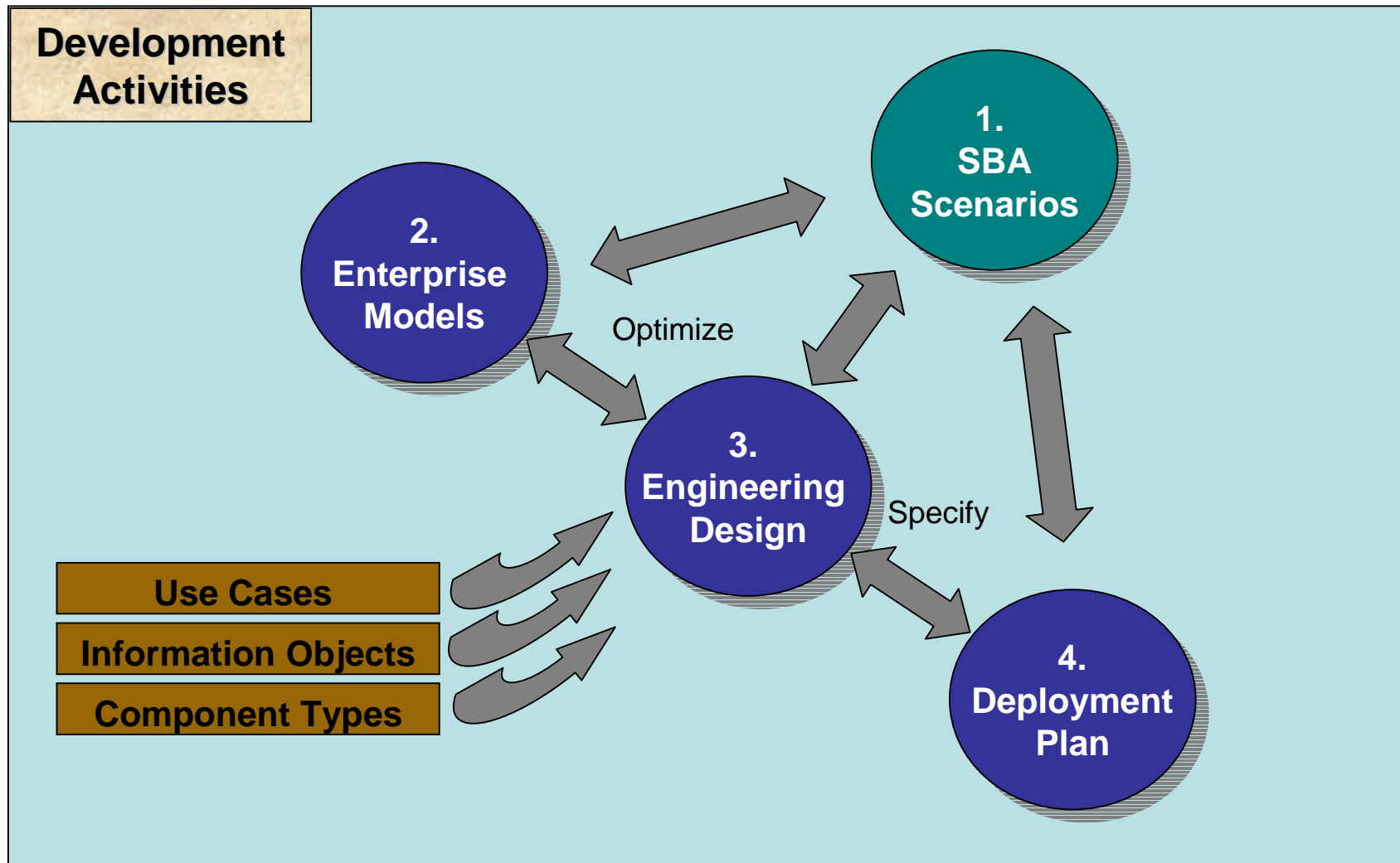


AI Pilot Development Approach





Scenario-to-SoA reusable process





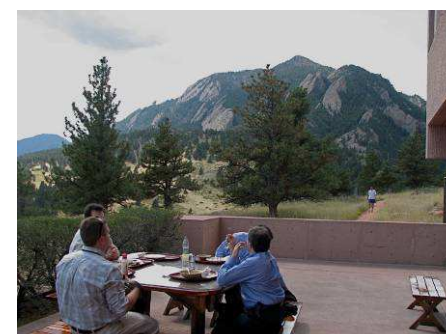
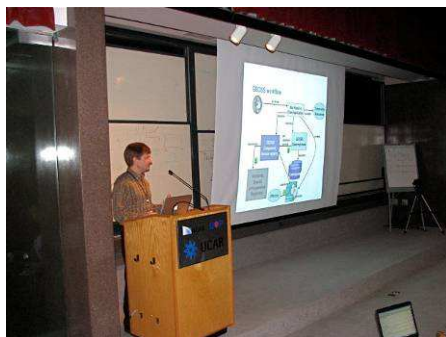
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AIP Phase 2 Master Schedule

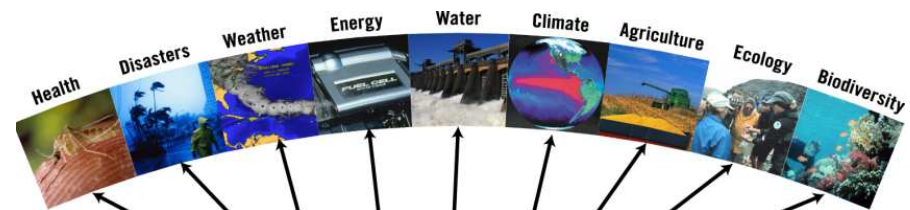
AIP-2 CFP Announced	June 2008
Kickoff Workshop at NCAR	September 2008
Scenarios and Use Cases defined	January 2009
Demo Capture Workshop	4-5 May 2009
Finalize AIP-2 deliverables	8 September 2009
AIP-2 results transition to operations	2 nd Half of 2009





AIP-2 Scenarios co-leads

- **Disaster Management**
 - NASA, Spot Image, ERDAS, Northrop Grumman
- **AQ & Health – Smoke Event**
 - EPA, Washington Univ St. Louis, NAS
- **Biodiversity: Pika Distribution**
 - CNR
- **Biodiversity: Arctic Food Chain**
 - CNR
- **Biodiversity: Polar Ecosystems**
 - USGS, George Mason Univ
- **Renewable Energy - Facility Planner**
 - Mines Paris Tech





AIP-2 Services architecture co-leads

- **Catalogues, Clearinghouse, Registries and Metadata**
 - USGS
 - NOAA
 - JAXA
 - OGC/Traverse
- **Workflow and Alerts**
 - AIST
 - GMU
 - CIESIN
- **Test Facility for service registration**
 - ESA
 - ElsasDatamat
- **Portals and application clients**
 - OGC/MobileAps
 - OGC/ERDAS
- **Access Services: products, sensors, models**
 - NOAA
 - OGC/ERDAS
 - UNR
 - ICT4EO
 - SURF



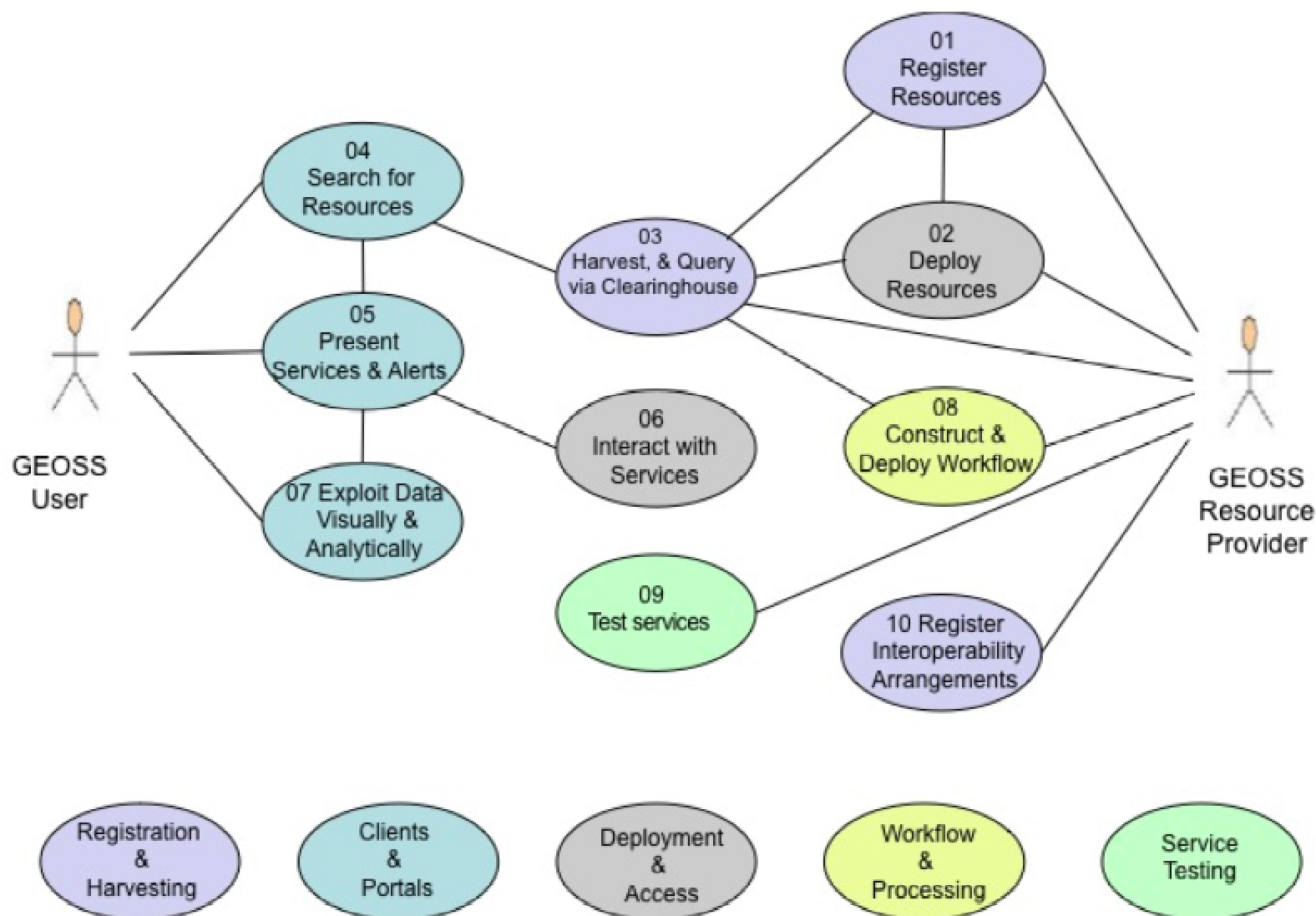


Scenarios and Use Cases

- Transverse Use Cases support Community Scenarios
- Scenarios: end user view of the value of GEOSS
 - Focused on topics of interest to a community
 - Occur in a geographic Area of Interest (AOI)
 - Steps in a scenario to be mapped onto the Use Cases
 - Scenarios are developed by Community WGs
- Use Cases: match reusable service oriented architecture
 - Use cases for discovery services, data access services, etc
 - Utilize Interoperability Arrangements
 - Use Cases are developed by Transverse Technology WGs



AIP-2 Transverse Use Cases



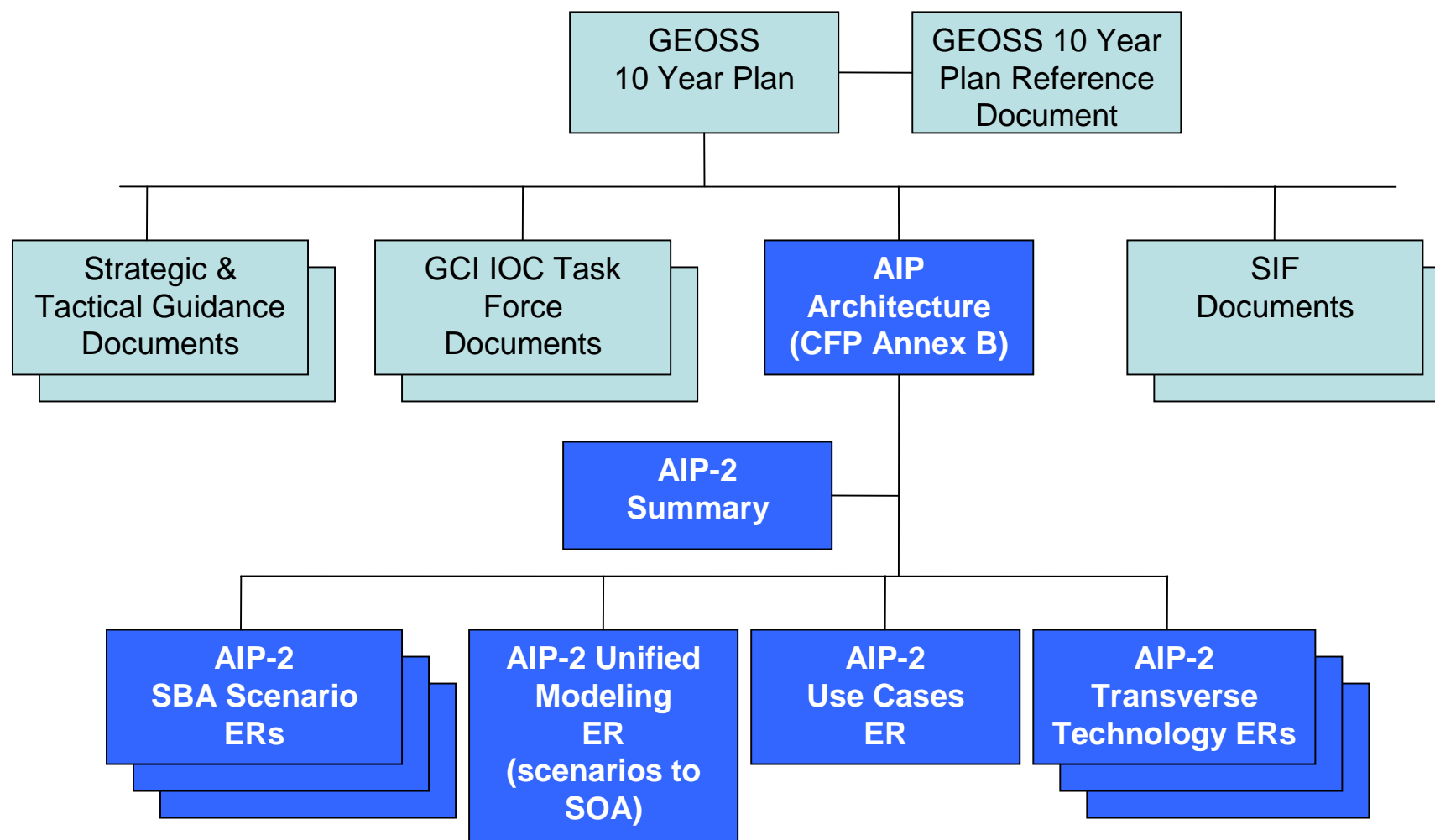


AIP-2 Deliverables (GEO Task AR-09-01b)

- **Demonstrations**
 - Demonstration of community Scenarios implemented through transverse Use Cases
 - Demonstrations were recorded and made available via the Web
- **Persistent Exemplars**
 - Registered services ('continuous operation') should have 99% availability (~7 hours down time a month); on a reliable network; plan for performance scaling
 - Nomination to operational task (AR-09-01a)
- **Engineering Reports**
 - Community Scenarios
 - Technology Reports
 - Use Cases Report (submitted as OGC Pending Doc, ref. 09-129)
 - AIP-2 Summary Report (submitted as OGC Pending Doc, ref. 09-130)



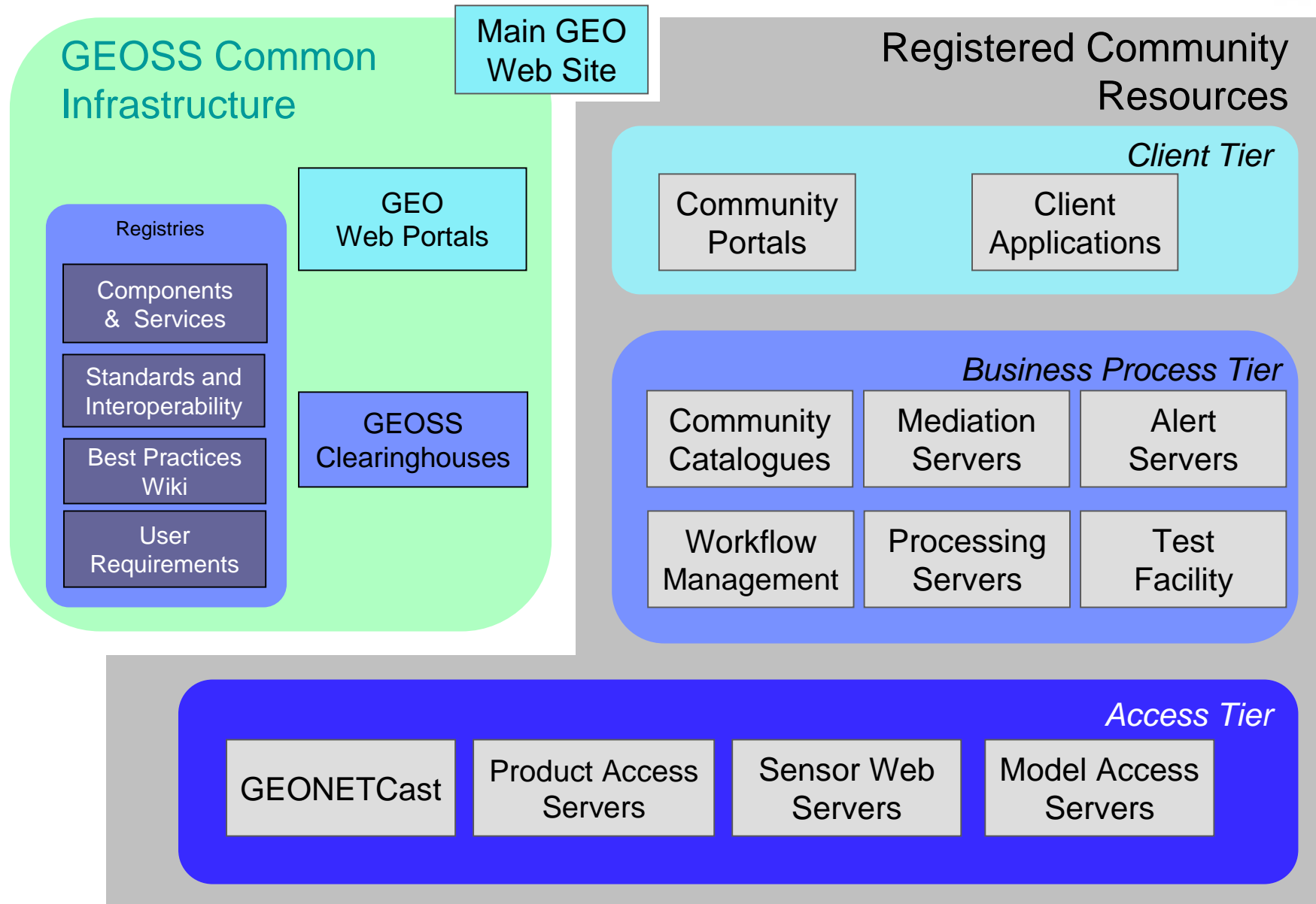
AIP-2 Document Tree





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Persistent Exemplar Services

- Criteria to be a persistent exemplar
 1. Registered in the Components and Services Registry (CSR) as “Continuously Operational”
 2. Accessible through a GEOSS Interoperability Arrangement that is an international standard.
 3. Level of Service: Available >99% of the time (~7 hours downtime/month); Adequate network bandwidth and hardware for performance
- 192 services met criteria 1 & 2 as of 13 July 2009,
 - Methods to assess criterion #3 to be developed



Services meeting Persistent Exemplar Criteria 1 and 2

Service Type	Number of Services meeting criteria 1 and 2
Catalog/Registry Service	21 services
Data Access	36 services
Portrayal and Display Service	131 (102 are WMS)
(Processing Services)	2 (both are WPS)
(Alerting)	2 (one CAP, one RSS)
Total	192



GEOSS Interoperability Arrangements

- From the GEOSS 10 Year Plan Reference Document -

- Interoperability through open interfaces
 - Interoperability specifications agreed to among contributing systems
 - Access to data and information through service interfaces
- Open standards and intellectual property rights
 - GEOSS adopting standards agreed upon by consensus, with preference to formal international standards
 - GEOSS will not require commercial or proprietary standards
 - Multiple software implementations compliant with the open standards should exist
 - Goal is at least that one of the implementations should be available to all implementers "royalty-free"



AIP-2 summary

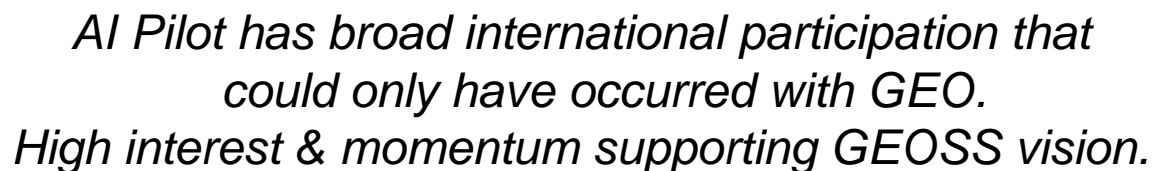
- All major AIP-2 activities are now complete
- Major Achievements
 - Six SBA Scenarios show use of GEOSS for communities of interest
 - Reusable process for applying Service Oriented Architecture to other SBAs
 - Augmentation of GCI: components, persistent exemplars, increase availability
- Presentation of results to GEO-VI Plenary, and Exhibit



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- Elements of the GEOSS Common Infrastructure (GCI) – **Initial Operating Capability established**
- Effective development process for GEO
 - CFP, Kickoff, Execution, etc.
 - **Approximately 120 organizations participated**
 - Methods for international coordination
- Prepared “Architecture Implementation Report”
- **10 Demonstrations** of Initial Operating Capability





AIP Phase 2 Results – Mid 2009

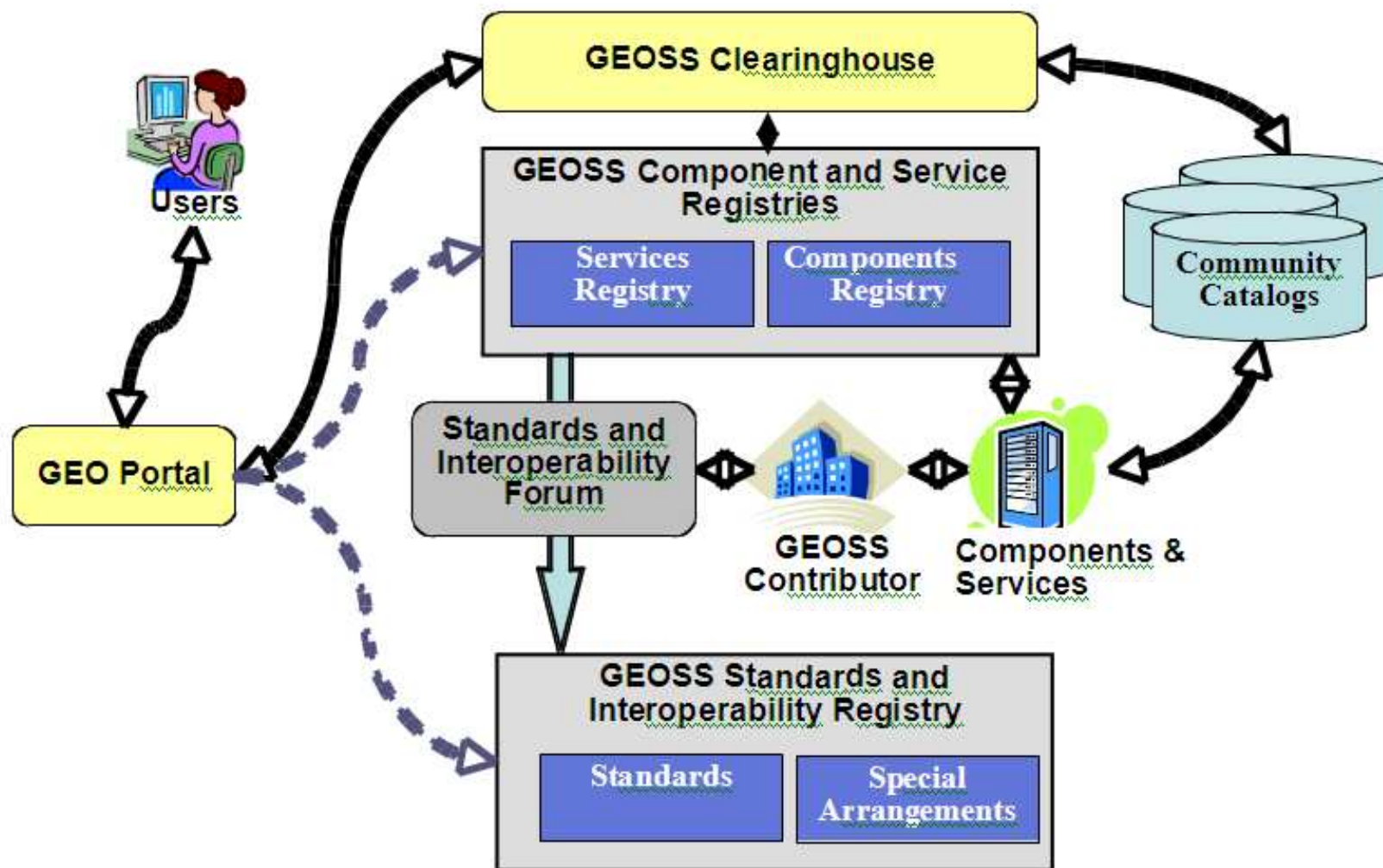
- GEOSS Common Infrastructure augmented with "persistent exemplars", architecture elaborated through scenarios and Use Cases
- Effective development process for GEO
 - 38 responses to AIP-2 CFP
 - Reusable engineering processes defined
- Prepared 10 Engineering Reports and a summary
- **11 Demonstrations** of GCI IOC augmented



The GEOSS architecture must provide an easy and reusable process to leverage the GEOSS Common Infrastructure (GCI) and components in support of many Societal Benefit Areas.

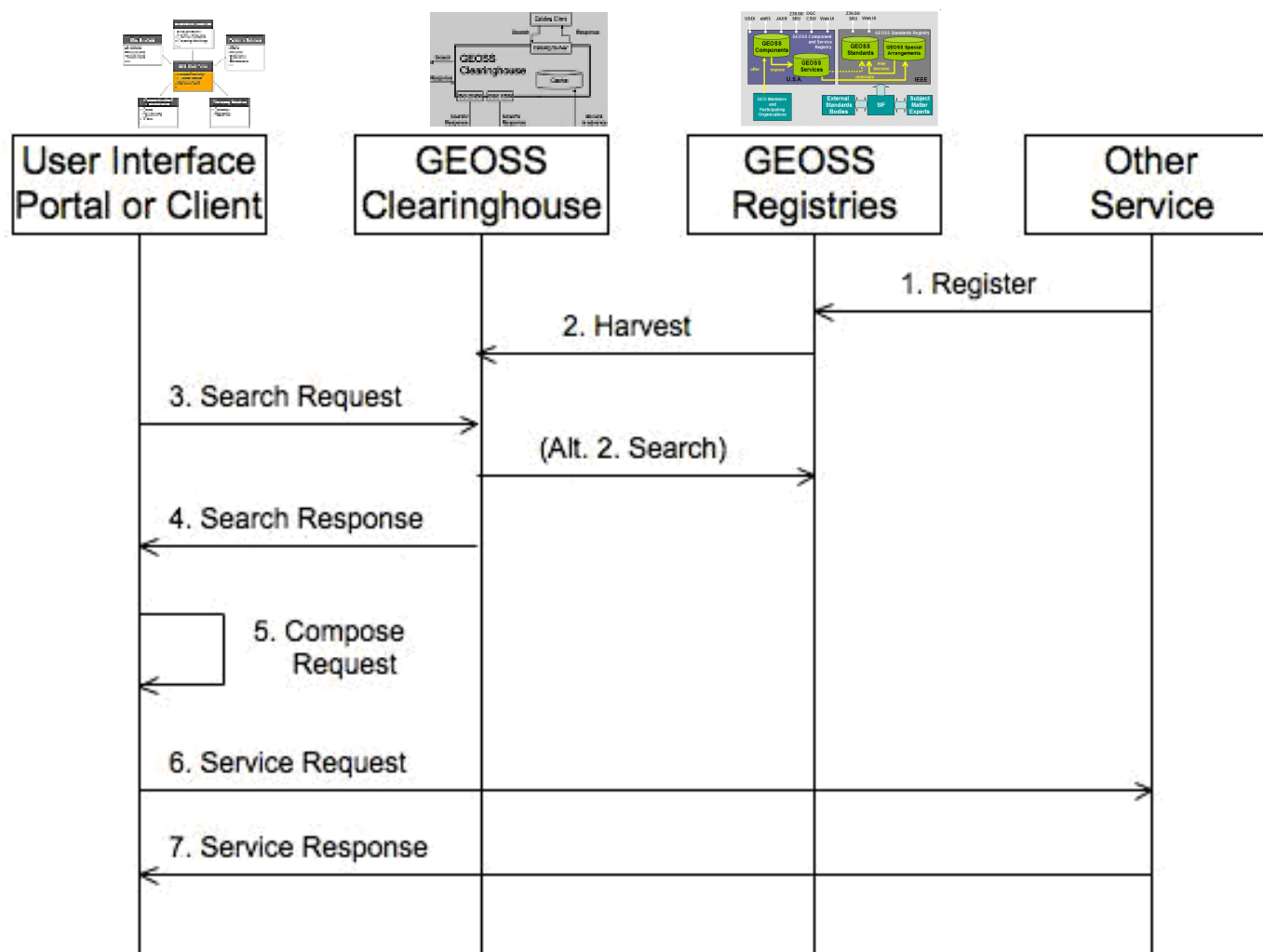


The GCI Initial Operations Capability





A GEOSS workflow using the GCI





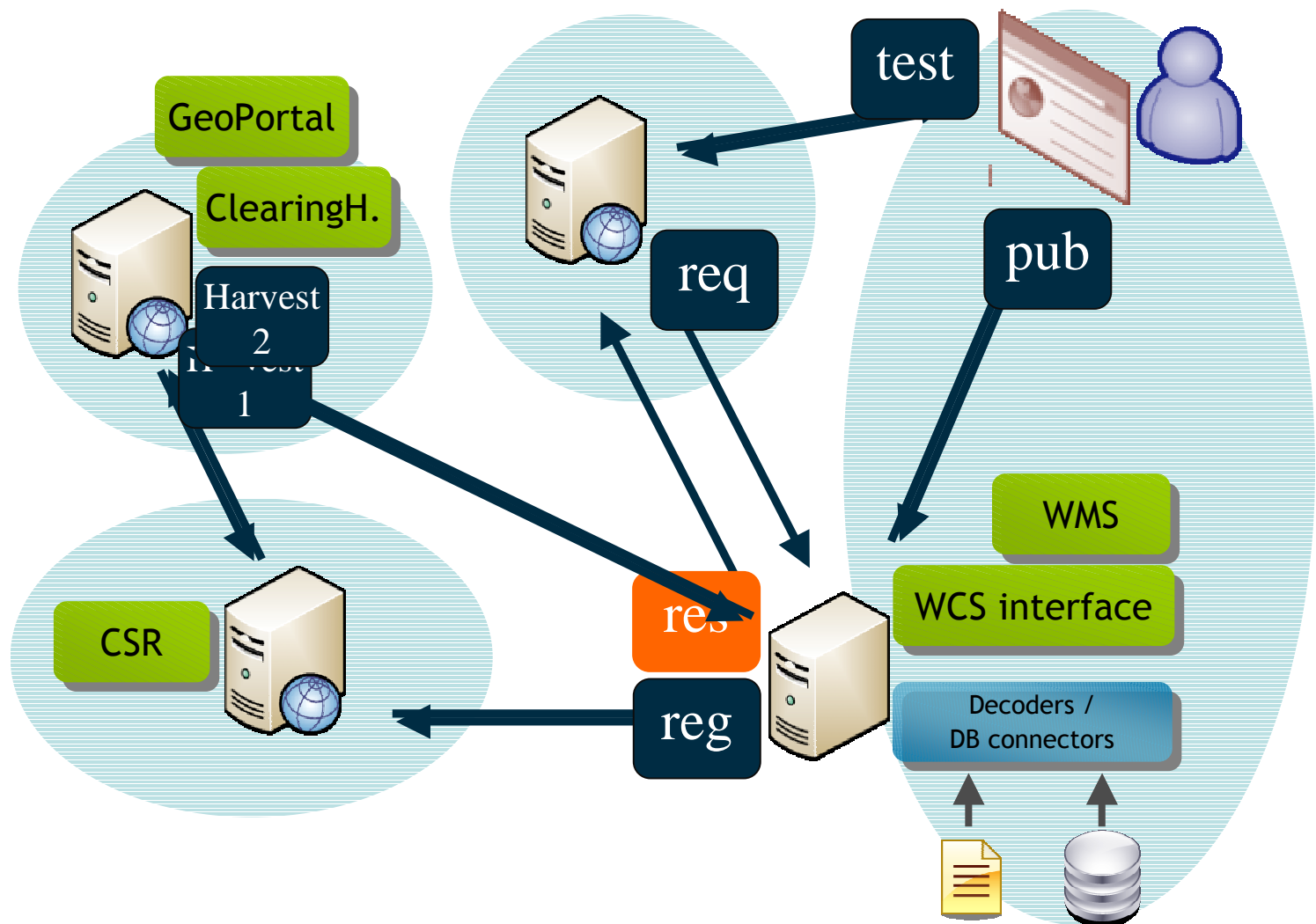
Applications to Deploy, Test, Register and Monitor a Data Access Service

- Behind the scenes, organisations like Data provider, Service provider, Catalog Provider, GeoPortal provider have to team-up to serve a category of users
 - Deploy a Data Access Web Service
 - Test the service interface
 - Register a web service in the CSR
 - Monitor a web service
- As a result, an update at one end (e.g. new dataset) must reflect at the other end (e.g. GeoPortal search) of the Service Oriented Architecture



GEOSS Service Oriented Architecture

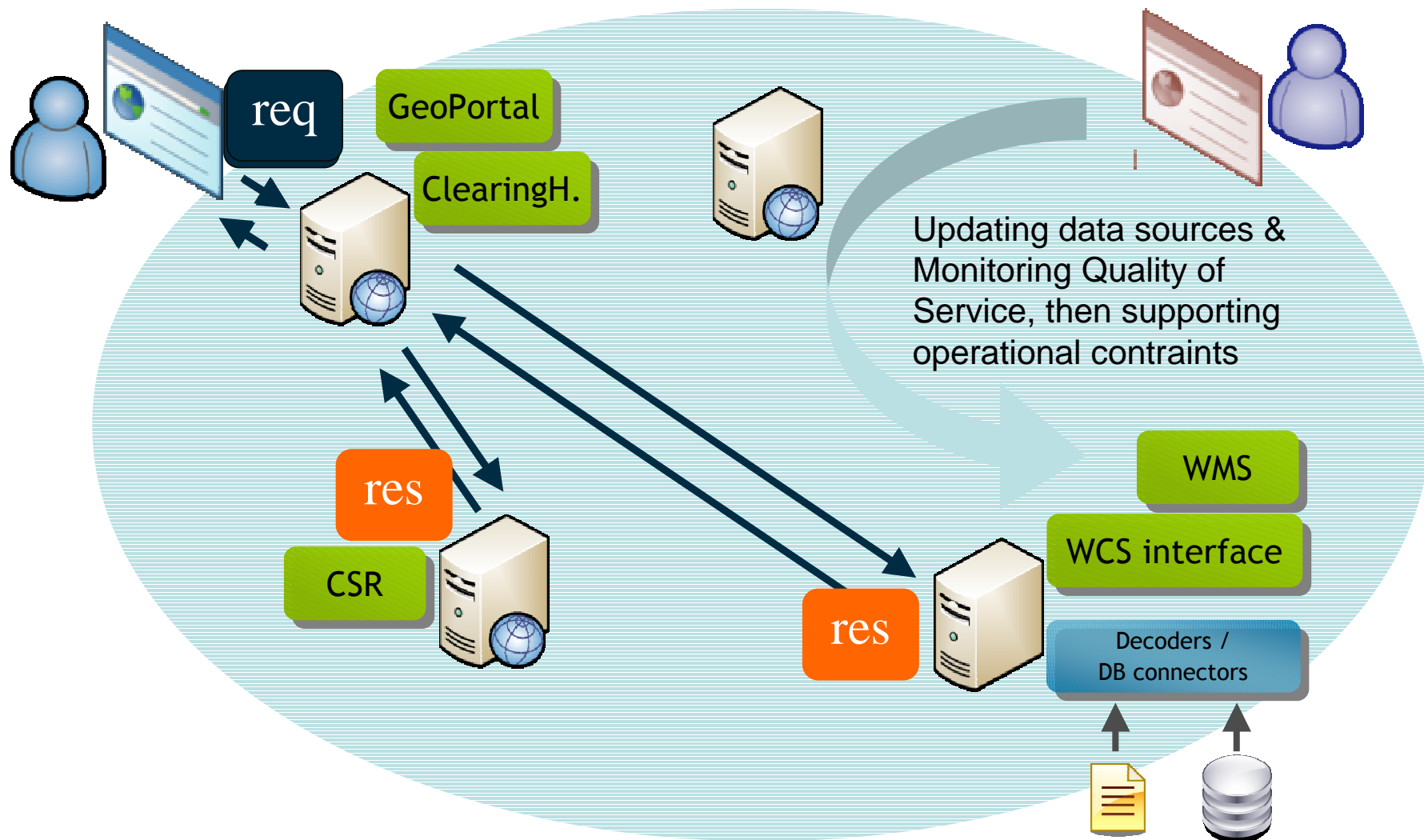
Organizations team-up to deliver service to the user





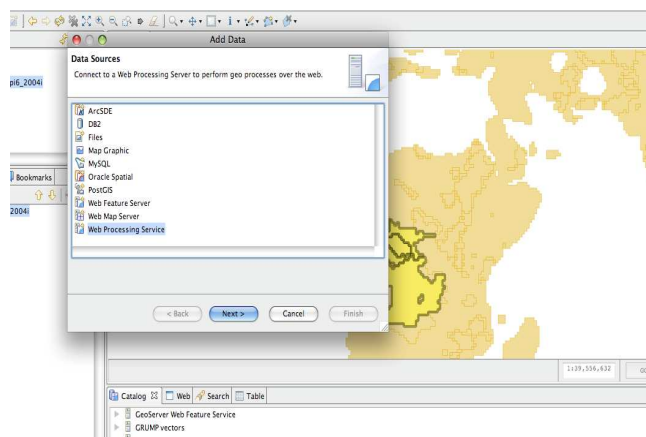
GEOSS Service Oriented Architecture

Then user sees the tip of the iceberg...

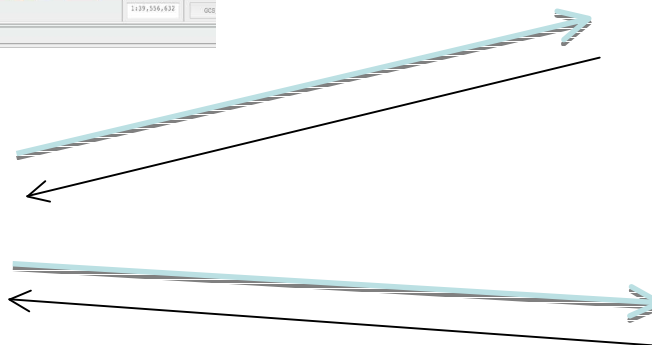
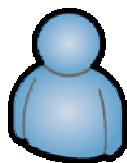




Applications to Geo-Processing component



uDig plugin for interface
with 52north WPS



UNEP 's
Feature service (WFS)

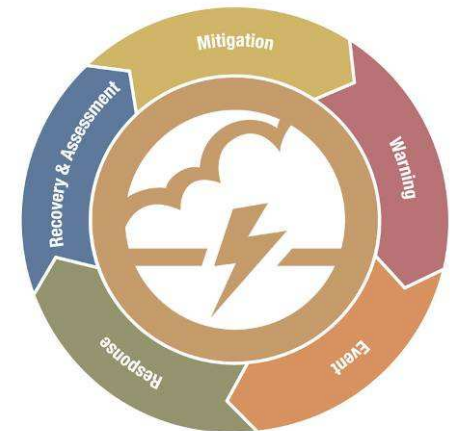
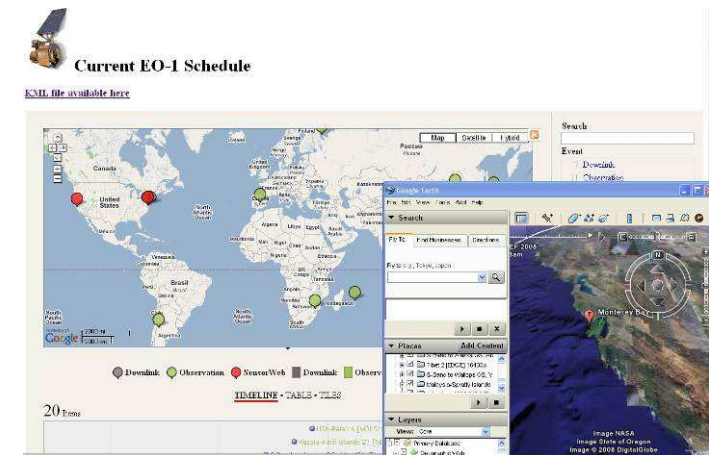


SEDAC's
Population Estimation (WPS)



Application to Disasters Management SBA

- Demonstrated capability to find, access, display, and use data from Myanmar, Ike, and Hannah events replayed from 2008
- Using the Geoportal to discover a community of interest portal (SIREN) and related data providers registered in the GEOSS registry
- Activity involved data provider components and services, and end user involvement from disaster management communities of interest
- Components and services remain ready to serve future needs, in particular, the Caribbean Flood Pilot GEO Task DI-09-02B

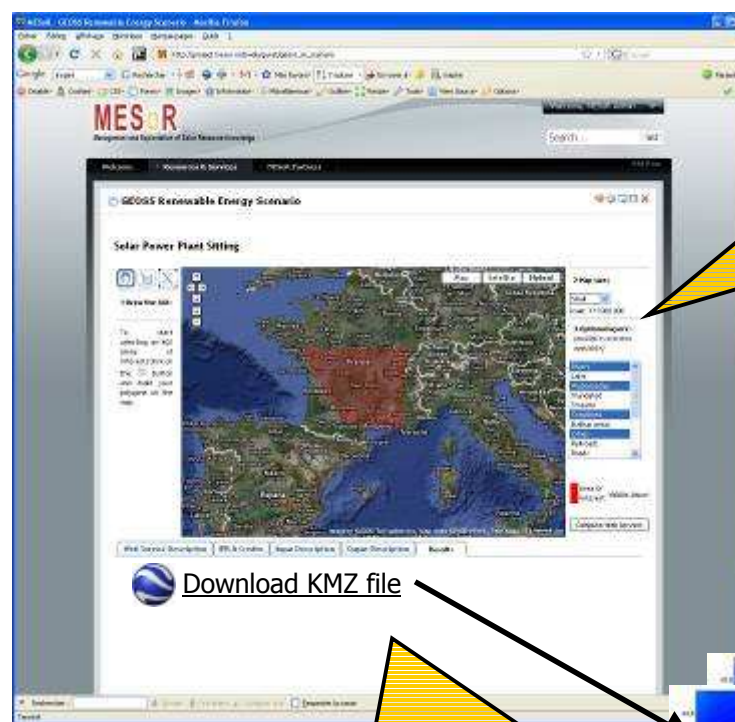




Application to Renewable Energy SBA

- **Investors** and electricity producers willing to invest in solar plants **need precise and thorough information** to support decision-making.
- On their behalf, **consulting companies** perform **feasibility studies** in order to decide where to sit power plants and which technology to use ensuring a profitable return on investment.
- To reach that goal, consultants need an **easy and unified access to data sets**. Such data sets include **meteorological, geographical** and **environmental** parameters.

From user concern...

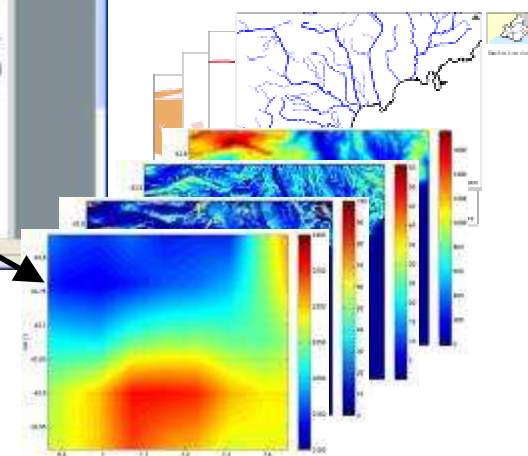


JSR-168 Portlet Client
input/output selection:

- Area Of Interest (AOI)
- Output scale
- Optional layers

Output result as a **KMZ archive** containing:

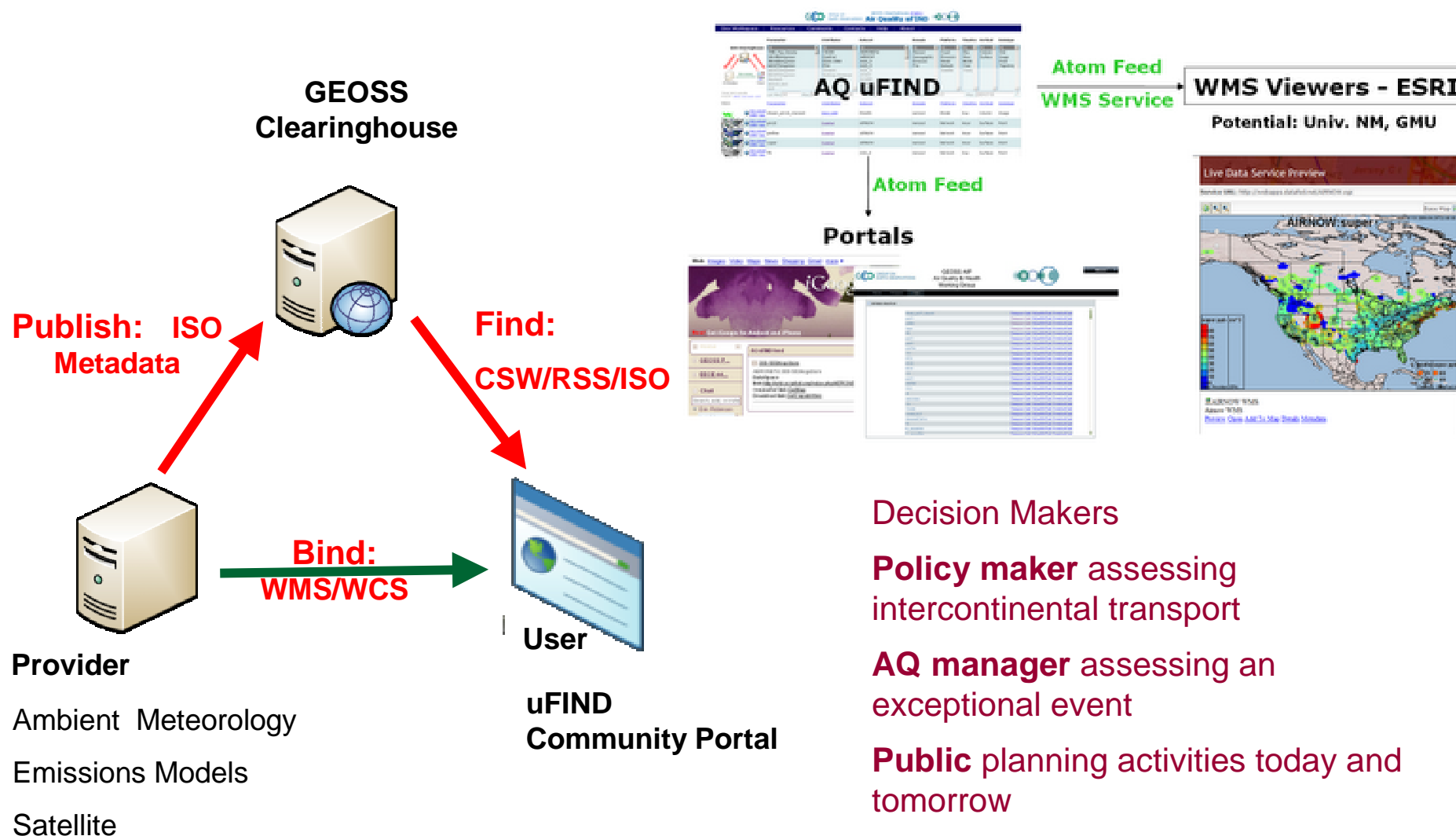
- Solar radiation layers (GeoTIFF)
- Additional geographical and/or environmental layers



...to on-line data and map delivery

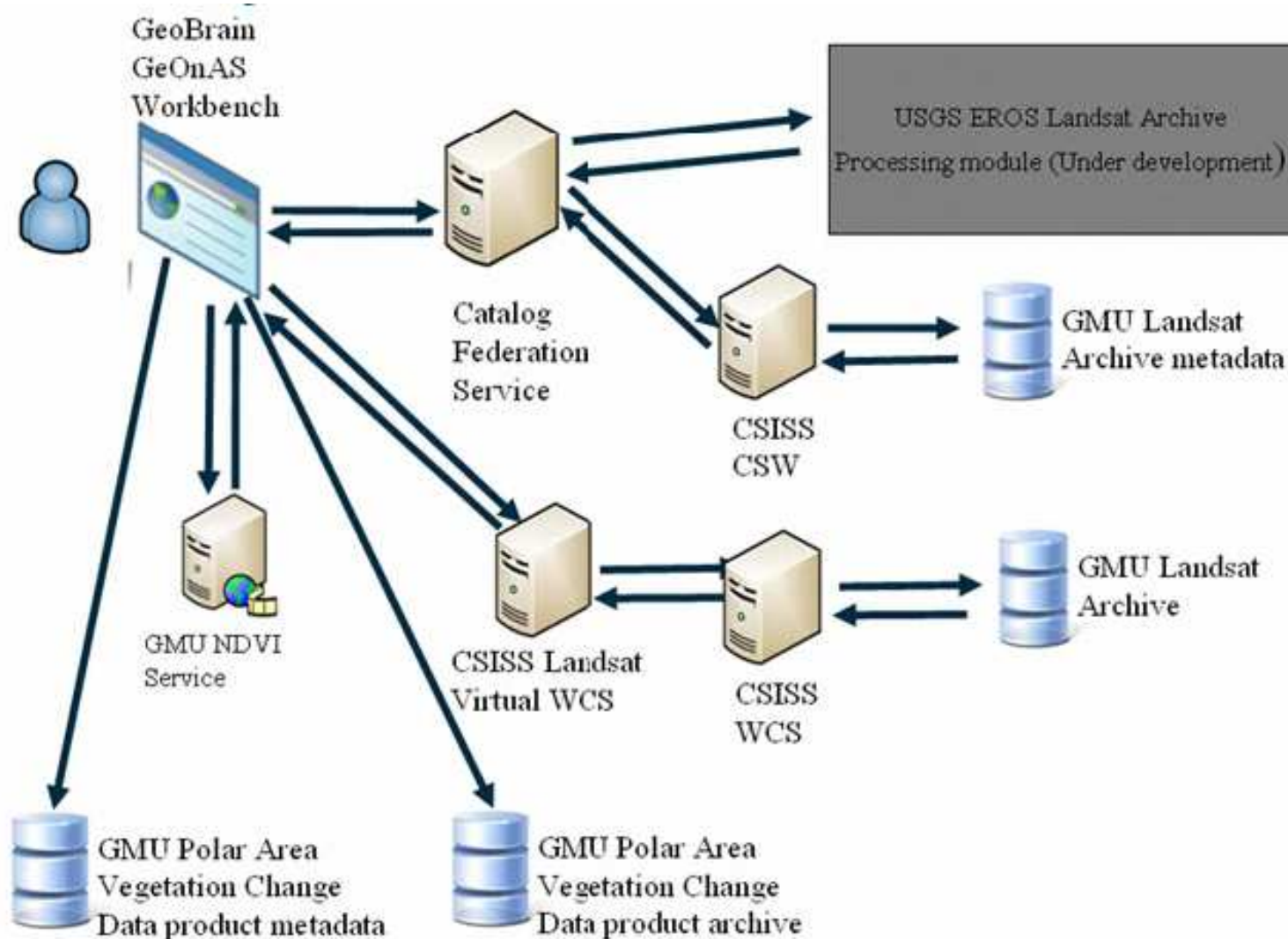


Application to Air Quality & Health SBA





Application to Polar Ecosystem vegetation





CC IMPACT ON PIKA DISTRIBUTION



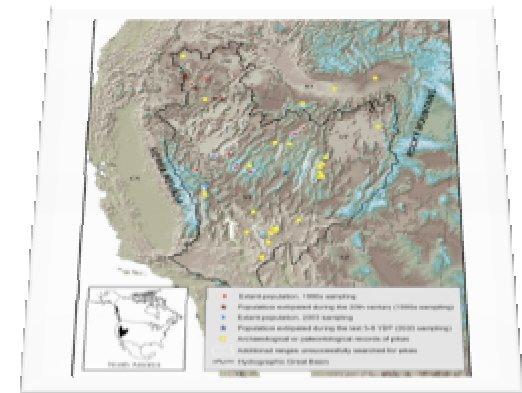
- This scenario is driven primarily by scientific research on the **distribution of pika and how it is changing**.
- GEOSS infrastructure perspective: **to investigate the interoperability process to determine valuable predictors for the impact of climate change on biodiversity**
- Use observations of pika over the last 20 years, plus existing modeling demonstration systems, **to model pika distributions and how they may change with climate**

Area of Interest

The US Great Basin region (1x1 km)

Scientific patrons

Dr. Chris Ray (University of Colorado - CO USA)





CC IMPACT ON ARCTIC FOOD CHAIN



- The scenario output will be as **maps of Arctic biodiversity, habitat and ecological service changes**, as well as **a summarized scenario runs with all relevant metrics** provided in a simple to comprehend table.
- The scenario models will allow to assess the amount and quality of **Ecological Services provided by the Arctic**.
- The activities are intended to be linked with all relevant components of the IPY (International Polar Year).

Area of Interest

The Arctic (as defined as the 60 degree latitude circle)

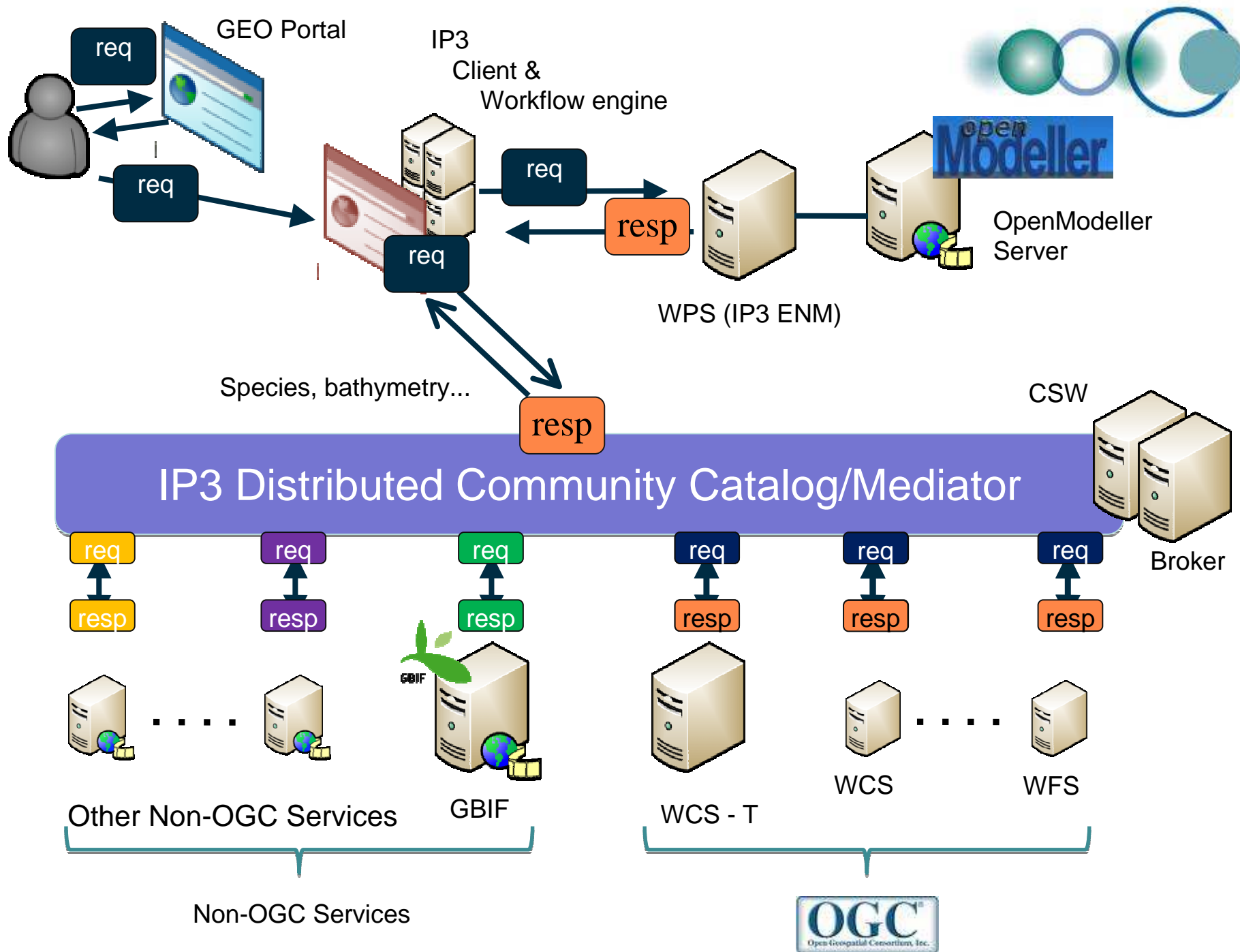


Scientific patrons

Dr. Falk Huettmann

EWHALE lab- Biology and Wildlife Dept., Institute of Arctic Biology,
University of Alaska Fairbanks







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GEOSS AIP-3 Plans - Summary

- Build on service architecture of GCI and AIP-2
 - Build on both content and process
 - Increase emphasis on data provider point of view
 - Promote mash-ups in a "link-rich" environment
- Engage Communities of Practice (CoP)
 - Continue AIP-2 CoPs
 - Identify new CoPs working with UIC and SBA Tasks
- Focus on data; Promote content
 - Coordination with ADC Data Tasks, data quality
 - Vocabulary registries and ontologies as resources for scenarios
 - Data Sharing Guidelines implementation
- Schedule to support Ministerial Summit, November 2010



AIP-3 Communities of Practice - DRAFT

Scenario	GEO Task/ CoP	Status/comment
Emergency Management	DI-06-09: Use of Satellites for Risk Management	AIP-2, GIGAS
Air Quality	HE-09-02b	AIP-2, ESIP Cluster
Biodiversity and Ecosystems	(BI-07-01a)	AIP-2, EuroGEOSS, GIGAS
Energy	EN-07-03	AIP-2
Hydrology and drought management	(WA-06-07c) (Water CoP)	EuroGEOSS, SDSC, FCU, (ESIP)
Oceans and coastal zones	(Coastal Zone CoP)	(Oceans'09 GEOSS Workshop: Robert Weller) (Mediterranean workshop – Rob K)
Environmental Monitoring Sensor Webs	?	(EPA, EEA)



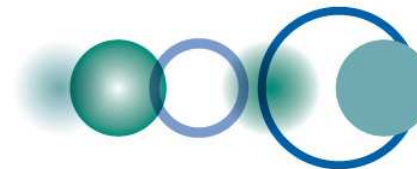
Example : Water CoP in AIP-3

- Relevant GEO Tasks
 - Capacity Building for Water Resource Management – Asia (WA-06-07c) – PoC, Chu Ishida, JAXA
 - (Water CoP - Rick Lawford - Drought)
- Responses to GEO Decision Support CFP
 - Assessing and predicting climate change effects on Water Resources in South East Asia – SDSC, Univ. of Melbourne, Univ. of Malaya.
 - Assessment and allocation decision model of limited water resource by open standards-based techniques – Feng Chia University
- Further resources
 - EC FP7 EuroGEOSS Drought Scenario
 - ESIP Federation: Water ontologies – Bill Sonntag



AIP-3 Draft Schedule

Post AIP-3 CFP	January 2010
Responses to AIP-3 CFP	Early March 2010
Kickoff Workshop (Europe)	Mid March 2010
Demo Capture Workshop (US)	2 nd Half of 2010
(ExCom/GEOSec prior to Summit)	(July 2010?)
Ministerial Summit & GEO VII (China)	Oct/Nov 2010
Finalize AIP-3 deliverables	2 nd Half of 2010
AIP-3 results transition to operations	2 nd Half of 2010



References

- GEO
earthobservations.org
- GEO Architecture Implementation Pilot
ogcnetwork.net/Alpilot
- GEOSS registries and SIF
geossregistries.info

OGC Point of Contact :
George Percivall
gpercivall at opengeospatial.org



