Capacity Building Scenario

Engineering Report

GEOSS Architecture Implementation Pilot

Version 0.2

[The following template is for use in the GEO AIP development process. Text enclosed in square brackets and displayed in blue italics is included to provide guidance to the author and should be deleted before publishing the document.]

[This template is for Engineering Reports that document the results of the AIP SBA Working Groups. The SBA ERs contain a Scenario, the implementation of the Scenario through Use Cases, reference to the demonstration video and next steps needed to make the operational. The main audience for an SBA ER is members of the SBA community of practice that can use the approach in the ER either directly or slightly modified. The SBA ERs show how the GEOSS Common Infrastructure and more generally the GEOSS architecture can meet the needs of the SBA community. ]

[This template was developed based on an Open Geospatial Consortium template]

Revision History

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| **Version** | **Date** | **Editor and Content providers** | **Comments** |
| 0.1, 0.2 | 2012/12/18, 2013/1/7 | L. Lovison | Report structure  Scenario outline adapted from DM AIP-5 and AIP-3 |
| 0.2 |  | S. Frye | Review report |
| 0.2 |  | Luciano Parodi | Review report |
|  |  |  |  |

Document Contact Information

If you have questions or comments regarding this document, you can contact:

|  |  |  |
| --- | --- | --- |
| Name | Organization | Contact Information |
| Lucia Lovison | OGC Team | lucia.lovison@gmail.com |
|  |  |  |

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Capacity Building Scenario

# Introduction

## Scope of this document

This report summarizes the scenarios considered in AIP5 and lay the foundation for further activity in AIP6 of the Capacity Building Working Group.

## GEOSS AIP

The GEOSS Architecture Implementation Pilot (AIP) task develops process and infrastructure components for the GCI and the broader GEOSS architecture as a mean of coordinating cross-disciplinary interoperability deployment. The AIP Task provides phased delivery of components to GEOSS operations, with each phase consisting of: architecture refinement based on user interactions; component deployment and interoperability testing; and SBA-focused demonstrations.

This Engineering Report (ER) is a key result of AIP. AIP-5 was conducted from May 2012 to December 2012. A separate ER describes the overall process and results of AIP-5 and thereby provides a context for this Community SBA ER.[[1]](#footnote-1)

## Summary of Capacity Building development

Within AIP5, Capacity Building (CB) WG has engaged with the other working groups to define an agenda for supporting more thoroughly the GEOSS Users and GEOSS Resource Providers. The Capacity Building WG has engaged with a fruitful collaboration with members from Chile in addressing two key aspects which are the testing of GEOSS Common Infrastructure (GCI) that is both for GEOSS Users and GEOSS Resource Providers.

* Capacity Building (CB) GEOSS-AIP5 aims to provide documentation of ongoing activities of AIP5 participants within each of the 9 Societal Benefit Areas as described in the framework <http://www.earthobservations.org/ag_cbc.shtml>.
* Documentation will be provided of the code repository for the capacity building of AIP5 will be posted on the Best Practices Wiki [http://wiki.ieee-earth.org](http://wiki.ieee-earth.org/).
* CB WG will assist the AIP5 by providing testing of web services across several working groups through SAF-Chile.
* CB WG will review the GEOSS Tutorial under development to see how to reach out to a greater GEO Community.

## Future work

In AIP6, planned for 2013, Capacity Building WG plans on to focus on engaging with other GEO members on carrying out tests that assess the maturity of web services – for example in the SBA areas of Disaster Management, Water Resources and Data Sharing – with respect to GEOSS Users and GEOSS Resource Providers. We plan to work in close collaboration with organizations from Chile and other countries such as South Africa.

Specifically, we will try to distinguish operational and development datasets as well as to discuss how to manage testing and non functional datasets.

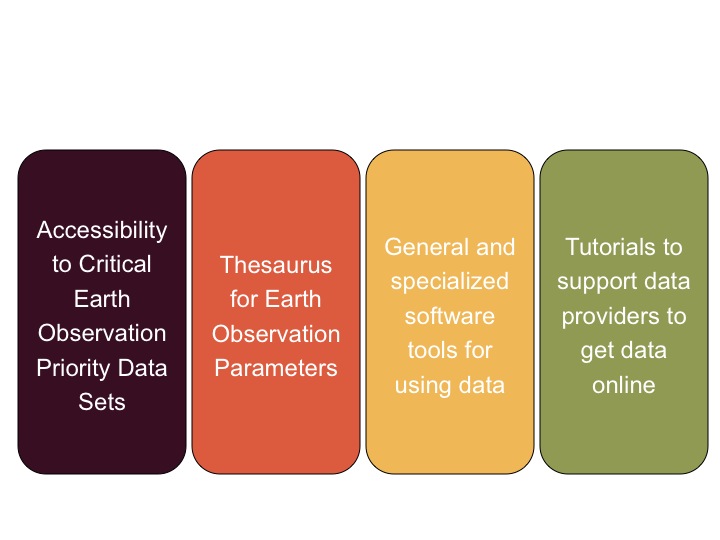
We plan to simplify, if possible, the GEOSS User Interface and discuss eventually the opportunity to establish an application to make easier for a GEOSS User to access and use GEOSS functionality.

Within AIP6 we plan to set up in the Best Practices Wiki an area where GEOSS Resource Providers can find snippets of code that will reduce the entry barrier and would allow each GEOSS Resource Provider to participate in a federated way to the GEO Infrastructure. Based on the experience in Namibia, Capacity Building WG suggests to leverage the work done by the different working groups such as Disaster Management and Water Management and to develop applications that can be easily downloaded in different electronic devices by the GEOSS Users, harvesting the power of the social web and crowd-sourcing.

Another plan for Capacity Building WG within AIP6 will be to generate one or more workshops or other tools –along with promoting the Tutorials section in the Best Practices Wiki, so to broadcast more effectively the work of the GEO working groups and address technical and organizational issues that may be specific to a particular country or region.

# Community Capacity Building Objectives

* CB WG will follow the guidelines described here:



The above figure shows the results coming from AIP4– Summary Engineering Report version 0.12 and it indicates the four main areas of activity within Capacity Building WG for AIP-5.

Here are the principles which have driven the definition of AIP-5 version of the Capacity Building scenario:

* Identifying the barriers for a GEOSS User:
  + To access GEOSS data
  + To discover GEOSS data
  + To manage GEOSS data
* Identifying the barriers for a GEOSS Resource Provider:
  + To access & register its own GEOSS data
  + To authorize the use of GEOSS data
  + To task web services for GEOSS data acquisition
  + To serve GEOSS data as different types of services.
* Thesaurus for Earth Observation parameters.
* Setting up of a repository of generalized and specialized software tools for using GEOSS data.
* To integrate the Tutorials with a Capacity Building component.

Capacity Building GEOSS-AIP5 WG has received the preliminary contributions and feedback from the Disaster Management WG, from the Water WG, from the Energy WG; within the technical topics, from the Data Sharing WG, from the Tutorials WG and is looking forward to receiving contribution from the other working groups within AIP-5.

# Scenario: CB-01 GEOSS Resource Provider Testing

## Actors

* The scenario **Initiator** will coordinate all efforts between **Processors**, who are both the **Resource Provider** and the **Map Producer**, with the objective to deliver expected maps and thematic products to the **Actuator -- the GEOSS User --** , who is focused on the water and/or disaster management on the field and in the analysis of the event.

## Context and pre-conditions

* Thematic Product generation process: a V0 version should be available as an existing product into a catalogue. The AOI selected is Talcahuano, Chile. The Talcahuano coastal region was affected by an 8.8 magnitude earthquake and consequent tsunami on 27 February 2010. The CB GEOSS Provider case will test the access & authorization, discovery, retrieval and use of GEOSS data regarding pre-and post-conditions **with respect to natural disaster management, water management and data sharing SBAs**. Then a V1 and later versions of the thematic product will be produced based on new data acquisition and involving several users’ teams from Chile.

## Scenario Events

Table 1 – Steps in the Capacity Building Scenario

|  |  |  |  |
| --- | --- | --- | --- |
| **Step** | **Description** | **Trans. Tech  Use Case** | **Specialized Use Case** |
|  | **CB-01 GEOSS Resource Provider** |  |  |
| 01.1 | The Initiator is in charge of searches for web services that provide events or predictions about potential disaster or water events on Talcahuano area.  These services should be discovered by accessing GEOSS Portals (e.g. geoportal.org), or others through previous authorization service (from IDP).  The Initiator check for the credentials (IDP) of the Actuator.  A GEOSS Portal shall provide minimum information about available services and how to access them. |  |  |
| 01.2 | Based on services found at Step 01.1, the Initiator identifies sensitive areas within Talcahuano and asks Actuator (Regional authority) if he/she wants to activate early warning services (e.g. based on modeling such e.g. a Global Flood Potential Model and/ or Tsunami Model) and to subscribe to any related Alert service to take care of these AOIs within Talcahuano. |  |  |
| 01.3 | When an alert is raised, Actuator (Regional authority) requests Initiator to activate monitoring services.  Initiator requests multiple Processors (Resource Providers) to activate such monitoring services.  In parallel, the Initiator activates a feasibility request for a new data acquisition to multiple Processors (Resource Providers) through a Tasking Service.  The Initiator receives back from multiple Processors (Resource Providers) the results for “feasibility of sensor acquisitions”. |  |  |
| 01.4 | Processors (Resource Providers) activate both monitoring and tasking services.  The output will be Data Visualization (e.g. WMS) and Data Access services (e.g. SOS) and others on daily time monitoring.  In parallel, the Initiator activates a feasibility request for a new data acquisition to multiple Processors (Resource Providers) through a Tasking Service.  The Initiator receives back from multiple Processors (Resource Providers) the results for “feasibility of sensor acquisitions”. |  |  |
| 01.5 | Processors (Resource Providers) configures/sends an event notification to Actuator (Regional authority) when monitoring and tasking service detects upcoming disaster conditions.  The notification can be send by using Sensor Alert Service (SAS). |  |  |
| 01.6 | Based on Alert issuing by a Processor (Resource Providers), the Actuator (Regional authority) accesses the monitoring results of services such as e.g. Daily Flood Map Prediction and/or Tsunami Vulnerability and Map. |  |  |

## Post-Conditions

The Resource Provider -- SAF Chile -- will update the monitoring and tasking service daily until the recovery and rescue stage related to the flood or the earthquake with tsunami is declared over.

## Special Requirements

Any legal and regulatory requirements, special standards and quality attributes of the systems related to the AOI will be considered. Specific relevance will be given to usability, reliability, performance and supportability requirements.

# Scenario: CB-02 GEOSS User Testing

## Actors

* Role of **coordinator** is given to the scenario **Initiator**. It aims at coordinate all efforts between **Processors**, both **GEOSS Users** and **Map Producer**, to deliver expected maps and analysis to the **Actuator.**

## Context and pre-conditions

* Thematic Product generation process: a V0 version should be available as an existing product into a catalogue. Then a V1 and later versions of the thematic product will be produced based on new data acquisition all along the crisis management.
* The AOI selected is Talcahuano, Chile. The Talcahuano coastal region was affected by an 8.8 magnitude earthquake and consequent tsunami on 27 February 2010. The CB GEOSS User case will test the access & authorization, discovery, retrieval, use and analysis of GEOSS data regarding pre-and post-conditions **with respect to natural disaster management, water management and data sharing SBAs**. Then a V1 and later versions of the thematic product will be produced based on new data acquisition and involving several users’ teams from Chile.

## Scenario Events

Table 2 – Steps in the GEOSS Users Scenario

|  |  |  |  |
| --- | --- | --- | --- |
| **Step** | **Description** | **Trans. Tech  Use Case** | **Specialized Use Case** |
|  | **CB-02 Activation of GEOSS Users** |  |  |
| 02.1 | According to the monitoring results analysis, the Actuator (Regional authority) sends back to Initiator a demand for activation of monitoring and tasking services with a list of requested map and thematic products. |  |  |
| 02.2 | Based on Actuator acknowledgment and info, monitoring and tasking services are activated.  Processor (Resource Providers) and Processor (Map Producer) are notified as well.  Requirements for new data acquisition are deduced and listed in the expected map and thematic products. |  |  |
| 02.3 | The Actuator search for existing data, maps or thematic products from Catalogue Services for a pre-event analysis.  Search and assessment would be made through integrated search and view services. Access would be made through Data Access services.  The Actuator (Regional authority), which will be able to access to existing map or thematic products, once the Initiator notifies him that the results are ready. |  |  |
| 02.4 | In parallel, the Initiator activates a feasibility request for a new data acquisition to multiple Processors (Resource Providers) through a Tasking Service.  The Initiator receives back from multiple Processors (Resource Providers) the results for “feasibility of sensor acquisitions”.  The Initiator analyses feasibility study, both from Tasking Service output to a dedicated Tasking client application and/or from generic Tasking Service output format (e.g. KML). |  |  |
| 02.5 | Based on existing feasibility studies, the Initiator sends a request for acquisition through Tasking Service to Processors (Resource Provider).  Once data is acquired, a Processor (Resource Provider) sends notification to Initiator and Processors (Map Producer) via a Notification Service. |  |  |
| 02.6 | One or more Processors (Map Producer) produce requested maps and thematic products and notify Initiator and Actuator (Regional authority) when they are available.  Notification is sent to Initiator and Actuator (Regional authority). Maps and thematic products processing can take benefit of a WPS.  Initiator handles monitoring services to ensure access to the requested maps and thematic products. |  |  |
| 2.07 | Actuator (Regional authority) accesses maps or thematic products (e.g coastal vulnerability from tsunami map) via WCS or WMS as soon as possible, and should start to use them to manage the event |  |  |
| 2.08 | The Initiator can download a code or upload a georeferenced water level entry that will populate a federated database of the AOI.  The Initiator can submit such results to an Hydrology/Meteorology domain experts (e.g. a yet-to-identify Chilean Agency) and ask for 'near real time' feedback on the produced maps or thematic products.  Initiator informs Actuator (Regional authority) about these feedbacks,and about level of quality of the available map or thematic product.  In case of major quality issue, Initiator may request a new production of map and thematic product by cycle loop at **step 02.4.** |  |  |
| 2.09 | In case of availability of fresh data that may enable the production of an up-to-date version of previously requested thematic product the Initiator may request to produce a new version of the thematic product looping from **step** **02.4**. |  |  |
| 2.10 | When the monitoring service does not need to be in activation anymore, Actuator (Regional authority) notifies the Initiator.  Initiator acknowledges the termination of the activation and notifies Processors (Resource Provider and Map Producer). |  |  |

## Post-Conditions

[A post-condition (of a use case) is a list of possible states the system can be in immediately after a use case has finished.]

## Special Requirements

Any legal and regulatory requirements, special standards and quality attributes of the systems related to the AOI will be considered. Specific relevance will be given to usability, reliability, performance and supportability requirements.

# System Model of the Scenario

[This section is to contain system models for the scenario. If multiple scenarios are provide in the preceding sections, then the editor must decide if a single System Model can be provided (most desirable) or if several system models are provided. This section can be similar to the Enterprise Models in the AIP-5 Call for Participation. Potential topics to be included in this section are:

* Context Diagram showing actors and entities external to GEOSS
* Enterprise Specification Diagram showing the enterprise components
* Enterprise Activity Diagrams showing the major processes.
* Information View: Data types
* Computational View:
* Engineering Component Types ]

# Use Cases

## AIP Engineering Use Cases

The GEOSS AIP Architecture approach supports the several SBA communities with a reusable process of SBA Scenarios and Engineering Use Cases.[[2]](#footnote-2) Scenarios are implemented by use cases. Use cases describe reusable functionality of the GEOSS service oriented architecture implemented through Interoperability Arrangements.

A summary of GEOSS AIP Use Cases is shown in Figure 1 with details provided in the following tables. In addition to the actors shown in Figure 1 the GEOSS Actors involved in GEOSS use cases are listed in

Table 3.

20120127_UseCaseDiagram

Figure 1 – GEOSS AIP Use Case Summary Diagram

Table 3 – GEOSS Actors

|  |  |  |
| --- | --- | --- |
| **Actor** | **Description** | **Role Type** |
| GEOSS User | Discovers, consumes, and exploits GEOSS resources | Principal |
| GEOSS Resource Provider | Deploys, operates, registers GEOSS resources | Principal |
| SBA Integrator | Builds network of organizations and components to achieve objectives on an SBA community | Secondary |
| GCI Operator | Operates GCI components and approves registrations | Administrative |

Table 4 – Publish Resources Use Cases

|  |  |  |
| --- | --- | --- |
| **Name** | **Description** | **Actors (may be optional)** |
| P1. **Register Resources**  (AIP-3 ER: 1) | Register resources in GEOSS Components and Services Registry (CSR) or Community Catalog | * GEOSS Resource Provider * SBA Integrator – optional * GCI Operator – optional |
| P2. **Deploy a Service**  (AIP-3 ER: 2) | Deploy services for use in GEOSS. | * GEOSS Resource Provider * SBA Integrator – optional |
| P3. **Test a Service**  (AIP-3 ER: 09) | Service Provider tests its deployed service using a proper Test tool discovered in the GEOSS CSR. | * GEOSS Resource Provider * SBA Integrator – optional |
| P4. **Develop SBA network**  (AIP-3 ER: 14) | Identify resources in particular services relevant to an SBA. Promote concerted use on a larger-scale | * SBA Integrator * GEOSS Resource Provider |

Table 5 – Discover Resources Use Cases

|  |  |  |
| --- | --- | --- |
| **Name** | **Description** | **Actors (may be optional)** |
| D1. **Search for Resources**  (AIP-3 ER: 4) | Search for resources of interest. Variations: user initiated (e.g. GWP), process initiated, searching data sharing conditions. | * GEOSS User |
| D2. **Aggregate Metadata[[3]](#footnote-3)**  (AIP-3 ER: 3) | Harvesting and/or query metadata from community catalogs or services via GEOSS Clearinghouse | * GEOSS Resource Provider * SBA Integrator * GCI Operator |
| D3. **Conduct semantic search**  (AIP-3 ER: 13) | Utilize mediated vocabularies to extend GEOSS search queries across disparate domains or communities. | * GEOSS User |
| D4. **Semantic mapping**  (AIP-3 ER: 12) | Register, mediate, and map between disparate vocabularies used to describe GEOS resources. | * SBA Integrator * GEOSS Resource Provider * GCI Operator |
| D5. **Launch Enabler App**  (AIP-4) | Associated with resources discovered in GCI are enabler applications, e.g., clients. User launches help application including context from previous search. | * GEOSS User |

Table 6 –Visualize and Access Use Cases

|  |  |  |
| --- | --- | --- |
| **Name** | **Description** | **Actors (may be optional)** |
| A1. **Web Mapping**  (new) | Access web maps services and display a composite map to the user. Allow user to modify map layers. Variation: include use of portrayal service | * GEOSS User |
| A2. **Access files**  (new) | Retrieve a file from an access server using FTP. Variations include: user-initiated, process-initiated. | * GEOSS User if user initiated. |
| A3. **Access data via services**  (AIP-3 ER: 5&6) | Access data from using a service that allows for user selection of data returned based on content. Variation: use of Access Broker | * GEOSS User if user initiated |
| A4. **User Authentication**  (new) | User login with single sign-on (SSO). May used with Use Cases: A2, A3, W1. Variations: user-initiated, process-initiated. | * GEOSS User |
| A5. **Access with Acknowledgement**  (new) | May used with Use Cases: A2, A3, W1. Variations: user-initiated, process-initiated. | * GEOSS User |
| A6. **Exploit Data**  (AIP-3 ER: 7) | Exploit - visually and analytically- in Client Applications using information retrieved through access use cases. | * GEOSS User |

Table 7 – Process and Automate Use Cases

|  |  |  |
| --- | --- | --- |
| **Use Case** | **Description** | **Actors** |
| W1. **Execute Processing Service**  (AIP-3 ER: 11) | Invoke a processing service, to produce new derivative data resources. Variations: user-initiated, process-initiated | * GEOSS User |
| W2. **Construct and Deploy Workflow**  (AIP-3 ER: 8) | Design, deploy and execute a workflow. Described in Business Execution Language (BPEL) or any other script language. | * SBA Integrator * GEOSS User |
| W3. **Process with Waiver or License**  (new) | Use metadata containing information about the waiver or license to handle aggregation of data, derived data, re-use of data, and layered data. | * GEOSS User if user initiated |

Table 8 – Maintain and Support Use Cases

|  |  |  |
| --- | --- | --- |
| **Use Case** | **Title** | **Actors** |
| M1. **Register Interoperability Arrangements**  (AIP-3 ER: 10) | Register Interoperability Arrangements in the GEOSS SIR | * GEOSS Resource Provider * SBA Integrator * GCI Operator |
| M2. **Share Best Practices**  (AIP-3 ER: 15) | Create a Best Practice relevant to GEOSS in the GEOSS BP Wiki | * GEOSS User * GEOSS Resource Provider * SBA Integrator * GCI Operator |
| M3. **Monitor Services**  (AIP-3 ER: 10) | Services registered with GEOSS are routinely monitored for network connectivity and application response. | * GCI Operator |
| M4. **User Registration**  (new) | User information is provided to a centralized authentication server to support single sign-on (SSO) with GEOSS providers. | * GEOSS User * GCI Operator |
| M5. **Metrics Management**  (new) | GEOSS Resource Provider, or GCI, gathers access and use metrics and stores information for reporting to the GCI. Variations: reports pushed, reports available for query | * GEOSS User * GEOSS Resource Provider * GCI Operator |

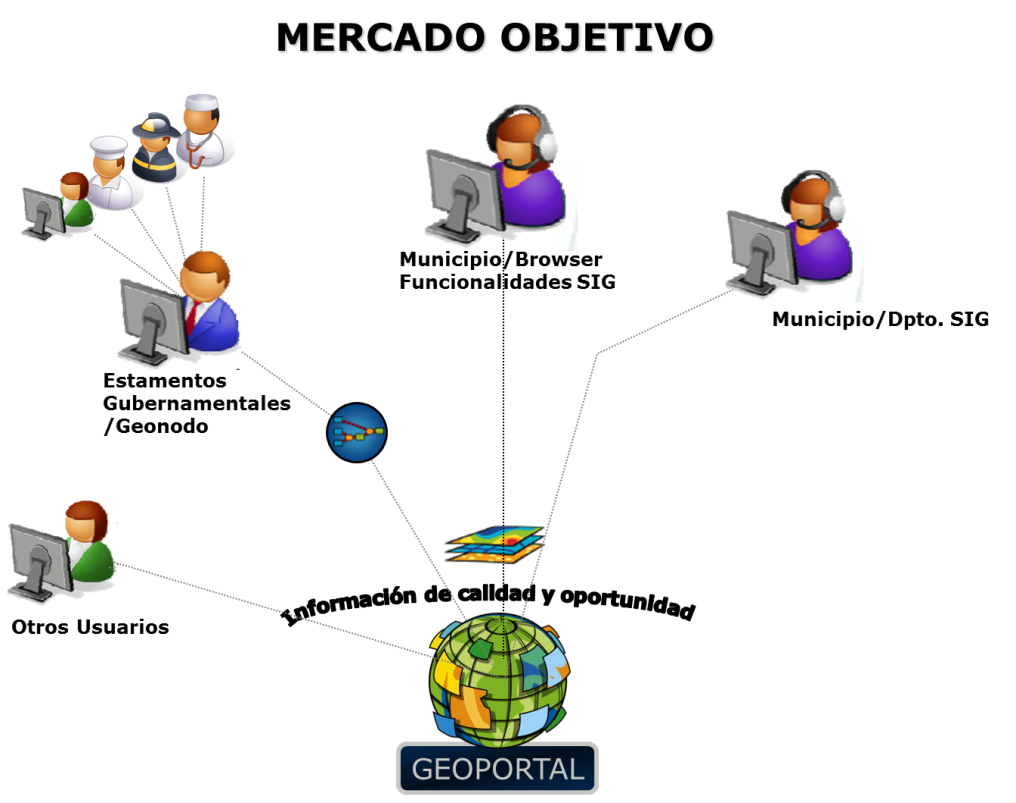
## Specialized Use Cases

### A6 Exploit Data – Impacts assessment Specialized Use Case

[Description of the specialized use case with reference to the relevant generalized use case.]

**Chile SAF -- Use Case Scenario (as GEOSS User and as GEOSS Resource Provider):**

An operator is interested in the impacts of an earthquake and tsunami in a coastal region of Talcahuana in Chile – South America.



***SAF, Chile, 2012***

**Data of Interest:**  Protect Coastal region of Chile

**Actions:**

1. As GEOSS User uses data and map interface from Chile SAF to define the contiguous areas of interest
2. Chile SAF gets authorized access (OpenID-type) GEOSS GCI, search and discover the NASA services (GeoBliki).
3. Chile GEOSS User chains their services to NASA.
4. Chile GEOSS User starts a tasking service to collect monitoring scenes of a geographic region (AOI).
5. Chile GEOSS User integrates its services with others, such as FASat Charlie, proximity of coast, elevation, forest cover, wetlands, urban extents, road networks and protected area boundaries to define contiguous areas
6. User requests GIS-compatible data for each defined area and analyze them with respect to their vulnerability to earthquakes and tsunamis.
7. Resource Provider will check on the authorization credentials (as OpenID) and will make available some code to the Best Practices wiki for GEOSS Users who wants to use some of the GEOSS Data but also to upload (in a federated database) georeferenced data (such as level of water table at water wells or at river or coastal gauges).

### [Specialized Use Case]

[Description of the specialized use case with reference to the relevant generalized use case. Add more sections as needed for additional specialized use cases.]

# Implementation

## Deployed Components

[Description of the engineering component types that have been deployed. Provide a “Wiring Diagram” showing the connections between the components. Provide a description of the components including the status of their registration in the GCI.]

* Chile SAF Client / Browser

## Interoperability Arrangements

[Description of the Interoperability Arrangements used in the deployed components. Provide a short description (title) of the Interoperability Arrangements including the status of their registration in the GCI.]

GeoBPMS (Tasks satellites in an area of interest)

## Use of the GCI

[Description of how the deployed components interact with the GEOSS Common Infrastructure (GCI). If relevant, provide recommendations of how interactions with the GCI could be improved.]

## Demonstrations

[Provide a description of the demonstration that was prepared for the scenario. A reference to the web page containing the Demonstrations Videos should be included.]

## Future plans for deployment

In AIP6, planned for 2013, Capacity Building WG plans on to focus on engaging with other GEO members on carrying out tests that assess the maturity of web services – for example in the SBA areas of Disaster Management, Water Resources and Data Sharing – with respect to GEOSS Users and GEOSS Resource Providers. We plan to work in close collaboration with organizations from Chile and other countries such as South Africa.

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# References

GEO: <http://www.earthobservations.org>

GEO Architecture Implementation Pilot: <http://www.ogcnetwork.net/AIpilot>

GEOSS Registries and SIF: <http://www.geossregistries.info>

GEOSS Global Water WMS and WFS services:

<http://services.ogc.noaa.gov/geoserver/geoss_water_sba/wms?request=getcapabilities>

<http://services.ogc.noaa.gov/geoserver/geoss_water_sba/wfs?request=getcapabilities>

1. A listing of all AIP-5 Engineering Reports: http://www.ogcnetwork.net/AIP5ERs [↑](#footnote-ref-1)
2. For details, see “AIP Development Process,” <http://earthobservations.org/documents/cfp/201202_geoss_cfp_aip5_development_process.pdf> [↑](#footnote-ref-2)
3. See also the Catalogue Use Case in “OGC Engineering Report: Water Information Services Concept Development Study,” OGC Document 11-013r6, 2011-07-012. [↑](#footnote-ref-3)