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Deliverable D8.1
OGC, ISO standards participation and contributions report

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Executive Summary

This deliverable describes the participation activities in OGC, ISO and CEN meetings, the contributions to its working groups and the outcomes.

The GeoViQua project has always reserved an important place for the standardization process. To further improve this aspect OGCE became partner of the project at de middle of the activities period. OGCE has been the nexus between GeoViQua and OGC. In OGC we participated in three AIP editions and in 2 OWS Interoperability experiments editions. The results of this participation are detailed in this documents, being the most relevant the two engendering reports generated in OWS9 about quality in WMS and provenance in conflation processes as well as the quality tutorials released in the GEOSS Best Practices Wiki:

OGC® OWS 9 Data Quality and Web Mapping Engineering Report, OGC 12-160r1, Jon Blower, Xiaoyu Yang, Joan Masó and Simon Thum 2013-06-18 https://portal.opengeospatial.org/files/?artifact_id=52884.

OWS-9 CCI Conflation with Provenance Engineering Report, OGC 12-159, Matthes Rieke, Benjamin Pross 2013-02-05, https://portal.opengeospatial.org/files/?artifact_id=51818

Quality tutorial in the BPW: http://wiki.ieee-earth.org/Documents/GEOSS_Tutorials

In ISO, GeoViQua was present in the TC211 discussions of the new releases in the ISO19157 and ISO19115-1 and some of the group suggestions were accepted.

CEN TC 287 has signed a format Memorandum of Understanding with GeoViQua and some of the GeoViQua partners participated in their regular workshops. GeoViQua had a presentation in the 33th meeting about ways to move FP7 results into the standardization process

1. Introduction

1.1 Scope of this Document and Relation to Other Deliverables

This deliverable describes the participation activities in OGC and ISO meetings and the contributions to its working groups.

Almost all the activities in GeoViQua took into account standard applicability and use of standard protocols and formats. When needed, these standards have been extended and some of the extensions have been presented to OGC or even to ISO. All this activities are reported here.

In particular, this report is related to the following previous deliverables:

- D1.7 Cooperation with other relevant projects and initiatives (first report). Section 2.2: Cooperation with standardization organizations
- D.5.1 Integration of quality information with OGC visualisation services best practice report. Section 2: Integration of quality information with Web Map Services (WMS), Section 3: Integration of quality information with Web Map Tile Services (WMTS), Section 4: Integration of quality information with KML and Section Integration of quality information with Augmented Reality Markup Language (ARML)
- D6.1 Best practice document for quality encodings. Section 2: Relevant ISO standards referenced and reused and section 4: Producer quality model.
- D8.3 First annual report on AIP participation (AIP4)

This report is related to the following future deliverables:

- D1.8 Cooperation with other relevant projects and initiatives (final report).
- D6.3 Assessment of standards, protocols and guidelines employed in GeoViQua
- B8.4 Second annual report on AIP participation (AIP5)
- B8.6 GEO tasks (STC, SIF, and UIC) participation results

1.2 The Standards

A standard is a publication that provides rules, guidelines or characteristics for activities or on their results, for common and repeated use. Standards are created by bringing together all interested parties including manufacturers, users, consumers and regulators of a particular material, product, process or service. Often perceived as boring and not particularly relevant to some organisations, they are actually crucial in facilitating trade and hence have high visibility among manufacturers inside and outside Europe. A standard represents a model specification, a technical solution against which a market can trade. It codifies best practice and it is usually state of the art. Everyone benefits from standardisation through increased product safety and quality, as well as lower transaction costs and prices.

1.3 The OGC

The Open Geospatial Consortium (OGC), an international voluntary consensus standards organization, was originated in 1994. In the OGC, more than 400 commercial, governmental, non-profit and research organizations collaborate worldwide in a consensus process encouraging development and implementation of open standards for geospatial content and services, GIS data processing and data sharing.

The goals of the OGC are:

- Provide free and openly available standards to the market, tangible value to Members, and measurable benefits to users.
- Lead worldwide in the creation and establishment of standards that allow geospatial content and services to be seamlessly integrated into business and civic processes, the spatial web and enterprise computing.
- Facilitate the adoption of open and spatially enabled reference architectures in enterprise environments worldwide.
- Advance standards in support of the formation of new and innovative markets and applications for geospatial technologies.
- Accelerate market assimilation of interoperability research through collaborative consortium processes.

Through its Standards Program, Interoperability Program, Compliance Program and Marketing and Communications Program, OGC develops, releases and promotes open standards for spatial processing.

We have participated in the Standards Program and in the Interoperability Program. In the OGC Standards Program the Technical Committee and Planning Committee work in a formal consensus process to achieve the approval (or "adopted") of the OGC standards. GeoViQua has actively participated in some Standards Working groups and Domain Working Groups that we will detail later. The OGC Interoperability Program is a series of hands-on engineering initiatives to accelerate the development and acceptance of OGC standards. We have participated in several interoperability initiatives such as the OpenGIS Web Services (OWS) and the Architecture and Interoperability programs (AIP).

1.4 The ISO

ISO (International Organization for Standardization) is the world's largest developer of voluntary International Standards. International Standards give state of the art specifications for products, services and good practice, helping to make industry more efficient and effective. Developed through global consensus, they help to break down barriers to international trade.

ISO develops International Standards. It was founded in 1947, and since then it has published more than 19 500 International Standards covering almost all aspects of technology and business. From food safety to computers, and agriculture to healthcare, ISO International Standards impact all our lives. ISO International Standards ensure that products and services are safe, reliable and of good quality.

ISO/TC 211 Geographic information/Geomatics is responsible for the ISO geographic information series of standards. Many bodies are actively engaged in the work of ISO/TC 211. These include national standardization bodies, the OpenGIS Consortium (OGC), international professional bodies (such as FIG and ICA), UN agencies, and sectoral bodies (such as DGIWG and ICAO). The work of ISO/TC211 aims to establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to Earth.

These standards may specify, for geographic information, methods, tools and services for data management (including definition and description), acquiring, processing, analyzing, accessing, presenting and transferring such data in digital/electronic form between different users, systems and locations.

1.5 The CEN

A European Standard (EN) is a standard that has been adopted by one of the three recognized European Standardisation Organisations (ESOs): CEN, CENELEC or ETSI. It is produced by all interested parties through a transparent, open and consensus based process.

European Standards are a key component of the Single European Market. Although rather technical and often unknown to the public and media, they represent one of the most important issues for businesses.

CEN/TC 287 Geographic information works for the Standardization in the field of digital geographic information for Europe to create a structured framework of standards and guidelines, which specify a methodology to define, describe and transfer geographic data and services. This work is carried out in close co-operation with ISO/TC 211 in order to avoid duplication of work. The standards support the consistent use of geographic information throughout Europe in a manner which is compatible with international usage. They support a spatial data infrastructure at all levels in Europe.

The objectives of CEN are achieved by:

- adopting the ISO/TC 211 standards series as CEN standards;
- developing and maintaining standards, specifications and profiles of standards;
- developing technical guidance and best practice documentation;
- collaborating with other standards related initiatives;
- educating the user community and promoting the use of standards for geographic information.

CEN/TC 287 promote liaisons with other organizations and projects to create a platform for better standards development in Europe. CEN has established liaison within for European funded projects such as GeoViQua.

2. OGC standards participation

The GeoViQua project has always reserved an important place for the standardization process. To further improve this aspect OGC became partner of the project. We decided to include the European branch of the OGC: OGCE in the GeoViQua Consortium. This partner was not included at the beginning of the project because, during the proposal phase, they where participating in other proposals for the same call and thus they did not feel appropriate to participate in other proposals. During the negotiation phase we all agreed on having OGC in the advisory board and, at that time, it seemed enough. Nevertheless after the beginning of the project, we learnt that the standardization process could be slower than we anticipated so we explored the solution of stimulating it by financing interoperability experiments. Partners in GeoViQua considered the possibility of organizing the interoperability experiments themselves but we were aware that only if organized under the OGC OWS-9 framework, they will have the needed impact.

The details on the OGCE activities are as follows: OGCE develops standardization activities in OWS-9 and OWS-10, which involves external actors in the development phase as well as contribution to a faster and broader dissemination and outreach. In the *letters of request and justification* GeoViQua described the activities OGCE was going to develop in OWS-9 (already executed) and in OWS-10 (planned). This activities will be explained in the next section. OGC is also leading the GEO AIP activities and GeoViQua participates in them in the form that will be later described.

2.1 Interoperability program

2.1.1 OWS-9

GeoViQua contribution to OWS-9 is structured in 4 main directions: OWS-Context (CCI); Data provenance (CCI); WMTS harmonization (OWSI); and Data quality in map services (OWSI). To make this collaboration more obvious, GeoViQua is negotiating with the commission an amendment of the Grant Agreement in order to allow OGC to become a partner in the project and get some small budget to organize quality related activities in OWS-9. Activities in WMS-Q and provenance are the ones that are results of this collaboration.

The proposed contribution impacts on the following deliverable list:

- CCI-9: OWS-9 CCI OWS Context evaluation Engineering Report,
- CCI-11: OWS Context encoding examples for CCI,
- CCI-15: CCI Integrated Client.
- OWSI-4 OWS-9 OWS Innovations Map Tiling Methods Harmonization Engineering Report
- OWSI-6 WMTS Change Requests
- OWSI-7 WMTS Service (unfunded)
- OWSI-5 OWS-9 OWS Innovations Data Quality for Web Mapping Engineering Report

OWS-Context (CCI)

GeoViQUa will continue developing the integrated OWS client (WMS, WCS, WFS and WMTS) that incorporated WMTS OWS-6, by extending it to support the new version of OWS Context. It is a HTML+Javascript client, so it is the right environment to test Atom, JSON and HTML5 encodings. We also propose to test Atom in a desktop application solution developed in C. We

propose to define encoding example files, test them in the client and report the lessons learned in an ER. These are the 3 work items where we want to participate:

- CCI-9: OWS-9 CCI OWS Context evaluation Engineering Report
- CCI-11: OWS Context encoding examples for CCI
- CCI-15: CCI Integrated Client.

Data provenance (CCI)
The integrated OWS client (WMS, WCS, WFS and WMTS) presents layers metadata as an HTML page that is a transformation of an ISO19139 XML file. We propose to enhance this transformation to present provenance information in a tree style that can link with the records of the previous datasets that were used to generate these ones. We also propose to explode id andhref (and eventually the uuid uuidref), which can be used to reduce the length and redundancy of the provenance description by linking to the provenance of the source instead of repeating it. This will be done in the context of the following work item

- CCI-15: CCI Integrated Client

But it is strongly related with Aviation-11: OWS-9 Aviation Metadata & Provenance ER

WMTS harmonization (OWSI)
In OWS-6 WMTS standard draft this was tested and the lessons learned where incorporated in WMTS 1.0. Several implementations of different standards are still competing with WMTS. There are 2 different problems. On one hand we have standards that are similar but can not be directly supported by WMTS (such as TileCache that orders the J axes in the opposite direction; in fact TileCache can be configured to invert the J axe and generate compatible WMTS tile indices), we also have new approaches to store tiles directly in databases such as MBTiles. We also have mass market providers such Google and Bing tiles that are influencing OpenStreetMap to adopt the same tile pattern that actually is a WMTS RESTful pattern but they don't recognize it (they just lack a ServiceMetadata document!). A set of suggestions to harmonize the panorama has to be collected in an ER and some modification on WMTS can be requested to better support other implementations (such as supporting direct and reversed J ordering) in the change request form. Some of these changes can also be tested in a WMTS service and client. We propose to do this in the context of the:

- OWSI-4 OWS-9 OWS Innovations Map Tiling Methods Harmonization Engineering Report
- OWSI-6 WMTS Change Requests
- OWSI-7 WMTS Service (unfunded)

Data quality in map services (OWSI)
With the proliferation of WMS services the need to choose between different products based on their quality metadata has increased. Also, each pixel in the data can have associated a different uncertainty. There is a need to have an ER that could eventually become a quality profile for WMS. We propose to work collaboratively with others in a task focused in generating this deliverable:

- OWSI-5 OWS-9 OWS Innovations Data Quality for Web Mapping Engineering Report

2.1.1.1 Results

The tangible results of the GeoViQua participation in the OWS-9 are the following engineering reports:

- OGC® OWS 9 Data Quality and Web Mapping Engineering Report, OGC 12-160r1, Jon Blower, Xiaoyu Yang, Joan Masó and Simon Thum 2013-06-18 https://portal.opengeospatial.org/files/?artifact_id=52884.
  This Engineering Report specifies conventions for conveying information about data quality through the OGC Web Map Service Standard (known hereafter as the "WMS-Q conventions"), OGC Web Map Tile Service Standard (known hereafter as the "WMTS-Q conventions"), OGC KML (known hereafter as the "KML-Q conventions") and OGC Augmented Reality Markup Language.
- OGC® OWS-9 - OWS Context evaluation IP Engineering Report, OGC 12-105 Joan Masó 2013-06-18 https://portal.opengeospatial.org/files/?artifact_id=52018
  This OGC Engineering Report describes the results of the OWS-9 IP on OWS Context 1.0. OWS Context is a draft OGC candidate standard. The OWS Context activity tested and evaluated the relative benefits of different encoding methods prior to finalization of the candidate standard. OWS Context has been proposed with an Atom encoding, a JSON encoding and an HTML5 encoding. The encoding requirement seeks to understand the level of mass-market acceptance of these different encoding options and their ability to support mash-ups. Each encoding should be evaluated, including examples and recommendations to move forward. Recommendations should enable the OWS Context capability for OGC services while remaining cognizant of implementations using mass-market technologies.
- OWS-9 CCI Conflation with Provenance Engineering Report, OGC 12-159, Matthes Rieke, Benjamin Pross 2013-02-05, https://portal.opengeospatial.org/files/?artifact_id=51818
  This OGC® Engineering Report describes the architecture of a WPS capable of conflating two datasets while capturing provenance information about the process. The report also provides information about defining and encoding conflation rules and about encoding provenance information. This Engineering Report was created as a deliverable for the OGC Web Services, Phase 9 (OWS-9) initiative of the OGC Interoperability Program.

2.1.2 OWS-10

GeoViQua has participated in the preparation of an activity on provenance information.

At the time of writing this document the Open Geospatial Consortium (OGC®) has issued a Request for Quotations/Call for Participation (RFQ/CFP) to solicit proposals in response to requirements for the OGC Testbed 10. The RFQ/CFP is available at http://www.opengeospatial.org/pub/www/ows10/rfq/index.html. Responses are due by 5 pm EST on 26 August 2013.

The OGC Testbed 10 Kickoff event for the CCI and Open Mobility threads will be held 7-9 October 2013 in Washington, DC. The Aviation thread kickoff will be held on September 27th in Frascati, Italy during the week of the OGC Technical Committee Meeting in Frascati.

GeoViQua is considering applying for the participation in a CCI activity on WPS conflation and provenance. The participants shall advance in the management of data provenance in OGC Web Services by properly capturing and propagating that information through OGC services: They should investigate how data quality and provenance information (using ISO 19115) can be exposed in OGC services and encodings, while providing an approach for maintaining data provenance of processed data in metadata of combined datasets.

The participants shall conduct an engineering study to investigate alternatives and provide provenance strategy. They should Include multiple standards (e.g. ISO and W3C) at specified levels (layer, feature, attribute), a review of geospatial quality indicators, identification of processes to support provenance queries, provide visual flags of changes and provide alerts on quality issues.
The participants shall implement an expanded provenance processes.

GeoViQua is also considering to participate in the OGC Testbed 10 through the development of a JSON encoding and exploring the use of quality enriched KML objects to create annotations on OWS Context resources.

At the time of writing this deliverable, the coordinator is in contact with the OGC to try to introduce a packaging strategy for linked files that will use OPC ISO 29500-2, even if this activity is outside of the RFQ.

2.1.3 AIP-4

2.1.3.1 Preparation of the participation

The preparation for the AIP4 consists on studying the call for participation (CFP) and finding if it is possible to organise any activity described in the call that can be provided by the project. In this particular case, we had identified the tutorial activities.
GeoViQua organized a small group consisting of members from the NASA GES-DISC, ESIP federation, ASTON University and CREAF. This group maintained some telecons on what can be done. It was agreed on writing two different tutorials, one tutorial for producers and another for consumers. In preparation for that, a new web titled Quality Twiki was set up in the GeoViQua twiki.

Then again, CREAF responded to the CFP proposing to create tutorials for WCS and WFS collecting experiences from previous usages of open source products. It includes references to the Standards and Interoperability Forum (SIF) and the relation of CREAF with the SIF.

2.1.3.2 SIF tutorial coordination for AIP4

The Standards and Interoperability Forum (SIF) was formed by the GEO Architecture and Data Committee to provide advice, expertise and impartial guidance on issues related to standards and interoperability for the Global Earth Observation System of Systems (GEOSS). It relies upon GEO Members and Participating Organizations, Standards Development Organizations, domain experts, as well as on other contributors and users to carry out its work. The SIF has overseen the development of a system for reviewing and registering submitted standards and other interoperability arrangements for GEOSS-contributed resources. Entries in the Standards and Interoperability Registry (SIR) can be linked with entries in the GEOSS Components and Services Registries (CSR). Together, these resources enable and make specific processes easier, these processes involve the discovery and **learning** through the web of standards and practices that bring about interoperability of sensors, data, models, and other GEOSS resources, and thus bridge the diverse communities that GEOSS comprises.

The Standards and Interoperability Forum:

- **helps in the identification and promotion of standards** required to achieve GEOSS interoperability objectives

- **facilitates cooperation** among the many organizations, including national agencies of member countries, in selecting, developing and using diverse standards applicable to GEOSS
- **assists in reaching agreement on standards** for each technical component of the GEOSS Common Infrastructure
- **seeks to identify gaps** in current standards and facilitates the creation of standards to fill such gaps
- **supports education and outreach to help increase technical and public awareness of interoperability issues**

The SIF oversees the accession of formal external standards and other less formal but shared "special arrangements" standards into the Standards and Interoperability Registry (SIR), which documents these interoperability arrangements that are employed by GEOSS components. The SIF also works with users to facilitate the understanding and use of standards within GEOSS.
The SIF provides a forum for dialogue and resolution of issues at various levels while advocating within and across existing systems. It serves the purpose of encouraging a broader use of existing standards, which has proven to be a key factor in recommending interoperability arrangements for GEOSS, considering existing international standards organisations such as IEEE, ISO, OGC and others as focal points for GEOSS interoperability objectives.

A main objective has been to provide educational sources to be used by the broad community, while increasing technical and public awareness of interoperability issues, these is what has driven SIF to take the lead on the coordination and design of the GEOSS tutorials. **SIF has contributed to the development of the Best Practices Wiki (BPW) for registering tools and techniques in common usage that are not formal community standards**. This was used as a platform with the idea of providing a forum of discussion on how to elaborate tutorials, to work on the coordination issues between different editors, to provide a common template that all tutorials have to follow and to have a common platform to distribute them. It was decided that tutorials were to be published in the http://wiki.ieee-earth.org/Documents/GEOSS_Tutorials section of the BPW.

Through this application, all the organisations involved in the elaboration of a particular tutorial can easily interact and discuss the evolution of the tutorial. The writing of the document is done directly in the Best Practice Wiki, providing a WYSIWYG editor with special tools to do so, while allowing the addition of images and complementary documents. The Wiki also has a section where users can give feedback on each issue explained in the page that is visible.

The GeoViQua coordinator is also a member of the SIF and actively participates in telecons and face2face meetings.

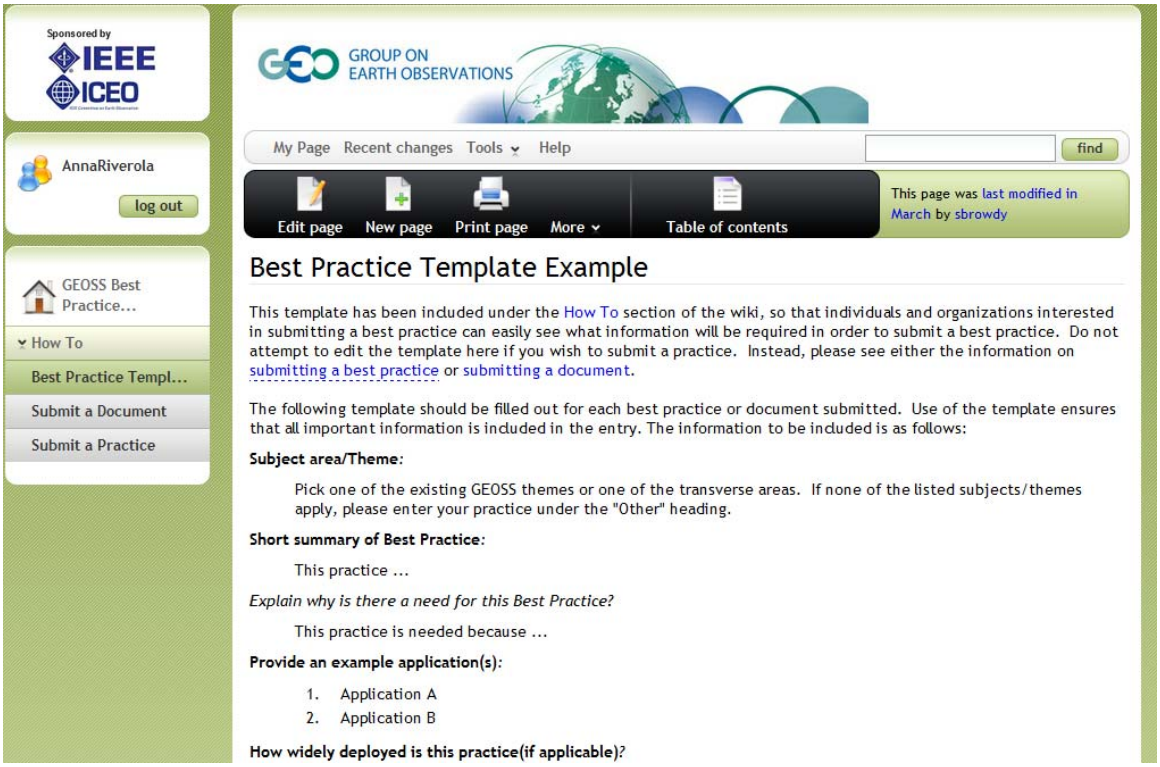
(1) GeoViQua contribution to tutorial coordination

CREAF actively participated in the tutorial coordination activities. CREAF provided the GoToMeeting teleconference facilities that GeoViQua uses for its regular project meetings.

Using this facility, participants form the various tutorial activities have met regularly and agreed on how to divide the work to elaborate the following tutorials:

- Data Discovery and Access
- Resource Registration
- Sensor Observation Service
- Web Feature Service
- Web Coverage Service
- Web Processing Service

The methodology followed to elaborate the tutorials has been standardized by a template structure which is available in the Wiki. The idea was to provide a common template that all tutorials had to follow and to offer a common platform to distribute them.



A promotional video was presented during the GEO plenary held in Istambul in November 2011, in the OGC booth of the GEO exhibition. It was also published in Youtube and it can still be seen at the following URL:
http://www.youtube.com/watch?v=F5bsHCtN9QM
as part of the promotional videos of the activity that is found here:

http://www.ogcnetwork.net/pub/ogcnetwork/GEOSS/AIP4/pages/AIP4_Videos.html

2.1.3.3 **Data quality tutorial on AIP4**

A tutorial for GEOSS users and another for producers was planned.

This is a fragment of the index of the GEOSS user tutorial:

2 Introduction to the topic
2.1 Discussion of tutorial use
Which kind of consumers are we targeting? (GEOSS should work for scientists but also for "policy-makers", users are not generally experts in using EO data < L3... On the other hand, those guys too have requirements on data accuracy, authenticity, traceability, etc)
3 Use Cases
3.1 A consumer view on using data quality use case
3.1.2.1 How to retrieve quality information in the GEOPortal
3.1.2.2 How to interpret data quality measures and other quality information
3.2 A consumer exploitation of the data quality use case
3.2.2.1 How to compare quality indicators and choose the dataset that is fit for purpose.
3.2.2.2 How can be quality information used in further analysis?

This is a fragment of the index of the GEOSS producer tutorial:

> 2 Introduction to the topic
> In providing data to users, several aspects must be considered when determining utility or value of the data to that user. These aspects include:
> • ease of access (web availability, design of web interface, adherence to well adopted standards, compatibility with widely used software)
> • cost of access
> • quality of the data, and quality of the metadata
> • relevance to the objective of the user
> 2.1 Discussion of tutorial use
> This tutorial is designed to be used by data producers to guide their provision of quality information within their data products.
> 2.1.2 A producer view on standard data quality
> 2.1.3 Basics of measurement uncertainty, QA4EO
> 2.1.4 How to think about reality, how to define it, statistical measures of data quality
> 2.2 How interoperability is improved through use of this server/service
> 2.2.1 QA4EO principles
> 2.2.2 What elements of data quality are most useful to what sort of usersstence
> 3 Use Cases
> 3.1 How to produce useful data quality information, with a focus on accuracy
> 3.2 Data quality information encoding

Unfortunately, the Data Quality Tutorials were not finalized on time due to other activities that had to be done in GeoViQua, activities that had higher priority and thus took precedence. The short period of time in which AIP activities are structured had not made possible to hand in the tutorials to be published along with the rest of the AIP-4 tutorials. One of the volunteers for elaborating this tutorial, Dr. Gregory from NASA, suddenly deceased.
Some materials produced for the tutorials were reused in the elaboration of a scientific paper for the special issue on the Philosophical Transactions of the Royal Society A, which was peer reviewed and accepted for publication. The intention of the group is to restart this activity by the end of the project if time allows it.

2.1.3.4 Services tutorials for AIP4

GeoViQua members also worked on the creation of a tutorial for publishing information in GEOSS using Web Feature Service and Web Coverage Service. This tutorials where also included in the Best Practice Wiki at the end of the activity.

2.1.3.5 EuroGEOSS broker activity

In the context of AIP-4 activity the EuroGEOSS broker was involved in two different scenarios: Biodiversity and Semantic.

(1) Biodiversity Scenario

This pilot was built on the results of the previous AIP-3 eHabitat Use Scenario. It aimed to enhance the developed architecture as well as its components. In particular, the pilot will make use of the new (or enhanced) components of the EuroGEOSS Advanced Operating Capacity (AOC).

The eHabitat 3.0, an uncertainty-enabled WPS for ecological forecasting, was developed. This made use of UncertML to encode and address uncertainties in the outputs.
Moreover, we will enhance the architecture developed in AIP-3 by introducing the EuroGEOSS Data Access Broker component. This component provides users with an effective and seamless multidisciplinary data access, implementing all necessary interoperability arrangements to "normalize" downloaded data by using transformation services. The framework allows the user to discover and evaluate datasets and to combine them with internal sources of information in a robust manner.
As far as semantics-enabled discovery is concerned, the pilot made use of the new version of the EuroGEOSS Discovery Augmentation Component (DAC) in order to access the Thesaurus for EO Observation Parameters developed in the context of the GEOSS Sprint to Plenary activity.
The main components of the system architecture are:

- eHabitat 3.0 WPS (uncertainty-enabled)
- the enhanced eHabitat Web Client
- the EuroGEOSS Discovery Augmentation Component
- the EuroGEOSS Data Access Broker
- the EuroGEOSS Discovery Broker

Differently from the previous pilot that focused on a Protected Area in Spain, this pilot will focus on a region in Africa.
This pilot was developed in collaboration with UncertWeb Project.

(2) Semantic Scenario

One of the outcomes from the Architecture and Data Committee (ADC) meeting held in March 2011 in Brazil was a proposal to develop an action plan to "Demonstrate Access to Priority Earth Observation (EO) Data" by the upcoming GEO-VIII Plenary. This effort is characterized as the "Sprint to Plenary" (StP). Among the key activities identified by the ADC to achieve the StP goal, this pilot aimed to contribute to the "*Identify a common set of observational parameters (EO Observables) as a vocabulary to streamline search or concept-browse through GEOSS*" activity.
In fact, the enhancement of the Discovery Augmentation Component aimed to include the vocabulary of EO Critical Parameters, which is under development by task AR-09-01d, among its brokered semantic repositories. As a consequence, this eased discovery and access to Priority EO Data Sources in the GEOSS Common Infrastructure (GCI) framework.
As to components that enable exploitation of EO Data Sources this pilot contributed:

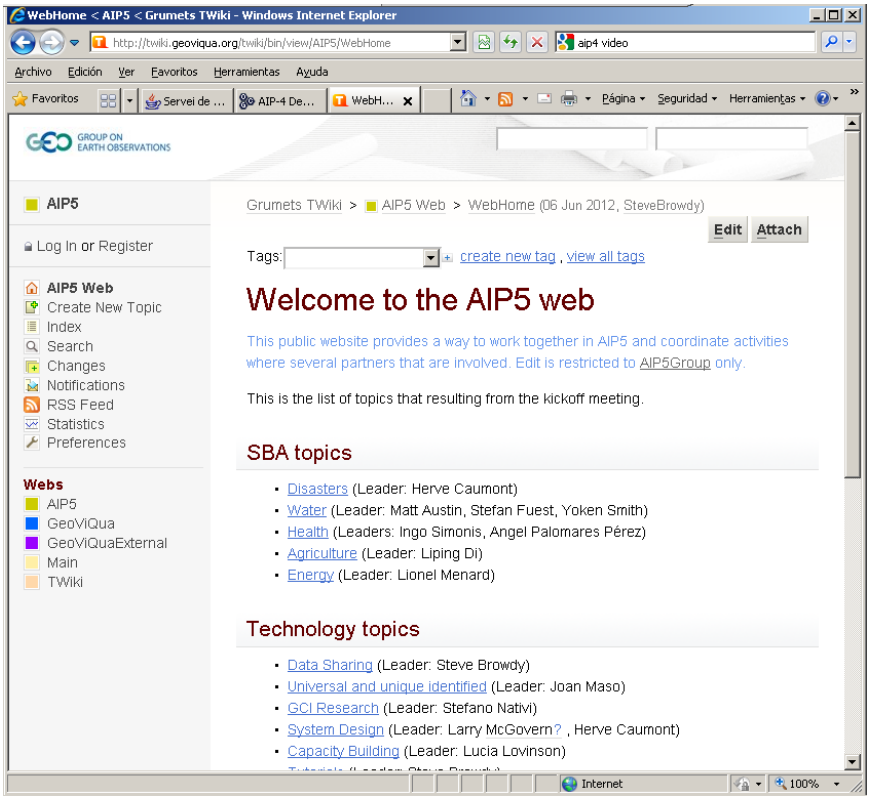
- **the enhanced Discovery Augmentation Component** to integrate the vocabulary of EO Critical Parameters in the GCI
- **the GENESIS Vocabulary Service** providing access to different controlled vocabularies and their inter-relations
- **a web-based client** to access the Discovery Augmentation Component, enabling the browsing of semantic repositories, the execution of queries against a CSW/ISO catalog (EuroGEOSS discovery broker, Clearinghouse Catalog, etc.) , and the preview of

2.1.4 AIP-5

2.1.4.1 Preparation of the participation

GeoViQua attended regular teleconferences to prepare AIP5 call for participation. The interest for discussing quality topics was shown and welcomed by the OGC. GeoViQua submitted a text for the call for participation to motivate others to debate about these topics.

GeoViQua is providing the collaborative infrastructure by creating a new twiki web in the GeoViQua twiki infrastructure. The participants are active, updating it regularly to coordinate their activities. This can be freely accessed at: http://twiki.geoviqua.org/twiki/bin/view/AIP5/WebHome



GeoViQua also responded to the call for participation to prove its commitment to quality activities. The summary of this response can be found at: http://www.ogcnetwork.net/node/1803

"This response aims to extend to a broader audience the discussions that GeoViQua project is conducting on how to make quality information more visible in GEOSS. GeoViQua proposes to lead a quality activity in AIP5 to discuss the GeoViQua quality model for producers and consumers and how to deal with data and metadata identifiers in GEOSS. Also aims to serve as a bridge between AIP5 and QA4EO activities."

2.1.4.2 Kick-off meeting report

The kick-off meeting of the AIP5 initiative was held in Geneva on the 3rd and 4th of May 2012. The list of participants is available in the Web: https://portal.opengeospatial.org/public_ogc/register/aip5ko_view.php.
A summary review of the last year important steps was presented by Steven Bowdy and George Percivall:

- AIP 1: GCI activity. 2007
- AIP 2: Scenarios and SBA. 2008
- AIP 3: Results of Beijing - SBA. 2010
- AIP 4: Sprint to the Plenary. 2011

During the meeting it was defined that the AIP5 activity was to be based on the following principal topics:

- interoperability testing, to begin on September 2012
- results to GEO Plenary, Brazil Nov 2012
- completion of AIP5 activities, December 2012

A key activity during the AIP5 will be to link the SBA with the different use cases: Disasters, Health, Water, Energy and Agriculture. Within the AIP5 there will also be activities in Uncertainty and Provenance, Semantics and Ontology. It was also agreed that the GCI components (Register Community Resources Client) should also interact with the Use Cases. Within the sessions, it was referred that SIF will assist in bringing more services online, and it was mentioned that the tutorials written in AIP4 can be a useful tool for that purpose. These tutorials contain important practical examples and are available in the Best Practices Wiki (as previously explained in section 2.1.3.2).

The communication plan for the AIP5 was explained. It will be mainly supported by the three following mechanisms:

- **teleconferences,** where the Plenary teleconferences will be held on Tuesdays.
  The Working Groups (WG) teleconferences will be determined by the WG leaders.
- **email list server**: Aip-plenary@lists.opengeospatial.org, and the WG specific mailing list will be formed
- **web**: the GeoViQua wiki is providing a specific Web called AIP5 which is public for reading

Finally, as closing summary, the AIP5 efforts should seek to:

- populate/register primary data sets especially available though standards service interface
- exploit existing catalogues
- register applications that can work with MIME types

AIP-5 Agriculture SBA Session

The AIP-5 Agriculture SBA Session in the Kick-off Meeting in Geneve (Switzerland, 3rd-4th of May 2012) was led by Liping Di from the CSISS George Mason University and attended by Stuart Frye (SGT/NASA), Meixia Deng (CSISS/GMU), Jochen Schmidt (NIWA), Sneha Rao (CIESIN Columbia University), Tien-Yin Chou (GIS Center, Feng Chia University), Lan-Kun Chung (GIS Center, Feng Chia University), Eva Sevillano Marco (UAB), Paula Díaz (CREAF), Lucien Wald (MINES ParisTech), Lucia Lovison (Afriterra Foundation) and
Ángel Palomares (ATOS – ARI).

Within this session, three presentations were made in order to explain different use cases related to the Agriculture SBA:

- GeoViQua (Eva Sevillano Marco)

- Use case: to promote good practices that will help to comply with the European legislation on birds habitat conservation, the local administration has established a subvention for farmers that keep their rice crops flooded during the period when the birds are visiting the area. The local government requires a fair system to control the fulfillment of farmers' practices.
- An expert system based on Remote Sensing is developed to control location, duration, and type of flood needed for government subsidy. Field survey to map and control the flooding practice is very expensive. Earth observation data (Landsat ETM/SPOT) are used to map the winter flood through the supervised and unsupervised classifications. Cadaster layers are overlaid to check per-field categorization and the trustability of the farmer's declaration. Uncertainty assessment with confidence intervals and quality indicators is an essential component of this use case.

- PYXIS WorldView Client (Perry Peterson): video presentation

- https://vimeo.com/41473492
- It shows how the client supports various GEOSS SBA scenario demos in the past AIPs

- NCPMS (Liping Di)

- Use case: Remote sensing based national crop condition and progress monitoring for entire U.S. Extensible for the whole globe.
- It provides both condition (up to daily at 250 meter resolution) and progress.
- OGC service interfaces (WMS, WCS and WPS) for data and services.

Next, the scenario development and the work plan were discussed. Multiple scenario ideas were discussed, although there was not time enough to develop a complete scenario. In this session, the most concrete scenario pointed to an EO-based crop condition monitoring web-based system to support government decision making. For the scenario, multiple sites were proposed (e.g., Sub-Sahara Africa, China-spring wheat, U.S.- Summer Corn vs fragmented Mediterranean landscape in Spain and local scale for accurate applications). Some ideas would be a real-time tasking of EO-1 satellite by NASA for validation and detail situation analysis, remote sensing-based 250 meter-resolution crop condition by GMU and CAAS, and crop, soil and population information provided by CIESIN, using the PYXIS client for visualization and demo. Other contributions would be integrated accordingly where appropriate. A key aim would be to show the ability to integrate multiple EO data and socioeconomic data for near real time monitoring to support decision making in territorial management.

Finally, as for the work plan, the establishment of an Agriculture Workgroup (WG) chaired by Prof. Liping Di (GMU) was decided. The Co-Chairing is to be appointed. The Agriculture Scenario should ideally engage w/GEO stakeholders, especially from the Agriculture SBA regarding requirements and problems. Although the schedule and milestones for AIP-5 are yet to be developed, two teleconferences have been taking place and since mid July the teleconferences are to be held weekly.

2.1.4.3 **UUID activity**

Within the GeoViQua project, some work has been done related to the Universal and Unique Identifiers (UUID), mainly regarding the UUID described in the ISO 19115, ISO 19139 and ISO 19118. Improvements on this topic were proposed in the last ISO TC/2011 meeting in Toulouse in the 19115-1 DIS preparation session, where some of them were included as modifications in the reviewed the ISO.

From the study conducted on this matter, it was found that some elements can be used as identifiers in ISO19115. ISO19115 separates data identifiers and metadata identifiers. To clarify that, we are going to represent them in different colours.

ISO19139 adds two additional attributes that any metadata XML element where identifiers can also be expected: id and uuid. *"The XML attributeGroup gco:ObjectIdentification represents the ISO19118 IM_ObjectIdentification. This attribute group is used to identify a resource, it contains two elements: id (of type xs:anyURI) and uuid (universal unique identifer) of type xs:string. The corresponding XML schema fragment is shown below:"*

```
<xs:attributeGroup mane="ObjectIdentification">
  <xs:attribute name="id" type="xs:ID" />
  <xs:attribute name="uuid" type="xs:string" />
</xs:attributeGroup>
```
(from ISO19139 document)

This mechanism was designed to avoid metadata section duplications by referencing internal or external xml blocks using **xlink** or **uuidref**. Unfortunately, this is rarely used in practice.

*The gco:ObjectReference attributeGroup contains a reference to the xlink:simpleLink attributeGroup, plus the definition of an XML attribute named **uuidref** of type xs:string.*

```
<xs:attributeGroup name="ObjectREference">
    <xs:attributeGroup ref="xlink:simpleLink"/>
    <xs:attribute name="uuidref" type="xs:string"/>
</xs:attributeGroup>
<xs:attribute name="nilReason" type="gml:NilReasonType"/>
```
(from ISO19139 document)

ISO 19115:2003/19139 provide different possible placeholders for both data identifiers and metadata identifiers:

ISO element	Xpath
File Identifier	/gmd:MD_Metadata/gmd:fileIdentifier/gco:CharacterString
Parent Identifier	/gmd:MD_Metadata/gmd:parentIdentifier/gco:CharacterString
Metadata ID	/gmd:MD_Metadata/@id
Metadata UUID	/gmd:MD_Metadata/@uuid
Dataset URI	/gmd:MD_Metadata/gmd:dataSetURI
Citation Identifier	/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:identifier

ISO element		Xpath
Data Identification ID		/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/@id
Data Identification UUID		/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/@uuid
Aggregation Information	Data Set Name	/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/ gmd:aggregationInfo[1]/gmd:MD_AggregateInformation/ gmd:aggregateDataSetName/gmd:CI_Citation/gmd:identifier
	Data Set Identifier	/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/ gmd:aggregationInfo[1]/gmd:MD_AggregateInformation/gmd:aggregateDataSetIdentifier

ISO 19115-1:2012 will provide different possible placeholders for both data identifiers and metadata identifiers. Some of them are new, and some of them have been renamed to clarify the semantics.

ISO 10115:2003 element		ISO 19115-1:2013 element
fileIdentifier		metadataIdentifier (MD_Indentifier)
parentIdentifier		parentMetadataIdentifier (MD_Indentifier)
Dataset URI		metadataLinkage (CI_OnlineResource)
Aggregation Information	aggregateDataSetName	name (CI_Citation)
	aggregateDataSetIdentifier	*already present in name*
Citation	identifier	identifier (MD_Indentifier) *unchanged*
Citation	*new*	onlineResource (CI_OnlineResource)

The development of this activity will continue in http://twiki.geoviqua.org/twiki/bin/view/AIP5/UUIdTopic and by holding teleconferences.EuroGEOSS broker activity

In the context of AIP-5, the EuroGEOSS broker is involved in the “GCI Research Activity”. The main focus of this activity is testing the new configuration of the GEOSS Common Infrastructure (now including the brokering framework) with a set of new client and server applications.
In order to facilitate the Access to online data, this activity is also exploring the possibility to enrich source metadata with “Helper Application” information. A helper application is essentially a client application which is recognized by the Broker and which is able to consume the discovered dataset (according to the protocol utilized to publish the dataset and its encoding format).
The AIP-5 is currently ongoing; results of this activity will be reported in the next version of this document.

2.1.4.4 Agriculture SBA

Agriculture is a crucial component of societal well-being and food security. Information on the agriculture production condition and outcome is linked to many aspects of activities and directly to the trade of commodities. Timely acquisition and provision of agricultural condition assessment, crop progress, and production on large scale are highly desired to many sectors beyond agricultural agencies. Earth Observations have been proved to be the most effective means to acquire and produce such information in timely fashion.

Information requirements from decision-makers and practitioners in agricultural sectors are: timely crop growth, condition report, crop progress stage monitoring and crop production and yield projection. This information is required in order to be available in a timely fashion, especially during the growing season. Condition, progress reports, and production estimate should be publicly accessible. In other words, ideally these should be fully implemented and open exchange of data while protecting individual privacies, data and products at minimum time delay and cost (free of charge or minimum cost for research and education) is desirable.
In the last teleconference, with attendants from PYXIS-Canada (Perry Peterson), Tsinghua University-China (Yuqi Bai), UAB-Spain (Eva Sevillano Marco), CAAS-China (Zhongxing Chen) and GMU-USA (Eugene Yu), the Agriculture Scenario Engineering Report for the GEOSS Architecture Implementation Pilot version 0.1 draft has been reviewed. As stated, a web-based system to support EO-based crop condition monitoring to support government decision making is to be implemented. The system is related to GEO SBA Task AG-01 Global Operational Monitoring System of Systems for Agricultural Production, Famine Early-warning, Food Security and Land-use change.

The GEOSS AIP task develops process and infrastructure components for the GCI and the broader GEOSS architecture as a means 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.

Regarding the architecture for the current scenario, it was suggested that the portal could be independently implemented by GMU. Ideally, the scenario would have an alternative client to emulate the portal and the application would be able to integrate on-demand from other data sources: visualization and analysis tools could be used. For the GeoWeb Browser, a global grid system was proposed (complementing the AIP-4 demo https://vimeo.com/41473492). Data from WCS/WMS is expected, as their client is trying to be involved in all SBAs (e.g., the Energy group and the Disasters group) with the aim of achieving interoperability and enabling client access to the data. Ongoing initiatives are testing the WCS/WMS. However, it was noted that the current portal may not stand for stress test because of the limitation of current hardware configuration. Contributions to solve this issue are expected. The portal address for the current system is VegScape (http://dss.csiss.gmu.edu/vegescape). Endpoints for WCS/WMS will be provided.

If feasible at the scale the scenario will be developed, it would be interesting to introduce quality elicitation, quality visualization, and quality encoding (e.g., Producer and Consumer quality models under development in the GeoViQua project, error spatialization). Several local agriculture datasets from Spain could be used for this purpose (e.g., GeoViQua's use case presentation on the kick-off report section above), including the improvement of uncertainty assessment and visualization for

categorical variables, and derived quality indicators (e.g., global indicators, per-pixel or per-object indicators).

Specialized use cases would include EO time series crop growth and simulation (http://www.wofost.wur.nl/UK/ WOrld FOod STudies WOFOST). For the simulation, non-EO data is needed, beyond meteorological data.
With the monitor, the following are specific products to be produced routinely and operationally using time series satellite observations:

- crop condition: daily NDVI and daily VCI
- crop growth stage: major crop types cover corn and soybean
- crop condition and growth geospatial community portal

New EO data source will trigger the workflow to generate the intermediate products and crop growth stage. Mainly, products like daily Normalized Difference Vegetation Index (NDVI), daily vegetation critical index (VCI) and crop growth stage map will be updated when new EO data are available.

Agriculture information requirements can be met with the development of time series from moderate resolution satellite observations, open geospatial standards, and expanded virtualization of computing hardware, software and service in the web environment and cloud computing cyberinfrastructure. Many satellite-based observations, such as Moderate Resolution Imaging Spectroradiometer (MODIS), Advanced Wide Field Sensor (AWiFiS), Landsat, and Satellite Pour l'Observation de la Terre (SPOT), have been extensively and successfully used in large area cropland classification, crop condition monitoring, crop progress stage estimation, and yield production. Open geospatial specifications, such as Web Feature Service (WFS) and Web Map Service (WMS), meet the needs of timely delivery and seamless interoperation.

The goal is to leverage the advancement of Earth Observations, open geospatial standards, and computing powers in serving the agricultural decision-makers with timely and objective crop progress condition and production information. Near-term objectives of the agricultural community in this phase will be focused on: (1) Earth Observation based crop condition and progress reporting, (2) fostering collaboration and sharing of information through networking and partnership in disseminating and utilizing the results and products, (3) open, on-demand data analyzing and results access in timely fashion, and (4) integrating the results in a visible Web presence-portal and interoperable services.

2.1.4.5 **Quality model session**

The Call for Participation in the Quality model session was answered by the following groups:

- CIESIN (C)
- GeoViQua (P)
- GeoWOW Hydro (C)
- EuroGEOSS (C)

The meeting started with a description of the GeoViQua project and an explanation on the achievements made so far in this EC project. The main goals presented were:

- extract, encode, embed and link information on data quality with the data themselves
- generate innovative quality-aware

- visualisation tools
- geo-search capabilities
- integrate solutions in the GEO Portal and GCI
- support QA4EO principles

(From more information on GeoViQua goals and activities, please check deliverable D1.4 "Project activity report for first period")

As background information, the Producer and Consumer quality models developed in GeoViQua were introduced. Regarding the Producer's quality model, Herve Caumont proposes to provide some guidelines (good practices) in a social network to explain how to contribute using GeoViQua model. Preferably it will be done using a social networking in GEOSS where people can participate collaborating on its implementation. Another point raised by Joan Masó, as a result of GeoViQua research, was the need of some modifications of the ISO metadata quality model, in concrete on:

- quality indicator traceability (QA4EO)
- publications that describe, use, compare, etc., datasets (user requirements)

(From more information on GeoViQua quality models, please check deliverable D6.1 "Data quality encoding as a best practice paper")

Regarding the Consumer quality model, it was mentioned that formal and informal interviews to users together with the GEO Label questionnaire, revealed the need for users to express their opinions on the data. Moreover, a simple proof of concept to generate and edit user feedback for GEOSS resources in a GEOSS catalogue was previously developed (GEOSSBack, www.ogc.uab.es/geossback) which also revealed some requirements. A concern expressed during the session was related to the GEO Label and to the labelling (communicating) of things regarding GEO. At the moment the way it is going to be addressed is not too clear. Some ideas point out to the GEO Portal, oriented to get people informed on the wide range of tools that GEOSS currently have available for a broad range of uses. In the near future we are going to provide some tools specific to quality acquisition and usage. Two of these tools were presented in the session, as explained bellow.

A producers' useful tool was explained, particularly the quality extension of the rubric XSLT (http://www.ngdc.noaa.gov/metadata/published/). This tool was developed by NOAA/NESDIS/CLASS/ISO. It will help to evaluate how many metadata elements related to quality are provided. The extension of the system allows a better visualization and comparison in the GEO Portal.
(From more information on GeoViQua quality models, please check deliverable D3.1 "Metadata extraction quality component")

Furthermore, during this session it was also explained another tool related to quality named the Metadata comparison tool, which was developed by the GeoViQua project during the WP5.3. Its purpose is to allow users to easly compare the main metadata elements facilitating the selection of the best dataset for their purpose.
(From more information on GeoViQua quality models, please check deliverable D3.1 "Metadata extraction quality component")

Finally, another aspect treated was the Data Quality analysis of the GEOSS Clearinghouse, which depicts a scenario of the quality information distributed by the producers. This study is being

extended to other catalogues now available thank to the introduction of a main component in the GCI, the EuroGEOSS broker. One of the conclusions derived from the studies done, is the need of a unique and global identifier for data and metadata records. It is critical to GEOSS success, as also pointed out Herve Caumont in the Plenary Closing Session of the first day. Regarding the provenance, each new resource accumulates the processes and sources history of the previous resources by repeating the previous history. The GEOSS Clearinghouse metadata study done by GeoViQua revealed that some datasets accumulate more than one thousand processes and sources. Despite all these efforts, provenance descriptions are mainly textual and, when sources are mentioned, links point to the local data that was used (using local file system notations), thus they are not providing provenance linked to distributed data resources in the catalogues. When the metadata was made public, nobody took into consideration redirecting local files to public resources in catalogues (when available).
(From more information on GeoViQua Quality models, please check deliverable D7.2 “Report on current GCI and identification of issues in integration with GEOSS”)

As closing activity, long time for discussion was given, at this point some important questions arose, related with what was missing and still needs to be done: service and data gaps.

- How can we integrate MD comparison in the GEO Portal?
  - ESA is part of the project and SC is subcontractor
  - It is still to decide which technology is going to be used
- How can we impose the producer model in the GCI?
  - Producers are using current ISO19115
  - It will be difficult to adopt ISO19157
  - Even more difficult to accept modifications
- How consumer quality comments can be collected
  - By a single system
  - Several systems
  - How this can be integrated in the GCI

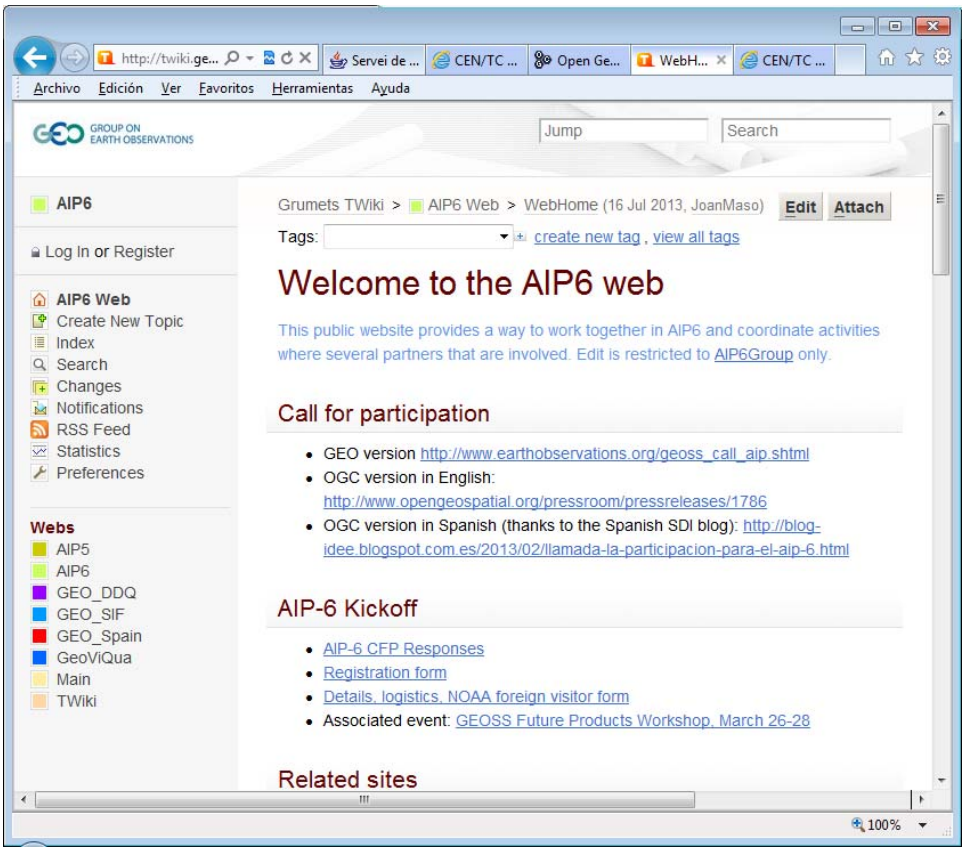
The Quality session, although having fewer assistants than what it was expected, it was quite productive and interesting in order to clarify the work done in GEOSS regarding quality, and also to receive input from other experts.

2.1.5 AIP-6

2.1.5.1 Preparation of the participation

This will be a key activity in the integration of GeoViQua results in the GEOSS Common Infrastructure. So that, GeoViQua attended regular teleconferences to prepare AIP6 call for participation. Our initial intention was to participate in the Agriculture SBA group and prepare a video based on the GeoViQua agriculture scenario. Also participate in the GCI activities and explore the possibilities to include the GeoViQua user feedback system into the GCI architecture. The interest for discussing quality topics was shown and welcome by the OGC. GeoViQua submitted a text for the call for participation to motivate others to debate about these topics.

GeoViQua is providing the collaborative infrastructure by creating another twiki web in the GeoViQua twiki infrastructure. The participants are actively updating it regularly to coordinate their activities. This can be freely accessed at: http://twiki.geoviqua.org/twiki/bin/view/AIP6/WebHome



GeoViQua also responded to the call for participation as a way to express its commitment to quality activities. The summary of this response can be found at: http://www.ogcnetwork.net/node/1887:

"GeoViQua proposes to contribute with two scenarios around quality encoding and visualization. The Agriculture and Carbon Cycle scenarios demonstrate how GEOSS data can be used considering quality for the benefits of their respective Societal Benefit Areas. Additionally, GeoViQua plans to contribute with a user feedback database and user feedback service with the intention of having them integrated in the GCI Architecture. The objective is to complement the producer metadata about the quality of these resources that is already provided by the Discovery and Access Broker (DAB). Additionally, a client will be provided to query and to produce this information."

2.1.5.2 **Kick-off meeting report**

The kick-off meeting of the AIP6 initiative was held in Silver Spring on the 28rd and 29th of March 2013. The list of participants is available at: https://portal.opengeospatial.org/public_ogc/register/aip6ko_view.php.

During the meeting it was defined that the AIP6 activity was going to be based on the following principal topics:

- Water SBA
- Disasters SBA
- GCI research

A key activity during the AIP6 will be to elaborate a showcase that can be seen at the next GEOSS Ministerial that will link the SBA with the different use cases: Disasters, Health, Water, Energy and Agriculture. It was also agreed that the GCI components (Register Community Resources Client) should also interact with the Use Cases. Within the sessions, it was referred that SIF will assist in bringing more services online, and it was mentioned that the tutorials written in AIP4 can be a useful tool for that purpose. These tutorials contain important practical examples and are available in the Best Practices Wiki (as previously explained in section 2.1.3.2).

The communication plan for the AIP6 was explained. It will be mainly supported by the three following mechanisms:

- **teleconferences,** were the Plenary teleconferences will be held on Tuesdays.
  The Working Groups (WG) teleconferences will be determined by the WG leaders.
- **email list server**: Aip-plenary@lists.opengeospatial.org, and the WG specific mailing list will be defined
- **web**: the GeoViQua wiki is providing a specific Web called AIP6 which is public for reading

2.1.5.3 GCI research group participation report

We are participating in this group reviewing the efforts done in the integration of the user feedback system and the GEO label into the Discovery and Access Broker. Two teleconferences have been done and the minutes are documented in the AIP6 twiki. So far we established the objectives of the group. This activity is on going at the moment of elaborating this report.
For example, in the last telecon the GEO Label and User Feedback System were introduced using this tutorial: http://uncertgeo.aston.ac.uk/INSPIREtutorial, these videos: http://uncertgeo.aston.ac.uk/INSPIREtutorial/videos/ and the new GEO Label website http://geolabel.net/geolabel.html. Discussions on how to make progress were made and Steve Browdy recommended to move discussions directly to the IDB "As soon as we have achieved something we have to schedule a telco with IIB and IDB." While Stefano Nativi recommended to ask ID-03 Hans Peter about a dedicated telecon.
Meeting minutes are recorded here: http://twiki.geoviqua.org/twiki/bin/view/AIP6/GCIResearchTechnologyTopic

2.1.5.4 Agriculture SBA

We are participating in this group by creating a video demonstration about what we are doing in the Ebro delta scenario. We hope this video case can be presented at the exhibition of the GEO Ministerial. This activity is on going at the moment of elaborating this report. Details can be seen here: http://twiki.geoviqua.org/twiki/bin/view/AIP6/DM_AgricultureSBATopic.

In particular data and services contributed by GeoViQua can be seen here: http://twiki.geoviqua.org/twiki/bin/view/AIP6/DMAgricultureSBAData, http://twiki.geoviqua.org/twiki/bin/view/AIP6/DMAgricultureSBAServices

2.1.5.5 Tutorials

GeoViQua is planning to contribute to the Best Practice Wiki with a tutorial about the user feedback system and the GEO label: http://uncertgeo.aston.ac.uk/INSPIREtutorial.

2.2 Standards program

2.2.1 WMS.SWG

During the duration of the GeoViQua project, we have participated in the WMS Standards Working Group. In the discussions we have presented the activities conducted in OWS-9 about the WMS-Q Engineering Report described on section 2.1.1 OWS-9. The objective of these talks is to adapt this ER into a Best Practice document created by this group and submitted to the OGC TC for approval.

To help in the objective we have also been discussing on how to modularize the WMS standard and released a new version of WMS that makes easy to extent it, particularly in the quality direction.

2.2.2 WCS.SWG

In Web Coverage Service Standards Working Group we have been participating in order to know more about the modularization approach that WCS has lately adopted. In particular, a proposal for a Quality extension for GMLCov has been discussed in the group. Even though this was not foreseen in the original Description of Work of the project. This extension describes how to include specialized quality in the GML description of a coverage.

2.2.3 GMLJP2.SWG

In the GML JPEG2000 Standards Working Group, we stand as editors of the new standard version. The idea is to harmonize GMLJP2 with GMLCov (defined in the WCS.SWG). This will have the bonus benefit that when adopted, the quality extension for GMLCov elaborated in WCS.SWG will be also adopted by GML JPEG2000, solving the problem of including specialized quality. For the dataset level quality (that is encoded in ISO metadata documents in XML) we have make sure that GMLJP2 is able to include it.

2.2.4 ARML.SWG

We have contacted the Augmented Reality Markup Language Standards Working Group during an open revision period of their standard; we wanted to ensure that the standard is semantically rich enough to support quality annotations of the reality. We concluded that some modifications were needed and we included our recommendations in the OWS-9 Engendering Report.

2.2.5 DataQuality.DWG

We have participated in the reactivation of the OGC Data Quality Group activities. This is an OGC thematic group focussed on Data Quality. GeoViQua activities were presented in the group twice, and we have started to develop a collection of datasets with different examples and requirements.

2.2.6 Workflow.DWG

We have participated in activities and presentations about the relation with lineage, provenance, traceability and workflows.

2.2.7 Mass market DWG

This group has attended the Mass Market face-to-face meeting to discuss improvements in WMTS and particularly to include quality layers in it. The results of these interactions have been recorded in another Engineering Report on WMTS that is publicly available at OGC: OWS-9 Engineering

Report - OWS Innovations - Map Tiling Methods Harmonization https://portal.opengeospatial.org/files/?artifact_id=52757

2.2.8 TC meetings participation during the GeoViQua project duration

OGC face-to-face meetings take place every 3 months. GeoViQua project has attended several of them. This had made possible that quality aspects were discussed in several groups of the OGC for the past three years.

- March 2011 Bohn, Germany: A presentation on GeoViQua and UncertWeb was done in the Data Quality Working Group
- September 2011 Boulder USA: Presentation on Quality and other metadata topics was done in the WCS.SWG and in the GMLJP2.SWG. We attended the GEOSS Climate Workshop that was organized the day after the TC meeting.
- November 2011 Brussels, Belgium: We attended the OWS-9 sponsors' preparation meeting and presented the interoperability experiments proposed by GeoViQua. In the Data Quality Group we presented the project and a comparison between W3C Prov. and ISO 19115 lineage model. A presentation about data quality in aviation domain was relevant for our project. Other presentations were done in WMS.SWG, WCS,SWG and GMLJP2.
- June 2012 Exeter UK: A presentations about GeoViQua activities in OWS-9 and its presentation at the kickoff meeting in FairFax USA was held. Another presentation about WMTS harmonization and quality was done in the Mass Market Domain Working Group as well as a presentation in WCS.SWG.
- October 2012 Seoul South Korea: A presentation on GeoViQua was done again as well as a presentation on OWS Context.
- January 2013 Redlands USA: In the Data Quality Working Group we presented the GeoViQua Quality model and the WMS-Q Engineering Report. OWS Context was presented in the Decision Support Domain Working Group. In the Mass Marked the WMTS Engineering Report was presented and asked for approval. In GMLJP2.SWG we discussed about annotations and quality. In the OWS Context we presented our developments and the Engineering Report, while in the Workflow Domain Working Group we listened several presentations about data provenance from different angles.
- Juny 2013 Virtual Meeting: In GMLJP2.SWG we discussed the new specification and its implication on data quality.

At the time to present this deliverable ESA (a partner of this project) is planning to host the next TC meeting at the ESRIN facilities in Frascati, Italy, in September 2013. The coordinator is planning to attend this meeting and present several developments carried out by the project members:

- September 2013 Frascaty, Italy: In this meeting, we plan to participate in the Data Quality Working Group presenting the GeoViQua Quality model, the label and our ideas on data provenance (possibly this ideas about provenance can be discussed in the Workflow domain Working Group. In GMLJP2.SWG we will continue discussing on annotations and quality. In the OWS Context we will study quality encoding in JSON.

3. ISO Participation

3.1 ISO19115

GeoViQua actively collaborates with ISO standard revision processes. The last ISO/TC 211 meetings took place in Toulouse on 4-8/6/2012. GeoViQua proposed 7 comments over 20 total comments on ISO/CD 19115-1 Geographic Information – Metadata – Part 1: Fundamentals. 5 out of the 7 comments were accepted to be included in the new version of the standard.

The overall comments presented by GeoViQua were:

	1	2	(3)	4	5	(6)	(7)
No	**MB 1**	**Clause N°/ Subclause N°/ Annex (e.g. 3.1)**	**Paragraph/ Figure/Table/ Note (e.g. Table 1)**	**Type of com-ment2**	**Comment (justification for change) by the MB**	**Proposed change by the MB**	**Editing committee and secretariat observations on each comment submitted**
7	ES 05	6.5.5	Figure 9	te	Sometimes there is a publication that explains the whole process to generate a dataset	Add "+ additionalDocumentation: CI_Citation" to LI_Lineage. Description is: A resource (e.g. a publication) that describes the whole process to generate this resource (e.g. a dataset)	Accepted in principle see OGC 85 *DD_Done*

9	ES 08	6.6.2	Figure 20	te	First paragraph says: "This package provides a standardized method for citing a resource". So it could be used to cite a publication that is related to the dataset (resource) described. Data citation in scientific publications (and vice versa) is an important problem that is recognized by several organizations such us GEO/GEOSS, Datacite (http://www.datacite.org/) and it is already used by Elsevier (see e.g. Elsevier: http://www.sciencedirect.com/science/article/pii/S0967063708001805. With current CI_Citation some attributes are missing to generate a complete citation of a publication. You are explicitly accepting this approach by including + additionalDocumentation: CI_Citation [0..*] in MD_Identification so I kindly ask you to follow your own path and to complete the process.	Add: "+ DOI: CharacterString" (data object identifications. Used for datasets and for scientific papers), "+ volume: CharacterString", "+ issue: CharacterString", + "pages: CharacterString" (the three very common in scientific literature), + "otherRelatedResource : MD_Identifier [0..*]" (other resources also covered by this publication) Additionally we could also add "+ scope: DQ_Scope [0..1]" (the publication is using only a part of the resource) and "+ category: GVQ_PublicationCategoryCode" (see next comment).	Not accepted Identifier and other citationDetails already present – DOI is only the flavour of the day.
10	ES 09	6.6.2	Figure 20	te	If you accepted the inclusion of GVQ_PublicationCategoryCode you need to add the definition of it. The attributes are deeply based on ISO-690	Add GVQ_PublicationCategoryCode with this attributes: bookChapter, book, report, journalArticle, magazineNewspaper, atlasPaperMap. applicationProgram, conferenceProceedings, cdDvd, blogWiki, website, webpage, onlineVideo.	Not accepted
11	ES 10	6.5.3.2	Figure 6	te	Allow to include publications that describe usage of data in MD_Usage	Add: additionalDocumentation: CI_Citation [0..*] (publications that describe usage of data)	Accepted *DD Done* Add to Data Dictionary

12	ES 11	6.5.3.2	Figure 6	te	Sometimes the producer discovers issues on the data and can suggest alternative solutions.	Add a new MD_DiscoveredIssue class to MD_Usage with the following attributes: + expectedFix: CI_Date [0..1] (Date when a solution is expected) + fixedResource: MD_Identification [0..1] (Link to an alternative resource that has the problem fixed) + knownProblem: CharacterString [0..1] (the issue that is known to be present) + workAround: CharacterString [0..1] (provisional solution) + additionalDocumentation: + CI_Citation [0..*] (Publication where the issue was reported)	Accepted in principle Add attribute named "identifier: MD_Identifier [0..1] Joan will provide definition and explaination text *DD Done*
13	ES 14	6.5.3.3 or 6.5.6	Figure 7 or Figure 10	te	We have reviewed "W3C provenance" standard (http://www.w3.org/TR/2011/WD-prov-dm-20111018/) and we find out that almost any element/attribute that an equivalent element in this standard but a relation between entities called "revisionOf" to say that a resource is the revision of another resource. We propose 2 alternatives to include this here. Please consider the possibility of including one.	Alternative A: Add a new code "revisionOf" in the DS_AssociationTypeCode Alternative B: Include a new element in MD_MaintenanceInformation called "+ previousVersion: MD_Identifier" (or CI_Citation) as a way to link to the previous version of this dataset.	Accepted alternative A *DD_Done*
19	OGC 85	6.5.5	Figure 9	te	Many more detailed languages are emerging for describing details of lineage. If such descriptions are available for a dataset, the metadata should be able to reference them.	Adding citation [0..*]: CI_Citation to LI_Lineage is a general way to address this need.	Accepted

Table 1. GeoViQua comments on ISO/CD 19115-1 Geographic Information – Metadata – Part 1: Fundamentals. In blue the accepted ones. In orange the not accepted ones.

Since the work on the ISO19115 and in ISO19157 is completed, the participation in ISO meetings has been suspended.

4. CEN Participation

GeoViQua and CEN (European Committee for Standardization) signed a Memorandum of Understanding.
GeoViQua has recently applied for “project liaison” with CEN/TC 287 "Geographic information". We strongly believe that by joining efforts in this Pan-European forum, **GeoViQua Project** efforts to create practical and effective standards will benefit both the industry and the user.

4.1 Meeting participation

As a result of this project liaison, GeoViQua partners have participated and represented the project in the following meetings that CEN has organized:

- the CEN/TC 287 29th workshop was held in CEN Headquarters, Brussels, Belgium, October 2011 “The new economy: Best practices in Geospatial Innovations and applications”
- The CEN/TC 287 30th workshop March 2012 (Trento, Italy)
- The CEN/TC 287 31th workshop September 2012 (Edinburgh, UK)
- The CEN/TC 287 33th workshop September 2013 (Fascati, Italy)

4.1.1 GeoViQua 33th workshop meeting participation

This workshop is looking at ways that CEN and OGC can form a liaison to allow FP7 projects (and other European research) results to be injected in the standardization process. The main aim is that the results of these projects can be saved in different kinds of documents in the standardization bodies in a way that their progress is not lost but can be continued by other projects in the future. Some of the discussed formats for these documents are OGC Public Engineering Reports (http://www.opengeospatial.org/standards/per) or CEN best practices (http://gistandards.eu/bpc).

In the afternoon, several projects have talk about how they see the standardization process to expand the impact of their project.
i-SCOPE (Debbie Wilson) aims to deploy smart cities services for urban ecosystems. COBWeb (Bart de Lathouwer) discussed the needs of Citizens Sciences for natural reserves and their needs for data quality and access rights management. GeoViQua (Joan Masó) presented their work in producing standards and collaborating with standards organizations, including ISO and OGC. eENVplus (Giacomo Martirano) aims to unlock huge amounts of environmental data which is managed by the involved national/regional environment agencies and others through the integration and harmonisation of existing services. i-locate (Guiseppe Conti) offers an indoor routing and a location framework with open data.

GeoViQua has made a 10 minutes presentation on which standards we have been using and how we have adapted or extended them. We have also explained how OGCE has become part of the project to organize sub-activities in OWS-9 and how this end up in two Engineering Reports

One of the main conclusions of this workshop is that FP7 projects have to work together in interoperability programs to do not repeat work are harmonized. Then they will be able to standardize and integrate solution. GeoViQua is considering using the CEN Best Practice repository to expose a couple of best practices document that result from GeoViQua activities.

Annex A includes the program of the 33th CEN workshop.

Annex A

Joint CEN/TC 287 and OGC Workshop

ESA - ESRIN, Centre For Earth Observation

Via Galileo Galilei, Casella Postale 64, 00044 Frascati Province of Rome, Italy

European Space Agency, Rome

30 September 2013

10am-4pm

Bringing GI Standards-making bodies together

Three Geospatial Information (GI) Standards-making organizations – ISO, CEN and the OGC – each have specific roles to play in advancing technical interoperability to serve institutional coordination in Europe. ISO/TC 211 produces International Standards, OGC manages an industry consensus process to develop interoperability standards and CEN/TC 287 deals with European-specific interoperability issues.. Through their efforts, geospatial interoperability has advanced greatly in the last 20 years, and yet there are gaps in the standards portfolio, which European initiatives such as INSPIRE fill by producing their own specifications, which may be different from the ISO, CEN and OGC standards. To optimize the standards making process, ISO, CEN and OGC are proposing a workflow and mechanism for European Initiatives (like INSPIRE) to make it easier for these initiatives to bring their findings and observations regarding GI back into ISO, CEN and the OGC.

The purpose of this workshop is to bring together the major players to discuss this communication and coordination activity. First, the organizations' various roles, product sets and initiatives (Test beds, Pilot Projects, Interoperability Experiments) will be explained. Then implementers of the three organizations' standards who have participated in a range of European initiatives will describe their experiences and identify their requirements for future developments. Finally, there will be a discussion on how requirements discovered in future joint initiatives might be most efficiently gathered and delivered to the organizations to further refine their collaboration workflows and mechanisms.

The workshop will be of benefit to those involved in determining the work programme of ISO/TC 211, CEN/TC 287 and OGC, as well as those responsible for pan-European initiatives and EU-funded projects with unfulfilled standardization requirements.

10mins	**1. Welcome**	*Pier Giorgio Marchetti* *ESA/ESRIN*
15mins	**2. Italian experience in GI Interoperability**	*Francesco Tortorelli* *Agenzia per l'Italia Digitale*

15mins	**3. Is there life after FP7?**	*Mark Reichardt* *OGC*
20mins	**4. The work of CEN/TC 287** - Publication process - Collaboration with ISO/TC 211 - European-funded projects - TR 15449- Spatial Data Infrastructure - Best Practice Catalogue - Current developments	*Rob Walker* *Chair CEN/TC 287*
10mins	**4. The work of ISO/TC 211** - Work programme - Standards maintenance	*Morten Borrebaek* *ISO/TC 211*
25mins	**5. Current and future work of OGC** - OGC Reference Model (JH) - Interoperability programme (BdL) - Compliance testing (JH/ BdL) - Future aspirations in Europe (BdL/JH)	*Bart de Lathouwer* *and* *John Herring* *OGC*
20 mins 10 mins 10 mins 10 mins 10 mins 10 mins	**6. European requirements for Standards** INSPIRE - Perspectives from DG Environment - Perspectives from Thematic Working Groups FP7: European funded projects - i-SCOPE - Cobweb - GeoViQua - eENVplus	 *Hugo de Groof* *Andrea Giacomelli* *Debbie Wilson* *Bart de Lathouwer* *Juan Maso* *Giacomo Martirano*

10 mins	- i-locate	*Guiseppe Conti*
	7. Future collaboration between CEN/TC 287 and OGC **«An interactive brainstorming session on hot topics» for example** - Interoperablity issues - Harmonization (eg INSPIRE modification to existing standards) - Storage place for FP7 work Next steps: Possible interoperability test bed initiative for standard harmonization issues, resulting in CENTC/287, and /or OGC adoption.	*Panel of experts* *Chair: Rob Walker* *Hugo de Groof* *Bart de Lathouwer* *John Herring*
10 min	**Summary & wrap up**	