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Integrating new data visualisation approaches of
earth Systems into GEOSS development**



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**QUAlity aware VIsualisation for the Global Earth Observation system of
systems**

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*Cooperation with other relevant projects and initiatives (first
report)***

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1. Introduction

GeoViQua project started in February 2011 with the objective of promoting the usage of quality information among GEOSS EO data and to provide users this information in order to enhance the accuracy of the scientific and management work. Since then, this has been accomplished by a strong effort put into dissemination GeoViQua's work as well as in cooperating with other projects and initiatives related to GEOSS.

2. Cooperation with other relevant projects and initiatives

During the execution of the GeoViQua project several other projects have been developing simultaneously. Some of these projects are the UncertWeb, EGIDA, EUROGEOSS, GEOWOW, EO2HEAVEN and the GEOBalkans. We also collaborate with other initiatives such as the IGARSS-2012 conference, EARSC general assembly, the OGC OWS-9, the OGC AIP5, CEN European normalization organization, ISO and we have participated in the GEPW 5 in London and the GEPW 6 in Rome. A very important initiative to contribute to the spreading of the GeoViQua activities and results with other European projects is the organization of GEPW7 next year. The European Commission has just confirmed that GEPW7 will be held in Barcelona and organized by CREAM.

This has allowed building synergies and sharing the knowledge gathered while elaborating the GeoViQua project and the other initiatives. In this deliverable we are going to describe the projects with which some kind of cooperation has been done, as well as the specific contributions of GeoViQua to the different projects.

2.1 Cooperation with other FP7 projects

2.1.1 UncertWeb

UncertWeb is an EC funded research project running from February 2010 to January 2013 developing the uncertainty enabled model web. The model Web concept, formulated within the Global Earth Observation System of Systems activity envisages the integration of complex resources, such as data and models, to construct complex models, composed of chains of model and data components exposed as web services. This offers exciting opportunities for model development in a more loosely coupled, component oriented manner, encouraging sharing, re-use and easy access.

UncertWeb builds on the Model Web concept and contributes to it by supporting accountable uncertainty representation and propagation. A range of different tools and extended standards are necessary to uncertainty-enable web services. First of all UncertWeb further develops UncertML(www.uncertml.org), which is an XML (Extensible MarkupLanguage) encoding designed for encapsulating probabilistic uncertainties. This encoding is necessary for interoperable communication of uncertainty between web services. The flexibility of XML encodings is high, but for larger datasets such as spatial grids, UncertWeb will also contribute to extended standards for netCDF (network Common Data Form). NetCDF (Network Common Data Form) is a set of software

libraries and self-describing, machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data.

NetCDF-U is based on a generic mechanism for annotating netCDF variables according to the UncertML conceptual model. NetCDF-U is convention-neutral, in particular it integrates with the netCDF Climate and Forecast Conventions.

Within GeoViQua and UncertWeb, it is proposed the UncertML as a means of improving the treatment of data quality in GEOSS, alongside QA4EO.

2.1.2 EGIDA

EGIDA prepares a sustainable process promoting coordination of activities carried out by: the GEO Science & Technology (S&T) Committee; S&T national and European initiatives; and other S&T Communities. However, GEOSS committees have been transformed into Boards (GEO Work Plan 12-15). This is done by supporting broader implementation and effectiveness of the GEOSS S&T Roadmap and the GEOSS mission through coherent and interoperable networking of National and European projects, as well as other international initiatives.

EGIDA delivers evaluation processes, tests and assessment indexes, expertise databases, a “GEO Label” concept, surveys, and other instruments that link relevant European S&T communities to GEOSS while ensuring that it is built using state-of-the-art science and technology. Through coordination with the GEOSS S&T Committee (five co-chairs are involved in EGIDA), these deliverables strongly contribute to the GEO S&T Roadmap implementation. For European countries, EGIDA delivers the EGIDA Methodology, a sustainable mechanism based on the GEO S&T approach at national and regional level, to coordinate national multi-disciplinary “System of Systems”. This builds on existing national initiatives and European projects, and facilitates the European S&T Community contributions to and interactions with GEOSS. The EGIDA Methodology improves development and management of S&T infrastructures (i.e. sensors, data, processing services, and environmental modelling infrastructures), supporting mobilization of the resources needed to contribute effectively to GEOSS. EGIDA involves developing countries by transferring the EGIDA S&T methodology to them and implementing three specific use cases: two regional use-cases (Balkan region, Mediterranean region) and a pan-European thematic use-case (Air Quality and Health). EGIDA is embedded within a wide Network of Stakeholders selected to represent the various actors (science teams and institutions, S&T programmes, GEO components) and the scientific fields relevant to the nine GEOSS SBAs.

As stated in the first EGIDA deliverable (EGIDA 2010), the initial framework for the implementation of the GEO S&T Roadmap is provided by two S&T Tasks in the GEO Work Plan 2009-2011, Tasks ST-09-01 “Catalyzing Research and Development (R&D) Funding for GEOSS”, and ST-09-02 “Promoting Awareness and Benefits of GEO in the Science and Technology Community”. Recently, the GEO Work Plan 2012-2015 establishes new four tasks, amongst which we find: “*Institutions and Development*” Task ID-03 on “*Science and Technology in GEOSS*” (GEO 2011).

Many of the activities in Task ID-03 (Science and Technology in GEOSS) are continuations of the activities started by ST-09-02.

GeoViQua collaboration in the tasks

According to the GEO tasks EGIDA has to contribute to the next tasks (Plag 2011), on our side; GeoViQua is also contributing to the achievement of them.

- Facilitate the science and the technology needed to utilize the benefits of Earth observations:
 - Respond to the needs of science and research;
 - Support the development of decision support tools.
- The GEO S&T Road Map details two Activities:
 - Actively engage and incorporate S&T participants in developing GEOSS;
 - Create incentives and promote GEO in S&T Communities
 - Facilitate the science and technology required to utilize the societal benefits of GEOSS and Earth observations
- Actively engage and incorporate S&T communities in developing GEOSS
- Create incentives and promote GEO in S&T communities
- Facilitate the R&D required to utilize GEOSS and Earth observations for decision support

In order to accomplish the previous tasks, different GeoViQua partners are contributing to the ID-03 GEO Task group, in which monthly teleconferences are scheduled. Bellow, it is presented an abstract list of commitments that GeoViQua is developing with other EGIDA partners.

- Sub-Activity 2.1. GEOSS citation standard (See Annex B)
GeoViQua Producer Quality model includes a way to cite publications that talk about data. This is the inverse problem but it is deeply related to the GEOSS citation standard.
- Sub-Activity 2.2. GEO Label (See Annex A)
Geo Label activity is one of the main objectives of the GeoViQua project. This effort is lead by Aston and will be tested by UAB in GeoViQua.
- Sub-Activity 3.2. Inform organizations about GEO and GEOSS.
CREAF have been working on resurfacing the GEO Spain national initiatives. We also have been pushing for creating an S&T section on it.
- Sub-Activity 3.3. Establish a dialog and foster cooperation between GEO and maily CREAM have also done that at the Spanish national level in EGIDA.
- Sub-Activity 5.1. Enhancing registration of relevant scientific data sets (Roadmap Activity 2e).

All pilot cases in GeoviQua are being registered in CSR and we will stimulate this process in GeoViQua advisory board.

- Sub-Activity 5.4. The GEOSS Science and Technology Stakeholder Network. GeoViQua has participated in previous meetings and is willing to continue collaborating on this. After EGIDA project concludes (September 2012), GeoViQua could increment the commitment on this for a year and a half more.

GeoViQua collaboration in dissemination

Also, both EGIDA and GeoViQua projects have been collaborating in dissemination activities; following, the list of past and future events are listed.

Past activities:

- Earth Observations for the Social Benefit of the Balkans Post-GEO Workshop; Istanbul, November 2011. EGIDA jointly organized a Workshop with the OBSERVE and BalkanGeoNet FP7 projects to discuss about "Earth Observations for the Social Benefit of the Balkans". This was a good opportunity to present both EGIDA and GeoViQua progress and to establish the collaboration between the two projects.
- EGU; Vienna April 2012. GeoViQua, in collaboration with EGIDA, prepared and submitted an extended abstract on the GEO label and its development progress to the EGU 2012 conference. The submission was accepted as a poster presentation and both GeoViQua and EGIDA presented posters on the GEO label concept, its development process, first GEO label study results, and further plans of development. EGIDA also organised a splinter meeting which included two GEO label presentations given by GeoViQua and EGIDA projects. The EGU splinter meeting also included an active discussion about further steps in the GEO label development.
- IGARSS; Munich July 2012. GeoViQua, EGIDA and MiraMon shared a stand in IGARSS 2012. The poster: "Emerging data quality from GEOSS integrated clearinghouses" was presented. See section 2.5 IGARSS2012 of this document for the extended explanation.

Coming activities in 2012

Science and Technology Stakeholders and Communities of Practice Workshop.

- August 28-31, 2012, Bonn, Germany

- Topic: GEOSS: a utility for Earth sciences in service of society

2.1.3 EuroGEOSS

EuroGEOSS is a large scale integrated project in the Seventh Framework programme of the European Commission. It is part of the thematic area: "ENV.2008.4.1.1.1: European environment Earth observation system supporting INSPIRE and compatible with GEOSS.

GeoViQua has participated in the EuroGEOSS 2012 conference (Advancing the vision for GEOSS) in Madrid on January 25-27th. There, 2 presentations were presented:

- *Analysis of the Quality Metadata in GEOSS Clearinghouse*. E. Sevillano, P. Díaz, M. Ninyerola, J. Masó, A. Zabala, X. Pons

- *GeoViQua: the quality challenges for GEOSS*. X. Yang, J. Blower, D. Cornford, V. Lush, J. Masó, A. Zabala, D. Nüst

2.1.4 GEO-WOW

GEO-WOW is a project, co-funded under the European Community's Seventh Framework Programme FP7/2007-2013 under grant agreement n° 282915 in response to call ENV.2011.4.1.3-1 "Interoperable integration of Shared Earth Observations in the Global Context". It is implemented by a consortium of 15 partners from Europe, Brazil and Japan and is coordinated by the Italian establishment of the European Space Agency (ESA-ESRIN) in Frascati. The project's kick-off date was 1st September 2011 and its duration is 3 years.

GEO-WOW will benefit by the advances and solutions that GeoViQua will propose on data quality search and visualization. **Quality-aware search functionality, user-rating capability following the web 2.0 trend, metadata standards enhancements, low bandwidth and quality visualisation techniques are a few of GeoViQua's objectives that should be considered for in the forthcoming architectural design of GEOWOW.**

The collaboration between the two projects will be possible by the participation in the AIP initiatives where GeoViQua will regularly introduce and share its components and results, especially regarding the **Unique and Universal identifier for the GEOSS tutorial**; or by direct communication.

2.1.5 EO2HEAVEN

Through the GeoViQua partner 52°North a link to the European FP7 project EO2HEAVEN was established. Within EO2HEAVEN the complex relationships between health and environmental influences are investigated. Of the three use case scenarios covered by EO2HEAVEN, especially the activities regarding the link between air quality and respiratory as well as cardio-vascular diseases are of interest to GeoViQua.

An important subject for the cooperation with EO2HEAVEN is the so called **Air Quality Egg**, a low-cost air quality sensing device. Within EO2HEAVEN project the use of this device is investigated in order to increase the density of air quality observations so that a better coverage is achieved. A continuous exchange regarding the Air Quality Egg was established with EO2HEAVEN.

2.1.6 GEO Balkans

It has been found that the Balkan countries do not have a coherent and continuous approach towards the challenge of implementing integrated Earth Observation (EO) applications in environmental monitoring and management. The defect in the implementation of EO applications and their use in the environmental decision making, are manifested through the limited synergies among national and regional institutions, ineffective technological means and discontinuous record of participation to international organizations and committees. On the other hand, the increasing importance of a common approach towards effective environmental monitoring practices, for the benefit of the societal web of the broader Balkan region, calls for immediate action, setting as a starting point the built up of regional institutional capacity and spillage of technology transfer.

GeoViQua has collaborated with the GEO Balkans local initiative, especially in the Earth Observations for the Social Benefit of the Balkans Post-GEO Workshop (<http://www.postgeo-ws.itu.edu.tr>) on 18-19/11/2011. On that event, a presentation about GeoViQua benefits on quality data information was made.

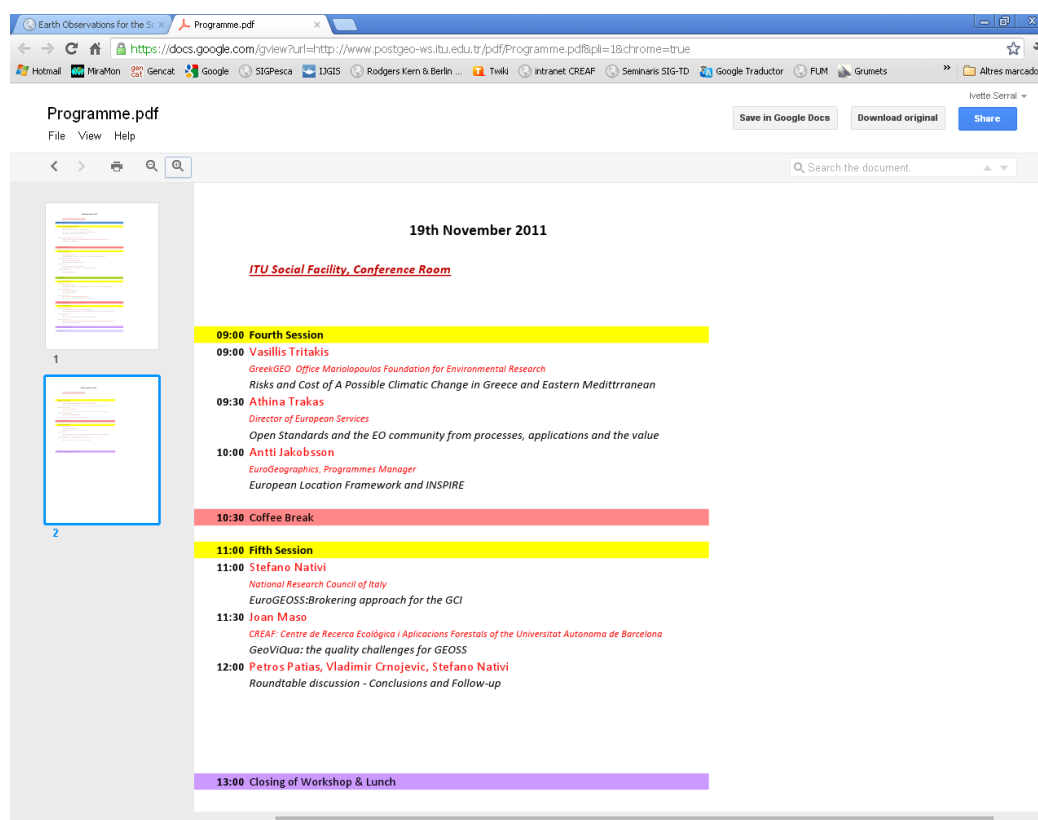


Figure 2. Agenda of the GEO Balkans programme

2.1.7 New proposal: OpenDataGEOSS

With the objective of continue part of the efforts and results after the GeoViQua project finalization, CREAM has participated in a consortium scientifically lead by JRC in response to the ENV.2013.6.5-3 topic call with the full title Open Data: Linking Science, Citizens and GEOSS. In this proposal, there is a task dedicated to quality and trust,

where we hope some results of the GeoViQua project could be adapted to the open data initiatives in GEOS.

2.2 Cooperation with standardization organizations

2.2.1 OGC 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 clear GeoViQua is negotiating with the commission an amendment of the Grant Agreement to allow OGC to be 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, href (and eventually the uuid uuidref) that 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 deeply related with Aviation-11: OWS-9 Aviation Metadata & Provenance ER

WMTS harmonization (OWSI)

In OWS-6 WMTS standard draft was tested and the lessons learned were 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 and we have the 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 be able 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 can eventually become a quality profile for WMS. We propose to work collaboratively with others in this task and focus the results on this deliverable:

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

2.2.2 CEN

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 forces in this Pan-European forum, **GeoViQua Project** efforts to create practical and effective standards will benefit both the industry and the user. See Annex C, Letter of request.

2.2.3 ISO

GeoViQua actively collaborates with ISO standard revision processes. The last ISO/TC 211 meetings took place in Toulouse from 4-8/6/2012. GeoViQua proposed 7 comments over 20 total comments on ISO/CD 19115-1 Geographic Information – Metadata – Part 1: Fundamentals. From these t proposed comments, 5 were accepted to include 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/Tabl e/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 "+ additionalDocument ation: 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 <i>DD_Done</i>

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 as 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_Identifier 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 <i>DD Done</i> <i>Add to Data Dictionary</i>

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 explanation text <i>DD Done</i>
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_AssociationType Code 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 <i>DD Done</i>
19	OG C 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.

You can see the complete comments table on the Annex D.

2.3 Cooperation with European and GEO initiatives

2.3.1 Coordination and outreach activities with the new GEO components and tasks from the 2012-2015 Work Plan

The 2012-2015 Work Plan differs from the current 2009-2011 Work Plan in four main ways:

- It derives directly from the GEOS Strategic Targets;
- it groups Tasks into three thematic parts (rather than two as before);
- it features a streamlined number of Tasks; and (iv) it proposes an improved Work Plan management structure (see GEO-VIII Document 21).

The Work Plan has been organized into three major parts to match the key objectives outlined by the GEO-VII Plenary and to provide a clear overview of GEO activities.

- Part 1 on “Infrastructure” features the physical cross-cutting components of an operational and sustainable GEOS, including interoperable observing, modelling and dissemination systems.
- Part 2 on “Institutions and Development” describes “GEO at work” and the community’s efforts to ensure that GEOS is sustainable, relevant and widely used; it focuses on reinforcing data sharing, resource mobilization, capacity development, user engagement and science and technology integration.
- Part 3 on “Information for Societal Benefits” focuses on information, tools, and end-to-end systems that should be available through GEOS to support decision-making across the nine Societal Benefit Areas.

GeoViQua collaborates in the following components and tasks:

INSTITUTIONS AND DEVELOPMENT Task

More information about all these tasks on:

<http://www.earthobservations.org/docshow.php?id=129>

ID-01 Advancing GEOS Data Sharing Principles

C1 Advancing GEOS Data Sharing Principles

- In the GEO Work Plan Symposium 2012, Robert Chen (bchen@ciesin.columbia.edu) presented the existence of a new sub-activity: “Documentation and Data Quality”
 - Develop recommendations on data documentation and Data Quality.
 - Sub-activity leaders: G.Withee (US) (gwithee@msn.com), D. Halpern (COSPAR) (david.halpern@jpl.nasa.gov)
 - This will be a no technical discussion

ID-02 Developing Institutional and Individual Capacity

C1 Institutional Development

- QA4EO is part of the activities in ID-02: Developing Institutional and Individual Capacity
 - Sub-activity relevant people (nigel.fox@npl.co.uk;stensaas@usgs.gov;dave.smith@stfc.ac.uk;D.Cornford@aston.ac.uk)

ID-03 Science and Technology in GEOSS

C1 Engaging the Science and Technology (S&T) Community in GEOSS Implementation

Sub-Activity 2.2 GEO Label

GeoViQua is actively participating in ID-03. GeoViQua is committed to ID-03 with the development of the GEO Label

Sub-Activity 2.1 GEOSS citation standard

In GeoViQua Producer Quality model includes a way to cite publications that talk about data. This is the inverse problem but it is deeply related to the GEOSS citation standard.

Sub-Activity 3.2 Inform organizations about GEO and GEOSS

We have been working on resurfacing the GEO Spain national initiatives. We also have pushing for creating a S&T section on it.

Sub-Activity 3.3 Establish a dialog and foster cooperation between GEO and major university networks

We have also done that at the Spanish national level in EGIDA.

Sub-Activity 4.1 Organizing Special Sessions and Side Events

Sub-Activity 5.1 Enhancing registration of relevant scientific data sets (Roadmap Activity 2e)

All pilot cases in GeoViQua will be registered in CSR and we will stimulate this process in GeoViQua advisory board.

Sub-Activity 5.4 The GEOSS Science and Technology Stakeholder Network

He have participated in previous meetings and we what to continue collaborate on this.

INFRASTRUCTURE Task

More information about all these tasks on:

<http://www.earthobservations.org/docshow.php?id=129>

IN-01 Earth Observing Systems

- In the GEO Work Plan Symposium 2012, Lawrence Friedl (lfriedl@nasa.gov)
 - the idea of "Crowd sourcing for consumer-site metrics of data quality"
 - It is just an idea (no development, no pilot) but it was well accepted by the people in the room

IN-05: GEOSS Design and Interoperability

C1 GEOSS Design and Interoperability

- Manage the evolutionary technical architecture (design) of GEOSS and contributed Earth observation data and service resources. Promote GEOSS interoperability principles. Enable a sustainable GEOSS of value to the user – supporting the development of the GEOSS Common Infrastructure (GCI) and GEOSS communication networks for the access to, and use of, Earth observations and related services.
- AIP5
- SIF

2.3.2 Collaboration with the Documentation and Data Quality GEOSS Subgroup

The Documentation and Data Quality (DDQ) Subgroup of the Data Sharing Working Group (DSWG) promotes comprehensive documentation on data quality, including accuracy, stability, precision, spatial and temporal sampling characteristics, error characteristics, timeliness, completeness, reproducibility, calibration, accessibility, stability traceable to international standards, and reprocessing.

Objectives

The DDQ Subgroup works towards the establishment of universal principles for optimal data quality management and utilization, including: definition of concepts, tools and systems, and capacity building.

The DDQ Subgroup is committed to expanding, maximizing and providing comprehensive documentation of data quality, including traceability, provenance, uncertainty, and fit for purpose to allow a broader use and understanding of Earth observations.

The DDQ Subgroup will coordinate with GEO entities in related areas of data assurance and data quality such as GEO Infrastructure and Implementation Groups.

Activities/Deliverables

- 1) Prepare a draft Principles and Management document on GEOSS guidelines for Documentation and Data Quality
- 2) Prepare a draft Roadmap document on how the DDQ Subgroup will work with GEO and other initiatives, such as QA4EO through IN-02-C1 and GeoViQua, to realize documentation of data quality for GEOSS.
- 3) Identify processes, tools and standards that support and enable superior documentation for data quality.

Work Practices

The DDQ Subgroup will conduct its business through regular conference calls and web meetings/emails and will convene a face-to-face meeting as appropriate.

2.3.3 QA4EO

QA4EO has been endorsed by CEOS as a contribution to facilitate the GEO vision for a Global Earth Observation System of Systems (GEOSS). The aim of GEOSS is to deliver comprehensive and timely knowledge / information products worldwide to meet the needs of its nine “societal benefit areas”. This can only be achieved through the synergistic use of data derived from a variety of sources (satellite, airborne and in situ) and the coordination of the resources and efforts of the GEO members.

GeoViQua has participated in the 2011 - QA4EO Workshop on 'Providing Harmonised Quality Information in Earth Observation Data by 2015', Harwell, UK (18th - 20th October).

QA4EO is a contribution to GEO.

2.3.4 2nd GEOSS Science and Technology Stakeholder Workshop

GEOSS: Supporting Science for the Millennium Development Goals and Beyond
Bonn, Germany, August 28—31, 2012

http://www.geo-tasks.org/workshops/2012_Bonn/

The goal of the workshop was to bring together representatives of the stakeholder organization in international science and research, funding agencies providing resources for sustainability research, and intergovernmental agencies defining and maintaining frameworks relevant for global sustainability for a dialog on the support provided by GEOSS for sustainability research and monitoring can be better aligned to the needs of the stakeholders.

The output of the workshop included a goal document summarizing the research needs associated with the eight MDGs (Millennium Development Goals) and grand challenges and detailing the strategy for a GEOSS that would ensure the availability of Earth observations required for addressing these research needs. A road map describes the steps necessary to ensure that the future development of GEOSS is aligned with the needs arising from the current MDGs and post-2015 goals, as well as the Grand Challenges and Belmont Challenges addressed by the Future Earth - research for global sustainability Initiative.

The workshop was jointly organized by the GEOSS Science and Technology Stakeholder Network and the Group on Earth Observations (GEO). The workshop is sponsored by the EGIDA Project and co-sponsored by a number of stakeholder organizations and projects, including the Belmont Forum; DIVERSITAS; the European Science Foundation (ESF); the Federation of Earth Science Information Partners (ESIP); EuroGeoSurveys; the Directorate Environment of the European Commission; the International Council of Science (ICSU); the IEEE International Committee on Earth Observations (IEEE/ICEO); the International Geosphere-Biosphere Programme (IGBP); the International Human Dimension Program on Global Environmental Change (IHDP); the International Social Science Council (ISSC); the International Union of Geodesy and Geophysics (IUGG) represented through the International Association of Hydrological

Sciences (IAHS); the Scientific Committee on Problems of the Environment (SCOPE); the Global Change System for Analysis, Research, and Training (START); the United Nations University Institute of Environment and Human Security (UNU-EHS); the World Climate Research Programme (WCRP); and the World Data System (WDS) of ICSU. Projects co-sponsoring the workshop are the projects **GeoViQua**, and GEOWOW, all funded by the European Commission's Seventh Framework Programme (FP7). The Communities of Practice (CoPs) of GEO are represented through the GEO Work Plan Task ID-04.

2.3.5 GEOSS EUROPEAN PROJECTS WORKSHOP (GEPW)

“The GEO initiative was launched in 2005 with the objective of increasing the accessibility and availability of Earth Observation data through the development of a Global Earth Observation System of Systems (GEOSS) to be delivered by 2015. It includes 86 countries, the European Commission and 61 intergovernmental, international, and regional participating organisations “. (GEO 2012)

GeoViQua has been continuously collaborating with the GEO European Projects' Workshop since its beginning in 2011. During this time, GeoViQua has participated in the following Workshops:

2.3.5.1 GEPW-5

The Fifth GEO European Projects Workshop took place in London on 8th and 9th February 2011. This workshop was built on the outcomes of the GEO Plenary and the GEO Ministerial meetings, which took place in Beijing in November 2010. The GEPW-5 was the latest in a series of workshops designed to foster European participation within GEO and increase Co-ordination between existing or future Earth Observation projects in Europe that contribute to the implementation of the GEOSS. The workshop had three main points:

- The preparation of the European input to the 2012-2015 GEO Work Plan
- o The implementation the GEOSS Data Sharing Action Plan in Europe
- o To discuss the future of GEO and GEOSS from a European viewpoint

In the GEPW-5 GeoViQua presented a poster about the objectives of the project.

2.3.5.2 GEPW-6

The principal theme of this workshop was assessing Europe's current and potential contribution to the 2012-2015 GEO Work Plan. It was also discussed the future of GEO beyond the current mandate, which runs until 6 2015. Rapporteurs noted the progress that has been made and the gaps that still exist. The meeting was organised around a series of keynote addresses covering a selection of the GEO Societal Benefit Areas. These were followed by a number of individual splinter sessions with presentations by representatives of GEO-related projects and organisations. In the GEPW-6 held in Rome (7-8 May 2012), GeoViQua presented a poster and the presentation “GeoViQua:

Trustworthy Earth observation data", which summarized some of the results obtained in the first year of the project.



Figure 3. Agenda of the GEPW-6

2.3.5.3 GEPW-7

GeoViQua is willing to organize the next GEPW-7 in Barcelona on April 2013.

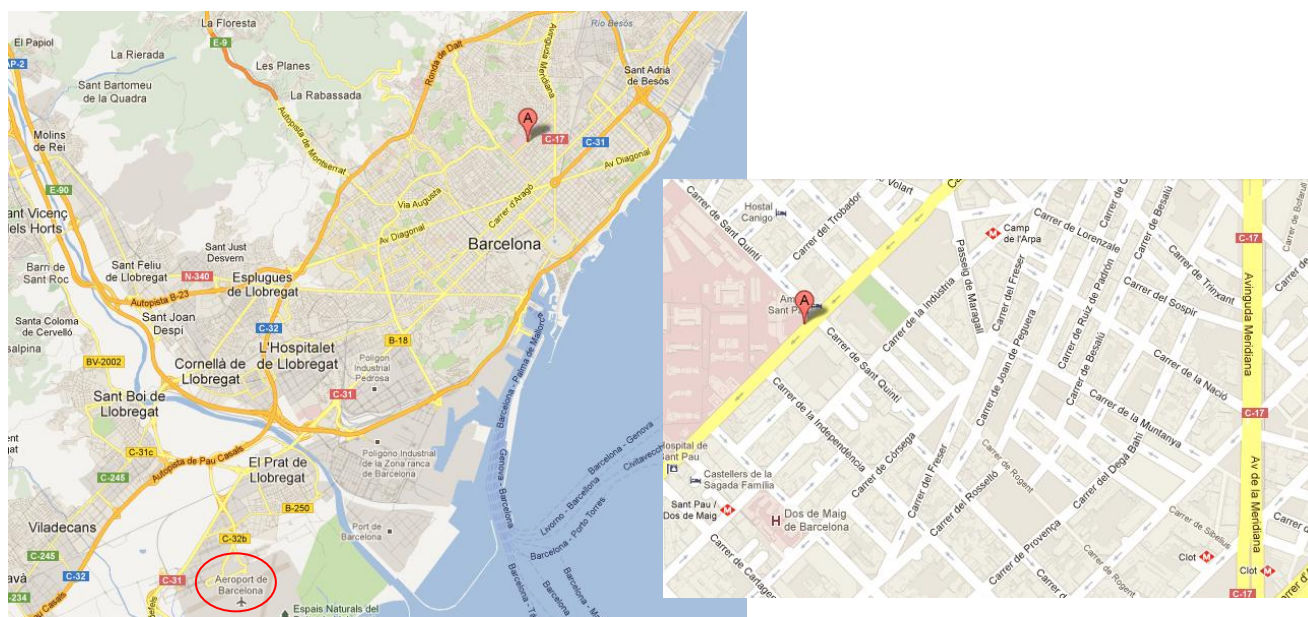
Tentative date: 8-9 April 2013

Tentative assistants: 180 people, approximately.

The venue

The proposed venue is foreseen at the "Casa de la Convalescència" (Convalescence House), a Modernist building (*art nouveau*) built by the famous architect Domenech i Muntaner that is currently a conference facility that our university restored at the Barcelona city centre (close to Gaudi's Sagrada Familia). 2 metro stations are at 50 meters of the main entrance and buses as well. People can get the venue from the airport by several buses, train and metro.

development



More information about the history and the architecture of the building can be found at:
http://www.fundaciouab.com/casa/pdf/historia_arquitectura_eng.pdf

The building has a plenary room (up to 180 people) and other small rooms (up to 70 people each) next to the main room. Internet access is provided by WIFI connection. Preparation of the rooms will be done by UAB staff. Corridors can host 30 poster panels approximately.



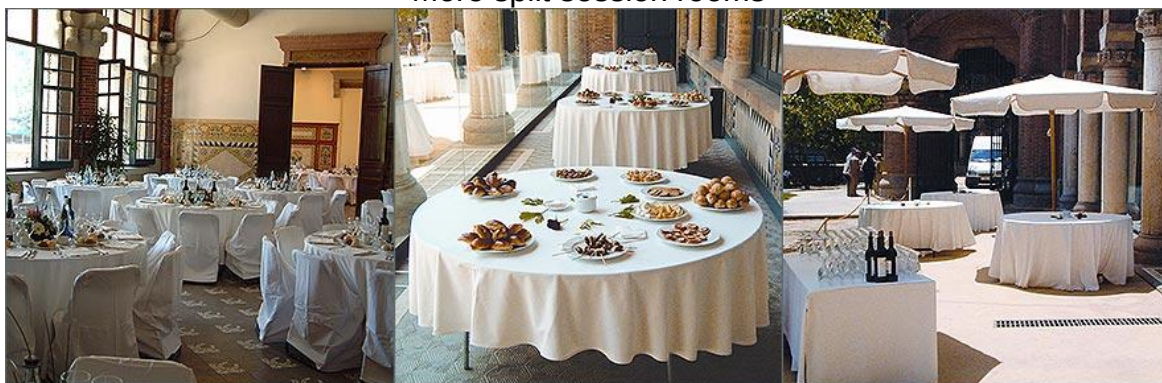
Details of the building



Plenary room (left) and split session room (right)



More split session rooms



Catering facilities

More pictures can be seen at:

http://www.fundaciouab.com/casa/ENG/galeria.asp?Id_CARPETA=1&Id_FOTO=62

The accommodation

There are 2 hotels nearby proposed by the UAB staff:

- Hotel Ayre Roselló ****: <http://www.ayrehoteles.com/en/hotels/ayre-hotel-rosellon-barcelona/the-hotel/home/>
- Hotel Amrey Sant Pau **: <http://www.hotelsantpau.com/en>

More hotels in Barcelona can be contacted for the accommodation. CREAM will manage the creation of a room block for reservations.

Website

<http://www.geoviqua.org/gewp7> will host the website of the event with all the relevant information on agendas, hotels, “how to get there” and so on.

The Social Dinner

The proposed social dinner could be held at the Restaurant 1881 in the upper level of the History Museum of Catalonia. It is located at the seaside of Barcelona old port. Prices are about 45€ per person.



<http://www.gruposagardi.com/marcas/ca/31/1881/per/sagardi#>

2.4 Cooperation with other international institutions

2.4.1 IGARSS 2012

GeoViQua collaborates in the IEEE Geoscience and Remote Sensing Symposium as an exhibitor jointly with EGIDA FP7 project and MiraMon, a GIS and RS software developed in the Universitat Autònoma de Barcelona. GeoViQua also participates with a scientific contribution with the paper *Emerging data quality from GEOSS integrated clearinghouses*; I. Serral, P. Díaz, J. Masó and X. Pons. The event will take place from 22-27th July 2012 in Munich, Germany.

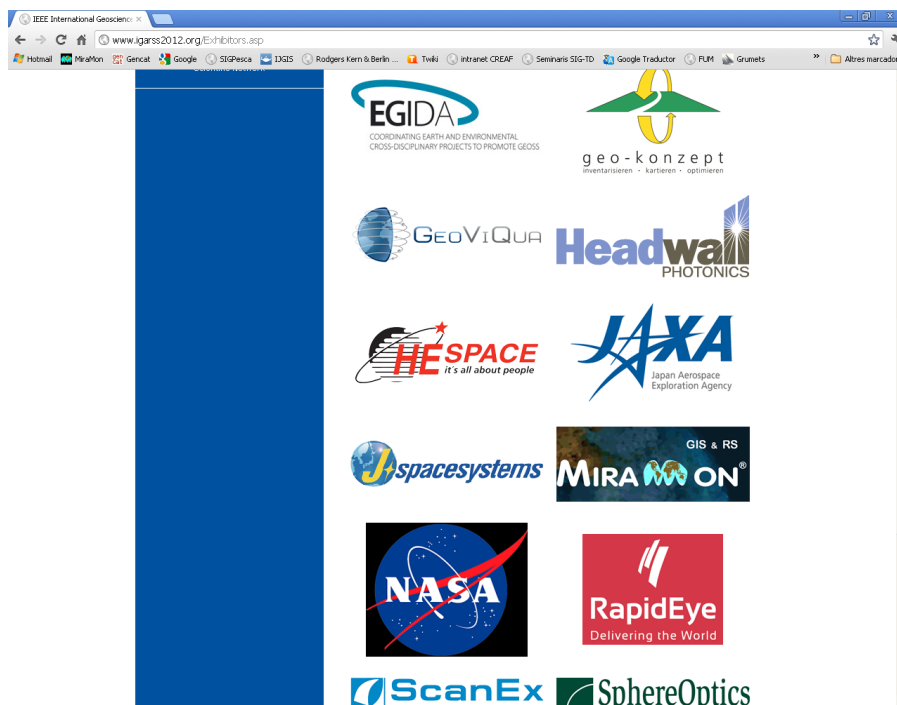


Figure 1. Relation of main participants in IGARSS 2012

2.4.2 EARSC general assembly

Involvement of the European association of remote sensing industry (EARSC). EARSC set up a working group dedicated to certification. As observer to the EARSC, ESA brings in also input coming from GeoViQua achievements, including outcomes from the GEO label activity. ESA made a presentation of project concept and achievements at EARSC general assembly, and other EARSC meetings, including telecoms. The EARSC Annual Meeting and General Assembly took place on June 30th in Brussels. About 20 Members took part in the meeting and contributed to the familiar and interesting event. Two invited lectures were presented Dr. Stefano Bruzzi, Head of the ESA Coordination Office and co-leader of the GMES Programme Office and Dr. Steve Coulson, Head of the ESA-EOMD Program. Both have informed us about ESA's strategy in Earth Observation, in particular in the GMES and EOEP activities and the new opportunities to do business with ESA at the upcoming EOMD- Market Development programme.

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EGIDA 2010. D1.1 Project Presentation. 1st STC-EGIDA Workshop, Rome, Italy –30 September, 2010. Available in: <http://www.egida-project.eu/images/documents/egida%20outcomes-22-dec-2010%20v2%20rev.pdf>

Plag, H.P. and Nyenhuis M (2011). Towards a GEOSS Stakeholder Network for Science and Technology. In support of developing GEOSS as a utility for Earth sciences in service of society. Available in: http://www.geotasks.org/geoss_stakeholders/library/documents/20111118_plag_nyenhuis.pdf

3. Annex A. GEO Label, contribution from GeoViQua to this task.

3.1 Introduction

GEO is an international voluntary partnership of governments and international organisations. Amongst its objectives is the construction of a Global Earth Observation System of Systems (GEOSS) – a distributed ‘system of systems’ which “will provide decision-support tools to a wide variety of users” (GEO 2012) in order to “achieve comprehensive, coordinated and sustained observations of the Earth system, in order to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behaviour of the Earth system” (GEO 1000R 2005). GEOSS currently contains a large amount of data and is constantly growing, offering users ever greater choice in datasets. With choice, however, comes a problem of data quality assessment and decision making. To tackle this challenge, the GEO Science and Technology Committee (STC) propose to establish a GEO label – that is, a label to certify geospatial datasets and their quality. As envisaged by the STC, the GEO label is proposed as a value indicator for geospatial data and datasets accessible through the GEOSS. It is suggested that the development of such a label could significantly improve user recognition of the quality of geospatial datasets and that its use could help promote trust in datasets that carry the established GEO label. Furthermore, a GEO label could assist in searching activities by providing users with visual cues of dataset quality and possibly relevance; a GEO label could effectively stand as a decision support mechanism for dataset selection. The GEO label could also act as an incentive to scientists, researchers, and others to contribute their data and systems to GEOSS by offering an accepted voluntary label.

Given that the GEOSS is estimated to contain more than 28 million dataset records, choices faced when selecting a dataset can (depending on usage domain) be quite daunting. The research in which we are engaged is being done in close collaboration with GEO and its STC for the betterment of dataset selection in the GEOSS.

3.2 GEO Label Development Plan

The development and evaluation process will be carried out in three phases:

Phase I: We conducted an online survey (GEO Label Questionnaire) that was looking at:

- initial user and producer view on the role that a GEO label should serve;
- participants’ opinion on common review and rating systems to draw on the strengths of these when developing a GEO label;

- relevance of commonly used seals that use click-to-verify functionality to the GEO label role;
- any comments and suggestions on a GEO label or its potential role.

We have analysed the results of the GEO label questionnaire and identified key components that could be included as part of the GEO label functionality.

Phase II: We are currently working on the Phase II of the GEO label development where we will conduct a further study presenting some GEO label examples based on our first study results. We will elicit feedback on these examples under controlled conditions and in a well-managed and structured way.

Phase III: We will create physical prototypes which will be used in a human subject study. The most successful prototypes will then be used to define the GEO Label concept and the role that a GEO Label will serve.

3.3 First Study Results

The aim of our research this far has been to investigate user and producer views on the role(s) that they think a GEO label should serve. Our intention with the first GEO label study was to provide some initial insight into the functionality that a GEO label should comprise and to elicit requirements for the development of GEO label prototypes, the design and evaluation of which will form the next phase of our research.

We received a total of 87 valid questionnaire responses: 57 from dataset users and 30 from dataset producers. The questionnaire was accessed and completed from a number of countries including Austria, Spain, Germany, Slovenia, Greece, United States, Netherlands, France, Italy, United Kingdom, Belgium, Switzerland, China, Bolivia, and Estonia – suggesting that we have successfully solicited opinions of experts from a variety of user groups and cultures around the world.

Overall, the results of our study show that users and producers of geospatial data appear to have generally very positive attitudes towards the development and introduction of a GEO label. Interestingly, there was no distinct difference between user and producer views on the role that a GEO label should serve; it may be, therefore, that both groups equally recognize the challenges of assessing quality of geospatial data and that producers may be willing to place themselves under greater scrutiny to better support informed dataset selection. When asked whether the presence of a GEO label would influence their dataset selection decisions, 48% of respondents stated that its presence would influence their decision, 22% stated that it would depend on whether they had previously used the data, and 11% stated that a GEO label would not influence their selection.

We asked respondents to identify their preference(s) for the role of a GEO label. The majority (50 respondents) indicated preference for a drill-down interrogation facility, with a large number of respondents additionally and/or alternatively stating preference a certification seal. Where respondents suggested alternative functionality, it was generally related to seeing predominant representation of individual elements of metadata. When asked whether a GEO label should combine multiple functions (e.g., data ratings, reviews, quality assurance, etc.) and thereby represent an all-in-one quality indicator, the majority of respondents (66%) agreed saying, for example, that a “single label [would be] easier for [making] initial first-cut decision[s]”, that “too many labels kill the relevance of labels”, and that, as the “more easily consultable” option, an all-in-one label “would provide a researcher with a one-stop source of quality assurance and reliability”. Respondents who thought an all-in-one function was inappropriate suggested that it would be impossible to provide all the information in one place. Many of them stated that expert judgement, community advice, data ratings, quality assurance, etc. are different concepts, and cannot be combined into one function and represented via a single label.

Overall, respondents demonstrated positive attitudes towards a GEO label providing some sort of rating and review facilities, seeing this as appropriate support for more subjective metadata recording and assessment for datasets. The majority of users and producers also seem to support the notion of a GEO label providing an all-in-one drill-down interrogation facility that would combine expert value judgements, community advice, links to citation information, side-by-side visualisation of metadata records, etc. This suggests that, in order to make an informed dataset selection decision, respondents require as much information as possible presented in one place in a format that allows for easy comparison.

3.4 Further Work

As part of the Phase II of the GEO label development process, we are currently working on an online questionnaire that will present some GEO label examples. The examples will be based on our first study results and will include key quality informational aspects identified in the first GEO label questionnaire. By conducting the Phase II study, we are aiming to identify GEO label designs that will convey quality information to users in most efficient and comprehensible way.

When Phase II study results are analysed, we will create physical prototypes which will be used in a human subject study.

4. Annex B. Scientific Publication Citation, Contribution from GeoViQua to this task

4.1 Introduction

A scientific publication is usually applied to text, images, or other audio-visual content on any medium, from paper (newspapers, magazines, catalogs, etc.) to electronic publishing forms such as websites, wikies e-books, Compact Discs and MP3s.

Under the term of **scientific publication** we have evaluated all the categories mentioned above, as well as its relationship with a dataset catalogue, all of this by means of citation of publications.

It has been found that the relation between a dataset and a scientific publication is a 2 way link. In one had, a dataset can cite external publications that uses the dataset, and on the other hand, a publication can cite a dataset that has been used while elaborating the publication.

In many scientific studies, the data is produced by a scientist who is willing to find out something. This could later lead to a publication in a scientific paper. The data and of the paper publication can be simultaneous. In which case, Pangea proposes a workflow to relate both, based on connecting the publication chains of both data and articles.

In GEOSS the situation is not so simple because main data producers release their products with their metadata and then, scientist use this data and publish research on these products in a disconnected way. It has not been approached the issue on how this connection should be made in GEOSS.

During this task, we have focussed on the relationship between publication-dataset as well as on how publications can be linked to a GEOSS dataset (the second scenario). Initially, it was considered to use a reference to the data in the reference/bibliography section of the document (with all the other normal references to other publication) as suggested by the International Polar Year (IPY) citation standard. The former GEO task ST-09-02 (also supported by the EGIDA project) did some work on how to build a citation standard. This work is now being continued by the ID-03 group. When this work is finished, they will also provide a univocal way on how a publication should cite data. They are using the classical expanded approach, but currently they do not consider to link unique identifier for publication with data identifiers. Through all this process GeoViQua is collaborating with these groups. Parallel efforts to deal with this problem are being undertaken by DataCite and Pangaea projects. In fact Elsevier has recently adopted a way to cite data as can be seen in the following example: <http://www.sciencedirect.com/science/article/pii/S0967063708001805>.

While some effort has been done to identify datasets, GEOSS catalogues has other mechanisms to identify metadata records in the clearinghouse that are different from this approach. Please, note that a metadata identifier is not necessarily a data identifier.

A thorough background on citation was performed, and it was found that citation has been addressed for some time now through several initiatives, some projects such as CLADDIER [CLADDIER, 2005] (aimed at establishing methodologies for data citation as well as designing a system to link publications held in two repositories with datasets hold in the British Atmospheric Data Centre), have been working on the importance of data cir

tation and on how to link datasets and publications; other projects concentrate their effort on establishing a unique number for identifying datasets and parts of it, such as the DataCite organisation [DataCite,2009] (helping researchers to find, to access, and to reuse data through internet in an easy way, by promoting and providing a Digital Object Identifier [DOI] number for the datasets); there is also Centre for Environmental Data Archival [CEDA, 2011] repository (which provides a unique identification number to identify earth data acquired on field campaigns); and finally, some initiatives try to address the issue on how to view publications that cite a particular dataset (OJDC, which is a repository for grey literature). All of these are just mentioned as examples of initiatives that have been taking place or that are still undergoing.

When gathering information on how to identify a particular dataset, it was found that the existence of a unique identification value such as a DOI, a Uniform Resource Locator (URL), an ISBN number or an ISSN number, which identifies a particular publication, can be used to link a scientific publication to a specific dataset within a catalogue. The DOI reference has been used for scientific publications since 1994, as well as the ISBN and ISSN identification used for books back in the seventies, but recently, with the use of the Internet, new categories of publications have appear (web-pages, wikis,...) which require a unique identifier number. ISO 690-2010 interpretation on web publications, states that URLs should be written in the same place where DOIs are. If the information location changes from time to time, the URL also changes accordingly, and thus it can be difficult to retrieve the resource. This is why accompanying the URL, it has to be documented as much information as possible regarding the web. This can also be solved by the use of persistent URL's (PURL) redirectors.

Even though, this was found to be an optimum solution, not all scientific publications have a unique identification number, in some cases a publication can be a manual, or an article from a journal which is not indexed, or a CD/DVD from an official institution. All of which are lacked of a unique identification number, and thus the need for a holistic approach to link data and complete citations has to be solved.

In the GeoViQua project we need a corpus of publications that reference datasets for different purposes in order to test the reference publication model that is going to be included in the Producers Quality Metadata Model. Since this is a new topic in GEOSS, it is not possible to extract publications form metadata about the data. Despite efforts have been made to define a data citation standard for scientific publications, currently it is not possible to automatically extract this information from the publications. In order to have a small set of examples, we have manually extracted some publications that are related to datasets registered in GEOSS. This material will be input to test the models developed for the producer quality metadata model (Task 6.1), as well as for the user feedback system (task 3.5).

To that aim, a producer quality metadata model has been designed taking into consideration all the guidelines stated in ISO 19115:2006, ISO 19115-2, ISO 19157, ISO 690-2010 and from additions made by GeoViQua group based on the requirements phase (deliverable 2.1). These additions have been introduced to meet the needs observed, and thus to correctly link datasets to publication through the citation of the publication.

4.2 Dataset-Publication Relationship

Efforts have been made to integrate all the ISOs relevant to the subject, such as ISO 19115:2006 which defines the elements that conform the entity “Citation and responsible party information: CI_Citation” class that can be used for citing external resources. When merging all this guidelines GeoViQua has found necessary to add some more attributes to this class to be able to reuse it as a way to cite publications, this is why a specialized class has been designed (**GVQ_Publication**) with some additional attributes such as DOI, URL, volume, issue, pages, purpose, relatedResource, target, scope and category. By doing this, any CI_Citation in the metadata model can be substituted by a GVQ_Publication. Also, the possibility to add a GVQ_Publication has been included in several different metadata classes that had no previous CI_citation attribute depending on the purpose of the publication.

Publications have evolved from paper publications to an extended variety of sources, having suffered a dramatic increase in number and sources on the last decades due to the on-line access. During the development of this task, a lot of time was put into gathering and studying all formats of publications in order to have a wide scope of the different kind of publications now available, from paper map documents to articles and wikis, among other, as well as defining the kind of information that is needed to reach a particular publication.

4.2.1 Examples of publications sorted by data reference purpose

One of the needs detected has been to establish the **purpose** of each publication. With the aim to provide as much information and as clear and easy to reach as possible, the following purposes have been suggested. As we already stated, the purpose of the publication depends on where the GVQ_publication element is used in the “tree” of metadata classes.

<<CodeList>> GVQ_PublicationPurposeCode	
+	Descriptive
+	Methodology to get the resource (Algorithms, models,...)
+	Evaluation of performance
+	Validation/quality assessment
+	Application (MD_usage)
+	Derivated products
+	Comparative (inter-comparison)

+ Datasets Combination

Figure 4. Purpose of the publication included in the GeoViQua producer metadata quality model.

Nevertheless, there is also a purpose attribute in the GVQ_Publication class that includes in a codelist that is used as an attribute in the GVQ_Publication class.

<<CodeList>> GVQ_PublicationCategoryCode	
+	bookChapter
+	book
+	report
+	journalArticle
+	magazineNewspaper
+	atlasPaperMap
+	applicationProgram
+	conferenceProceedings
+	cdDvd
+	blogWiki
+	website
+	webpage
-	onlineVideo

Figure 5. Element proposed in the GeoViQua producer metadata quality model to group all citations depending on the publication category.

A number of examples on this has been done and added to the deliverable 3.1 in order to test the proposed classes. Examples on different **purposes** types, as well as on different categories have been tested with the appropriate xsd schemas. Each example refers to a publication and it is documented by a unique identifying number (when existing), the title, the link to the dataset (or datasets) to which the publication cites, and finally some information on Quality assessment when mentioned in the text. Some of the links to the original data are no longer valid, and no redirection is given. This problem is quite common at the moment.

Once the new producer quality metadata model is adopted, publications usually will cite the dataset directly (that is outside of the GCI) while datasets are represented by metadata records in the clearinghouse that will contain references to publications. For that reason publications will continue not recognizing the GEOSS infrastructure.

4.2.2 Some thoughts on the design

While elaborating this section, some thoughts came up that need further consideration:

- Visualization: We propose that within the Geobroker/GEOcatalogue interface, there could be a place referring to the publications/citations, providing a link to a page that contained the list of publications where the dataset has been used/cited. The list of publications could be grouped into the publication categories defined in GeoViQua Producer Quality Model

(GVQ_PublicationCategoryCode) in order to facilitate the access to the different information that cite the data. From the publication lists it would be possible to find other datasets related to this publication. This will be solved in tasks from the Work Package 4.

- Some publications use a unique identifier, sometimes in the form of "PII" (Personally Identifiable Information), which has been encountered in few cases, others in the form of DOI or ISBN. The PII is a concept which is quite old, and its use in publications has been found to be scarce. In order to correctly identify a publication, it should be stored the unique identifier number that it has. Even though some of these identifier types are already contemplated in the ISOs, identifier types have been found which do not correspond with those that are actually on the ISOs. This is why we suggest having an Object Identifier (OI) that could include DOI, PII, as well as any other unique identified number that has not formally a place in the MODEL. Nevertheless, we recommend using a prefix to categorize the identifier type (e.g.: all DOI number shall start with "doi:" and all PII shall start with "pii:") that correspond to that particular publication.
- In some cases the publication is related to more that one dataset. The first dataset identifier is the one included in the metadata root element. The other additional datasets are referenced to by using the relatedResources (MD_Identifier type)
- Regarding embedded elements, it has to be noted that this has to be specified (case of videos in youtube, ISO 690:2010), and the URL is thought as its unique identification number, and therefore, may be it could be included under the Object Identifier. An other option could be to open a new category for Online source. We think that the second option should be considered as the best option. Then a URL could be included in the producer quality metadata model as a URL, just after the ISBN term, being the URL a form of uniquely identification for the Video citation.
- While elaborating this document, it has also been found that publications sometimes may have two ISBN numbers that do not coincide, one for paper publication and one for on-line publication of the same publication. This could lead to errors when trying to reach the publication, so may be It should be specified which one is being used on the registry, or may be to specify the user which ISBN has to be edited.
- Also in the feedback model we suggest that there is a section where a person that wants to use a particular dataset, and before the actual dataset download, the user takes on a compromise that when ever this data is finally used in a publication, it will be notified to the GEOSS community by filling in all the information required to correctly link the dataset with the publication derived. And therefore, it should always be notified the need of data citation **and of reporting it when citing**.

5. Annex C. Letter on GeoViQua Project application for “project liaison” with CEN/TC 287



Mr. Martin Ford
Secretary of CEN/TC 287
Sent by email

2011-05-06

Re: **GeoViQua Project** application for “project liaison” with CEN/TC 287

Dear Mr Ford,

I am pleased to request that the **GeoViQua Project**, be granted a “project liaison” with CEN/TC 287 “Geographic information”.

GeoViQua is a recently started FP7 project (ENV.2010.4.1.2-2; nr 265178) focused on adding rigorous quality specifications to the Global Earth Observation System of Systems (GEOSS) spatial data in order to improve reliability in scientific studies and policy decision making. The project runs from 2010-02-01 to 2014-01-31.

GeoViQua is supported by a group of 10 partners: a Catalan research center (CREAF), a Catalan university (UAB), two English universities (Aston University and University of Reading), two German research centers (Fraunhofer-IGD and 52North), an Italian research center (CNR-IMAA), a French research center (LSCE-CEA), a Dutch small company (S&T), and the European Space Agency (ESA).

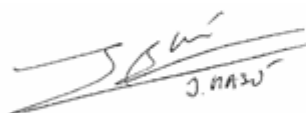
For further information, please refer to www.geoviqua.org.

GeoViQua Project agrees to:

- apply the project liaison for the duration of the project;
- undertake accepting CEN's exploitation rights policy and agreeing that no information brought to the project's attention will be disseminated or exploited in any form.

By joining forces in this Pan-European forum, **GeoViQua Project** is working to create practical and effective standards that benefit both the industry and the user.

Thank you for considering this request and I look forward to hearing from you soon.



Joan Maso
GeoViQua Project Coordinator

cc: Mrs A. Hayère, Officer CCMC - External Relations

6. Annex D. Complete comments on ISO/CD 19115-1

Comments on ISO/CD 19115-1 Geographic Information – Metadata – Part 1: Fundamentals

721 comments, sorted by clause

Date: 2012-05-24

Document: **N 3353**

	1	2	(3)	4	5	(6)	(7)
No	MB ¹	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/Table/ Note (e.g. Table 1)	Type of comment ²	Comment (justification for change) by the MB	Proposed change by the MB	Editing committee and secretariat observations on each comment submitted
1.	DGI WG 18	4.8	Page 4	ed	Rearranging the definition of lineage will be more appropriate.	Change the definition of lineage as follow: lineage provenance , source(s) and production process(es) used in producing a resource	Accepted
2.	DGI WG 58	6.5.5	Figure 9	te	The cardinality of the scope element should be zero or one (0..1). Because lineage information applies maximum only one scope.	Change the LI_Lineage diagram as follow and update the other related sections according to this change: + scope: DQ_Scope [0..1]	Not accepted in principle Change MD_Scope to MD_MetadataScope Add new class MD_Scope with same attributes as DQ_Scope with extent * Inform 19157
3.	ES 01	6.6.2,	title	ed	CI_ResponsibleParty or CI_ResponsiblePartyInfo do not exist but are mentioned on the title	Change the title to: Citation and responsible party information (CI_Citation, CI_Responsibility and CI_Party) classes	Accepted
4.	ES 02	6.6.3	title	ed	CI_ResponsibleParty or CI_ResponsiblePartyInfo do not exist but are mentioned on the title	Citation and responsible party information (CI_Citation and CI_Responsibility) Data Types and codelists	Accepted

5.	ES 03	6.5.5	Figure 9	ed	CI_ResponsiblePartyInfo cited in the UML model	The attribute has to be changed from "+ processor: CI_ResponsiblePartyInfo [0..*]" to "+ processor: CI_Responsibility [0..*]" (the EAP UML model must be also fixed).	Accepted
6.	ES 04	6.5.5	Figure 9	te	Too many ways of combining LI_Source and LI_ProcessStep. are difficult to implement. Allowing LI_Source only, LI_ProcessStep only, LI_ProcessStep+ LI_Source is fine but LI_Source+ LI_ProcessStep is a combination that is not informative enough, because when the process has more that one source involved, it can not be express clearly.	Put an arrow pointing from LI_ProcessStep to LI_Source.	Not accepted
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 <i>DD_Done</i>
8.	ES 07	6.5.9	Figure 13	te	contentType: MD_CoverageContentTypeCode [1..*] and processingLevelCode: MD_Identifier [0..1] are at the MD_CoverageDescription level but it can be different for each MD_RangeDimension. This is particularly important if you combine a data dimension with the per pixel quality/uncertainty dimension description. In this cases we need MD_CoverageContentTypeCode will be e.g. "image" and the second will be "qualityInformation". This change has descendent compatibility.	Move contentType: MD_CoverageContentTypeCode [1..*] and processingLevelCode: MD_Identifier [0..1] from MD_CoverageDescription to MD_RangeDimension.	Accepted in principle Add new class "MD_AttributeGroup" with attribute contentType (move from CoverageDescription) relationship from CoverageDescription = attributeGroup "groupAttribute" from MD_AttributeGroup to MD_RangeDimension See model diagram Steve has

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 as 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_Identification [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 See above
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 <i>DD Done</i> 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_Identification [0..1] Joan will provide definition and explanation text <i>DD Done</i> Needs to be added to DD

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 <i>DD_Done</i>
14.	ES 21	6.5.6	«Union» MD_ScopeDescription	ge	Indicate the type of data equally to all fields	Change: Set<CharacterString> By: CharacterString	Not accepted Need (comma) separated list
15.	OGC 07	6.5.2.3	Fig 5	T	MD_Metadata/fileIdentifier is a MD_Identifier and MD_Metadata/parentMetadataIdentifier is a CI_Citation. This is an oversight in the model	change parentIdentifier back to MD_Identifier	Accepted
16.	OGC 14	6.5.9	Figure 13	T	Origin of MI_RangeElementDescription is not defined	Reference origin of MI_RangeElementDescription (ISO 19115-2) in text in 6.5.9 and add it to the class in the model in Figure 13	Accepted in principle Remove attributes referencing MI_RangeDimension (and MI_RangeDimension) And ISO1915-2 from Normative Reference
17.	OGC 17	6.5.9	Fig 13	T	seems an inconsistency in the meaning of "minValue", "maxValue" and "units" ISO 19115:2003 minValue/maxValue/units were describing sensor characteristics, while ISO 19115:2011 minValue/maxValue/units describe data characteristics (See email from Martin Desruisseaux)	A possible fix would be to use different attribute names, for example "minDataValue", "maxDataValue" and "dataUnits".	Accepted in principle To MD_Band add 3 attributes boundmin boundmax boundUnits with defintions from 19115 and units of UOMDistance move bitPerValue to MD_SampleDimension

18.	OGC 55	D and E	General		exactly where is “hierarchical metadata” defined in 19115-1? It only appears once, in passing, in the preamble to Annex E. And then Annex E lays out an example in E.3 that I guess is the “operational definition” for this concept? Seems like a pretty poor place to be introducing something that seems “kinda important”, particularly given all of the stuff crammed into Annex D See email from Paul B dtd 3/2/2012	Reconcile the concept of MD_Scope, the concept of hierarchal metadata in annex E and D	
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
20.	US 44	B.2.2 - 37	39	ed	logical grouping similar to previous version of ISO	Change order – put resourceLineage right before or right after DQ_DataQuality	

7. Annex E. Letter of the EC requesting the organization of the GEPW6



EUROPEAN COMMISSION
DIRECTORATE GENERAL FOR RESEARCH & INNOVATION

Directorate I - Environment
The Director

Brussels, **16 JUL. 2012**
I.3 JS/cl D(2012) 973524

Ms Ivette Serral
Mr Joan Maso
CREAF, Edifici C. Campus UAB
08193 Bellaterra
Barcelona, Spain

Subject: Seventh GEO European Projects' Workshop, Barcelona, 8-9 April 2013

Dear Ms. Serral, dear Mr. Maso,

I would like to thank you and Dr. Retana Alumbrosos very much for your kind invitation to host the Seventh GEO European Projects' Workshop in Barcelona on 8 and 9 April 2013. I really appreciate the effort you have already made in proposing such a beautiful venue and proposing a draft budget.

The chance to bring all of our European projects together with representatives of other organisations participating in GEO is one to which we attach great importance and has proved to be very successful. Having the opportunity to contribute to raising GEO's profile in Spain is also something we would very much welcome.

I am very pleased to accept your invitation on behalf of the European Commission. With regard to a possible financial contribution from the European Commission towards the costs of organising this Workshop, I am unable to make any definite commitment at this time. This will only be possible once the Commission has received approval for the 2013 budget and the spending decisions have been finalised.

In the meantime, I invite you to liaise with Ms. Jane Shiel who will be your contact point for this event.

I am looking forward to fruitful cooperation with CREAF and to a successful Workshop next April.

Yours sincerely,



Manuela Soares

8. Annex F. Amendment request letter to incorporate OGC to the project

Barcelona, 2012-02-17

European Commission - RTD

Unit I.3 Management of natural resources 03/167 - Mr MILUKAS Arnoldas

B-1049 Brussels, Belgium

Dear M. Milukas,

Subject: Justification letter for Amendment No. 1 to grant agreement No. 265178 - Project title "GeoViQua"

Background

With reference to the above mentioned grant agreement, GeoViQua wishes to add OGCE in the GeoViQua Consortium. This partner has not been included at the beginning of the project because, during the proposal phase, they participated in other proposals for the same call and they did not feel appropriate to participate in other ones. 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 know that, only if we organize them in the OGC OWS-9 framework, they will have the needed impact.

Capacities and resources

OGCE has the capacity to organize the needed interoperability experiments (IE) synchronized with the OWS-9. OWS IE is a structure already in place with 9 editions of experience. No other organization can provide the expected impact in the form of public engineering reports approved by a standards organization. In the future, GeoViQua wants to influence in the OGC standardization process and the OWS activities are an incubator for new standard proposals (dates of OWS9 are starting almost at the middle of the GeoViQua project and this will give us enough time to implement them later on). To include OGCE in the consortium, will fully accelerate the impact on the relevant standards relevant to the project. Particularly, this request is consistent with the original version of the description of work that is quoted below. It will accelerate the definition "of a standard means of linking WMS and WMTS and KML documents to free-text (human-readable) documents provided by the original data provider. This will allow users to find out more information about the data they are visualising" and also "to define a standard means to make simple semantic links between layers (in a WMS and WMTS) and features (e.g. in a KML document), in order to express the fact that one entity (i.e. data point, pixel, graphic or layer) represents the uncertainty of another entity" (A task in the Work Package 5). Also we propose to increase the scope of the current description of the Work Package 8: "promote OGC profiles and best practices in GEOSS" and to "reactivate the OGC Data Quality Domain Working Group including taking UncertML to a best practice paper" by organizing interoperability experiments that involve external to the project actors, augment the consensus process and generating public engineering reports and increasing outreach of the project and extending the duration of the results after the project conclusion.

Tasks

The details of the OGCE activities are as follows: OGCE will develop standardization activities in OWS-9 that will involve external actors in the development phase but also contributing to a faster and broader dissemination and outreach. In particular, OWS-9 will conduct a thread on Cross-Community Interoperability (CCI) and a thread on OpenGIS Web Services Innovations.

Concretely the requested changes in the DoW are:

- In WP5 Task 5.1 include OGCE as participant in these items
 - Define a standard means of linking WMS and WMTS and KML documents to free-text (human-readable) documents provided by the original data provider. This will allow users to find out more information about the data they are visualising. [OGCE, UREAD]
 - Define a standard means to embed or link to structured (machine-readable) information about data quality (including uncertainty and provenance information, in various forms, numeric and graphical) in WMS and KML. This structured information will be in standard formats (such as UncertML, MOLES, ISO19115-2) – see WP3. [UREAD, OGCE, FRAUN]
 - We will implement these advances with as little modification as possible to the relevant specifications, in order to ensure that third-party client tools are able to take advantage of them. Where changes are necessary we will propose these as change requests to the OGC standards (see WP8). [UREAD, AST, CREAM, FRAUN, OGCE]
- In WP5 Task 5.1 Add a new item:
 - Produce a working “Catalogue for Provenance” instance ready to be interrogated by the project client tools and generate visual representations of provenance. [OGCE]
- In WP8 Task 8.1 include OGCE as participant in this item
 - Present at OGC TC meetings and promote OGC profiles and best practices in GEOSS [OGCE, CREAM, CNR].
- In WP8 Task 8.1 Add a new items:
 - Elaboration of a “Conflation with Provenance Public Engineering Report” considering ISO19115 lineage approach and W3C Provenance draft standard. This will be coordinated with OWS-9 in the thread on Cross-Community Interoperability (CCI) [OGCE]
 - Elaboration of a “Data Quality for Web Mapping Engineering Report” that will contribute to Task 8.1, This will be coordinated with OWS-9 in the thread on OpenGIS Web Services Innovations (OI) [OGCE, UREAD]
 - Incorporate the previously mentioned Engineering Reports in the OGC website Engineering Reports for download and outreach after the end of the project. Disseminate the results of the OGCE in this project in OWS-9 dissemination events, particularly in the January 2013 OGC Technical Committee meeting [OGCE].

To be able to do these items tasks, OGCE requests to spend 5 Person Months in WP5 and 5 Person Months in WP8.

OGCE wishes to be part of the consortium and agrees on the financial conditions common in FP7 calls.

Request

So that, I request on behalf of the consortium to modify the grant agreement in order to add Open Geospatial Consortium (Europe) Ltd (OGCE) as a new beneficiary to develop tasks on work package 5 and 8 in relation to OWS-9 activities.

Finance

The coordinator (CREAF) has studied the current financial situation and can extrapolate that it is possible to make an effort to save some money in the management aspects of the project without impacting in the quality of the project and wishes to transfer 45000.00 € (including overheads) of the assigned budget for management to the OGCE to develop research and technological development activities and also dissemination activities. This is done in a way

the expected European commission contribution remains unchanged but the total budget of the project increases in 6750€ that is cost shared by OGCE.

No competitive call justification

To incorporate OGCE as a new beneficiary (and not a subcontractor) a competitive call is not required following the Spanish legislation that has been transposed to internal policies on procurement of CREAM. According to the Spanish legislation: "Boletín Oficial del Estado", with date 16/11/2011, about the "Ley de Contratos del Sector Público" (Law of Public Sector Contracts): <http://www.boe.es/boe/dias/2011/11/16/pdfs/BOE-A-2011-17887.pdf>

Article 170. General assumptions.

In the terms established for each type of contract in the following articles, contracts concluded between public authorities may be awarded by negotiated procedure in the following cases:

d) When, for technical or artistic reasons or for reasons connected with protection of exclusive rights the contract may be awarded only to a specified company.

Article 174. Service contracts.

In addition to the cases provided for in Article 170, service contracts may be awarded by negotiated procedure on the following assumptions:

e) In any case, whose estimated value is less than 100,000 euros.

Article 191. Award of contracts not subject to harmonized regulation.

For the award of contracts not subject to harmonized regulation shall apply the following provisions:

c) It will be considered fulfilled the requirements of the principle of publicity with the inclusion of information relating to the tendering of contracts whose value exceeds € 50,000 in the profile of the contracting entity, subject to internal instructions to contracting devise other embodiments, alternative or additional outlets.

Since the amount involved is less than 50.000 €, our center was not obliged to do any competitive call. In addition, OGC is the only company that can provide these services.

This incorporation needs the modification of the Description of Work in terms of the budget, the project effort and costs table, all of this as indicated in the Request Letter.

Yours sincerely,

For the coordinator on behalf of all beneficiaries, done at Bellaterra (Spain)

Name of the legal entity: CREAM

Name of legal representative: José Antonio Fuentes

Stamp of the organisation:

Signature of legal representative:

Date: 27-08-2012