



Special Edition GSELand Newsletter - Madrid Land User Meeting

Dear Members of the Land Data User Community,

Another year has passed with incredible speed. We have completed and accomplished a lot, and we are awaiting exciting new challenges in 2008. We would like to say thank you for the excellent and valuable cooperation, the interesting discussions and meetings with you all.

With this special edition we provide you with information and outcomes from the successful Land User Meeting in Madrid, last October, and inform you about the start of the new project “GNU”–GMES network of users.

In Madrid we discussed several examples of object oriented data models and possibilities to go forward with projects supporting the bottom-up approach while, at the same time, it was emphasised that there is a important need to continue with data collection via European wide acknowledged methodologies like Corine Land Cover.

The presentation of users regarding services developed within GSE Land showed in general that, apart from certain possible improvements, excellent products have been developed which can be offered to a wider user community. At the same time better communication between all stakeholders, more training on the products, and closer cooperation between service provider and users were also requested.

The service providers presented their products and informed the meeting about the latest developments while participants at the workshop were able to test the products. Further active engagement with the user community was provided by the workshop on quality assurance, also featured in this newsletter.

More information about the GMES Land User Workshop held in Madrid, 22nd-23rd of October 2007, can be found at: <http://terrestrial.eionet.europa.eu/activities/announcements/ann1193747076>.

Last, but not least, we are delighted to see, in the experience of the Madrid User meeting, the many ways in which the user community is maturing, and we fully anticipate that this work will be given a new dynamic with the commencement of the GNU Project, the aims and objectives of which are summarised below.

We wish you a prosperous new year for 2008

Andreas Littkopf
ETC/LUSI Manager

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GNU GMES Users Platform

GNU Mission: GNU is the independent platform for users of environmental GMES products. It optimizes national and regional level users' benefits from the socio-technological system GMES.

Consortium: environment agencies and ministries, ETC LUSI, geological surveys, specialist agencies on air, forestry, and land information, KMUs for support work, research organizations (remote sensing and sociology); in total 22 partners coordinated by the Austrian Environment Agency.

Extended Consortium and further target groups: national and regional level stakeholders including service providers; European and international stakeholders; other projects and networks.

Resources: funded via the EU 6th Framework Programme of the European Commission (DGEntr.) with 1.1 Million €, and running from October 2007 to September 2010.

Objectives and Rationale

- **Consolidate the environmental GMES user communities:** Currently, user federations of GMES projects are isolated from each other, owing to their thematic basis (land, forest, air, marine, etc.), and there is an urgent need to address the cross-cutting issues and commonalities.
- **Enable independent and unfiltered user statements:** So far, GMES user federations exist only within the framework of projects led by service providers. These users have little or no access to project resources which makes it difficult for them to effectively engage or exchange.
- **Mouthpiece for the needs of GMES users at national/regional level:** European level users are already well represented in various

bodies, but this is not the case for users that operate at lower levels. For the latter users, a bottom-up development of data products may be more rewarding than a top-down approach.

- **Combine and differentiate users appraisals of GMES products:** GMES projects have brought about a wealth of different products. In this process users can lose track of all the GMES data, products and portfolios available. Furthermore, some of the documented user's appraisals of these products have been influenced by the respective service providers. There is a need to prioritise and catalogue GMES data products to facilitate users access to the products most suitable for their needs.
- **Link data-related and human aspects of GMES:** Most problems in GMES projects relate to communication issues rather than to technology development, however, this issue has not yet been addressed. An investigation of user-provider relations will provide the basis for efficient modes of collaboration.

Work Plan

- **Phase 1: Within the Consortium lay the foundation for joint work:** Partners exchange experiences and good practices, collect and interpret GMES project and process related documents, acquire a common state of knowledge and start to look behind the scenes of GMES; provide guidelines for effective user-provider interaction, and a synopsis of the GMES process for users.
- **Phase 2: Connect GNU to other activities:** The Consortium sets up links to European/international level stakeholders, other GMES related projects and networks, and puts together the Extended Consortium of various national level stakeholders including service providers.

- **Phase 3: Establish alliances and communicate:** An ongoing bilateral exchange is established with European/international level stakeholders and with other GMES related projects and networks. Various stakeholders will be enabled to mutually take advantage of their experiences.
 - **Phase 4: First Iteration of Interaction with the Extended Consortium:** Results are presented to and discussed with national level stakeholders including industry, researchers, policy makers, and users. Feedback is gathered to take advantage of the complementary perspectives.
 - **Phase 5: Deepen the work within the Consortium:** The partners define criteria to evaluate GMES data products, develop common validation standards, set up a meta data base of GMES data products and prioritise these products.
 - **Phase 6: Second iteration of interaction with the Extended Consortium:** A GMES stakeholder response analysis will show ways to optimise the impact of GMES data products in relation to different stages of particular policy cycles.
- evolution of the land service beyond the implementation of the fast-track elements;
 - need to converge a top-down EU centred approach for the most urgent reporting needs with a bottom-up approach to Land-cover/Land-use inventory methods established by some advanced member states, including data model aspects;
 - and “outreach” concerning ways of constant communication with the outside world.

The land fast track elements are progressing as planned. There will be a pan-European continental component including soil sealing and forest cover with 1ha resolution by next year, providing the first GMES added value. As for the local component, a call for proposals to map land-cover/land-use for cities with populations >100,000 with even higher accuracy is under preparation for completion by the end of 2008. Feasibility tests using Badajoz and Bremen have been carried out. Finally, an expert group defining a global component to follow the fast tracks met twice.

GMES Land has also been promoted via a number of EU policy documents including agro-environmental indicators, tourism, forest action plan, soil, and territorial cohesion. Furthermore GMES was identified as one of 11 priorities in the INTERREG call on “regions for economic change”.

The Implementation Group at its next meeting at end January 2008 will focus on an appropriate decentralised architecture for the LMCS, as well outreach in the form of constant interaction with users and stakeholders, recognising in particular the GNU Project as an invaluable partner in this effort.

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News from GMES Bureau

The Land Implementation Group is undergoing a re-shuffle with changes in the membership to include new members from DG-AGRI, DG-Eurostat and DG-REGIO. DG-ENV also joined the Group as from the last meeting which took place on 9th November 2007. The agenda for this meeting included:

- workplan for 2008;
- finalisation of the report on in-situ data needs following that on space data released in mid 2006;

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New Ways Forward: European Land Cover Information Systems

Land Cover Information needs to “mix” concepts and terms from many different thematic fields. The current CORINE approach (hierarchical classification model) and also the Land Cover Classification System (LLCS) developed by FAO, do not solve all the existing problems associated with classification databases (class definition incoherence, mixed classes, spatial variations not registered, temporal changes not detected, automatic generalizations not possible, etc.). There is therefore a need to consider alternatives to the current hierarchical classification land cover databases, including the potential of parametric object-oriented data models (POODM).

At the Madrid Land User Meeting Antonio Arozarena, Núria Valcárcel and Guillermo Villa (IGN) presented a new concept for land cover information system in Europe set in the context of a set of requirements including:

- Land Cover information has to face many challenges including: climate change and sustainable development, integration of existing knowledge into land cover, implementation of INSPIRE initiative;
- Current situation: different resolutions, nomenclature (only one use fit);
- Need for homogeneity, coherence, but also the need to take into account what already exists.

SIOSE: Example of POODM in Spain

The use of Parametric Object Oriented Data Models for Land Cover Information Systems is based on the following basic principles:

- The working area must be divided in a set of closed polygons, each one containing a surface that is as homogeneous as possible.
- The aim is not to classify each polygon but to “describe” each one as well as possible.

These descriptions are made associating “Land Covers”, “Land Cover Elements” and “attributes” for them to each polygon.

- “Land Covers” are thematic categories. They are defined with conceptual definitions of biophysical or socio-economic criteria (morphology, structure, relation with other land cover entities, etc).
- “Land Cover Elements” are the objects found in the terrain that make up “Land Covers”. Land cover elements (e.g.: buildings, trees, rock, sand, etc...) are the basic components of land cover e.g. trees are present in woodlands, urban fabric, agricultural areas, but they are always vegetation - woody – trees.
- Each “Land Cover” (LC) and “Land Cover Element” (LCE) has its own attributes. Attributes are observable characteristics (biophysical or socio-economic) that describe LC or LCE in more detail. These attributes take different values in each “instance” (appearance of the LC or LCE).
- Some attributes are simple variables of the adequate type (e.g.: number of floors: integer). Other attributes are “Controlled lists” (e.g. “vegetation distribution geometry”). Controlled lists are defined as “enumerations” in UML. Other attributes are more complex (e.g. “vegetation state”) and are represented as “UML classes” (white rectangles in the UML diagram).
- Homogeneous polygons (at the scale of the database) have one Land Cover. When homogeneous surfaces have an area smaller than the Minimum Mapping Unit, the photo-interpreter must draw a non-homogeneous polygon that encloses areas with different characteristics. In this case, the photo-interpreter must measure (or estimate), and store in the database, the percentage of surface in which each “Land Cover” is present



in the polygon. The sum of all percentages of each polygon must be 100 %.

- For each “Land Cover” found in a polygon, the photo-interpreter must study its “inner composition”, and measure and store in the database:

- The average values for each of the attributes in this “Land Cover”.
- The “Land Cover Elements” present in this “Land Cover”, and the percentage of the surface that each occupies.
- The average values for each of the attributes in each “Land Cover Element”. (e.g.: trunk diameter=0.40m; Number of floors = 4)

- One “Land Cover” may have several “vertical levels”. e.g.:

- Level 0: Natural Terrain – Soil
- Level 1: Vegetation – woody – shrubs
- Level 2: Vegetation – woody - trees

All these vertical levels are measured and stored in the database. For each level, the % of elements surface must be less or equal 100%.

- All the information of each polygon (percentage of surface of each LC present, average values of each parameter affecting each LC or LCE, ...) is stored in an alpha-numerical relational database (RDB). This RDB has been designed with two objectives in mind:

- Materialize as exactly as possible the Parametric Object Oriented Data Model represented in the UML diagram.
- Allow for unlimited future extensions of the model, making it as easy as possible to add more classes, parameters, conditions, etc...

From a robust and well defined Parametric Object Oriented Land Cover Database, land cover classifications, and nomenclatures can be easily

derived by making an appropriate SQL query to the database.

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Land User Satisfaction Overview

GMES in Context

GMES as a joint initiative of the European Commission and the European Space Agency has been set up to establish sustainable operational EO based geo-information services from 2008 onwards to serve Europe’s needs for environmental management and security.

Under this umbrella, GSE Land is an ESA GMES Service Element Stage 2 project, which aims at structuring and stimulating the demand and supply of Earth Observation (EO) based geo-information products and services with emphasis on public customers. Specifically, GSE Land aims to deliver initial geo-information services for a large spectrum of land applications which are harmonised and standardised for cross-border applications. They are based on general EO geo-information on Land Cover and Vegetation, and are provided for public administrations with a mandate to monitor, report, and manage land resources.

User Involvement in GSE Land

Approximately 50 users covering a broad range of scales, from European, to national and regional level, support GSE Land representing all targeted policy sectors (environment, agriculture, water management, regional development and urban planning).

In order to serve these very heterogeneous sectors the aim of GSE Land is to stimulate technical discussions within and across the different user communities, to identify

complementarities and common requirements that can serve the whole community and therefore create effects of synergy and scale in production.

At the same time, user organisations contribute to GSE Land in respect of technical, operational and advisory issues. This is being achieved on the basis of engagement in technical project meetings, annual reviews and collocations during the course of the project; and also, via taking responsibility for user-side validation, acceptance tests, and actual use of the services received.

The project also aims to set up a User Network to federate and coordinate self-organised ad-hoc GMES user working groups in the policy fields addressed, establishing a common understanding of service needs and implementation requirements of the different user organisations across policy sectors and vertical administrative levels addressed. The network, moreover, aims at

- achieving a continuous user involvement to support the common objective of setting-up sustainable GMES services beyond the bi-lateral supplier-user relationship;
- stimulating consensus among the different user organisations on common needs, service and qualification standards; and
- creating visibility and the impact of these new developments in decision making processes.

To achieve these ambitious goals, GMES is building up a general GMES user network supported as well by GSE Forest Monitoring and the FP6 projects BOSS4GMES and, most recently, GNU.

User Feedback on GSE Land Products

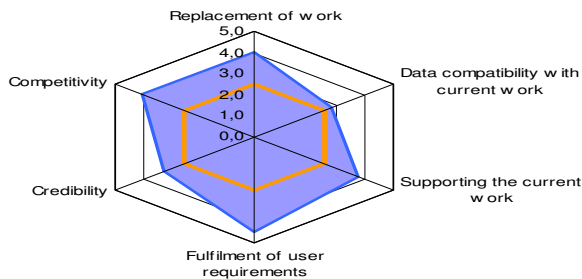
Users have evaluated several different products developed in GSE Land, belonging to water, land and urban services. After 2 years of production, the main achievements identified by the users are listed below:

- The products are useful to validate and improve existing data for the user organisation;
- Within each service, the different products have a harmonised approach and the methodologies and processes are reproducible;
- Time series are available;
- Automation of processes in getting the requested data;
- Some products are more competitive in respect of time (faster deliveries, quicker updates) and costs, and in some cases, there is a reduction of field work to obtain the data;
- The results provided have a better accuracy at pixel level; higher resolution; and better MMU.

Some of the main constraints and shortcomings regarding the products are as follows:

- Replacement of existing methodologies/products is not possible at this moment in some user organisations;
- For some users, and referring to specific products provided, the geometric accuracy is not yet sufficient;
- Some of the products could not be used as direct inputs by the user: there is the need for reprocessing of the data from the geometrical point of view.

In order to have an integrated overview of the evaluation of the users, comments received have been grouped and scored in six main areas as shown in the figure below which illustrates Inland Water Quality and Water Consumption Services. In this case all the aspects evaluated were very positive (above the mid point in a scale from 0 to 5), especially in respect of the fulfilment of user requirements, the competitiveness of the product compared with existing ones and, therefore the possibility to replace current working techniques.



improved as compared with the outcomes of GSELand Phase 1, in terms of percentage contribution to the project. The GSE Land project team is working to overcome this situation and improve response rates in Phase 3 of the project.

Based on input information from the service validation questionnaires completed by GSE Land users, a summary and an assessment of the results obtained per service has been devised based on the following parameters: fulfillment of users' requirements, credibility, competitiveness, and data compatibility.

User Feedback on Overall Project Process

The global figures at the end of phase 2 of the GSE Land are that, 60% of the users involved in the project did not respond to the questionnaires requested. This may be due to a variety of reasons including insufficient information and communication between users and service providers. Clearly, feedback and flow of communication inside the project has not

The sample size does not permit broadly applicable conclusions on user satisfaction and usefulness of the services/products or a representative statement for the whole user community, nonetheless some comments are summarized in the text boxes below, which provide ideas for progression of the project:

- Users should be motivated, not only pushed. Directly work with the users: dedicated meetings where the status of the project is presented, training should be provided on how to complete the documents and how to use the data, etc.

- Although the real utility and potential of the product is evident, the main constrain is the price.

Birgit Mohaupt, UBA (Germany)

- Users feel part of the project, although the flow of communication at project level could be improved
- Develop discussions between users of the same service, more feedback and examples are needed

Marion Gunreben, LBEG (Germany)

- Initial expectations have been achieved, although more testing is needed. The products received could be used by the user organisations to further develop monitoring plans, to use them as reference layers, etc.

Manuel Navarro and Rocío Wojski, MAPA (Spain)

- The relatively low state of development of rural and urban planning in some of the member states should be recognized. There will be great advantages if experiences in some countries can be used to support the development of knowledge and experience in other countries.

Ake Bengtsson, SWA (Sweden)

- Better engagement by end users could be facilitated from the beginning of the project: including organization of seminars for the users, supporting engagement in the project, and the creation of a community-feeling and the provision of clear agreements on the do's and don'ts.
- Provide the space and time to discuss, exchange different opinions between different users, and to learn from other users involved in the project. For example, creating user groups that communicate with each other, create a common extranet to upload the documents relevant for the users, etc.
- Commitment on the users' side could be influenced by the lack of data, the lack of user rights to the data provided or any other reasons outside users' control.
- Free products may appear to have less value than that which is worked for or paid for. It is important to try to find the right balance

Lawrence Beernaert, Intercommunale Leiedal (Belgium)

Final general remarks to be taken into account, can be summarized as follows:

- There is a need to provide regularly interesting and useful information to the users in order to encourage their involvement in the project, and to underline the reality that users are vital partners in the process. The GNU project aims to fulfill this need.
- There is a need for more promotion of what is being developed and the possible applications that could be derived. More training on the different products and on how the data could be used, will facilitate this requirement.
- Not all the products are evolving in the way users expected, although some of them are well developed and fulfill user requirements.

All the critical reviews of GSE Land services voiced at the meeting were immediately responded to by the GSE Land project members, and specific actions were taken to improve the situation where deficits had been detected. In addition to that, two users from two different regions have requested the production of additional areas, at their own expenses, to the ones already agreed into the project specifications.

It has become clear that a key issue concerns the need for improved communication among the service providers and with users to fully

understand their needs. For example misunderstandings of service specifications derived from European needs versus national/regional adaptations or deficits in user support after service delivery could be solved. Thus, the workshop was an important step forward to optimize the services as well as the producer/user relationships.

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Madrid Workshop - GMES standards for high geo-information quality



The main goal of quality assurance (QA) is to ensure an agreed quality of a product or a service.

This implies that it is important to produce reproducible and traceable results at any stage of the production process. In this sense, quality assurance not only guarantees quality, but also helps to streamline production (reduction of cost) and also provides comparable products across different production sites and service regions.



Compared to other service provision industries for geo-information services QA concepts and approaches are still immature or lack wider acceptance in the European stakeholder community by both users and producers. However, in GMES land projects significant effort has been allocated to assure a transparent and reliable process on quality assurance means for GMES products and services, which might serve as a proxy for future GMES quality standards (for details please refer to the GMES User Newsletter # 2 or download the GSE Land Validation Protocol providing all background information under

<http://www.gmes-gseland.info/pub/deliv/index.php>).

Under these preconditions, the goal of the workshop was first to achieve a common understanding of the quality assurance methodology chosen and to obtain recommendations for further improvements. Concrete results of the GMES Land approach

from the results of 3 GMES service lines were presented and discussed:

- the European component of the GMES Land Monitoring Core Service (LMCS),
- the Urban Atlas (the local component of the LMCS), and
- possible validation methods for the CORINE 2006 change layer, as a model how to handle map updating based on change detection means.

Among the participants there was a broad consensus that the approach represented an important step forward towards more reliable and coherent geo-information products and services at the European level. The involvement of ETC-LUSI, as an independent and experienced evaluator for the validation of the mapping products, was welcomed.



However, there remains an open question as to how to integrate in an optimal way the local knowledge and ancillary data available from member states or regions in order to minimise the overall effort.

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GSE Land



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