

Project no. 30956

Project acronym: GNU

Project Title: GMES Network of Users

Instrument: Coordination Action

Thematic Priority: Aeronautics and Space

Deliverable Number: 3.4

Practical approaches towards a new generation of GMES projects and actions

Due date of deliverable: Month 34

Actual submission date: Month 36

Start date of project: October 2007, Duration: 3 years

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Learning by doing

GMES is a complex and dynamic process. GNU, as one player among many, and representing one kind of stakeholders – users – among several, intends to influence this process in order to optimise it from its own perspective and to enable its participants to reap as many benefits from the process as possible. Therefore, from its beginning, the project has articulated differentiated views on the current status of different aspects of GMES from the users' perspectives. This included positive statements – to provide examples which others may consider to follow – and criticism – to identify areas which could be improved in the future. In its various deliverables and in the framework of several GMES related events, GNU has articulated a range of recommendations as to shaping the GMES process to make it most useful and accessible to users. At this late stage of the project, it seems sensible to investigate to which degree these recommendations made by GNU have been put into action, and, likewise, to which degree the aspects of GMES which GNU investigated in its early stages have changed in the meantime.

These two efforts are reported in this deliverable: The first part of this document explores how GMES projects and actions have changed from the beginning of GNU to the now existing new generation of undertakings. This effort started at the second GNU Extended Consortium Conference in Rome, Italy, February 2010, with dedicated working sessions which were preceded by an introductory background presentation delivered by the Italian Institute for Environmental Protection and Research (ISPRA) who also hosted the conference. Splinter sessions were formed each of which involved both GNU Consortium members and Extended Consortium members. The purpose of these splinter sessions was to gather the experiences in key projects/actions launched in recent FP7 calls and in other new or ongoing GMES related actions, regarding improvements in meeting user needs, user involvement practices, and expected contributions to the users' work. Each of the four splinter sessions was dedicated to a particular topic, these were (1) Meeting User Reporting Obligations and Priority Data Flows, (2) Improving modelling and forecasting of in situ data, (3) Facilitating User contribution in building SEIS/INSPIRE, and (4) Facilitating National/Sub national coordination. Predefined topics and for each of them a set of seed questions ensured focussed discussions and a systematic gathering of results by the facilitators. The outcomes of these splinter groups were then summarised by the respective

facilitators. These summaries were circulated among the conference participants for comments. The final versions were then used as the basis for the below text of part 1.

The second part of this document compares specific statements made at the early stage of GNU with the current perception of the GNU consortium members. This effort was started at the project close down meeting June 2010 in Tromsø, Norway (hosted by the Norwegian Institute for Air Research) with an explanatory note by GEOVILLE LUX who then drafted a questionnaire which was circulated among the GNU participants. This questionnaire consisted of two columns, in that the left one listed statements made in the first project year and the second one provided room for the GNU participants to articulate their current perception as to each particular statement. The questionnaires were then collated to a large table which was circulated among the GNU participants for comments and further additions. The final version of the table was then used as the basis for the below text of part 2.

Imprint

Part 1

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Part 1 : From the beginning of GMES to a new generation of GMES projects and actions

This part reviews/assesses to which extent major recommendations by GNU were reflected in the subsequent Space and Environment Calls 2009 and related 2010 Work Programmes (WP). The treatment of users' issues in the text of the GMES Regulation available at that time was also considered.

GNU key concepts relevant for GMES projects/actions:

- Usefulness/utility: the service improves users' day to day operations
- Reliability: the service is credible and consistently meets user defined quality standards
- Affordability: the service's benefits justify costs and are competitive with other usual sources

Main conclusions of GNU's analyses relevant for GMES projects/actions:

- Lack of consistent methodology for user assessment
- Weak C/B analysis carried out by users
- GMES should put more emphasis on the dynamic aspects of the products (e.g. time series) rather than in developing reference data
- Products and services should take into account new approaches and integrate different initiatives avoiding duplication with the existing ones (e.g. Corine Land Cover)
- Decision capacity of selected user organisations to purchase different products

Main recommendations by GNU:

- Develop a consistent database of users, service providers and products
- Integrate quantitative assessment into evaluation reports
- Ensure transparency of GMES projects
- Work for a common methodology to assess utility, benefits, accuracy and affordability of GMES products
- Select target user group according to project expectations

Extent to which GNU recommendations are reflected in recent European Commission calls/projects

FP7 Space call 2009/WP 2010

Although no straight forward matching with the GNU recommendations can be made, many issues addressed in the text of the call in terms of overall or specific objectives for project proposals show indeed a more mature approach to users demands, such as:

- Establish appropriate funding arrangements for the operational phase of GMES, in order to ensure the sustainability of the services for users;
- Targeting specific applications serving a wider group of users (e.g. across Europe), or a multithematic application of a specific user (e.g. regional or local) with emphasis on users ready to fund services when EC funding ends;
- Existing and validated experimental practices or methodologies need to be turned into operational prototypes in close interaction and trade-off/validation process with the service users;
- Successful integration into current user practices and their working environment need to be demonstrated;

- Description of feedback and assessment process of the service by relevant end-users, demonstrating acceptance level of products, of prototypical service;
- Scenarios for integration into users' working methods and resulting decision-making processes;
- To facilitate efficient acquisition and exploitation by both service providers and users, activities will have to include R&D for:
 - improved accessibility to long-term data archives, implementation of meta-data standards, actions to facilitate information retrieval and dissemination;
 - improved accessibility to in-situ systems;
 - adoption of open standards for data documentation, data models and services;
 - integration of tools and services allowing anybody to query, view access and exchange the information held by distributed public and private bodies;
 - establishment of a data policy and appropriate security framework.

FP7 Environment Call 2009/WP2010

As for the Space Call, the component of the Environment call regarding EO (Earth Observations) and Assessment Tools for Sustainable Development was also addressing some of the issues raised with GNU with regard to cooperation in a wider global context, such as:

- integrating European activities within GEO;
- Cross cutting research activities relevant to GEO
- EO in emerging areas
- Capacity building activities in new EU countries and developing countries
- Tools for impact assessment
- Sustainable development indicators
- Interplay between social, economic and ecological systems

Reflections on the response by recent FP7 calls to GNU recommendations and impacts on a new generation of GMES projects

The requirements of these calls show a good starting point in the qualitative process of learning by doing. However, the real difference will be truly measurable only at the end of the new projects. A quick glimpse on some FP7 projects now (autumn 2010) ongoing in response to the First FP7 Calls (MyOcean, MACC) or recently approved/negotiated (GRAAL, HELM, EGIDA, CERES,.....) show that:

- Users are stronger and more knowledgeable partners in terms of their capability to influence project proposals and expectations from projects results
- Quality criteria/Validation approaches seem to be taken into account on more knowledgeable grounds;
- Data policies are addressed and stronger outreach actions are included
- National/Subnational coordination issues are tackled

The calls 2010 and related WP 2011 include even more elements signalling a greater attention to users issues in the further development of GMES. For example, the WP2011 of the Cooperation Theme 9, Space, calls for the GMES Atmospheric Service to be “responding to user queries” and for “Data Products interface to users, ensuring the dissemination of all output products to the users with high quality”. The in situ dimension is also more directly addressed, calling for project proposals to show close liaison with the coordination activities of the EEA in respect of in-situ networks. Perhaps even more important, it also calls for proposals “to describe which efforts the proposers will undertake to obtain these data”. It also contains “measures to support take-up of services by users” during the GMES Initial Operations (GIO).

Furthermore, the proposed GMES Regulation includes:

- A User Forum to ensure that service specifications correspond to users needs
- Full and open access, free of charge, to information produced by EC funded GMES services and data
- Full transparency in procurement of space data
- The role of the EEA as technical coordinator of the in-situ component and land monitoring services
- Greater coordination with GEOSS

Specific views of the GNU Consortium and Extended Consortium members

Based on the practical experiences of the GNU Consortium and Extended Consortium members both in GMES overall developments and in specific past and ongoing projects, the “Learning by doing” process was in depth inquired into with respect to four key issues. This was done mostly in terms of support to the formulation of policy responses GNU members are often called upon to contribute.

1. User reporting obligations and priority data flows

Past project experience shows that improvements are needed in future projects and that opportunities can be identified-

Improvements

- Several GMES products provide information on the issues required by reporting obligations, but improvements are still needed as to data quality and overall maturity. This is true for most data products considered except for particular forest indicators.
- Pilot sites often related to parts of the countries exposed to particular types of environmental stress which are important but may be untypical for the overall country.
- Project cycles and reporting periods often show a mismatch. Reporting is done periodically over medium/long time periods, whereas the projects have a limited life span, which, in several cases, was insufficient to develop suitable products.
- The differences between the timing of product delivery by projects and of data gathering for reporting activities posed problems.
- Product development within GMES projects is in many cases conducted by project partners in connection with users not always or not sufficiently engaged within the institutionalised country level reporting framework, thus making difficult the optimisation towards the national reporting communities’ needs which may not have sufficient knowledge on GMES opportunities
- Early GMES projects were much focused on the reporting obligations stemming from EU environmental directives or Global Conventions

- Policy makers have many further data and information needs not directly arising from these compulsory frameworks, e.g. new policies areas such the sustainable use of natural resources, promotion of renewable energies and sites issues connected to land use, cross environmental thematic linkages
- Analysing data needs for policy support requires a wider approach is useful which also encompasses such needs.

Opportunities

- Pilot sites which have been investigated may provide useful demonstrators and, thus, the basis for future products covering entire countries or more as well as generate new tools by testing particular approaches which may later be more widely applicable
- Several pilot site's focus on special areas, although not immediately applicable to wider national contexts, may actually become the precursors for hot-spot monitoring.
- It may be sensible to focus GMES product development also on new environmental policy issues which may turn into new environmental legislation (e.g. Soil Framework Directive still undergoing negotiations) or in revisions of existing ones.
- Earth observation typically can fulfil only partially environmental data needs articulated in a directive, while through the combination of in situ data, remote sensing data and modelling, a new kind of environmental information may arise, thus contributing to better focus new or revised legislation during the negotiation phases and ad hoc hearings.
- From the data provider perspective, the development of a data product must be accompanied by a clear business case, thus they prefer to focus on existing environmental legislation rather than getting involved in the long and less predictable processes related to emerging new legislation.
- GMES already existing successfully contribution to environmental reporting is known particularly for forest indicators which fulfil specific obligations towards UNECE, FAO, MCPFE, and the Alpine Convention.
- New technical opportunities developed within GMES projects could be the basis for defining new ones which may, in the future, even become the subject of reporting obligations.

- A chemical weather forecast is already pre-operational for several European areas. In situ data in line with current legal data requirements are combined with remote sensing data and modelled, so that air quality can be depicted for areas between the in situ sensor sites and the future development can be predicted.
- Inverse modelling of emissions, although still in a research phase, and the GMES Soil Sealing Layer are also good candidates, since currently, neither information can be measured at all but relies on statistics.
- An example for an altogether new possible future product would be an approach to link ice monitoring and climate change scenarios in the Alps with water availability downstream, e.g. in the Italian Po area or as far as the Netherlands to aid large scale water management and climate change research alike.

GMES could, thus, be linked to environmental reporting in four ways:

1. GMES does the reporting, that is, existing data are replaced by GMES products. No such case is known.
2. GMES contributes to reporting, e.g. provides the spatial context to in situ data, provides one or few of a number of indicators, etc.
3. GMES widens the scope of (future) reporting, e.g. through modelling of current in situ data and forecasting, thus in the future there will be an improved quality of currently existing information
4. GMES gives a new scope for future reporting, e.g. reverse modelling of emissions or monitoring of soil sealing, such new information could even lead to future new priority data flows

Recommendation: to systematically understand the current progress made by GMES as to environmental reporting, a review would be useful to document where and to which degree such attempts were successful and where they failed.

2. Improving modelling and forecasting by use of in situ data

This investigation is based on a variety of environmental monitoring experiences and use of in-situ data as primary data source on Air Quality, Forestry, Flooding, Land use, Earth quakes (geophysics) and Biodiversity . It focusses not only on the use of

in-situ data alone, but rather on how in-situ data may be used to improve GMES products/services that are based on modeling/forecasting or satellite information. The following common obstacles to overcome were identified

- ***In-situ data are not always fit for purpose.*** The measurements are acquired by a different community and for a different purpose than to create pan-European service or product. This results in missing metadata and auxiliary information that is required to use the data in a wider context. An example is the use of in-situ Air Quality data for chemical weather modeling and forecasting. The elevation of the in-situ station (above ground level and sea level) has been difficult to obtain for the modelers and they also need a better description of how much the measurements are directly influenced by local pollution sources (this strongly depends on wind speed and wind direction).
- ***In-situ data are not available for pan-European use.*** Data are gathered by local or regional institutes and agencies for their own use. Depending on the discipline, there are some or no initiatives to make data easily available for a European GMES service. While the sharing of in-situ data is well established for meteorology and to a lesser extent for Air Quality services, it is not well developed for monitoring disciplines such as biodiversity, forestry and land use.
- ***In-situ data are not always available where needed.*** This is especially true for time-critical data and is applicable for Air Quality and flood monitoring services. In the case of flooding, the river exceeds its normal limits and water flows onto land areas where there are not measurements available. For Air Quality, there is limited coverage in remote areas (where few people live) and over oceans. A general problem with in-situ data (for pan-European application) is the relatively low spatial coverage and high cost per measurement – there is a need for securing time-series.
- ***In-situ data are not harmonised on a European scale.*** Besides the issue of data access and availability, the lack of harmonisation of in-situ data acquisition is the most serious limitation blocking increased use of the data in GMES products. Due to lack of European coordination, in-situ data are being gathered for different purposes using different methods across borders. Data collected in one country is not directly comparable to data collected in another part of Europe. Sometimes, this may be dealt with by post-processing of data (e.g. application of correction factors) – in other cases this is much more difficult. The formats and reporting routines are also often not

harmonised for in-situ data. EO (satellite) data are harmonised across borders, but lack the thematic detail or accuracy of in-situ data.

Recommendations

Better coordination at EU level to make in-situ data comparable across borders and to make the data accessible for pan-European services. This may require coordination of the both measurement activities and the funding methods, and also better alignments of data reporting with the requirements of pan-European stakeholders.

Creation of intermediate products to better link the accuracy and level of thematic detail of in-situ data, with the harmonisation level and coverage of satellite data.

3. Facilitating user contribution in building SEIS/INSPIRE

This part of the study falls back on experiences in past or ongoing projects of GMES relevance, such as MarCoast, Geoland 1&2, GSE Land, GSE-FM, CORINE and GNU and also on knowledge of INSPIRE, including competences on INSPIRE metadata model, web catalogue services (WCS), web map services (WMS) and web feature services (WFS). Knowledge with implications to SEIS was also utilised such as NRT-AQ (Near Real Time Air Quality), WISE (Water Information System for Europe), GeoNode (EEA).

Key findings:

- GMES, SEIS, INSPIRE lack a formal hierarchy among them and SEIS seemed more developed, in comparison with GMES for which no sustainable operational services exist after 10 years
- Some national SEIS initiatives are already operational which could provide best practices and good examples, also for improving the learning process on how GMES and SEIS can feed into one another
- Incompatible SEIS portals could be available at the end of FP7, leading to dedicated FP8 projects attempting to achieve interoperability between them.
- EEA metadata standards should be used for SEIS as the EEA metadata for land monitoring are more advanced than the INSPIRE metadata.

- A well coordinated system of portals (or a single data portal?) is needed to integrate European activities into GEO.

A partial picture of open source software for SEIS/INSPIRE was acquired and examples identified:

- “GeoNetwork” open source
- “GeoKettle”
- “MapServer”, a Web Map Server (WMS) from University of Minnesota, currently implementing OGC standards but might in future implement INSPIRE standards too
- “deegree”, Java open source suite from University of Bonn, provides a number of functionalities (WMS, WCS; ...)
- Web Processing Service (WPS) by ETC/LUSI and University of Münster
- INSPIRE online metadata editor.

However, most administrations use commercial software.

National and cross-border SEIS examples

No clear definition of what makes a project a SEIS project seems available, although the following projects could be accounted for being strongly related to SEIS:

- EYEOONEARTH
- OZONWEB
- ETC LUSI Geonode
- IDEE-Spain
- REDIAM (Spain)
- Geoland-AT (Austria)
- WISE

Conclusions:

Only very limited uptake of GMES services / products has been observed for SEIS projects focussing on land; uptake is perhaps stronger for projects dealing with ocean and atmosphere.

4. National/sub-national coordination

Only few GNU Consortium or Extended Consortium members work for regional/sub national organisations, but many are collaborating with this political level. Countries represented in GNU have different approaches or structures to inform sub national and regional organisations in their country about GMES and to deal with GMES governance issues, such as: periodical GMES Fora, (official) GMES contact points; thematic GMES groups. Recommendations on how a 'good' GMES should work towards sub national and regional organisations include the following negative and positive elements.

Negative elements to avoid :

- GMES is dealing with information that hasn't enough detail.
- The topics of GMES and the data are not interesting enough for a regional level.
- GMES has defined already specs and standards without interaction with the regional/sub-national levels.
- There is too much of a top down approach.
- Regional/sub-national authorities don't know what GMES is about and to them it appears to be a black box.
- Regions feel they already have enough (geo)information so that they don't need GMES.
- GMES does not suits regional/sub-national authority's needs as it focusses on transnational thematic projects or problems like atmospheric or marine pollution.
- The users are not well-defined, and it is not clear whether GMES addresses regional/sub-national groups, too
- GMES does not allow free access of data.
- Interaction with national organisations leaves no room for the large number of regional/sub-national actors to be considered.

Positive elements:

- GMES can assure the continuity of datasets, data-archiving which can never be accomplished on a regional level.

- GMES can provide analyses and statistics at a broader scale so the status of a region can be seen in a broader context.
- The interconnection of regions is becoming possible due to the global approach of GMES.
- Regions are automatically part of national, European approaches and should be open to get involved.
- GMES can offer valuable data and information to regional/sub-national authorities, hopefully free of charge.
- GMES can offer the knowledge, methods, experience, R&D and even results for European regions and their institutes.
- GMES can help to set up a regional (environmental) information system.
- GMES makes it possible to tackle sub national, trans regional, transnational themes (marine, ocean, atmosphere, ...), problems and solutions which on a local level is not possible.
- Regions are becoming important to give the necessary in situ information and should be recognised as valuable organisations to validate the GMES results.

Conclusions:

A network organisation like NEREUS can help in bringing the regions more into the political picture and to build regional partnerships. Nevertheless, from a regional/sub-national perspective, GMES currently:

- misses focus;
- should cover more global and transnational thematic problems that regions can't tackle (due to resources, ...) or solve;
- should allow regions to use data and developed technology and knowledge;
- should implement more downstream services so that regions can use their validation skills and experiences;
- should define itself next to and/or integrated to all the reporting directives, INSPIRE, SEIS because there the role and input of the regions or nations is mostly already well-organised and defined;
- should consider the future integration and possibilities of the upcoming large scale environmental (geo)-information at local level and the small scale/ European or global approach and analysis.

Conclusions of part 1

The flurrying of GMES projects over the last few years has certainly shown a mismatch between project cycles and reporting periods, the lack of sufficient time spans to develop suitable data products, the lack of sufficient representation among project partners from institutions with official national mandates for reporting, the lack of truly functional connections with INSPIRE and SEIS, and they were born at different times and with different agendas and not easy linkable in practical terms.

Once recognised, these shortcomings were systematically addressed. As a result, the above mentioned flaws have certainly induced GMES relevant work to be mainstreamed into initiatives and activities with longer time frames and more specifically addressing data needs by policy makers. Examples are the EU Directives (the Marine Directive and the Maritime Policy certainly include GMES originated data as an asset to improve policy response and the related knowledge base). Likewise, new EEA/ETCs responding to new policy needs (e.g. ETC on Climate Change Impact, Vulnerability and Adaptation; ETC on Inland, Coastal and Marine Waters) also envisage a strong contribution by GMES generated data.

These are good signals showing that the identification of project shortcomings have resulted in several GMES related activities to be positioned in working environments going much beyond mere project time tables and closer to thematic policy cycles.

Part 2: A review of statements from GNU's first project year

The objective of this activity is to review statements made by the GNU project at the beginning of the project and to compare the situation of then with the situation now (autumn 2010) and to evaluate whether the situation has changed (improved) or not.

Especially in the first public meetings where GNU participated some of the GNU statements were very direct, expressing a clear opinion of this user group which was sometimes not the one shared by other stakeholders. This caused some friction, but we believe that these “conflicts” were necessary to achieve a better understanding of the roles of the different stakeholders (i.e. users, service providers, European Commission, European Space Agency) in the process.

The discussion that was triggered by GNU has certainly led to a better understanding and mutual respect of each other. The present document summarises some of the early GNU comments and the development that GMES has taken in that direction.

As overall outcome it can be stated that

- Users themselves are more aware of their position and better expressing their needs
- Service providers take users more serious
- GMES governance has improved, but is still not fully mature and transparent

GNU Statements

The GNU statements to be reviewed have been extracted from three GNU documents written in year 1 of the project:

- GNU Presentation at geoland user workshop in Stockholm (26 May 2008)
- User experiences report (1 August 2008)
- GMES – a user’s approach (23. November 2008)

The statements under review were at their time regarded as being rather critical to the GMES process. This report reviews them and assesses if the situation criticised at the time has changed / improved or if the comment is still valid. In case of an improvement we do not claim that this would be a sole achievement of the GNU project, but we strongly believe that the statements made by GNU have helped to ameliorate certain weaknesses in the GMES process.

Evaluation of statements

User – Service provider relationship

Issue	Year 1 situation	Today
Service Level Agreement (SLA)	Regarded as barrier. Too rigid, might hamper collaboration	Ambiguous view. About 50% of the responses still agree to the situation while the other half does not share the opinion. Comments seem to depend on personal experience of the respondents.
Product delivery	Products are delivered to users without personal interaction.	This has clearly improved. All respondents disagree to the comment made for year 1.
Product delivery	Delivery of final products only	Has improved. Main products are final products, but intermediate steps are available if requested.

Selection of project users	Not representative, not enough	Still valid today.
Success	Success means: also working with “difficult” users	Still valid today. Is a representative user a difficult user?
User needs vs. technical requirements	Need to define needs and resulting requirements.	Still valid today, but difference between the 2 issues is clear.

User federation

Issue	Year 1 situation	Today
GNU – the only project to provide independent and unfiltered statements	Only project to clearly articulate user views.	Still valid today.
User statements	Politically correct, even though users know different.	Has improved. Users more clearly express their opinion.
GMES meetings	Not suitable setting for providing user views.	Still true today. Meetings are too much dominated by service providers.
User groups	Need to build more active user groups.	Still valid, but has certainly improved (e.g. EAGLE)

Quality

Issue	Year 1 situation	Today
Product usefulness	Products may meet requirements, but are still not useful.	Has improved. Problems exist where needs have evolved.
User feedback	Positive feedback to get rid of documents.	No longer true, especially since products better meet user needs.
Uptake of GMES products in organisation	No uptake of GMES products in organisation.	Has improved, but still valid today. GMES products need to better support the daily user work (should not replace but complement existing info). Details should be part of the SLA.

User satisfaction	High expectations – low satisfaction	Has improved. Satisfaction rate is good when expectations are in line with specifications.
Service description	Need to better describe the service / products	Still valid today

Governance / process

Issue	Year 1 situation	Today
Specifications	Little flexibility to update “consolidated” requirements.	Has improved, but varies for different products / services.
Driver of GMES	GMES is space driven, not by the user.	Still valid today.
GAC representatives	Mainly technology representatives, not environment.	Still valid today.
GMES governance	Caught in a complex structure it has defined itself.	Still valid today.
Cross-cutting issues	Not sufficiently addressed.	Still valid today.
Communication	Most problems in GMES relate to communication, not technology.	Still valid today.
Responsibilities	Need to be defined.	Has been recognised and addressed, but still not fully solved.
Target of GMES services	Main user of GMES not clear.	Has been recognised and addressed, but still not fully solved.
GMES misses focus	Too many stakeholders	Has been recognised and addressed, but still not fully solved.

Additional issues

In addition to the year 1 statements the following issues are of user's concern:

- GMES financing is extremely untransparent.
- Difficult to impossible to get an overview of GMES services & products already delivered
- Service provider oligopoly is still a threat. Who is not in now, is out.

Conclusions of part 2

GNU presented in 2008 the subliminal user dissatisfaction and the imbalance between political statements and promises. After providing its initial results, GNU started an open discussion with other GMES stakeholders and thereby contributed to the substantial changes within GMES during 2009 and 2010 . Being aware of the importance of GMES, all stakeholders started to collaborate closer and supported cooperation initiatives.

Main achievements in GMES during 2009 and 2010 – certainly in part triggered by GNU - are:

- User - service provider interaction has improved, especially with respect to product specifications and delivery.
- As a consequence, product acceptance and user satisfaction has improved.
- Today, users are stronger and more knowledgeable partners in terms of their capability to influence project proposals and expectations from projects results.
- Still more users need to be involved in the development of European-wide products, if European-wide acceptance is required.
- User federation has improved, but especially active user involvement needs to be further improved.

- Quality criteria / validation approaches seem to be taken into account on more knowledgeable grounds.
- Shortcomings of the GMES governance process have been identified and address, but still not fully solved.
- In recent project calls data policies are addressed and stronger outreach actions are included.
- National / sub-national coordination issues are tackled.
- Upcoming calls include improved accessibility to long-term data archives, implementation of meta-data standards, actions to facilitate information retrieval and dissemination.

This report and the other reports by GNU
can be downloaded at the project website:

www.gmes-network-of-users.eu