

Project no. 30956

Project acronym: GNU

Project Title: GMES Network of Users

Instrument: Coordination Action

Thematic Priority: Aeronautics and Space

Deliverable Number: 2.1b

# Analysis and evaluation of selected GMES projects

Due date of deliverable: Month 10

Actual submission date: Month 12

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

Lead contractor for this deliverable: European Topic Centre for Land Use and Spatial Information

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)

**Authors:**

Núria Blanes, Jaume Fons and Andreas Littkopf (ETCLUSI)

**Contributions:**

Jo van Brusselen, Herbert Haubold, Stuart Marsh and the GNU Consortium

**Technical editing:**

Brendan Kelly

**GNU Co-ordinator:**

Herbert Haubold (UBA-A)

**Date of release:**

5th June, 2009

## INDEX

<b>1</b>	<b>OBJECTIVES OF THE TASK</b>	<b>5</b>
<b>2</b>	<b>STRUCTURE OF THE WORK CARRIED OUT UNDER THE TASK 2</b>	<b>9</b>
<b>3</b>	<b>SELECTION OF THE PROJECTS: ACTION 1</b>	<b>10</b>
<b>4</b>	<b>ANALYSIS OF THE COMPILED DOCUMENTATION: ACTION 2</b>	<b>12</b>
4.1	Compilation of the most relevant documents	12
4.2	General analysis	13
4.3	Analysis of projects	16
4.3.1	<b>Methodology applied in the analysis</b>	<b>16</b>
4.3.2	<b>Geoland</b>	<b>17</b>
4.3.2.1	Introduction .....	17
4.3.2.2	Analysis of the services .....	17
4.3.2.3	Evaluation and GNU partners' view .....	19
4.3.3	<b>GSE Land</b>	<b>21</b>
4.3.3.1	Introduction .....	21
4.3.3.2	Analysis of the services .....	21
4.3.3.3	Evaluation and GNU partners' view .....	22
4.3.4	<b>GSE Forest Monitoring</b>	<b>24</b>
4.3.4.1	Introduction .....	24
4.3.4.2	Analysis of the services .....	24
4.3.4.3	Evaluation and GNU partners' view .....	25
4.3.5	<b>Marcoast</b>	<b>27</b>
4.3.5.1	Introduction .....	27
4.3.5.2	Analysis of the services .....	27
4.3.5.3	Evaluation and GNU partners' view .....	28
4.3.6	<b>PROMOTE</b>	<b>29</b>
4.3.6.1	Introduction .....	29
4.3.6.2	Analysis of the services .....	29
4.3.6.3	Evaluation and GNU partners' view .....	30
4.3.7	<b>TerraFirma</b>	<b>32</b>
4.3.7.1	Introduction .....	32
4.3.7.2	Analysis of the services .....	32
4.3.7.3	Evaluation .....	33
4.3.8	<b>GEMS</b>	<b>34</b>
4.3.8.1	Introduction .....	34
4.3.8.2	Analysis of the services .....	34
4.3.9	<b>MERSEA</b>	<b>35</b>
4.3.9.1	Introduction .....	35
4.3.9.2	Analysis of the services .....	35
4.3.9.3	Evaluation and GNU partners' view .....	35
4.3.10	<b>COORDINATED PROJECTS: HALO, B4G and WISE</b>	<b>36</b>
4.4	Summary	38
<b>5</b>	<b>CONCLUSIONS AND IMPROVEMENTS</b>	<b>39</b>

## DOCUMENT HISTORY

Origin/Name of the document (if different)	Version	Date	Prepared/Updated
GNU_RpD_Task2_080428.doc	Draft	15/05/08	Núria Blanes and Jaume Fons, with contributions from Jo van Brusselen, Herbert Haubold and Stuart Marsh
GNU_RpF_Task2_080709.doc	Final draft report	11/07/08	First draft update: contributions from GNU Consortium regarding content and providing opinion about the outcomes of the evaluation.
GNU_RpF_Task2_080731.doc	Final report	31/07/08	Final inclusion of the comments provided by the GNU Consortium to the Final Draft report. Technical editing: Brendan Kelly
FINALREPORT_GNU_Task2_Sept08.doc	Final report	30/09/08	Final review and delivery of the report
FINALREPORT_GNU_Task2_090602_update.doc	Final report	05/06/09	Correction of the report following issues identified in Task #8 and inclusion of the comments received from the GNU Extended Consortium.

## ACRONYMS

APAT	The Italian Environment Protection and Technical Services Agency
B4G	Boss4GMES
CBA	Cost Benefit Analysis
CIRCA	Communication & Information Resource Centre Administration
CORINE	Coordination of information on the environment
CSL	Core Service Generic Landcover
CSP	Core Service Bio-Geophysical Parameters
DUE	Data User Element
DUP	Data User Programme
EC	European Commission
EEA CSI	European Environment Agency - Core Set of Indicators
EFI	European Forest Institute
EMEP	European Monitoring and Evaluation Programme under the Convention on Long-range Transboundary Air Pollution
EPA	Environment Protection Agency
ESA	European Space Agency
ETCLUSI	European Topic Centre on Land User and Spatial Information
ETC/TE	European Topic Centre Terrestrial Environment
EU	European Union
FP4	4th Framework Programme
FP6	6th Framework Programme
GCOS	Global Climate Observing System
GEMS	Global and Regional Earth-System Monitoring using Satellite and In-Situ Data
GEO	Global Earth Observation
geoland	geoland (FP6 project)
GHG	GreenHouse Gas
GMES	Global Monitoring Environment and Security
GNU	GMES Network of Users
GSE	GMES Service Element
GSE FM	GMES Service Element Forest Monitoring
GSE Land	GMES Service Element Land
HALO	Harmonised Coordination of the Atmosphere, Land and Ocean
IGACO	International Global Atmospheric Chemistry Observations
Marcoast	Marine and Coastal Environment Information Services
MCPFE	Ministerial Conference on the Protection of Forests in Europe
Mersea	Marine Environment and Security for the EU Area
MMU	Minimum mapping unit
NILU	Norwegian Institute for Air Research
LC/LU	Land cover / Land user
OGC	Open Geospatial Consortium
ONP	Observatory Nature Protection
OSP	Observatory Spatial Planning
OWS-S	Observatory Water and Soil - Soil
OWS-W	Observatory Water and Soil - Water
Promote	Protocol monitoring for the GMES Service Element
SLA	Service Level Agreement
TerraFirma	Pan-European Ground Motion Hazard Information Service
TESEO	Treaty Enforcement Services Using Earth Observation
UBA-A	Austrian Federal Environment Agency
UBA-D	Federal Environment Agency, Germany
UEB	User Executive Body

UV	Ultraviolet
WIS	Advanced Window Information System
WISE	Water information system for Europe
WMO	World Meteorological Organisation

# 1 OBJECTIVES OF THE TASK

The objectives of the task were

- (i) to collect information on previous GMES projects in order to compare documented user needs and approaches for their evaluation, and
- (ii) to cross-reference different projects' data products.

The task involved the following challenges:

- A continuing lack of an objective, harmonised method of evaluating the benefits of GMES, (despite it being several years since the beginning of the GMES programme), improvements, deficits and gaps and of its large number of different projects;
- A continuing lack of an objective, harmonised approach to the evaluation of GMES (benefits, improvements, deficits, gaps, etc.), despite the programme having been ongoing for several years.
- A lack of a comprehensive overview of the state-of-the-art of user satisfaction across all projects and of proposed measures to try to overcome the problems identified.
- Subjective analysis and evaluations of the users or the service providers engaged in different GMES projects are described in utility reports, highlighting in each case different aspects.

There are, however, some commonalities that could be identified through the different reports analysed, which have been used to structure the evaluation described in this report. These may be used to establish the basis for the possible future comparison of different GMES projects, particularly with regard to evaluations carried out from the users' perspective.

According to the GNU Work Plan, this task is divided into the following different actions:

**Action 1: Collect documentation by previous pertinent projects.** Past and ongoing FP6 (and other programme) funded projects which provide (preoperative) services, and past and ongoing ESA funded Service Elements (both scale-up and fast-track) were contacted to obtain the latest versions of user needs inventories, product and service portfolios, and the appraisals of the respective users of these portfolios. Besides these documents, GNU also considered a selection of user requirement studies of other programmes than GMES, e.g., particular 4th and 5th Framework Programme priorities, such as CEO (FP4) or the ESA funded Data User Programme (DUP) or its continuation Data User Element (DUE) or the past programme TESEO. Other documents may be included as well, such as the results of the ESA/EC user workshops, or the GEO User Requirements Survey (among the EPA Network). These documents will be made available to the GNU consortium in a structured way using the project CIRCA site.

**Action 2: Compare documented user needs, products and appraisals thereof.** Firstly, the collected documents were analysed within the frame of their respective projects (past or ongoing). The investigation placed emphasis on the adequacy and efficiency of meeting the users' requirements, and on how the data products were received by the users. The apparent confidence of the users is elucidated, i.e. how they assess the chances for including these products in their work practices in the near future. In cases of doubt, the respective users were contacted directly. Different scales are considered, namely regional, national, European, Global level. Data products, where possible, are linked to existing indicator frameworks, such as EEA CSI, MCPFE, or EU Headline.

**Action 3: Cross-reference different projects' data products.** Secondly, the collected documents were analysed across project-related portfolios. Differences and similarities were highlighted to identify possible synergies and overlaps and to understand cross-cutting issues. The compatibility of products across (and also within) various projects and possible options for combining such products were considered. In some cases, consortia have already compared

and linked data products of different projects. This is particularly true for the so-called “fast-track” services, but also between certain GSEs and FP6 projects. Such efforts are also taken into account.

## 2 STRUCTURE OF THE WORK CARRIED OUT UNDER THE TASK 2

The structure of this report follows the logical workflow: compiling existing documentation, analysing these documents, assessing the outcomes and extracting a number of conclusions. In detail the structure of the rest of the report is as follows:

- Section 3: A description of the method used to make a selection of the relevant projects that are to be considered by GNU, as well as a list of the selected projects.
- Section 4: An analysis of the documentation compiled from the various projects (mainly through the web pages of the different projects or, in some cases, contacting partners or responsible organisations). This section is divided into different activities:
  - o Compilation of the most relevant documents and subsequent organisation of the information
  - o General analysis of the information: (number of users, representativeness, repeatability, etc.)
  - o Analysis of the selected projects: categorization of the projects evaluated based on the analysis made by the users, focused on utility, reliability and affordability of the services provided.
- Sections 5: Conclusions. Summary of the main findings and proposal for improvements that could be applied to ongoing and future GMES projects.

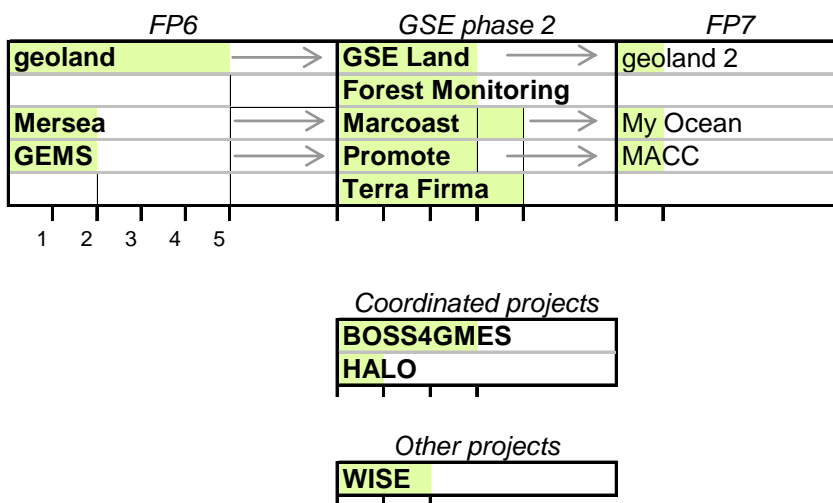
Several conclusions and recommendations were identified and summarised while this activity was under development, and also presented at the First Extended Consortium meeting, held in Barcelona on January 2009. The participants to the session provided several comments on the work carried out, which have been also included in the conclusions' section of this document.

### 3 SELECTION OF THE PROJECTS: ACTION 1

In order to establish the most relevant GMES-related projects to be analysed by GNU, a list of projects organised by the different ongoing programmes was compiled<sup>1</sup>.

The list of projects and relevant services was distributed to all the GNU partners and, through a consultation, 11 projects were selected. These are highlighted in bold in Figure 1.

**Figure 1. List of relevant projects identified, grouped by funding line. The green shading indicates the number of GNU partners that have identified the project as being relevant. The projects actually selected are shown in bold format. The rows give an indication of related projects that have been running in different programs.**



Three basic principles were taken into account in the selection of the projects for further analysis:

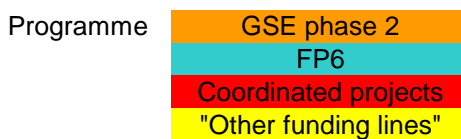
- To consider only the GSE phase 2 projects, because GSE phase 1 projects were previous developments which have been essentially merged into phase 2.
- To balance the number of projects belonging to different programmes but with a similar thematic approach. This should allow for a clearer comparison between different portfolios focused on the same thematic issue, and to help track their evolution. Therefore, although some FP6 projects did not receive as many votes as other projects, they have been selected in the context of this **continuity criterion**.
- To include also in the analysis some of the so-called "coordinated projects", which are going to establish the connections between the more thematic projects and draw up future service cases. Two examples of these include HALO, which is connecting the Geoland, Mersea and GEMS projects, as well as BOSS4GMES, which is building operational sustainable services for land, ocean and emergencies fast-track services. However, these coordinated projects are considered and analysed in a different manner, as they do not contain yet any user appraisals, user requirements, etc. However, the main envisaged outcomes and proposals of these projects will be extracted and discussed as part of this task.

<sup>1</sup> The list of projects organised by programme is available at the GNU website (Annex1.SelectedGMESProjects.xls, that can be downloaded in <http://www.gmes-network-of-users.eu/results/>, Section: "Do GMES projects satisfy their users?").

The following figure shows the distribution of the projects by timeline, and gives an overview of the development status of the different projects selected by the GNU Consortium. The strength and relevance of the results and outcomes derived from the analysis developed in this document should be considered in the context of the timeframe of the project. If it is a project which has been completed (e.g. Geoland), the outcomes should primarily be considered as lessons which should be learned for future GMES-related projects. On the other hand, if the project is only in the middle of its timeframe (e.g. Promote), the results obtained from the current GNU evaluation might be used to improve the continuation and future evolution of the project itself.

**Figure 2. Projects selected: Gantt chart**

Project	Timeline									
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
WISE	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
GSE FM		Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	
TerraFirma			Orange	Orange	Orange	Orange	Orange	Orange	Orange	
HALO			Red	Red	Red	Red				
geoland			Cyan	Cyan	Cyan	Cyan	Cyan			
Mersea			Cyan	Cyan	Cyan	Cyan	Cyan	Cyan		
GEMS				Cyan	Cyan	Cyan	Cyan	Cyan	Cyan	
Marcoast					Orange	Orange	Orange	Orange		
GSE Land					Orange	Orange	Orange	Orange	Orange	
Promote					Orange	Orange	Orange	Orange	Orange	
B4G										



It should also be noted that WISE, although one of the most selected projects, is out of the scope of this report and could not be used from the point of view of user analysis/evaluation of different products or services. Therefore, WISE should be considered from the point of view of harmonisation purposes and collection of users' experiences.

## 4 ANALYSIS OF THE COMPILED DOCUMENTATION: ACTION 2

This action has been divided into different activities which will be summarized in the following sub-sections of the document.

### 4.1 Compilation of the most relevant documents

Three different types of documents have been compiled from the projects mentioned in Section 3:

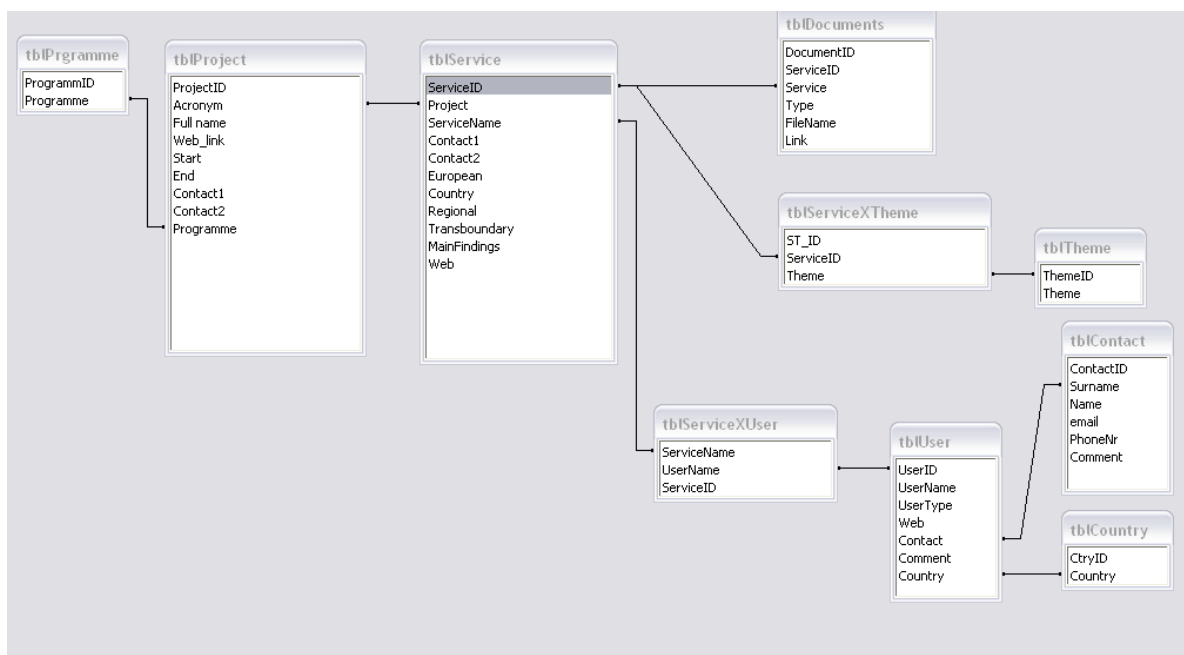
- o "User Needs" or "User Requirements" documents,
- o "Service Portfolios",
- o "User Validation / User Appraisal / User Acceptance documents (These documents are named differently in different programmes, and the name also sometimes depends on the phase of the project analysed, although the contents are rather similar).

If an explanatory brochure was available, it has also been included, as were other relevant documents obtained from the project website or from the project leader. .

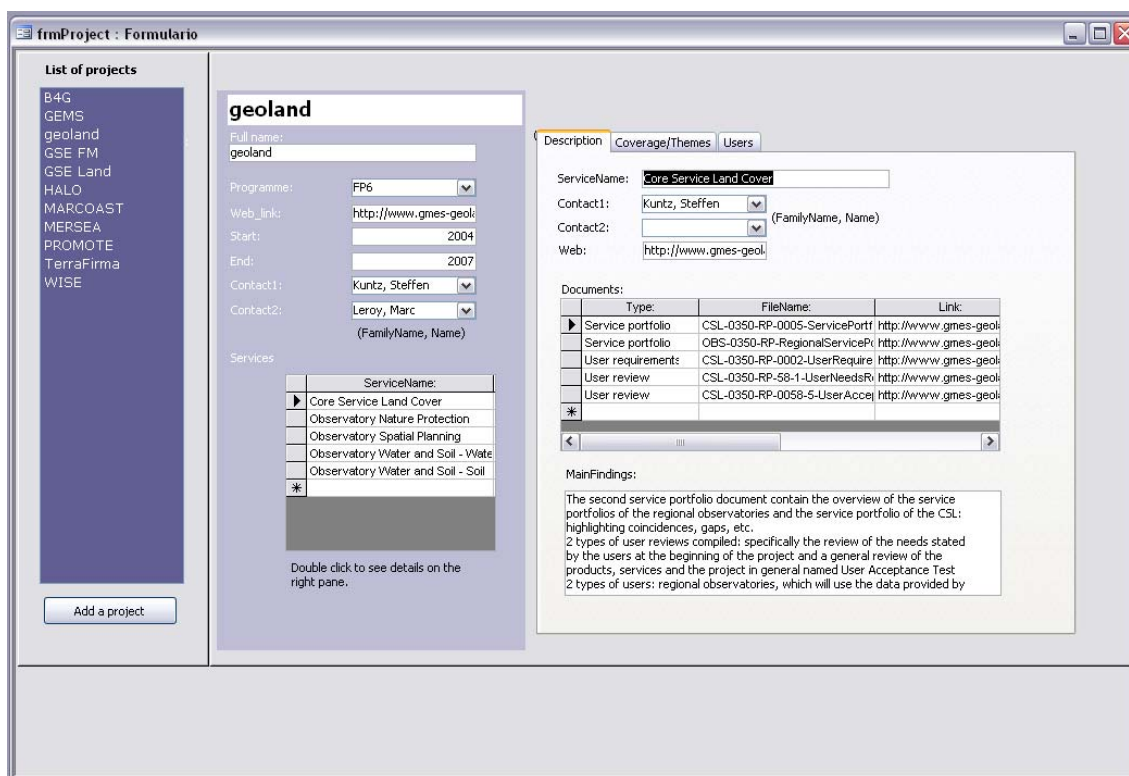
In some cases, the information provided in these documents is considered confidential by some users or by the project organisation, so it is not possible to reproduce it in the current report. In those cases, a summary generalizing the information that can be extracted from those reports, is provided in the current report. For each project evaluated, it will be indicated which documents have been considered to develop the analysis.

In order to compile the above mentioned documents, and other relevant information for the project (individual partners, users, list of the services, coverage of the services, etc.), a database has been developed. The documents considered confidential have however not been included in this database.

**Figure 3 Data model for the compilation of the information on programs, projects, services and users.**



**Figure 4 Screenshot of the application to collect information on the projects.**



The information is entered using separate forms for each of the relevant items considered. Statistics and other information can then be extracted through a database consultation (Section 4.2).

The complete list of documents compiled for the different projects as well as those taken into account for the evaluation of user satisfaction are available at the GNU website.

The MS Access database developed and the copies of all the documents compiled are available at the GNU-CIRCA website.

## 4.2 General analysis

From the most recent data made available by the various projects, it is possible to provide general statistics for 5 projects, (e.g., the number of users, their typology and geographic distribution). The typology of the users has been established according to their own description. Most of the users are public institutions ranging from local authorities to national institutions. Private companies also appear as users in most of the projects, although to a lesser degree. Research groups and research institutions were involved with the PROMOTE project.

Regarding geographic distribution, Germany, Austria, France, Spain and Italy are the countries with the highest number of users, taking into account all the projects. There are users from all the former EU-15 countries. In addition, three new member states have already contributed as users: Latvia, Poland and the Czech Republic.

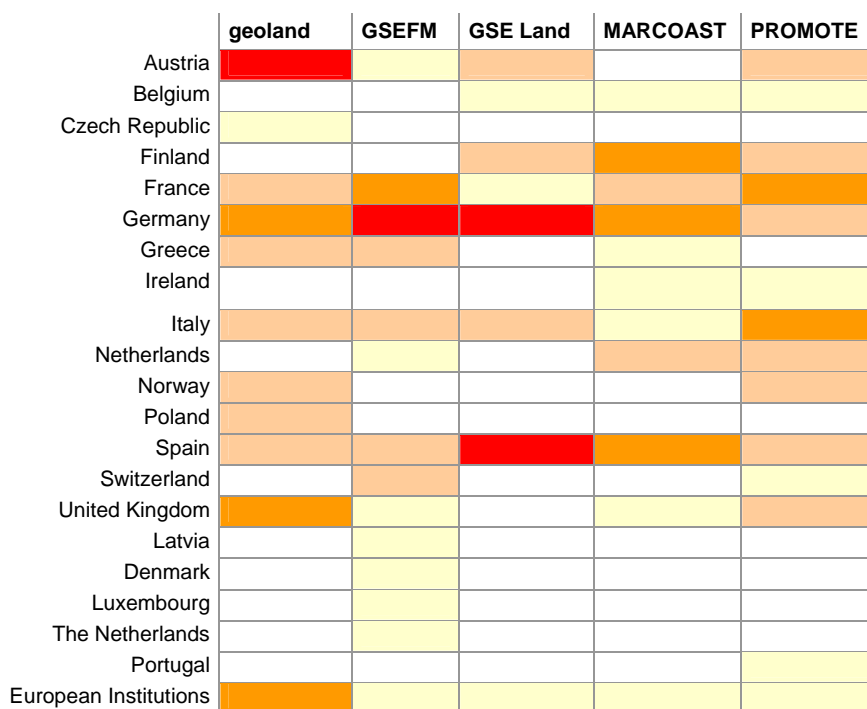
About 19 users have been involved in more than one project. More specifically, 1 user has been involved in 5 projects, 3 users in 3 projects and 11 users in 2 projects.

**Figure 5 Number and typology of European users per project and service.**

	Service	Nr	Typology of users (%)				
geoland	Core Service Land Cover	17					
	Observatory Nature Protection	19					
	Observatory Spatial Planning	11					
	Observatory Water and Soil - Soil	4					
	Observatory Water and Soil - Water	7					
GSE Forest Moni	Natural and Human induced Forest Disturbances	7					
	Forest information update	2					
	PAN European Forest Monitoring	1					
	Management and Reporting Obligations	1					
	National GHG Reporting for Kyoto - GSEFM phase 1	6					
	Support to Environmental Monitoring	5					
GSE Land	Support to UNFCCC and Kyoto protocol	10					
	European Urban Atlas	16					
	Impervious Areas and Sealing levels	8					
	Inland Water Quality and Contamination	13					
MARCOAST	Irrigation / Agricultural Water Consumption	5					
	Oil spills	9					
PROMOTE	Water quality	14					
	Air Quality Services	16					
	Greenhouse Gas and Aerosol Services	3					
	Ozone services	4					
	Special service: Support to aviation control	2					
	UV Services	7					



**Figure 6 European country contribution in number of users to different projects.**



Colours relate to the percentage of users within a project (column) belonging to a given country (row)

- 0-5%
- 5-10%
- 10-20%
- >20% (max 33%)

## 4.3 Analysis of projects

### 4.3.1 Methodology applied in the analysis

This analysis is essentially an evaluation of the services provided by the different projects from the point of view of the users. It is basically focused on those attributes thought to be essential for a sustainable service, as evaluated by each of the project through their own utility reports. In the context of the current GNU evaluation of the GMES services, issues arising in each utility report have been classified into one of the following categories:

- **USEFULNESS / UTILITY:** the service improves users' day-to-day operations (i.e. the measurable benefits of implementing the service in an operational environment).
- **RELIABILITY:** the service is credible and consistently meets user-defined quality standards.
- **AFFORDABILITY:** the service's benefits justify the costs and are competitive with other usual sources. This is a critical factor and it is difficult to complete the overall picture, as it is often not easy to assess the affordability if the real cost of the products is not provided to the users. It has been already mentioned in the first GNU Workshop (Nottingham, 20-21 May, 2008) the need to include the Cost Benefit Analysis (CBA) information on future GMES projects, following a harmonised approach to typify the service costs. Of course, proving the affordability of a product is necessary but may not be sufficient to encourage funding from user organisations whose budget priorities might be constrained by different priorities and considerations.

Another issue, the **AVAILABILITY** of the service (i.e. the service is readily accessible to users when needed, now and in the future), is not included in this classification due to the fact that questions of availability are rarely tackled in the questionnaires studied, mainly due to the nature of the projects evaluated (coordinated project, research project, implementation phase project, etc.). There is also often a lack of visibility on future decisions on investments in infrastructure required to guarantee continuity of services.

The distribution into the three groups mentioned above (utility, reliability and affordability) of the different questions addressed in the evaluation reports of the different projects analysed are available at the GNU website.

It should be noted that, for the majority of the projects evaluated in developing this task, the answers provided by the users to the questions asked were not quantitative answers. That means that qualitative answers (mainly text) have been "translated" into quantitative answers harmonising the variations figured out by the different users (e.g. "- The service is not useful, but..." or "Incomplete", etc.).

The following pages of the report are dedicated to the analysis of the selected projects. Each project has its own subsection with an introduction to the project, followed by the analysis and the evaluation done of the different services of that project. Finally, some of the main comments extracted from the figures presented and highlighted by the GNU Consortium are included for each project. The original answers provided by the GNU partners are available at the GNU website.

### 4.3.2 Geoland

#### 4.3.2.1 Introduction

Geoland has been set-up to under-pin the GMES initiative’s priorities “Land Cover Change in Europe”, “Environmental Stress in Europe”, and “Global Vegetation Monitoring”. The ambition of the Geoland stakeholders has been to develop and demonstrate a range of reliable and affordable geo-information services – in close cooperation with more than 100 user organisations from 24 European Member and Accession States.

The project was structured into two core services: Core Service Generic Landcover (CSL) and Core Service Bio-Geophysical Parameters (CSP), with six application fields or observatories (3 per each core service): Nature Protection (ONP), Spatial Planning (OSP) and Water and Soil (OWS-W and OWS-S respectively) for the CSL; and Natural Carbon Fluxes, Food Security and Crop Monitoring and Global Landcover and Forest Change (for the CSP).

#### 4.3.2.2 Analysis of the services

In the GNU context, the analysis of the Geoland services focuses on the CSL and the three related observatories (ONP, OSP, OWS), considering each of them as a single service.

The development of the User Validation report for Geoland involved sending two separate questionnaires (CSL/Obs-0058-1 and CSL/Obs-0058-5) to the project users.

Figure 7 shows the percentage of answers received by the Geoland project team highlighting in how many cases the same user has answered both documents “coincidents” column).

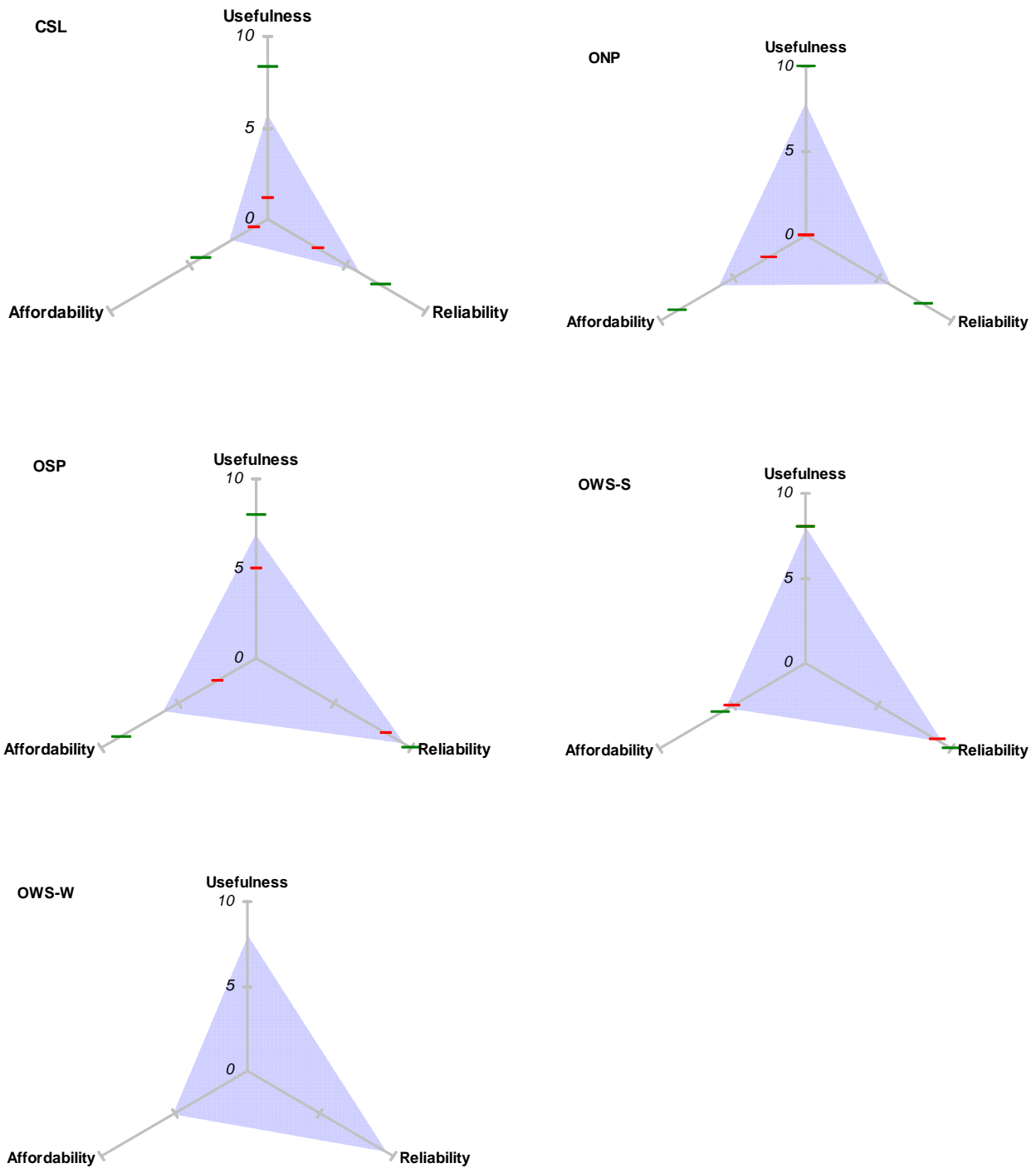
**Table 1. Percentage of feedback received by the users of the Geoland project for the evaluation of the services provided.**

geoland	number of answers to the CSL/Obs-0058-1	number of answers to the CSL/Obs-0058-5	coincidents (the same user has answered both documents)	total number of users	percentage
CSL	17	8	8	17	74
ONP	6	5	2	19	29
OSP	6	2	2	11	36
OWS-S	3	4	3	4	88
OWS-W	3	1	0	7	29

The same user is evaluating 3 different services.

4 users but only one answer provided through the whole document: it was agreed before deliver it

**Figure 7 Evaluation of the user review of Geoland services. Green marks indicate the highest value for a given axis; red mark shows the lowest values (except for OWS-W, where only one user evaluation was available). The triangle represent the average for each axis. (cf. summary table in section 4.4)**



#### 4.3.2.3 Evaluation and GNU partners' view

As can be observed in all the graphs, all the services evaluated are considered very reliable by the Geoland users. However, the answers provided by the users appear to always take a similar approach, i.e. the users generally stated that the reliability of the service would be very high when all the improvements mentioned by them were applied. It seems that, in this case, users prefer to be polite due to their engagement with the project, and trust that the improvements they suggest will actually be implemented.

However, the main critical point that can be observed throughout all the graphs presented is the general opinion on the affordability of the services developed, despite the fact that no cost-benefit analysis has been carried out by the project itself.

A total of 4 GNU partners (APAT, ETCLUSI (former ETC/TE), UBA-A and TLWJF) commented on 4 services: CSL, OSP, OWS-W and OWS-S. The forms with the detailed answers that this report is based upon are available at the GNU website.

Some of the main comments received have been summarized into the following list:

##### Geoland – CSL:

- The proposed land cover database is the most detailed European-wide land cover map (22 classes, 1 ha MMU), but the final list of land use/land cover classes were not fully discussed with the users and was ultimately decided by service providers. The result of this situation was that the evaluation documents of the project contain a lot of criticisms from the users' point of view regarding the nomenclature developed by the CSL.
- CSL tried to satisfy too broad a user community, with very different requirements. Therefore, most of the user needs were not satisfied by the final product. It was never mentioned at project level that the CSL intends to be an improved CORINE Land Cover classification, and with the product developed, there is no improvement to the current situation.
- The European satellites which are currently operating do not have the capacity to provide a European-wide coverage of images within one year with the required resolution to achieve the detail proposed in the CSL. However, if this data were available and the CSL developed, it could be assumed that the product would be used, especially in those cases where data at country level was not as accurate as the one developed.
- Specifically in the case of a regional user, the benefits from the service developed are rather low, due mainly to the minimum mapping unit (MMU) offered. It could be used for the comparison of the different regions with the corresponding state or as a basis for more detailed and focused downstream services, but at the current stage, the service is not yet affordable by a regional user due to the limited benefit it offers.

##### Geoland – OSP:

- In general, GMES data requirements are driven more by the interests of providers and less by user requirements. However, in the case of OSP and for some specific users, while not indispensable, the product developed is useful for spatial assessment or at a minimum, at least providing additional information.
- While the development of sustainable services was not the fundamental aim of the Geoland project (it being essentially a research project) the important lessons learnt from it should be applied to upcoming projects at both EU and national level.

##### Geoland – OWS-S:

- The relevance and utility of the service is high at European level. Soil erosion is one of the major threats in Europe, recognised in the Soil Thematic Strategy. The service and products give critical information about land issues, contaminated sites and provide instruments to reduce the erosion risk.

- The suggestions made by the user group were taken into account in the development of the products.
- Sustainability of the services depends on data availability and further diffusion of products applications.

Geoland – OWS-W:

- Results are acceptable, although not really fitting the requirements specified by the regional users at the beginning of the project.
- The service developed does not provide information for the operational activities of a regional user, mainly due to the scale of the service (i.e. it is developed for a whole-river catchment area).

### 4.3.3 GSE Land

#### 4.3.3.1 Introduction

Land Monitoring is one of three pilot services identified by the European Commission and the European Space Agency (ESA) as a priority service to be developed within GMES. The pilot service for regularly-updated, core land cover data was presented at the GMES Advisory Council meeting in June 2005. The land monitoring services proposed will support a wide range of environmental information needs in Europe and build on the results and experiences from initial GMES projects, existing elements of operational land monitoring activities in Europe and the priority criteria of the GMES Action Plan 2004-2008.

GSE Land implements four mature services consolidated by Geoland, GSE SAGE, GSE Urban Services and GSE CoastWatch:

- UrbanAtlas (supporting the UrbanAudit carried out by DG ENV/DG REGIO)
- Land Take Monitoring-"Impervious Areas" (Cohesion policies, ESDP, ESPON)
- Water Quality-"Diffuse Pollution" (WFD, linking to CAP)
- Irrigation-"Water Abstraction by Agriculture" (WFD, water management)

Further extension service options include a roll-out to more European Member States (MS) and a "nature protection" service.

#### 4.3.3.2 Analysis of the services

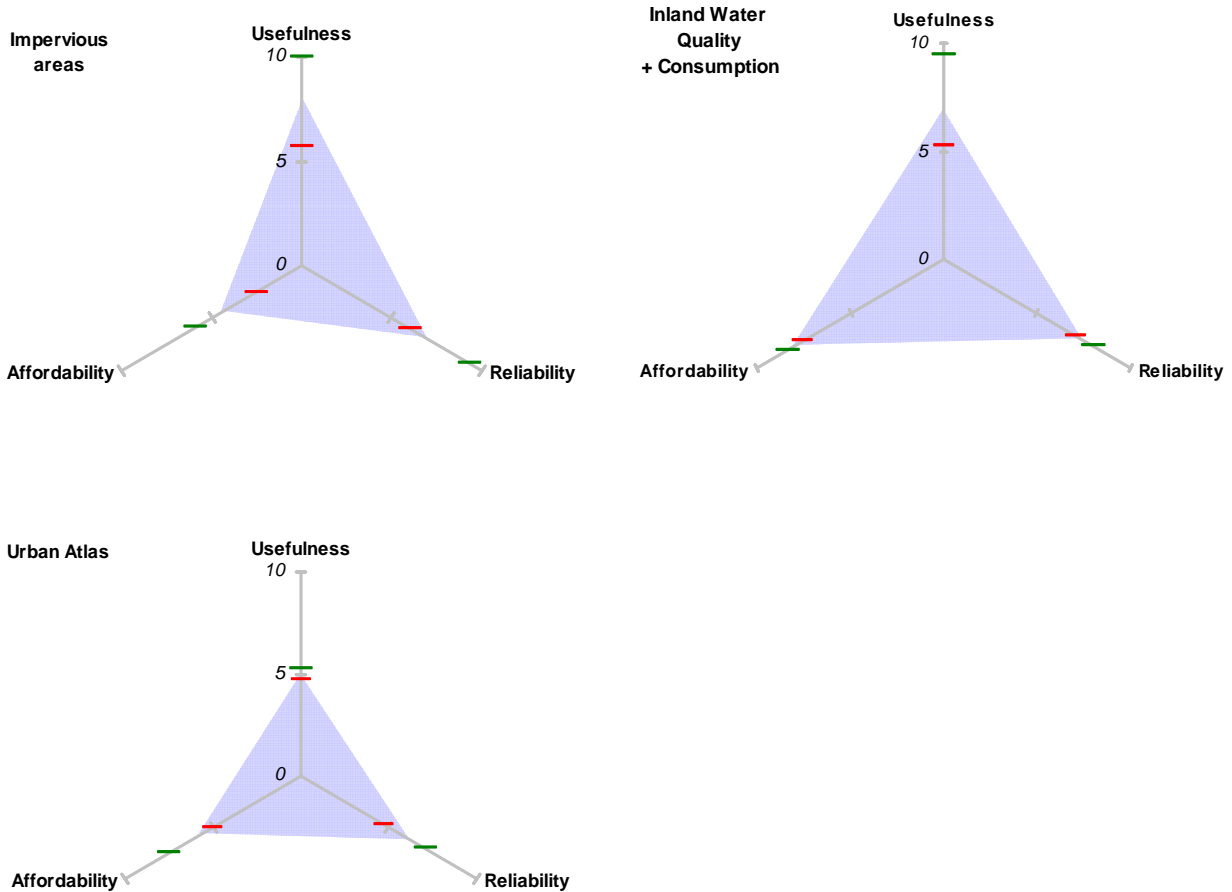
The GNU analysis of the GSE Land services used the evaluations provided by the GSE Land users on the update of the U7 – Service Utility Report, 2007 which corresponds to the second year of the project.

**Table 2. Percentage of feedback received by the users of the GSE Land project for the evaluation of the services provided.**

<b>GSE Land</b>	<b>number of answers</b>	<b>total number of users</b>	<b>percentage</b>
<b>Water services (Inland water quality and Water Consumption)</b>	4	18	22
<b>Impervious areas and sealing levels</b>	3	8	38
<b>Urban atlas</b>	3	16	19

Water Services (Inland Water Quality and Water Consumption Services) have been evaluated jointly due to the conceptual understanding of the services evaluated (i.e. water is considered in GNU as a single service) and also considering the fact that only one user has answered the questionnaire for the Water Consumption Service.

**Figure 8 Evaluation of user review of GSE Land services. Green marks indicate the highest value for a given axis; red marks show the lowest values. The triangles represent the average for each axis. (cf. summary table in section 4.4)**



#### 4.3.3.3 Evaluation and GNU partners' view

In the GSE Land case, the questionnaire has been intentionally modified and improved for the update of the U7 report (Service Utility report) in order to obtain quantitative results for the evaluation of the services, as well as comments for those questions which are not so easily quantified. Therefore, in this case, there is not the problem of translating the outcomes of the evaluations to quantitative answers.

As it can be seen in the graphs provided, affordability of water services is considered very high compared with the rest of the GSE Land services. This situation might be explained by the fact that most of the water products and services are new and, therefore, no comparison with existing products from the cost benefit analysis point of view could be done. Moreover, if the products are new, useful and required for the implementation of some EU directives, users would be more likely to rate them highly.

In the case of the "impervious areas" service, while the usefulness of the service is considered very high, affordability and reliability are the critical points. One main reason is the insufficient level of accuracy of the products provided, another being the delivery frequency of the

products, which is not sufficient from the users' point of view, and therefore downgrades the affordability aspect of the service.

Finally, the results of the Urban Atlas service are related to the scale of the products. This service is developed at a local scale, where data sources are very often available with a higher level of accuracy than the products provided by the service.

A total of 3 GNU partners (ETCLUSI - ETC/TE, UBA-A and UBA-D) commented on the results of the GSE Land project. It should be noted that UBA-D/Informus mainly focuses its comments on the Inland Water Quality service. During the first stage of GMES, UBA-D/Informus was involved as core user of the *AquaSAGE* consortium, while during the second stage of GMES, it participated as an observer to the *GSELand* project, where it closely followed the use of the *GSELand* products for modelling nutrient and pesticide inputs into surface waters.).

The forms with the detailed answers that this report is based upon are available at the GNU website.

Some of the main comments received have been summarized into the following list:

- A continuous transparent overview of the current state of the project was effectively maintained by the publication of the GMES Land newsletter.
- Cross-border harmonised products were developed by the project. However, there exist differences in scale and resolution between the three service lines developed in GSE Land.
- Although the project is still under development, and based on two projects from GSE Phase 1, some users have already purchased products from the GSE Land Service Portfolio.
- However, in the case of other users, expectations of this project were higher. In particular, more detailed information and more contact with the service providers to receive the relevant documentation was expected, and more discussions with smaller groups of users dealing with the same thematic issues was envisaged, etc.
- Specifically for the Inland Water Quality service:
  - The service developed has a clear potential if the various improvements proposed are applied. Some thematic differentiations for the agricultural areas were not completely realised but the higher spatial resolution could potentially contribute to improving the model-based assessment of diffuse inputs of nutrients and pesticides into surface waters.
  - The relevance of the product is considered high, and its integration into existing modelling frameworks straightforward.
  - However, the sustainability of this service is limited due to the fact that:
    - Not all the requested information on LC/LU classes was provided to the user. In particular, no information on costs have been published (hence the affordability of products could not be assessed) and in addition, no information on short, medium or long term service provision has been made available.
    - Responsible institutions which collect and produce the data that the service is providing should be involved in the projects as potential users, due to the fact that those institutions would have the capacity to acquire and implement the services operationally. For this service, the responsible institutions for the collection of data (to produce management plans as the WFD demands) should have been more strongly and broadly involved as potential users.

### 4.3.4 GSE Forest Monitoring

#### 4.3.4.1 Introduction

The GSE Forest Monitoring (GSE FM) consortium was set up to address the policy related demands for securing the ecological functions in the forestry and landuse sector. GSE Forest Monitoring (FM) therefore supplies accurate, timely and readily-available information on the state of forests in order to support more informed decisions and improved policies that enable sustainable forest management and related activities. The services provided are fully integrated combining applied earth observation (imagery) with ground inventory and modelling techniques, having, in addition, an underlying emphasis on the policy implications of the entire process. These services mainly supply information on the following items: areas of forests, other land use and changes; areas of afforestation, reforestation and deforestation; forest structure and changes; above ground biomass/carbon stock and changes therein; and forest environmental indicators.

#### 4.3.4.2 Analysis of the services

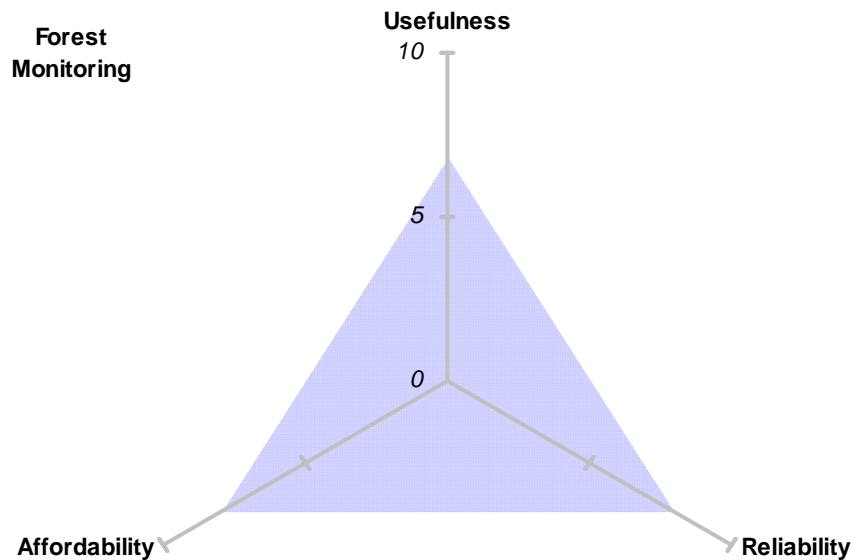
In the GNU context, the analysis of the GSE FM services considers all products which are developed for 26 users as a single service. This is due to the fact that there are many products focussed on various forest-related issues, depending on the specific demands of each user. In addition, the GSE FM project provided a final summary document of the Service Evaluation developed by the users and based on the responses of a questionnaire on the provided services. In this document, the information had been already compiled and grouped, so there is no specific information for the different services developed under the project. Therefore, the percentage of responses calculated is for the project as a whole, as there is no information about how many users evaluated the different service themes.

**Table 3. Percentage of feedback received by the users of the GSE FM project for the evaluation of the services provided.**

<b>GSE FM</b>	<b>number of answers</b>	<b>total number of users</b>		<b>percentage</b>
<b>Detection &amp; post-monitoring of Natural and Human induced Forest Disturbances</b>	22	7	26	85 <sup>2</sup>
<b>Forest information update at national and subnational scales</b>		2		
<b>PAN European Forest Monitoring</b>		1		
<b>Service Supporting Management and Reporting Obligations of LULUCF CDM projects</b>		1		
<b>Support to Environmental Monitoring at national and subnational scales</b>		5		
<b>Support to UNFCC and Kyoto protocol on LULUC Forest Activities</b>		10		

<sup>2</sup> In the phase 2 utility assessment document (i.e. the latest version) the UEB of the GSE FM included only questionnaire feedback from the active users in phase 2. This excludes some users with reporting only in phases 1 or 3. Normally, in GSEFM, a 100% response rate on questionnaires is reached. However, it is appropriate to note that only 85% of service cases are covered in the phase 2 utility assessment.

**Figure 9 Evaluation of user review of GSE Forest Monitoring. The triangles represent the average values provided by all the GSEFM users. (cf. summary table in section 4.4)**



#### 4.3.4.3 Evaluation and GNU partners' view

As can be seen in Figure 12, there are neither maximum nor minimum values for the usefulness, affordability and reliability criteria (cf. summary table in section 4.4), due to the fact that the document analysed is already a summary of the outcomes of the GSE FM user validation. Therefore, the values are already aggregated and the calculations have been done directly with the average values provided in the document.

The statements encountered in the documentation analysed and made by the users regarding GSE FM services are very positive in general.

From all the projects evaluated, GSE FM provides the best example of a users' assessment document, for the following reasons:

- the questionnaire evaluates a wide range of issues
- the questionnaire is very complete, considering all the typical and major aspects that an evaluation or appraisal should contain
- the questionnaire is structured with different levels for responding to the questions, which allows the possibility for providing more detailed feedback, in addition to "yes or no"-type answers
- the analysis that can be extracted from the questionnaire is very rich as well, although it would have been richer if the original documentation from the users' side (not only the summarized questions) would have been available.

A total of 4 GNU partners (UBA-A, UBA-D, TLWJF and EFI - is the latter being responsible for the UEB in GSE FM) commented on the results of the evaluation carried out for the GSE FM project. The forms with the detailed answers that this report is based upon are available at the GNU website. In this case, EFI made an integrated assessment due to its role in the project, while UBA-A concentrated their efforts in evaluating the service "GSE FM Corine spatial refinement - Service of Joanneum Research to Umweltbundesamt Austria in general". UBA-D

focussed on the service "Support to Environmental Monitoring" and TLWJF on the service "Sub-National Forest Information Update".

Some of the main comments received have been summarized into the following list:

- The vast majority of the GSE FM services are feeding into an operational set-up, showing a real, practical use and increasing levels of integration into work practices. Some of the services provide new data (which are not possible to derive from in situ inventories) with high accuracy and repeatability at reasonable costs.
- The service portfolio is highly policy-relevant: all services are based on real user needs. Moreover, the services delivered are easily comprehensible and have a high accuracy. In general, service providers take into consideration the different specifications and suggestions made by the users.
- The sustainability of the services (which has been discussed at project level several times) will not only depend on data continuity from the space component and the real cost of service implementation, but also on the evolution of policy and user needs and on funding these activities from the users' side.
- The combination of remote sensing and in situ data should in principle provide reliable data sets. An independent validation of the product has been conducted in some cases inside the project. Some of the services provided have a clear potential to be integrated into operational modelling, as this will increase the accuracy of downstream modeling results.
- The services should be integrated into the internal production lines of the responsible institutions, otherwise the risk of not becoming operational is very high. For instance, in Germany, the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) is responsible for offering standardised Germany-wide information on forests and is the institution which would have to acquire and implement the services operationally. This is also true for the GSE-FM products provided to UBA-D who scientifically assessed their usefulness. In this context, UBA-D and similar institutions may be thought of as acting as scientific consultants to such organisations.

### 4.3.5 Marcoast

#### 4.3.5.1 Introduction

MarCoast is a three year GMES service Network project with the aim of establishing a durable network of marine and coastal information services.

This operational marine service started in November 05 and its main goals are to:

- Demonstrate progress towards long-term sustainability for GMES services in the oil pollution and water quality sectors
- Deliver services and benefits to users on progressively larger scales
- Establish a durable, open, distributed GMES Service Provision Network
- Establish standards and working practices for GMES Services in the area of oil pollution and water quality

The MarCoast service portfolio is composed of 6 operational service lines that integrate lead companies and technologies that will contribute to the sustainable, competitive and secure European environmental strategy promoted by the Commission Green Paper: "Towards a future maritime policy for the Union: European vision of the oceans and seas":

- Oil spill surveillance and customised information
- Oil spill drift forecasting
- Water quality monitoring and alert
- Habitat monitoring, evolution and forecasting
- Water quality assessment
- Met-ocean data service

#### 4.3.5.2 Analysis of the services

In the context of GNU , and considering the methodology which has been applied, only the services referring to OIL SPILL (oil spill surveillance and customised information and oil spill drift forecasting) have been quantitatively evaluated. The rest of the services could not have been evaluated following the methodology developed due to the fact that the document made available to GNU makes only a general summary of the evaluations done by the users. Therefore, it is not possible to extract the underlying details and to differentiate the feedback provided by the users on each service.

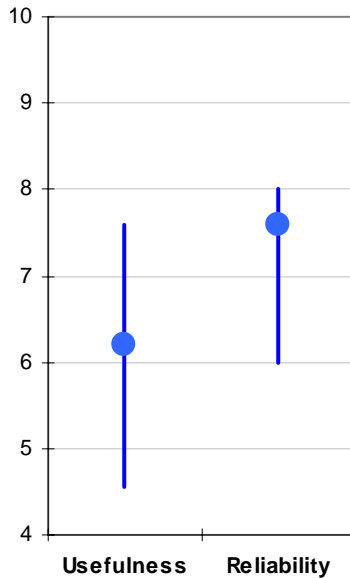
The GNU Consortium established contact with the Marcoast project in order to attempt to obtain the detailed validation reports carried out by the users. However, it has not been possible to have these documents circulated outside the MARCOAST project partners, as they contain sensitive information about the service providers.

**Table 4. Percentage of feedback received by the users of the Marcoast project for the evaluation of the services provided.**

<b>Marcoast</b>	<b>number of answers</b>	<b>total number of users</b>	<b>percentage</b>
<b>Oil spill services</b>	6	9	67
<b>Water quality services</b>	not detailed information	14	

**Figure 10 Evaluation of user review of MarCoast. Information was only available for usefulness and reliability. The points represent the average values and the bars show the highest and lowest values provided (cf. summary table in section 4.4)**

#### OIL SPILL service



#### 4.3.5.3 Evaluation and GNU partners' view

The high reliability observed by the users is due to the delivery of the information: always on time and using the expected delivery format. However, the users also highlight that technical, methodological problems on the data quality and, by extension, on the service provided should be solved in order to improve the overall reliability.

One GNU partner (APAT, acting as a user and also as a UEB member) commented on the results of the evaluation carried out for the MarCoast project. It should be taken into account that the comments provided by APAT refer to the Water Quality services; the forms with the detailed answers provided by this partner are available at the GNU website.

Some of the main comments received have been summarized into the following list:

- There is a strong need to share information and to carry out training and capacity building in the user organisations if satellite information and services are to be implemented by local and regional authorities.
- The lack of visibility on the transition from pilot projects to fully sustainable and operational services remain a key issue for both service providers and users.
- The services developed provide ancillary as well as alternative data to the in situ data normally available to users. However, the unavailability of satellite data and satellite acquisition problems undermine the usefulness of the products.
- The technology used is well-established and is considered mature. The service shows good technical reliability in terms of the timeliness of the delivery, the accessibility to the data and the spatial resolution.

### 4.3.6 PROMOTE

#### 4.3.6.1 Introduction

The GMES Service Element for Atmosphere PROMOTE delivers policy-relevant services on four atmospheric issues to end-users: stratospheric ozone, surface ultraviolet radiation, air quality and greenhouse gasses.

PROMOTE services assist user organisations in the public sector in their monitoring obligations and in their tasks to warn the public of air pollution episodes or enhanced levels of ultraviolet radiation.

One of the biggest challenges of PROMOTE is to integrate existing ground-based air quality networks with models and the newly-available satellite measurements on air pollution to generate accurate, daily information on air pollution levels above Europe. PROMOTE covers spatial scales from the ozone hole to polluted streets in London, and temporal scales from climate and ozone trends across decades to hourly information on ultraviolet radiation levels on Mediterranean beaches.

#### 4.3.6.2 Analysis of the services

Four services have been evaluated in the context of the GNU project.

The analysis that has been done on the PROMOTE services only considers two criteria: Utility and Reliability, because questions on Affordability have not been asked of the users of the project in the evaluation report analysed.

---

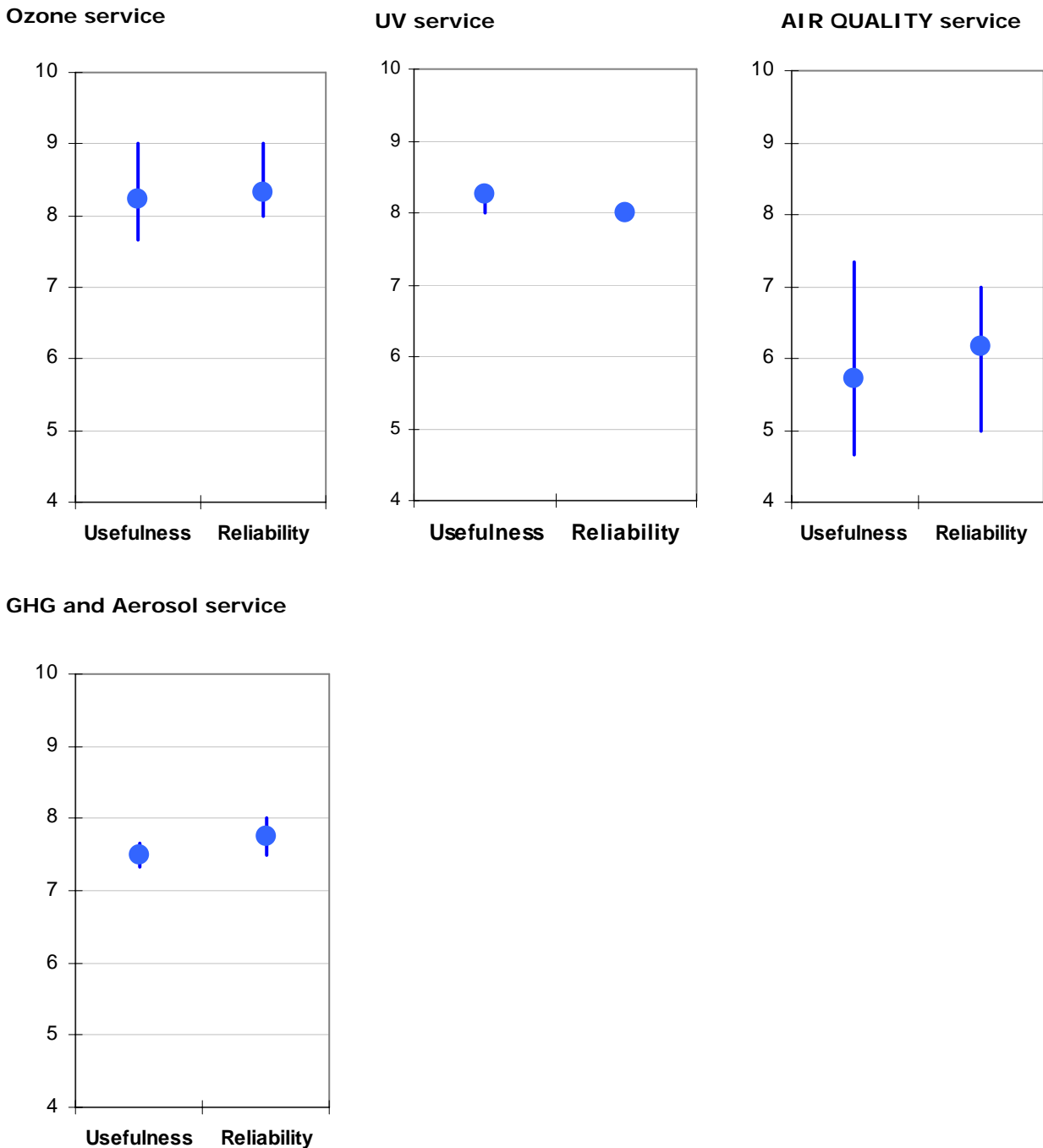
**Table 5. Percentage of feedback received by the users of the Promote project for the evaluation of the services provided.**

---

<b>PROMOTE</b>	<b>number of SLA</b>	<b>evaluations</b>	<b>Percentage</b>
<b>Ozone services</b>	3	3	100
<b>UV services</b>	7	7	100
<b>Air Quality services</b>	27	25	93
<b>Greenhouse Gas and Aerosol services</b>	2	2	100
<b>Special services</b>	2	2	100

The above numbers have been extracted from the last Service Utility Report which was provided by the PROMOTE project team. In order to calculate the percentage that appears into the table, it has been assumed that the term "number of SLA" corresponds to the total number of users of that service in the project and "evaluations" correspond to the number of users that have answered the questionnaires or the documents for the evaluation of the products and services provided.

**Figure 11 Evaluation of user review of PROMOTE services. Information was only available for usefulness and reliability. The points represent the average values and the bars show the highest and lowest values provided (cf. summary table in section 4.4)**



**4.3.6.3 Evaluation and GNU partners' view**

The evaluation done by the users in the PROMOTE project is well structured: all the users analyse the same issues on the different services by answering the specific questions posed by the project itself.

However, it is very difficult to translate the qualitative information provided in the reports into quantitative or measurable items in order to get more objective answers than the subjective

ones provided by the users. In addition, the potential errors that this transformation might entail cannot be ignored, especially as an external organisation carried out this operation.

In reference to the ("Support to Aviation Control Service", (graphic showing usefulness and reliability not included ) two evaluations were made by two user organisations. However, this service has only been running for a short period of time during which, moreover, no relevant volcanic activity has occurred. Therefore, more time will be needed to make an extensive evaluation of the service. It should be highlighted, nevertheless, that at this stage, there is a high level of satisfaction among the two users regarding the quality of service and the interaction with the service provider, and both users are strongly engaged in the development of the service.

Two GNU partners (IEPA, as member of the UEB, and an anonymous GNU partner) commented on the results of the evaluation done for the PROMOTE project. Both dealt with the Air Quality service, and the anonymous GNU partner also provided feedback on the satellite-based PM demonstration service, and the Climate study support service, as well as an overview of the general results obtained from the evaluation of the project. The forms with the detailed answers that this report is based upon are available at the GNU website.

Some of the main comments received have been summarized into the following list:

- A higher number of users have been included in the PROMOTE phase 2, but the general results of the evaluation they have carried out on the project remain quite similar.
- A larger scatter in the results would have been expected, as some data (e.g. ozone) are already used operationally, while other data are still demonstration services. The results of the evaluation bear this out and point to the fact that the UV and Ozone services are more mature than Air Quality and GHG services.
- Specifically, the PROMOTE AQ service is a successful demonstration project; but, in the process of engaging with the service and appreciating the issues involved in implementing an EU-wide AQ service, many of the difficulties have become more apparent to users.
- It is possible to identify areas of relative weakness in the forecast, particularly with regard to specific parameters (e.g. PM10) and to some underlying basic issues (resolution and accuracy of the emissions inventory used, the lack of real-time satellite-derived information, model technical issues, etc). The emissions inventories, as well as some other model features, are not sufficiently accurate to give a reliable indication of the detailed air quality situation, compared to the AQ monitoring network; issues that could be improved with investments in model improvements, deploying of geostationary satellites, etc.
- Nevertheless, considering the concept of reliability in the sense of the consistency of production and timely delivery of the forecast, the service has been good.
- Two services are already used in the institution's annual reporting on air quality assessment (to EMEP).

### **4.3.7 TerraFirma**

#### **4.3.7.1 Introduction**

TerraFirma is a European Space Agency project under the GMES Service Element Programme, started in 2003 and due to be completed by 2008. TerraFirma offers ground motion hazard information services to save lives, improve safety and reduce economic losses. Also, these services can be related to issues such as subsidence, unstable buildings and infrastructure, earthquake activity, landslides, flood risk and coastal erosion, as well as volcanic and seismic activity.

The aim of the TerraFirma service is to make available satellite-derived ground motion information products, primarily through the national geological organisations of the European Community, plus some large engineering organisations.

#### **4.3.7.2 Analysis of the services**

TerraFirma is currently in the second stage of project development, i.e. the operational phase.

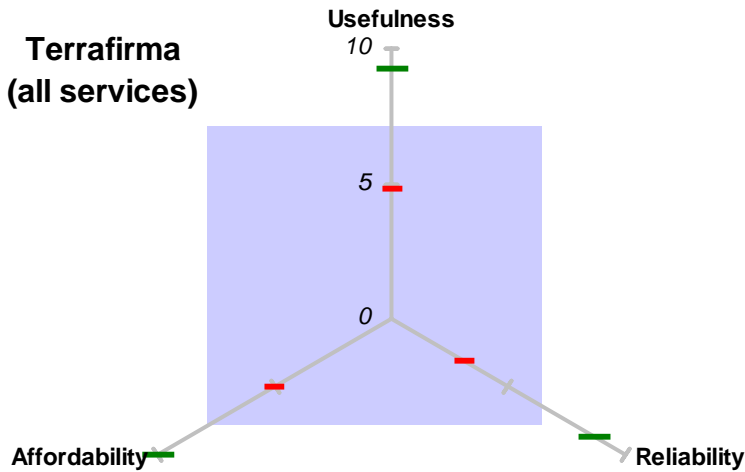
There is no information on the web page regarding the total number of users of the TerraFirma project. The Core User Group of the TerraFirma project consists of six user institutions, while the general user group is represented by institutions and organisations representing geological surveys, the civil engineering and building sector and utility companies. With only this information, however, it is not possible to know the percentage of responses to the Utility reports of the project.

The following analysis has been carried out based on 9 Utility reports provided by 9 users.

Stuart Marsh (Head of Spatial Geoscience Technologies at the British Geological Survey) summarizes the responses to the questions put to the users in the TerraFirma Utility Reports. It should be noted that, in this project:

- All the Utility reports relate to TerraFirma as a whole, so the analysis cannot be on particular services or products.
- The analysis is based on 9 Utility Reports from the current phase of TerraFirma, and which utilised a common template for acquiring the user feedback.
- Questions in this template are qualitative (as in the majority of the projects evaluated - recent results obtained using a new quantitative template are not yet available.)
- Average values for three groups are more reliable than individual results, given the qualitative nature of the questions posed.

**Figure 12.** Evaluation of the user review of all Terrafirma services. Green marks indicate the highest value for a given axis; red marks show the lowest values. The triangles represent the average for each axis. (cf. summary table in section 4.4)



#### 4.3.7.3 Evaluation

As mentioned a number of times in this GNU report, it is a difficult exercise to “translate” the qualitative answers provided by the users into robust quantitative measures.

However, the main results can be summarised for the nine reports by the following general points:

- Expectations of value and cost saving were high.
- Some issues in reliability, mainly a lack of sufficient comparison with existing methods, reduced the actual utility in most cases, especially for the ultimate end-users who remain sceptical and difficult to convince of the usefulness of the services/products.
- Many potential future applications are seen by the geological surveys, but they use to feel frustrated in reaching those applications due to the barriers in the progress encountered with the ultimate end users.

### **4.3.8 GEMS**

#### **4.3.8.1 Introduction**

In the course of carrying out this evaluation, the GEMS project leader informed GNU that GEMS is primarily a project developing capabilities to deliver services, and, as such, has not developed project-wide formal documentation on user requirements, user validation or a service portfolio. In general, GEMS instead responds to more generic user requirements, as expressed by international bodies and activities such as GCOS and IGACO. GEMS' regional activities are reported to a User Advisory Board.

It has also been mentioned that some contract negotiations are currently in progress for a follow-on project to GEMS, with the short title MACC, which will also incorporate components of the GSE project PROMOTE. This will be much more involved in the provision of services and interaction with users than GEMS has been up until now.

#### **4.3.8.2 Analysis of the services**

Considering the information stated in section 4.3.8.1, the GEMS project will not be further analysed by GNU.

### **4.3.9 MERSEA**

#### **4.3.9.1 Introduction**

It has not been possible to establish contact with the MERSEA project. Documentation appears to be available at the webpage but a password is required to download the pertinent documents. If this information is made available to the GNU Consortium in the near future, it may be possible to evaluate this project in the planned update of this task.

#### **4.3.9.2 Analysis of the services**

See Section 4.3.9.1.

#### **4.3.9.3 Evaluation and GNU partners' view**

See Section 4.3.9.1

#### 4.3.10 COORDINATED PROJECTS: HALO, B4G and WISE

To evaluate the three coordinated projects HALO, B4G and WISE that have been selected by the GNU consortium, another analysis methodology has been followed.

These projects are mainly focused on establishing coordinated actions and roadmaps for the services and products developed in different projects, studying the overlaps and connections among the different thematic issues being addressed (i.e. atmosphere, land, ocean, emergency, etc.). For this reason, and considering that they are more conceptual projects than the user/service-provider projects previously considered, it has not been possible to make an evaluation of the users' assessments, as, in this case, the users are mainly the "contractors" or "funders" of the projects to be coordinated.

It should be noticed that only the HALO documentation has been used to elaborate this section of the document. WISE, as mentioned in Section 3, is out of the scope of this report and could not be used for user analysis/evaluation. On the other hand, the European Commission's Integrated Project "Boss4GMES" (B4G) which should support the implementation, definition and processing line integration for all three Fast Track Services (Marine, Emergency and Land) between the end of 2006 and 2009<sup>3</sup> does not have any relevant documentation available at its website, although the requested information is soon to be provided to the GNU project.

Regarding **HALO**, the main objective is to optimise the efficiency of the interactions of the Ocean, Land and Atmosphere segments of the GMES Backbone by formulating agreed recommendations to the Ocean, Land and Atmosphere IPs, and to the GMES steering group in the areas of scientific analysis and coordination, in order to identify coordinated solutions to shared problems and recommendations for the transition to operational status.

analysed major focus is to identify the links and interdependencies between different projects in the following areas:

- Data requirements: analysing common data demands, direct product exchanges and emerging data requirements.
- Technical/political areas where progress is needed to ensure the transition to an operational stage: acquisition of land in-situ observations and implementation of a common GMES data policy.
- Information structure to ensure a coordinated transition to an operational stage.

Clearly, the technical recommendations made by HALO are of high interest, although the scientific recommendations are very much focused on the topic of the global carbon cycle, which is out of the scope of the current analysis.

The main technical recommendations highlighted in the documentation are as follows<sup>4</sup>:

1. *As implied by the forthcoming INSPIRE directive (2004/0175(COD), C-6 0445/2006, PE-CONS 3685/06), the GMES leadership should address the provision of a GMES Information System based on Internet technology. The lack of such a system is a critical gap in GMES planning.*
2. *The GMES leadership should monitor the 2008 roll-out of the WMO Information System in Europe, and assess the adaptability of the WIS for GMES purposes and interoperability with OGC and Earth Science Information Systems.*

Finally, a recommendation to the GMES management to meet the challenges of the transition from Research to Operations in GMES has also been formulated:

*"The HALO experience demonstrates the benefits of dialogue between the leadership of three independent GMES integrated projects. GMES Managements should support the establishment*

<sup>3</sup> Information extracted from the document: "Geoland summary report".

<sup>4</sup> Information extracted from the report: HALO – Contract number 502869. Harmonised Coordination of the Atmosphere, Land and Ocean IPs in GEMS. Final Activity Report.

*of a similarly efficient forum for managing the interdependencies and the Research to Operations transition of the GMES Fast Track and Pilot Services."*

### 4.4 Summary

PROGRAMME	PROJECT	SERVICE	RELEVANCE		USEFULNESS / UTILITY	RELIABILITY	AFFORDABILITY
			Total number of users	% of user answers			
FP6	geoland	CSL	17	74	5,7	5,7	2,4
		ONP	19	29	7,9	5,8	5,9
		OSP	11	36	6,8	9,6	5,9
		OWS-S	4	88	8,0	9,5	5,4
		OWS-W	7	29	8,0	9,7	5,0
	Mersea				No available documentation		
	GEMS				Not possible to evaluate: the project is developing capabilities to deliver services, not formal documentation on user requirements, user validation or a service portfolio		
GSE phase 2	GSE Land	Impervious areas and sealing levels	8	38	8,0	7,1	4,4
		Urban Atlas	16	19	4,9	6,2	5,8
		Water services (Water Quality and Irrigation)	18	22	6,9	7,4	7,9
	GSE FM	(all the products considered a single service)	26	85	6,7	7,9	8
	MarCoast	Oil spill service	9	67	6,2	7,6	Not possible to be evaluated
		Water quality services	14	N/A	Not possible to be evaluated		
	PROMOTE	Ozone services	3	100	8,2	8,3	Not possible to be evaluated
		UV services	7	100	8,3	8,0	Not possible to be evaluated
		Air quality services	27	93	6,2	6,5	Not possible to be evaluated
		GHG services	2	100	7,5	7,8	Not possible to be evaluated
		Special services	2	100	More time needed at project basis to make an extensive evaluation of the service		
	Terrafirma	all services included	N/A	9 Utility reports included	7,1	6,4	7,9
	Coordinated projects	HALO			Not possible to evaluate following the same methodological approach		
		B4G			No documentation received		
WISE				The project is not appropriate to be analysed following the schema proposed			

color code

	less than 5
	5 to 7,5
	more than 7,5

## 5 CONCLUSIONS AND IMPROVEMENTS

There is a high heterogeneity of the projects, services and approaches used for the evaluation of the users' assessments which diffculted the comparison between them.

The first difficulty was to identify and collect the relevant documents in the most updated version. Currently, a publicly-available and comprehensive list of GMES programmes and projects, together with copies of their relevant documentation is lacking. This results in a barrier to the better understanding of GMES and the promotion of what has been achieved so far. It would be assumed that when a service is agreed by both service provider and user, the related documentation would be public, but there is still not a clear policy on the storage and publication of such documentation. In the end, the most effective way to obtain the information required to carry out this work, was to make personal contact with personnel involved in the various projects. However, this has not always been successful, and as noted previously in the case of some of the selected projects, it has not been possible to access to the most up-to-date version of the user satisfaction/validation documentation.

This issue also raises the more general question of transparency. Evaluations carried out based on the information that a project wants to provide might be biased, and could be more positive than those projects that have published the latest reports available in a more transparent manner.

A common methodology for user assessment is lacking. In principle, some key elements are identified and theoretically covered by all the selected projects (e.g. usability, cost, etc.). However, in reality, a more consistent methodology is missing. In most cases, the user validation is based on statements that may be ambiguous or difficult to be compared directly. When only statements are used, the language component in a multilingual environment is also relevant. The methodology developed in this activity is proven to be useful to translate qualitative statements to semi-quantitative values and, therefore, the results obtained are more intercomparable. It should be noted that the templates used for the user assessment have been constantly improved during the whole GMES process, but only in the context of some projects, a quantitative approach has been integrated with the more qualitative approach.

The cost-benefit analysis is the weakest part of the evaluation carried out by the users. This issue needs to be further improved as most of the users are not able to give clear statements on the possible investments to be made (e.g. would they actually invest in a given product or service, what they would be prepared to pay for these new services vis-a-vis current practices, etc.). This is also difficult to be established because there are other aspects beyond the cost of the product that may be difficult to evaluate by a user primarily dealing with scientific and technical matters rather than administrative or accounting issues.

In this context, several relevant aspects have been identified:

- GMES should **put more emphasis on the dynamic aspects of the products** developed (considering time series, for example) than putting the efforts in developing reference data (more accurate at users' premises in the majority of the cases).
- The products and services developed should take into account **new approaches and the integration of different initiatives**, it would be important also to look at the work already developed by the users' organisations itself. It would be important to **avoid repetition of what already exist** (e.g. CORINE Land Cover instead of a new product for land cover mapping). This focus on new products will provide a real **added value to the GMES process** in general, which will be higher if it could be also related to different initiatives such as INSPIRE, GEOSS, SEIS, etc.

Moreover, the selection of the user organisations to be involved in a project should also consider the decision capacity of the selected user organisation to purchase the different products developed or if they can only recommend from the scientific point of view the organisation that has really the capacity to invest on them.

But there are still several **barriers** that users have to face when becoming part of a GMES project, which do not facilitate their participation in GMES projects. Some general barriers identified are the following ones:

- The products and services are many times **too technical** for the majority of the users approached.
- There should be a method to **facilitate the interpretation** of the product the users receive.
- **Boundary conditions** and **main uncertainties** of the different products should be clearly stated.
- A real **need to develop expertise** in the user organisations involved in the projects is identified.
- There exists also an interest, apart from the product itself, in the **methodologies** developed by the project and in the **raw data** used for the developments which can be both used for other applications at the user premises.

A strong partnership has been established between the service providers and the users (based on comments provided by the users into the documentation analysed and during several meetings held on at project basis). In some cases, it can be traced to previous joint participation in other projects/business. In general, good user/service-provider relationships appear to result in a better product evaluation. It is also reflected in the reliability assessment of the product; the service provided generally always being rated in the medium to high range.

It is already known that in these kinds of projects, users tend to often provide positive statements about the products and services. Although in many cases, the positive evaluation is warranted, it can be observed that some users prefer to provide a positive statement, but with an additional indication on the need for further improvements, instead of specifying that the product is not of use to them or that there is no intention to further use it.

Considering the GMES programme in general, another conclusion that could be made from the evaluation developed refers to the large numbers of users involved in some of the projects analysed. In compliance with the specifications made at the tendering process, the bigger the number of users involved the better, because it is assumed that the more users that participate in one project, the more relevant would be the project and the results obtained.

However, due to the large and broad range of users: it would be very important to map the user community in a more appropriate way. The mapping of the user community would help in diminishing the complexity that exists nowadays in this aspect. It is important then, at the same time, to better define the target user group per each of the product developed, in order to have more focused discussions on the developments to be done by the project itself.

However, if a service attempts to serve a too wide user community (which, by definition, will be divergent with a wide range of requirements), there will certainly be two major difficulties. Firstly, the information needs will be very difficult to harmonise and a common agreement on priorities among all user organisations may not be possible at project level. Secondly, the evaluations required at the end of the production phase will most probably highlight this fact, providing a lower satisfaction rating than expected, which does not contribute to the overall perception of the success of the GMES process.

Another issue to be also taken into account are the **different scales of product development** is a gap that has not yet filled in from the developments done at national or regional level compared with the developments done at GMES level. It would be interesting for GMES to demonstrate how the different "scales" could fit together instead of developing a single product to fulfil each request (developed for a single user normally), per each scale and each time.

Finally, there is the need to develop and agree on a common method to tackle the evaluations of the services made by the users. They should be encouraged to integrate their opinions and feedback in the user questionnaires, containing aspects such as sustainability, affordability, etc. Depending also on the type of question to be answered, a range of different answers could

be provided, which will facilitate and enrich in some cases the analysis to be carried out regarding the answers provided by the users. In all the cases, the possibility to give additional comments in free text should be provided, in order to include the specific views of each user.

Apart from all the items highlighted before, it would be of general interest to perform a user consultation before the different calls went out, in order to establish priorities among the different aspects to be tackled in each project and to know in advance which would be the more relevant ones from the users' point of view. This consultation will provide the users with one of the roles they should theoretically fulfill in GMES

This activity can be considered an initial attempt to establish a common approach for comparing existing information regarding user evaluations of GMES projects. Further work is needed within the GNU project and other frameworks, to reach a common and representative approach for GMES projects evaluation from a user perspective. The development of an harmonised approach could be built up with some of the issues dealt with in this report (i.e., utility, reliability, affordability, availability, timeliness and sustainability of the services/products developed). Such an approach could then be recommended for use in all new GMES projects. This could help to overcome the disparity between the evaluation of a project's proposal and the evaluation of a project's outputs within and between different projects.

The main recommendations of this activity are listed as follows:

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