PROGRESS REPORT

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Project acronym: EuroGeoSource

Project title: EU Information and Policy Support System for Sustainable Supply of Europe with Energy and Mineral Resources

Project type: ☐ **Pilot A** ■ **Pilot B** ☐ **TN** ☐ **BPN**

Periodic report: **1ˢᵗ** ☐ **2ⁿᵈ** ☐ **3ʳᵈ** ■

Period covered: **from** 01-04-2012 **to** 31-03-2013

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PUBLISHABLE SUMMARY

Summary of project objectives

EuroGeoSource is a three year project funded by the ICT PSP Call, theme 6.2 Geographic information That started in April 2010 and will end in April 2013. The project has a budget of 2.5 million EUR divided over 11 work packages (see figure 1) and the project consortium consists of 11 geological surveys, 2 commercial companies and one university.
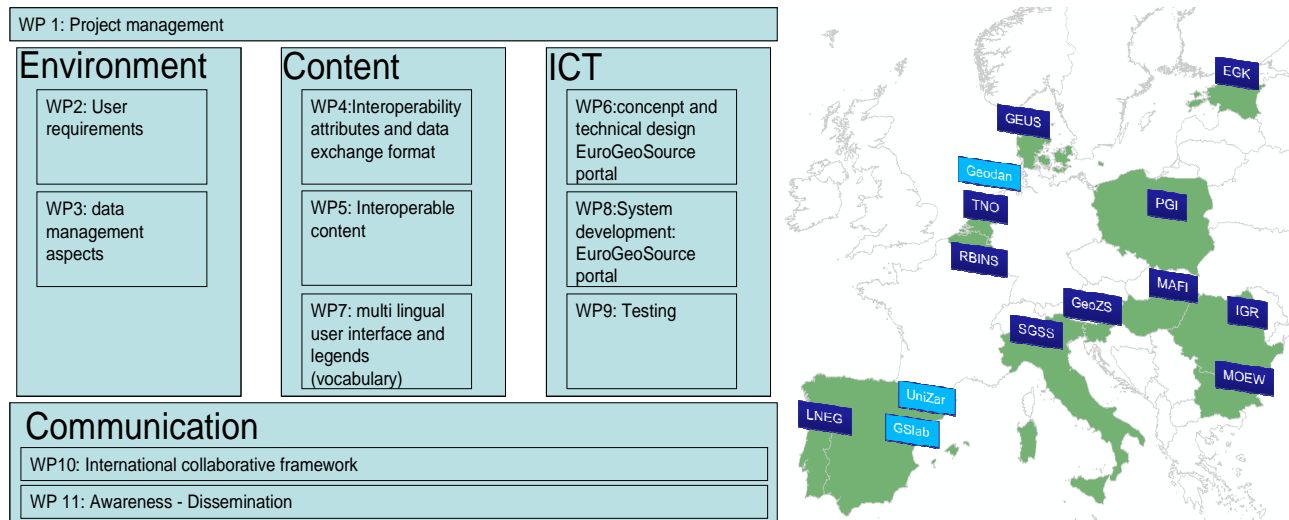

Figure 1: project structure(left hand side) and consortium partners (right hand side)

The main objective of the project is to develop an information and policy support system for sustainable supply of energy and mineral resources in Europe (EuroGeoSource). The system will allow users to identify, access, use and reuse aggregated geographical information on geo-energy and mineral resources, covering at least ten European countries. The multilingual system will provide basic services for the visualization and overlay of the information layers obtained from distributed sources, as well as more advanced spatial and temporal analysis on the data. The implemented solutions will be in accordance with OGC specifications and compliant with INSPIRE. The developed web services will enable the creation of value-added services (such as demand-supply modeling) by third parties. EuroGeoSource is aimed at users from the EC (including the EC Directorate-General for Energy and Transport, EuroStat, the EC JRC Institute for Energy), commercial parties (oil gas and mining companies, investment companies), geological surveys, research institutes and universities, and (inter-)national geo-energy and mining authorities.

Work performed since the beginning of the project

We have send out 1040 potential users of the future EuroGeoSource portal and invited them to give us their opinion on desired content and functionality via an internet questionnaire. We analysed the 187 returned answers statistically and composed a list of user requirements (WP2).

Furthermore, an inventory of the current situation regarding data and information on energy and minerals in the participating countries (WP3) has been made via an internal questionnaire.

Based on this inventory we collected the existing standards, data types and data models used for hydrocarbon and mineral resources from the participating data holders and identified relevant existing data models within the scope of the EuroGeoSource project. From this we selected a set of available key attributes (WP4) that

met the user requirements and organized them in a data model. The attributes were mapped on the draft versions (2.0) of the INSPIRE guidelines (TWG Geology and Mineral resources and TWG for Energy) and on the EarthResourceML Data Exchange Model where appropriate. INSPIRE does however not address all EuroGeoSource needs, therefore extensions have been added. At the same time simplifications have been made when the INSPIRE model was too complex.

The EuroGeoSource project is registered as a Spatial Data Interest Communities (SDICs) and has been participating in public consultation and testing of the drafts of the INSPIRE ANNEX II and III data specifications for Energy Reources, Mineral Resources and Geology.

For the quantification of the resources the United Nations Framework Classification (UNFC) for Energy and Mineral Resources has been adopted.

To make the supply of data to the EuroGeoSource project easy, a relational data model has been designed and implemented (WP5) that supports the storage of all information relevant to the project. A OGC/INSPIRE compliant download service has been implemented to deliver the data stored in the relational data model. The implementation of both the relational database and the download service is described in detail in a cookbook.

With regard to the non-harmonized spatial data content an new inventory of relevant datasets that are available at the partners has been carried out, together with relevant services already published elsewhere. Many of these services are already integrated in the EuroGeoSource portal.

The first prototype of the Web application has been updated using remarks and feedback from the first public workshop in Rotterdam (March 2011), stakeholders, the advisory committee and project members, resulting in a second prototype (WP6). This prototype has been built on OSS software: OpenLayer combined with MapQuery as client software. MapQuery has specifically been created to support the required EuroGeoSource functionality. On the server site different OSS components process and supply data to the client. The second prototype includes the Southern Permian Basin Atlas comprising of almost one hundred different layers, and WMS services form project partners. A cloud system has been setup and the mentioned layers are tiled and cached in this cloud system to guarantee a fast and responsive client interface. The implemented services also supply data to an Android prototype which has been developed.

Based on the prototype, the real EuroGeoSource system has been developed (WP8). Administrative areas data for most partners has been loaded into the central node database, and an OGC Web Feature Service (WFS) for geonames has been set up to access this information. Several OGC Web Map Services (WMS) have been added to the Web applications. The requirements for the multi-lingual functionalities are finalised (WP7) and the data structure to implement it has been designed and built, together with a translation web service. The actual filling of the translation functionality with the translated terms will be completed in the last year of the project.

The 2nd workshop (Rotterdam, March 2012) brought representatives from international, European and Member State level, as well as stakeholders from international and EU levels together, to discuss the results of the project so far and guide the finalisation of the project. As such the workshops built an international collaborative framework to discuss data harmonization and interoperability issues related to mineral and energy resources.

The website is used as a communication tool, with continuous updates following the project progress and suggestions of the partners. Furthermore a EuroGeoSource newsletter and flyers have been made (WP11).

Main results achieved

The analysis of the results of the internet questionnaire showed that there is a lack of data accessibility due to differences in format, lack of harmonization and uncertainty on update frequency. Potential users see the EuroGeoSource portal therefore as a real necessity. This conclusion is backed by the results of the inventory of data availability and involved organizations within the consortium. The internet questionnaire led to a number of conclusions on the content, expected use, scope and functionality of the portal. Different user

groups had different wishes on type and detail of the information that should be present at the portal, and also had different views on desired functionality. All user groups agreed that the portal has to be compatible with other already existing datasets (OpenStreetMap, OneGeology, Corine Land cover 2000...) and that the data is compliant with the INSPIRE directive. Finally the want the portal to work with a map viewer, using a GIS interface and have a downloading option for personalised search results. The respondents showed a primary interest in non metallic resources, secondly on energetic resources and finally on metallic resources. The EuroGeoSource portal will serve data on all tree types of resources.

The inventory of the current situation regarding data on energy and mineral resources within the members of the consortium shows that the content and structure of the data differs substantially in each country. Access and use is further complicated by the fact that the data can be acquired in several different institutions and at different levels of processing. None of the countries possesses a system that could be regarded as an example for setting up the harmonised database of the EuroGeoSource project, not even on a meta database level.

The attributes on mineral and energy data that the project selected as key attributes are shown in figure 2. The consortium chose to use the UNFC (The United Nations Framework Classification for Fossil Energy and Mineral Resources) classification system because it covers both minerals and energetic resources. This system is already in use in three of the participating countries, the reserves calculated in the other countries will be mapped as close as possible. From discussions at several meetings outside the project on the use of UNFC we learned that this system is gaining in popularity, and countries are taking steps to implement it in their own environment.

The compliance of the data model to INSPIRE is monitored by the direct participation of consortium members in the TWG Geology and Mineral resources and the TWG for Energy. Furthermore EuroGeoSource is registered as an SDIC within INSPIRE, volunteering to act as a pilot project and offering our expertise.

The simplifications we used and the extensions made are discussed with the Thematic working groups in detail, showing the tension between the free availability of data desired by INSPIRE and national laws providing to share this information publically. EuroGEoSoruce as a project has provided a solution for this by creating an energy of minerals producing country to be able to public information on a country level instead of the' mine' level in INSPIRE.

GENERAL DATA OF SITE	DATA OF LOCATION	ADMINISTRATIVE DATA
INSPIRE ID of site (M&E)	Coordinates: longitude, latitude (M&E)	licence ID (M&E)
local ID (M&E)	depth below surface (M&E)	type of licence (M&E)
Name of site (M&E)	water depth (M&E)	Name of licencee / operator (M&E)
Name of site (M&E)	geographical location (M&E)	Duration of licence (M&E)
Type of resource (M&E)	Country name (M&E)	Areal extent of licence (M&E)
Year of discovery (M&E)		
status of site (M&E)		
References (M&E)		
Remarks (M&E)		

ECONOMIC DATA	ADDITIONAL DATA	ADDITIONAL DATA
Classification (M&E)	Geological characteristics regional / of field (M&E)	Main type of field (E)
in situ ore / substance reserves (M&E)	Age of host rock / Reservoir rock age (M&E)	Status (E)
Production (M)	Host Rock type / Reservoir rock type (M&E)	Nr of oil producing wells (E)
Period of Production (M)	mineral deposit type (M)	Nr of gas producing wells (E)
Dimension of the deposit (M)	primary comodities (M)	Nr of gas injecting wells (E)
mining method (M)	secondary comodities (M)	Nr of oil/gas producing wells (E)
Oil Initially in Place (E)	main ore minerals / substance (M)	Nr of water injecting wells (E)
Gas Initially in Place (E)	secondary ore minerals / substance (M)	Nr of water/gas injecting wells (E)
Cumulative oil production (E)		Nr of CO2 injecting wells (E)
Cumulative gas production (E)	hydrothermal alteration (M)	Nr of producing/injecting wells (E)
Cumulative water production (E)	morphology of the deposit (M)	Areal extent of field delimitation (E)
Cumulative gas injection (E)	regional deposit structure (M)	Reservoir depth (E)
Cumulative water injection (E)	dating method of mineralisation (M)	Production strategy (E)
Remaining Oil reserves (E)	age of mineralisation (M)	Installations (E)
Remaning Gas reserves (E)		
Year of reporting (E)		

Figure 2: Set of key economic attributes for minerals(M) and energy (E) resource or both (M&E).

An infrastructure has successfully been created that enables the project partners to implement download services for harmonized energy and mineral resources data. The services are operational at five project partners. All partners will come on line during the final year of the project. The tools needed to build this infrastructure, and the detailed cookbook describing how to implement is, will shortly be available for any other data provider not participating in EuroGeoSource.

The results of WP2, WP3 and WP4 have been used as input for WP6 to design the first prototype of the EuroGeoSource portal which has been updated using remarks and feedback from the first workshop, stakeholders, the advisory committee and project members, resulting in a second prototype containing a multi-lingual user interface. The architecture of the system uses cloud computing to fulfil basic (non-) functional requirements (see figure 3). This facilitates and speeds up the EuroGeoSource tiling service, Diagram service and advances query options (search index).
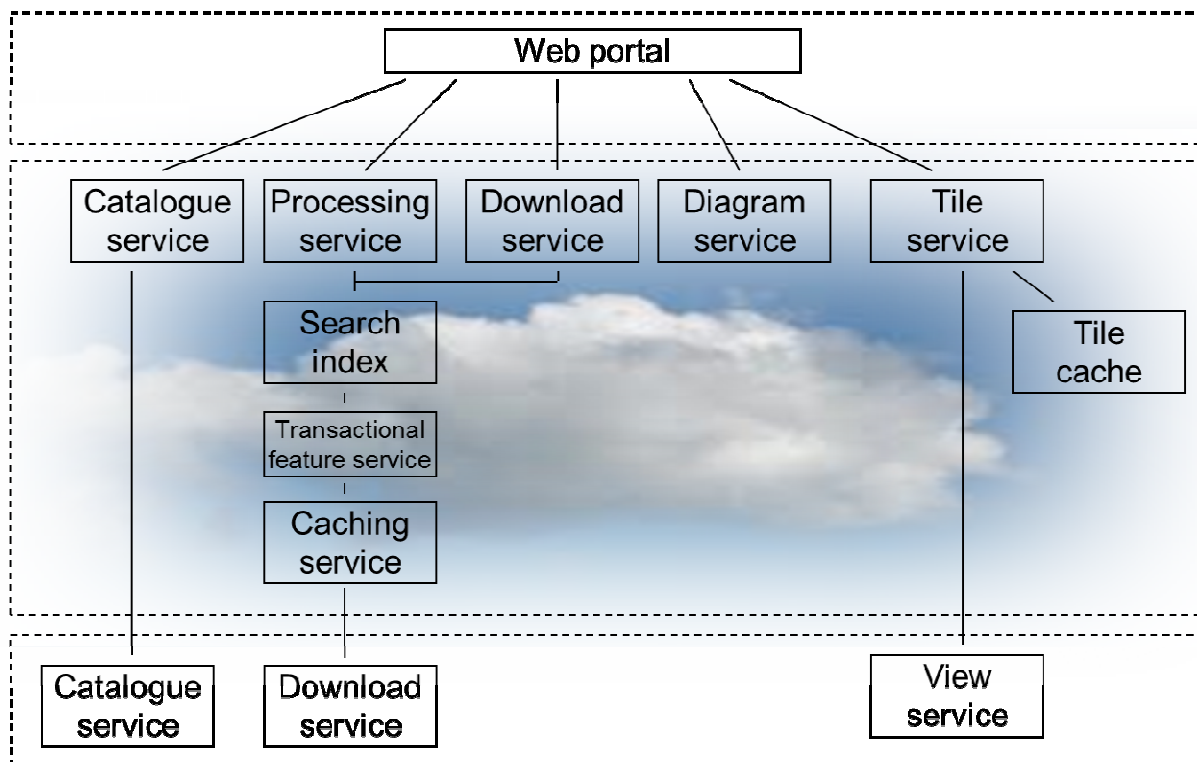

Figure 3: EGS architecture with (1) data/service provider, (2) central EGS implemented in the cloud and (3) service consumer.

In addition to the desktop prototype (figure 4), we developed an Android (Figure 5) and a Windows Touch table (figure 6) prototype. The Android client opens up a whole new user perspective, and the implementation in the cloud guaranties smooth performance of the EuroGeoSource system, even on a 3G network. These prototypes as well as presentations of the work done were presented at the 3rd public workshop, held in Brussels. Next to the three public workshops the EuroGeoSource project has been presented at 11 international conferences and 21 main user groups, achieving awareness and dissemination of the project results.
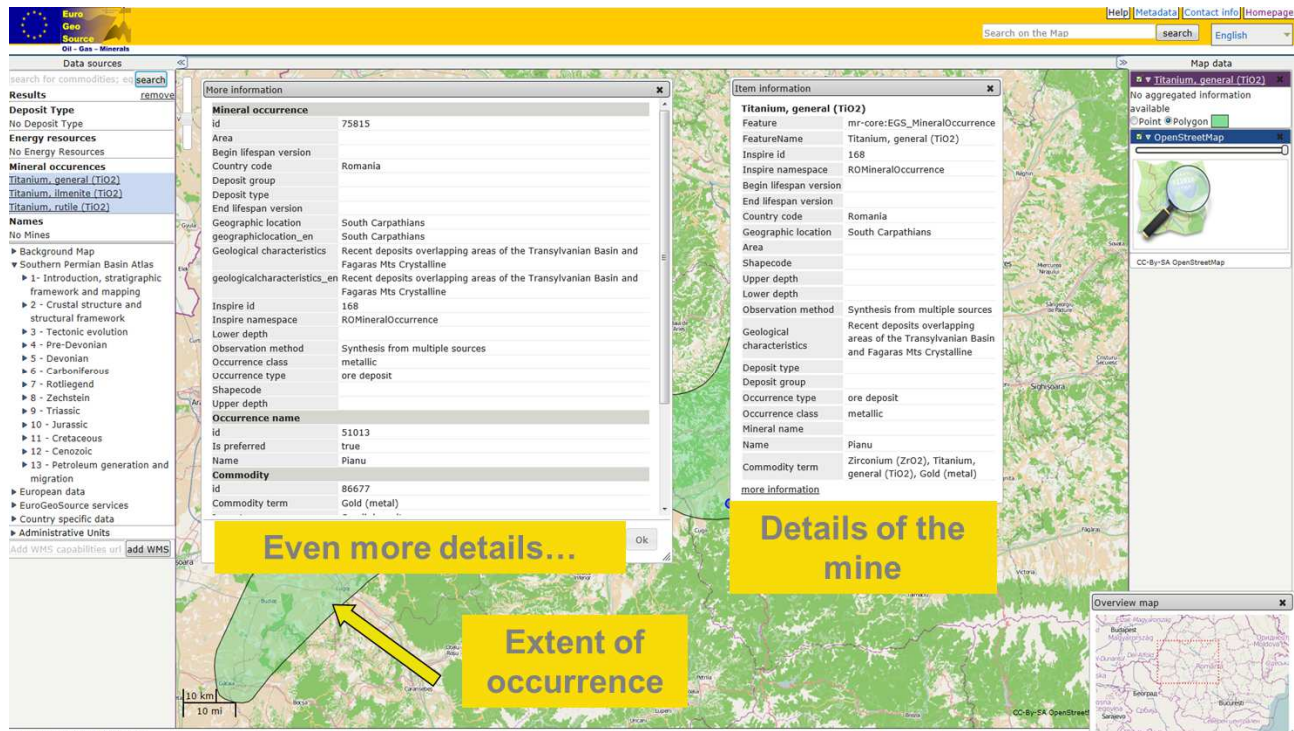
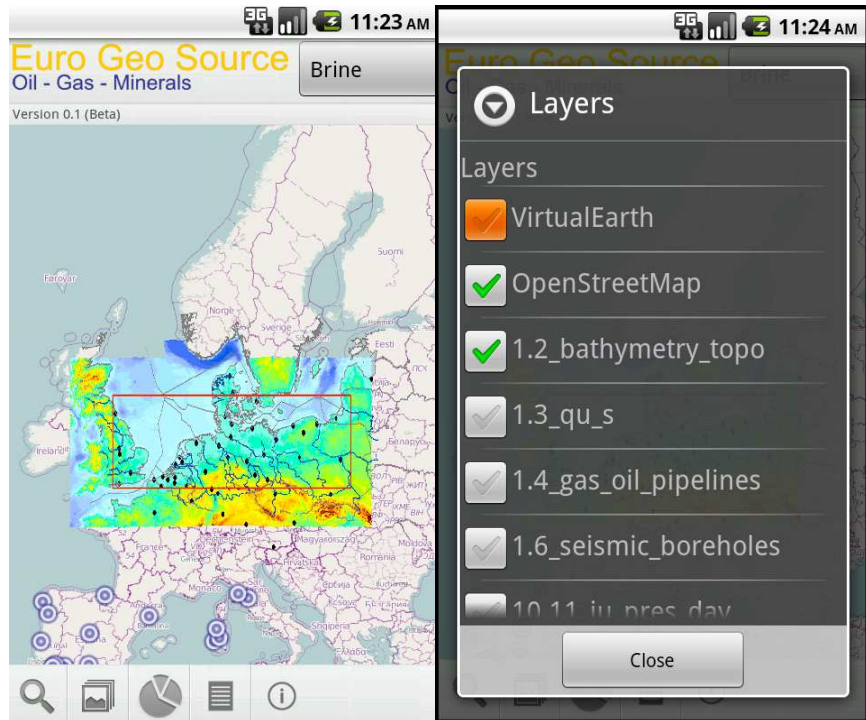*Figure 4: Final EuroGeoSource system showing the database results for Titanium in Romania.*

Figure 5: Main screen of Android Prototype App (left hand side) and the selection of layers (right hand side).

Figure 5: Main screen of Windows Touch table Prototype.

Collaborative framework

On important task within the project is to build a collaborative framework between the major players in the energy and mineral resources sectors of the EU economy. This framework will be built by organizing three workshops during the execution of the project. The first of these workshops was organised on the 10th of March 2011 in Budapest Hungary. Almost 100 attendants listened to representatives from the project, experts from OECD, DG Enterprise and Industry (Unit 3), EESC, JRC, Euromines, OGP, Academia (University of Luleå) and a Representative from the Mining Authority from Portugal. In the audience the workshop had participants from Geological Surveys, Academia, Mining and Oil Industries, representatives from Promine, consulting companies, EU strategy/policy entities and representatives of the EuroGeoSource's advisory board.

The second workshop was organised on the 8th of March 2012 in Rotterdam, the Netherlands. Almost 80 participants listened to presentations from the Ministry of Environment and Infrastructure of Netherlands, Hungarian Office of Mining and Geology, DG Enterprise and Industry, JRC, INSPIRE, UNECE, Energistics, CETEM, Brazil, the Mineral Resources Expert Group within EuroGeoSurveys, Promine and of course representatives from the EuroGeoSource project itself. The workshop ended with a panel discussion.

The third public and final Seminar was held in Brussels at the Museum of the Royal Belgian Institute of Natural Sciences, on 12th March 2013. Almost 100 participants listened to presentations from project experts, representatives of other IT and or data management related EU projects, and data management or standardisation organisations. The seminar had lively discussions on the added value of data portals like EuroGeoSource, harmonisation and standardisation on EU and national level, and ended with a debate on challenges for the future. The Final Seminar was regarded as a success and many expressions of congratulations were received by the project team. The presentations and discussion periods during the final seminar were great conduits of positive feedback and what the future may hold in store in terms of what is still needed to do and what needs improvement.

The set of three workshops allowed the project team to get some very valuable inputs, both from the invited experts speakers and the participants. The general feedback was very positive. In addition, the workshops are an important communication tool for dialogue between the potential community of users and the project team with the consequent added value to the future project developments.

Final results and their potential impact and use

The EuroGeoSource system has been deployed on the 22nd of March 2013. In total we have 9 countries on line, serving their data via the harmonised EuroGeoSource data model. Additionally, we have over 300 (inter-)national services that relate to mineral en energy resources, including 94 maps from the southern

Permian Basis petroleum Atlas . All the data available in the database can be viewed by clicking on a mine and the EuroGeoSource WFS are available for other clients to use. The portal is also multilingual, supporting 12 languages for the terms in the database and the user interface.

During the final seminar the portal was described as an example of the next step in functionality for distributed web GIS information systems. As such, the results from the project will be incorporated into new EU initiatives like Minerals4EU and EGDI, together with the achievements of the Promine project.

Indeed, the added value functionality will only flourish when all EU countries are feeding their data to the portal. Portals will not be able to answer all questions related to mineral en energy resources, but surly they help users get access and re-use data in a comprehensive way.

More information and feedback on the project

Our website gives the latest information on the project, and detailed information related to mineral and energy resources data management. The number of unique visitors has grown from about 250 in the first year to more than 1000 from more than 24 countries worldwide. Any visitor can view and download all public deliverables and presentations there, including the tool stack to transfer their own data into a EuroGeoSource web service. Also the Android app is available for download. And of course a link to the portal is available.
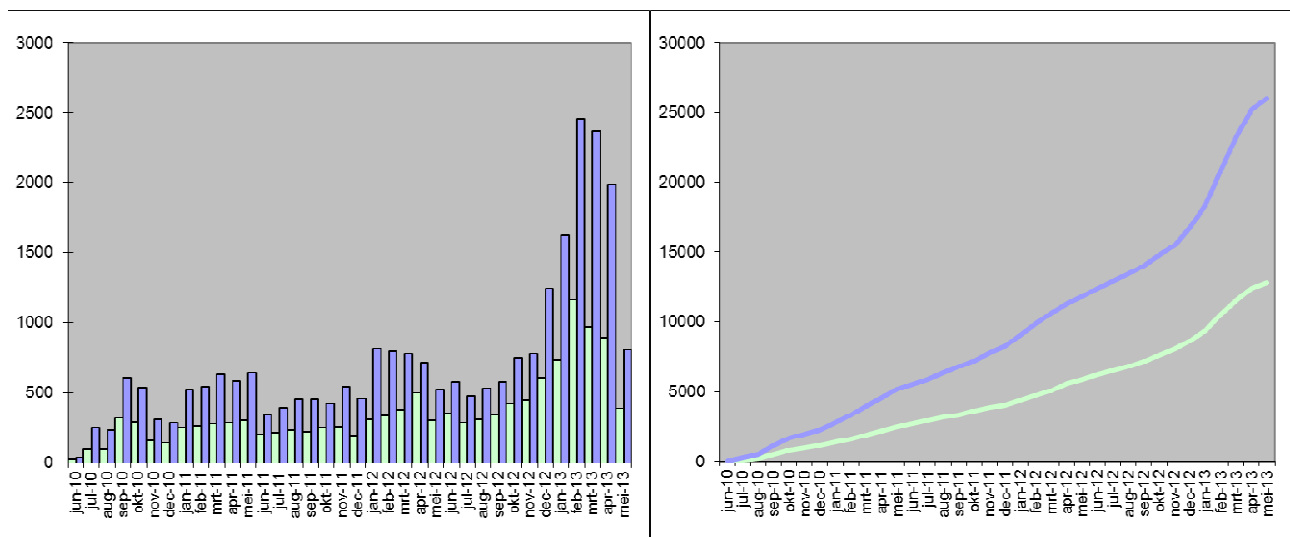

Figure 6: User statistics of the project website. Number off unique visitors (green) and visits (blue) per month (left graph) and cumulative (right graph)since the start of the project.