

Building a Soil Information Portal for Europe based on the PortalU Technology

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Abstract

The availability and accessibility of environmental information has become a key concern for public and private bodies within Europe in the recent years. The European Environmental Information Directive (EEID, 2003/4/EC), the Directive for establishing an Infrastructure for Spatial Information (INSPIRE, 2007/2/EC) as well as further initiatives of the EU like the Shared Environmental Information System (SEIS) emphasizes the European-wide need to improve the access to environmental information.

Especially the web-based supply of the huge amount of spatial environmental data deserves particularly attention because high organisational efforts and financial expenses are necessary to improve the access to this kind of data. While INSPIRE and its Implementing Rules (IR) give the framework to establish a European spatial data infrastructure, vital obstacles in reference to harmonization and interoperability of data and services as well as in reference to the organisational structure are not removed yet.

The project GS Soil “Assessment and strategic development of INSPIRE compliant Geodata-Services for European Soil Data” aims to make a contribution to remove these obstacles by establishing a European web portal for soil information (GS Soil Portal). Within the project 34 partners from 18 European member states are involved and the project is co-funded by the European Community programme *eContentplus*. The project duration is from June 2009 until May 2012.

Overall it will focus on data organisation, data harmonisation as well as semantic and technical interoperability with the objective to produce seamless spatial information in terms of INSPIRE (European Union 2007). Both the description and harmonisation of European spatial soil data and the operation of a corresponding spatial data infrastructure will take centre stage. Out of the 34 partners, soil data are provided for all 18 involved European member states mainly on national level and partly on regional level. That means 67 % of the 27 European Member States will provide soil data for the project. These data build a sufficient base to analyse and improve the access to the different kinds of digital content.

As technical base InGrid[®], the technology of the German Environmental Information Portal PortalU[®], will be used to build up the GS Soil Portal, where all decentralized distributed soil data are bundled. In the GS Soil Portal all soil related information from web pages, over data bases to data catalogues will be made available and accessible. Search results will be ranked and listed in shared result lists and spatial soil data from OGC compatible Web Mapping Services (WMS) and Web Feature Services (WFS) will be visualized in a map viewer.

1. The *eContentplus* Project GS SOIL



The project is co-funded by the European Community programme *eContentplus* with 4.1 M € It is a programme from the European Commission DG Information Society and Media with the objective to make digital content in Europe more accessible, usable and exploitable (DG Information Society and Media 2008). GS Soil is thereby allocated to the area of geographic information, where the focus is set on the aggregation of existing national datasets into cross border datasets, which will serve to underpin new information services and products, in particular with a view to reducing barriers related to one or more of the specific themes mentioned in annexes I-III of the INSPIRE Directive (European Union 2007). The focus of GS Soil is thereby set on soil and soil related data. In the *eContentplus* programme, GS SOIL is defined as a Best Practice Network for Geographic Information. The project duration is from June 2009 until May 2012.

2. Partner consortium

The project consortium comprises 34 partners from 18 EU member states. Project Coordinator is the coordination center PortalU at the Lower Saxony Ministry of Environment and Climate Protection (Germany).

Overall 24 partners out of the consortium are soil data providers and will make the data available for the project. Hence, a complex and high quality data basis in a European context is assured.

The focus will be on data provided by national and regional institutions. Beyond that, European institutions are also involved via the advisory board.



Figure 1. The project consortium at the Kick-Off-meeting in June 2009, Hanover, Germany

3. Main objectives and results

The project GS Soil aims at establishing a European network to improve the access to spatial soil data for public sector bodies, private companies and citizens. The project considers aspects of data organization, data harmonization as well as semantic and technical interoperability in order to produce seamless geospatial information and to improve the data access for a wide community of different user groups. The structural specification for the description and harmonization of spatial soil data within Europe as well as the operation of a corresponding spatial infrastructure are main objectives of GS Soil.

The partners will establish and operate a network of services for spatial datasets and metadata. This network includes distributed services for data transformation, discovery, view and download. The final result of the project will be a central Soil Portal, where European soil data from heterogeneous sources will be bundled. In order to ensure cross-border usability of the portal and related services, aspects of multilingualism and data interpretation will be considered thoroughly. In this respect the harmonization of metadata is also a key topic within the project work.

The project will extensively support the implementation of the INSPIRE requirements on basis of available experience in selected European countries and regions on different organisational levels. Users will be able to discover, view and download soil data across Europe. The results of the project will be:

- A consolidated soil-related theme catalogue and consolidated soil-related theme content-framework standards,
- An INSPIRE compatible metadata profile for spatial soil datasets, dataset series and services,
- Generic application schemes for soil information,
- A web portal (GS Soil Portal) which provides access to all project soil data, including,
 - a view service which provides access to spatial soil data,
 - discovery and view of the INSPIRE conform metadata for the provided soil maps,
 - interoperable spatial soil datasets (for exemplary soil products),
 - case studies on cross-boarder delivery of harmonised soil data access,
 - Best practise guidelines for
 - creating and maintaining metadata for soil database,
 - and for data harmonisation.

3.1 Project structure

In order to achieve the aims of the project, GS Soil is structured in seven work packages (WPs) (Fig. 2):

- WP1 for project coordination and networking,
- WP2 for building up the content provision framework,
- WP3 with focus on metadata,
- WP4 with focus on harmonisation and semantic interoperability,
- WP5 for establishing of an integrated network and a soil portal,
- WP6 for evaluation and sustainability
- and WP7 with focus on dissemination, awareness and clustering activities with other projects.

WP2 to 4 will set up on each other. The soil and soil related data will be analysed, necessary metadata will be identified and provided and specific datasets will be systematically harmonised. The improved access to soil information by the GS Soil Portal is the main objective of WP5, while WP6 focuses on user needs and the long-term perspective of the GS Soil Portal.

At the beginning of the project specific and generic requirements for soil information, services and products have to be identified by a range of user communities and stakeholders. This requirement analysis will result in a soil inventory and theme catalogue, which documents the current state and ability of data providers to meet the goal of data harmonization. Based on this, specific content requirements and characteristics will be defined as fundament for the establishment of harmonized soil data sets.

As a fundament for harmonizing different kinds of soil data, basic information about the data sets have to be made available in the form of methodical metadata, which describe the underlying data models in

depth, and which comply with a generic framework for developing application schemata for the relevant data. Therefore a schema for describing spatially linked soil data and database services to comply with the INSPIRE Directive will be developed, which meet the needs of data users for a harmonised, interoperable EU-wide, national and regional soil data infrastructure. A soil oriented metadata structure profile will be developed following the INSPIRE IR for metadata, other international, and national standards, like the ISO 19115:2003, and the needs of the data users.

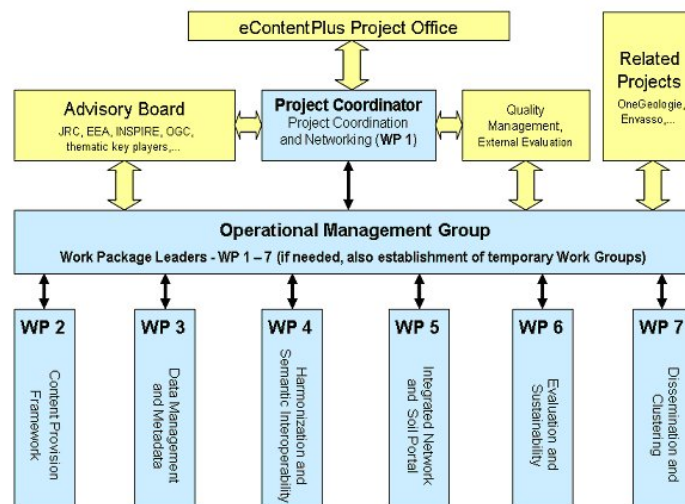


Figure 2. Structure of the *eContentplus*-project GS SOIL

In the context of data harmonization a framework will be developed that enables existing soil datasets to be linked up from one country to another. Therefore data specifications will be developed and made available as basis for designing and testing of transformations or translations. The level of spatial data consistency depends to a large proportion on user level harmonization efforts. Such efforts will be thoroughly analysed in order to identify, to which degree pre-harmonization is needed and how it can be implemented. However, particular focus will be given to the development of user level transformation services in the context of the INSPIRE harmonization framework. Exemplary services will be developed with the objective to present comparable and meaningful data portrayal. The focus on soil map legends and soil inventory data is important because attribute and property data are crucial for developing evaluation and transformation services. The results will enter in a best practice guideline for soil data specification development under INSPIRE.

4. Development of the GS SOIL Portal

InGrid[®], the technology of the German Environmental Information Portal PortalU[®] (Voegele at al. 2007), will be used as technical base in the project to build up a European GS Soil Portal. The European web portal, GS Soil Portal, is used to bundle the decentralized distributed soil information of the 18 states (Fig. 3). In the GS Soil Portal all soil related information, web pages, databases as well as data catalogues, can be searched by simple or advanced search queries according to the requirements of the user. The results of a query are displayed in a ranked result list independent from the data source.

The technology provides different kinds of interfaces to data sources (iplugs) and also interfaces for the transfer of information to other systems like spatial data infrastructure (SDI) of the GDI-DE or the INSPIRE geoportal. The most important iplug / interfaces in reference to the GS Soil project is the CSW-

SPIRE geoportal. The most important iplug / interfaces in reference to the GS Soil project is the CSW-2.0-interface (Fig. 3).

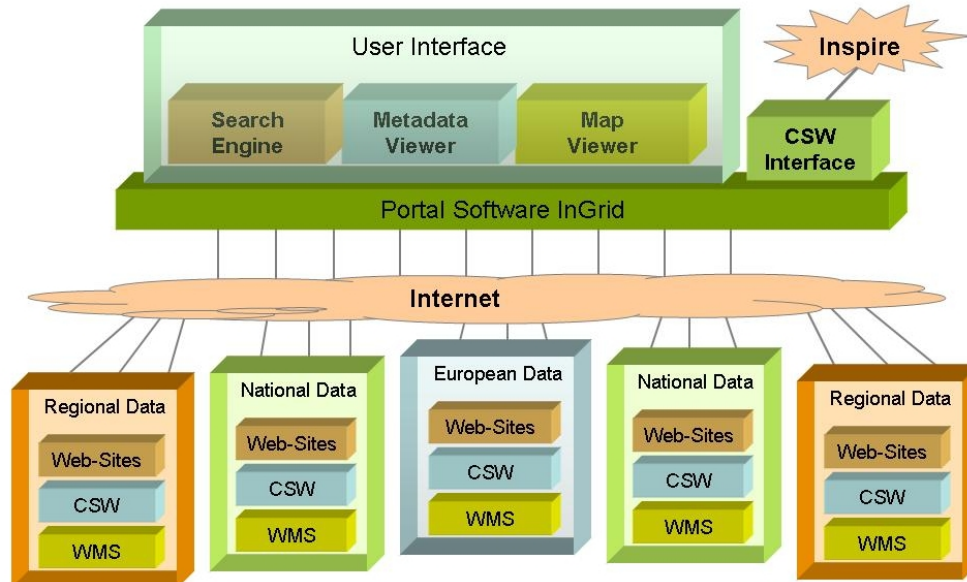


Figure 3. Architecture of the PortalU[®] technology InGrid[®]

The OGC conform CSW-2.0-interface is based on the ISO standards 19115, 19119 and 19139 and the IR metadata of INSPIRE. This interface makes the exchange of spatial metadata in both directions possible. With the CSW-iplug spatial metadata sources (data catalogues) can be connected to the GS Soil Portal, while on the other hand the CSW-interface can be used to transfer spatial metadata from the GS Soil Portal to external systems. In reference to embed the GS Soil in a major spatial data infrastructure like INSPIRE the standardised CSW interface and further standardised interfaces play an important role.

The PortalU[®] technology provides a hierarchical structure of partners and data providers in order to consider the federal administrative structure in Germany. According to this, the federal government and the states (Bundeslaender) act as partner in PortalU[®], the single data providers are accordingly subordinated to the federal government or the referring state. This structure can also be easily used on European level for GS Soil: each state will act as partner and the data providers are allocated to the referring country. In the GS Soil Portal all soil related information will be made available and accessible. Spatial soil data from OGC compatible Web Mapping Services (WMS) and Web Feature Services (WFS) will be visualized in the map viewer.

The technology has a modular structure and is thereby easily extendible for the specific needs within the project. It is based on open source components and internal developments. Therefore it can be used without external licence fees in the project. For all tasks within the project the GS Soil web Portal will be used as platform for an improved access to the soil data.

5. Evaluation, awareness raising and cooperation

In terms of evaluation and sustainability the project consortium will also take care of the requirements concerning data provision of different target groups and stakeholders (e.g. public sector bodies, private

companies and citizens). Different levels of user needs regarding metadata, application in planning procedures etc. will be identified.

Testing scenarios for target groups will be designed and criteria and key success factors for their evaluation will be set up. Results of the evaluation and improvements will be implemented in the technical working packages of the project. A long term operation plan for sustainable establishment of the Soil Portal will be developed to guarantee further usability and development connected to other European data networks. For that means intensive coordination with the European Soil Data Center (ESDAC) and Shared Environmental Information System (SEIS) initiatives are foreseen.

In addition, another objective is the communication and dissemination of the project achievements. Communication is divided into project-internal and external communication. External communication is further spited between communication to the scientific community (and herewith to soil scientists and IT-scientists) and communication to the general public.

The dissemination activities are carried out through the use of websites, GS Soil Wiki, discussion forum, leaflets and brochures, the organisation of regional, national, and international conferences and workshops. These are target to a wider auditorium such as stakeholders, politicians and business people. Awareness is specific to potential target users of project outcomes and members of the network, providing the basis for a tangible contribution to the processes of validation and best practice documentation.

Finally, GS SOIL plans clustering activities with related projects taking into account knowledge and experiences transfer from other *eContentplus* projects (e.g. OneGeology-Europe, Nature-SDIplus) as well as other EU-initiatives (e.g. INSPIRE, SEIS).

6. Acknowledgement

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For further information on the project please visit the website: <http://www.gssoil.eu/>.

7. Literature

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