Geospatial Web Data Sharing in Agriculture

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Abstract

The objectives of the SpravaDat (Data Management) project are to support better utilisation and commercialisation of spatial data in Europe to provide information for public and private activities/services and to build Internet and Mobile Internet GIS European Market place, where spatial data from different source will be shared, accessible for another application, distributed and sell. The main subtasks are

• To standardised and improve the accessibility to the digital data collection in order to create an inventory of rural related data sources, farm and forest surveys and establishment of standardised metadata bases, catalogue and gazetteer services with the respect to INSPIRE recommendation. This increases the effectiveness and efficiency of rural development, forest and farm activities monitoring, regional support, commerce, strengthen indifferent data sectorial analyses and contribute to more objective decision-making.
• To analyze market situation with spatial data and build business models based on Public Private Partnership for data distribution and sharing the cost and incomes and on the base of this model implement advanced Web Pricing & Ordering Service (WPOS)
• To solve questions of data security and intellectual rights protection
• To implement advanced Metadata, Catalogue and Web services: Web Mapping Services, Web Analytical Services, Web Feature Services and Web Coverage Services.

Key words: Spatial data sharing, Web Services, Data management.

1 Introduction

There are different aspects associated to the interoperability, accessibility and availability of the digital spatial information that will be considered in SpravaDat:

• Technology.
• Legislation.
• Business.
• Environment and socio-economy.
• Public interests.

Between the different areas where the better utilisation and commercialisation of digital data will provoke a clear improvement of the state of the art and will have a clear socio-economic impact, agriculture and forestry has been selected as one pilot application. This selection is based on different criteria ranging form environmental to socio-economical and practical:

• Lacks of good-quality and affordable agriculture and forestry digital data limit the better utilization of this data.
• Farmers and forest owners in Europe are very often micro-enterprises. Affordable and good quality digital data will improve the competitively of those Smart and Medium Enterprises (SMEs).
• There already exist technological solutions resulting of research project that are able to support the current initiative.

In spite of the thematic pilot, SpravaDat demonstrates how the technological solution can be extended to other rural digital spatial data sources and will analyse the European rural digital market as a whole. Furthermore, the innovative use of the technology and the innovative approach of SpravaDAT will be able to be extended to application where digital spatial data are important.

2. Current situation

Rapid development in new WEB-based technologies and knowledge management brings new demand for new solutions for spatial information management. Over next few years, GIS technologies will completely moved from desktop GIS solutions to distributed WEB systems with different access modes including mobile devices. Such solutions bring new possibilities of utilisation of spatial data, but they will also require the change of philosophy of utilisation of spatial information. The main principles of such systems will be openness; it means better accessibility and usability of data. Future systems have to share data from different sources. This sharing will be in both vertical and horizontal level (horizontal -data from different regions, which will covered large areas, vertical – data from different users in one regions). Only such kind of information and knowledge sharing will be able to offer possibilities to work with up to date spatial information. The new systems will support networking of different data providers and data users on the base of open platforms. These technologies will build new type of GIS information source networking and will also supported by this way possibility of public private partnership.

Important for the Open Land project is, that it work on the border of two discipline GIS and mobile communication There is rapid development in both, but mainly the wireless technology for mobile application was the most discussed topic in the IT community. The future of 3G and even 4G mobile systems was very promising and hundreds of technological projects were started with GPRS, UMTS, Bluetooth progress in mind. The application of these systems was driven by the vision “information at any time, at any place in any form”. There are running or previous R&D project, which partly solve the problem with general accessibility of data in rural areas. It could be mentioned:

- WirelessInfo - The project aims to implement advanced wireless communications into multimedia systems and services for agriculture and forest administrations to improve access to information. The mobile communication and OGC standards was integrated.
- Premathmod - The goal of project is to improve methods of data access and statistical data analysis in process of precision farming. Precision farming is new agriculture technology designed to monitor, analyse and control plant production with the aim to optimise expenses and ecological effects. The first attempts to build analytical services were provided.
- ReGEO - will provide interfaces to be linked to other e-platforms, like e-commerce, tourism service providers. Virtual databases on OGC standards are implemented

3 SpravaDat Solution

SpravaDAT solution will be tested applications with agriculture and forest data as one from application domains. To assure the extensibility of the solutions the technology approach has to fulfil the next requirements

- System have to share data from different places and different technological platforms
- System has to be able to give overview about existing data sources, about rules for their utilisation, cost etc.
- System has to support easy search of information
- System has to protect data
- System has to support distance analysis of data
- System has to solve problems with paying of data
- System has to offer easy access to data anywhere and anytime with the possibility personalised content according localisation
• Systems has to offer also non expensive applications, which will be easy to implement for local solutions and local utilisation

There exists the technology that can fulfil all those requirements nevertheless those technology has not been extensively applied in the specific area of rural development with the clear goal of stimulate the development of spatial data collection that provide the digital information an services to public and private sector to provide services and cover the gap between rural and urban areas in Europe.

Picture 1. OGC Web Services Base system

There are defined two basic services in SpravaDat that have technological implications. The first one is for data providers; the second is for data user. Both general architectures has been represented in the schemes in order to achieve the general goal of the project and assure the improvement of interoperability, availability and usability of rural digital spatial data, the technological implementation of both services involves the integration of specific technology based on OGC standards. Web Mapping, Web Feature, Web Analytical, Web Catalogue, Web Coverage, Web Registry, Web Terrain and Web Coordinate Transformation services will be integrated, together with Filter Encoding, Styled Layer Description, Web Pricing and Ordering services.

4 Standards Compliance

ISO/TC211 and OpenGis Consortium Ltd are the major standardisation initiatives whose recommendations can be applied to SpravaDar. The mandate of ISO/TC211 is to develop an integrated set of standards for GI. The vision of OCG is the complete integration of geospatial data and geoprocessing resources into mainstream computing. In order to collaborate with the construction of the European Spatial Data Infrastructure and following INSPIRE recommendation the next standards will be analysed and applied when possible

• For data documentation and data content
  o ISO/TS 19103 Conceptual scheme language
o ISO 19109 Rules for application schema
o ISO 19110 Feature cataloguing methodology
o ISO 19115 Metadata
o Dublin core metadata standard for information discovery

- **For transfer of geographic information**
  o GML for feature data
  o GeoTiff, HDF-EOS, BIIF ISO 12087-5 or CEOS for coverage data

- **For the catalogue services**
  o ISO 19119
  o ISO 19128 WMS (OGC WMS1.1.1)
  o OGC WFS
  o OGC catalogue of services

- **For the usability of the services**
  o ISO 9241-11.2

5. Why Spravadat Brokering system

The important question is, why is necessary to build SpravaDat brokering system, why it is not possible to establish direct link between data providers and data users on the base of INSPIRE principles and OGC specifications? There exist more topics, which are important for this brokering system:

- Search for relevant information – there is not possibilities to find relevant information without existing catalogue services, also orientation in data, data validity could not be guaranty from different sources and mainly for individual users is difficult to establish contract with data providers

- Data security versus data usability – there exist to tendencies, on one side to offer to users combination of different data sources and possibilities to provided data analysis on the combination of data from different sources (this is for example not possible on the base of WMS services, the WFS or WCS is required). However, from second side some services, as WFS, or WCS are not able to protect data against coping. The brokering system give to users possibility to use complex services but allowed protect data providers, because there is easy to make clear contract between broker and providers

- The brokering system could offer different Web Analytical services and so give to users possibility use this services without investment on the side of users.

- The Web pricing models allowed easy sharing incomes among partners and it is easier mainly for large public organisation to solve this on the base of agreement with broker then to make for example contract with every individuals.
References

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