Plan4Business

-A service platform for aggregation, processing and analysis of urban and regional planning data-

K. Charvat[1], J. Ježek[2], C. Malewski[3], T. Mildorf[2], J. Rix[3]
[1)] HSRS, CZ; [2)] University of West Bohemia (UWB), CZ; [3)] Fraunhofer-IGD, DE

Summary

The scope of the European project plan4business (296282) facilitates harmonisation and integration of heterogeneous pan-European data sets to be used for cross boarder information and analysis services. Based on the results of two previous European projects Humboldt and Plan4All the integration process was further developed and improved to provide a large set of harmonised and integrated open data. Despite this, it will be extended with data sets possessing access restrictions. A set of applications is developed to run analysis on such data sets and present the results accordingly. Besides the technical approach and examples of applications, the business approach will be presented.

***Type of presentation*:** In-use contribution

Project Idea and Goals

Urban and regional planning data sets were not aggregated so far, and thus it was very laborious to use them for any other purpose than for printing or simple publishing by the authorities that they were created by. Creating time series or comparative analyses on these data sets was not yet possible; researchers, spatial planners and professionals from the real estate world and other disciplines, such as insurance industry, investors, or market-relevant activities related to urban development have a growing stake in such capabilities.

The plan4business project[1] consequently aims to develop a platform that can serve to users as a catalogue of planning data such as transport infrastructure, regional plans, urban plans and zoning plans. The platform represents not only a central access point for integrated, harmonised and thus ready-to-use formatted data, it moreover offers rich analysis and visualisation services via an Application Programming Interface (API) and an interactive web frontend.

Two main challenges have so far hindered wider usage of planning data in such a manner. These challenges are the required data integration and harmonisation processes that need to be highly facilitated through a system, and the need for an ICT system that can efficiently answer complex queries over the diverse and complex planning data sets. The business model for the plan4business platform foresees several different groups of active stakeholders:

- data providers (planning authorities, engineering bureaus, researchers),
- data curators (who perform integration and quality assurance),
- clients, and data brokers (who will be hosting and exploiting the plan4business portal).

---

[1] EU Project plan4business (296282) is funded by the European Commission under the call FP7-ICT-2011-SME-DCL. The project started in April 2012 and runs for 2 years.

There are two platforms foreseen. There will be an Open Data Platform which will be accessible for free and will contain open data. In order to keep the platforms sustainable, there will also be a Commercial Platform, which revenue will be generated via on-demand and subscription services to different customer groups ranging from environmental and planning authorities and companies to banks and real estate companies and developers.

Technical Approach

The system is realized through composition of three engine layers, namely the integration layer (1), the storage layer (2) and the analysis layer (3) (Fig. 1). The layer's tasks are either to harmonize (1), store and provide (2), or visualize and analyse (3) data related to urban plans.

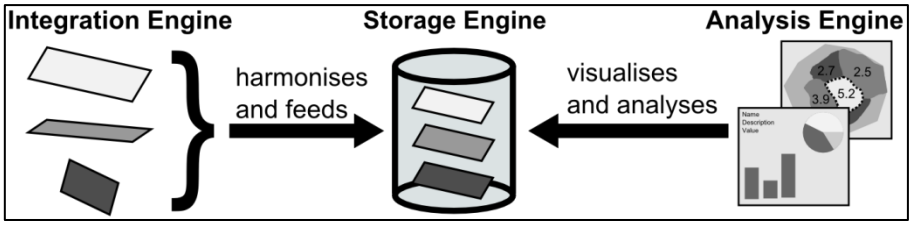

Fig. 1. Composition of the three core engines; integration engine for data harmonisation, storage engine for data storage and provision, analysis engine to visualise and analyse harmonized data.

The Integration Engine's task is to transform spatial data sets based on a set of schema mapping instructions. Examples for mapping instructions are reclassifications of land use nomenclatures, spatial coordinate transformation and assigning object types from the source data to a target schema. The Integration Engine has been realized as a web service based on the *Humboldt Alignment Editor* (HALE) software stack[2]. HALE provides the functionality to perform interactive mapping of geospatial schemata. HALE's user interface has been adopted in order to allow for performing the mapping process online. Therefore, a step-by-step wizard guides the user through the mapping process and asks to map the source entity types to a pre-determined target schema. The latter is a simplified subset of the INSPIRE Data Specification on Land Use[3]. Fig. 2 sketches mappings for spatial, temporal and thematic attributes as performed in the integration engine.

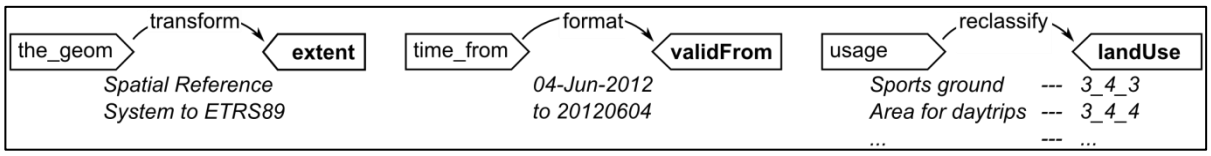

Fig. 2. Exemplary mappings for spatial, temporal and thematic attributes. The bold attribute names belong to the target schema INSPIRE Data Specification on Land Use.

Once the schema mapping is finished it may be executed, published and shared with other users.

Applying the mapping instructions to the source data uploads the resulting transformed data to the Storage Engine. The latter is a combination of two separated data bases following the

[2] http://www.esdi-community.eu/projects/hale
[3] http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_LU_v3.0rc2.pdf

relational paradigm on the one hand and the graph paradigm on the other. The main component of the Storage Engine is the relational data base. Although the relational paradigm has been carried out successfully for many years, it lacks in performance when it comes to more complex queries that require a lot of table joins. Thus, we have supplemented it with a graph data base that runs particular use cases. Both, the relational data base and the graph data base, can be managed via the web portal. This allows for storing, deleting or updating transformed data sets. The data is either accessible as INSPIRE compliant files (e.g. Geography Markup Language[4]) or via SQL.

The Analysis Engine encapsulates data access and represents a base for an extensible collection of analysis and visualisation applications (apps).

plan4business Apps

This section presents the end-user apps built on top of the Analysis Engine, such as Brownfields (an app for brownfield advertisement), Embed Map (embedding an interactive map window with user defined maps into user's website) and Advert (placing an advert for selling real estates). The plan4business platform and the apps are available at www.whatstheplan.eu. The apps combine the data harmonized through the Integration Engine with open data available from various sources. As an example the Thematic Map Viewer and the Location Evaluator apps are described in more detail.

The Thematic Map Viewer (Fig. 3) enables to navigate through thematic maps and results of predefined analyses from local to European level. Based on the level of zoom in a certain area a list of thematic maps is dynamically offered to the user. The user can then select one of the thematic maps, display it in the map viewer and analyse it in an interactive manner.

The Location Evaluator (Fig. 4) is an app for user friendly access to data from various sources including statistical, analytical and cadastral information. User can generate a comprehensive report about a region in Europe (Fig. 5), a municipality or a point of interest in selected countries through navigation in a map.

Open Data Platform for Data Reuse

The current situation with data availability and compliance to commonly used standards differ from country to country. But in general, most data from the public sector are not published in a standardised and machine readable form. This makes collection, integration and update of data rather difficult.

The plan4business project offers a solution that can help to overcome this situation and enable effortless sharing and reuse of open data. The Open Data Platform (Fig. 6) is a data hub containing Open Data, management and harmonising tools and open applications such as the Thematic Map Viewer presented in the previous section. Any party can access the data pool and make commercial or non-commercial apps based on these data (keeping in mind the original data licences).

[4] http://www.opengeospatial.org/standards/gml

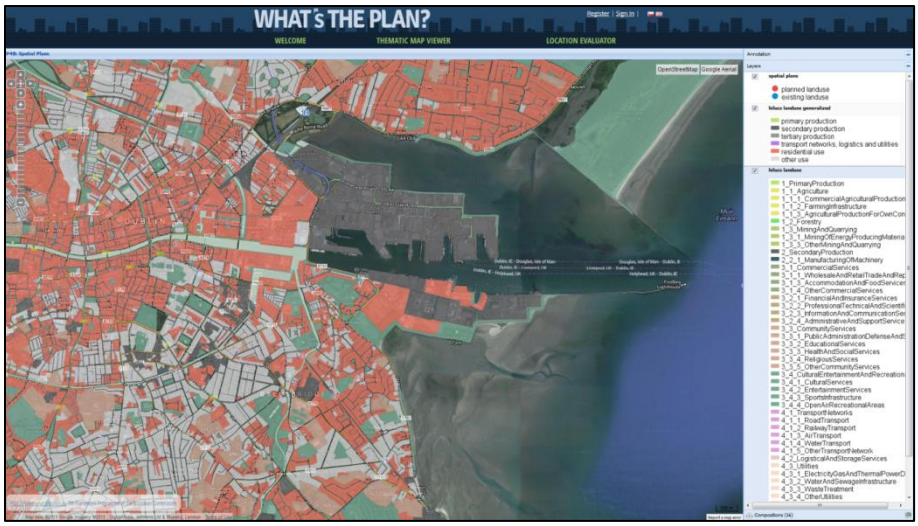

Fig. 3. Thematic Map Viewer

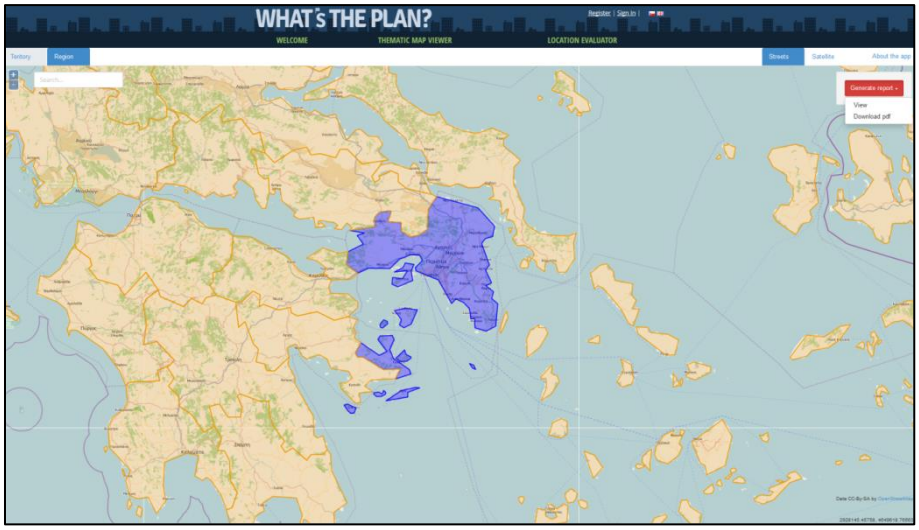

Fig. 4. Location Evaluator

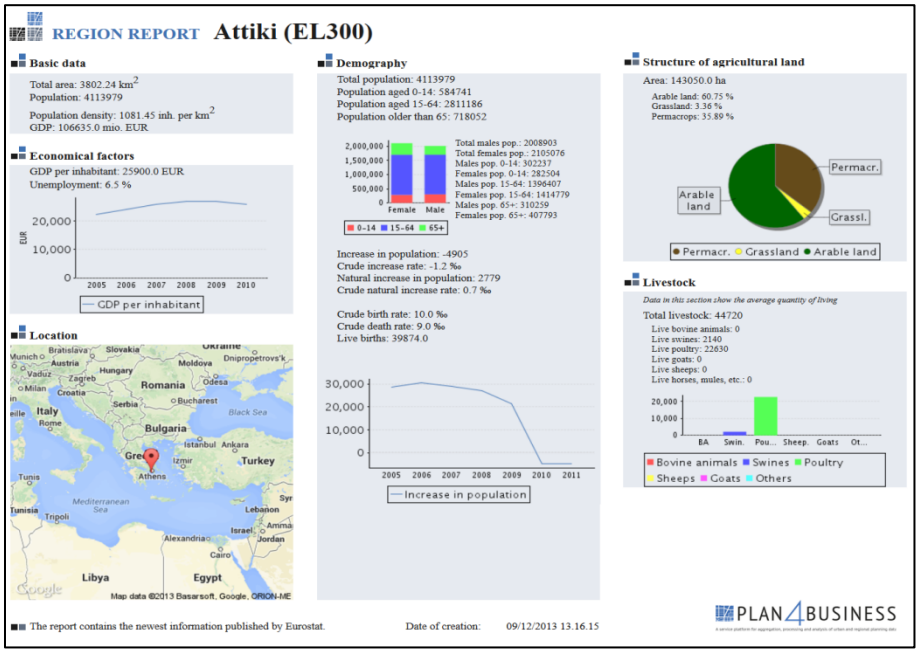

Fig. 5. Report generated by the Location Evaluator

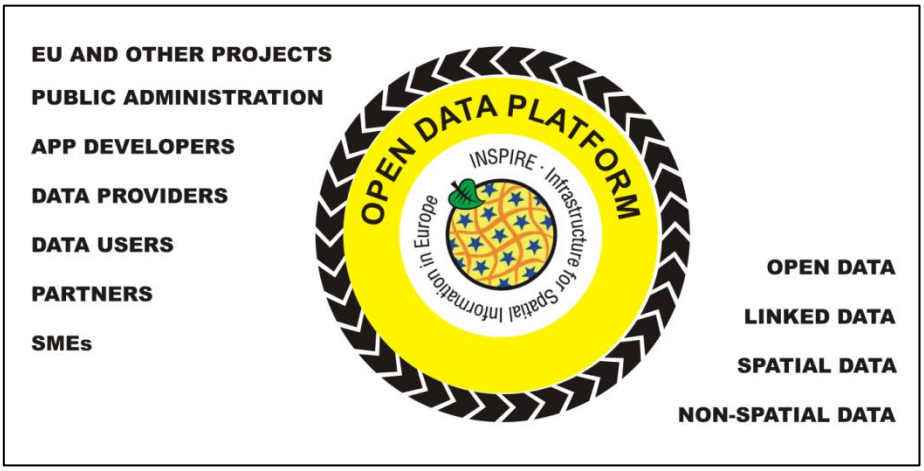

Fig. 6. Open Data Platform – its content and users

Future perspectives

The results of the plan4business project offer a first complete solution for users. The solution will then be continuously extended with additional data sets as well as further functionalities and applications to support different user communities. Advanced applications for the commercial market are planned and it is intended to extend the data sources also with restricted data (or not yet open data) to offer advanced services and also extend the application perspectives to a broader user community.

Presenters' short biography

Charvát Karel – Charles University in Prague - Doctor in theoretical cybernetics. Member of CAGI and CSITA, Former president of the European Federation for Information Technology in Agriculture Food and Environment (EFITA), chairman of the Czech Centre for Science and Society. Key qualification: strategic studies and management of projects in ICT and SDI.

Jan Ježek – Ph.D. (2009) in Geomatics, Czech Technical University, Prague; Researcher at University of West Bohemia in Pilsen; Research activities: GIS, Spatio-temporal data structures, spatial databases.

Christian Malewski – M.Sc. (2013) in Geoinformatics, University of Münster, Münster, Germany; Research Assistant with Fraunhofer Institute for Computer Graphics Research IGD. Research interests: semantic interoperability of spatio-temporal data, spatial information infrastructures and the sensor web.

Tomáš Mildorf – Ph.D. (2012) in Geomatics, University of West Bohemia in Pilsen. Research activities: infrastructure for spatial information, model generalisation. Traineeship in Joint Research Centre of the European Commission in Ispra (Italy) – Institute for Environment and Sustainability, Spatial Data Infrastructure Unit.

Joachim Rix – Dr. degree in Computer Science from Technische Universität Darmstadt. Head of department for Spatial Information Management at Fraunhofer-Institute for Computer Graphics Research IGD; Member of InGeoForum and the advisory Board of DDGI; 25 years of experience in applied research with industrial, national and European projects; project coordinator of plan4business.