

<b>Project number:</b>	296282
<b>Project acronym:</b>	<i>plan4business</i>
<b>Project title:</b>	A service platform for aggregation, processing and analysis of urban and regional planning data
<b>Instrument:</b>	STREP
<b>Call identifier:</b>	FP7-ICT-2011-SME-DCL
<b>Activity code:</b>	

<b>Start date of Project:</b>	2012-04-01
<b>Duration:</b>	24 month

<b>Deliverable reference number and title (as in Annex 1):</b>	<b>D5.3 Analysis Engine</b>
<b>Due date of deliverable (as in Annex 1):</b>	<b>M21</b>
<b>Actual submission date:</b>	<i>see "History" Table below</i>
<b>Revision:</b>	

<b>Organisation name of lead contractor for this deliverable:</b>
University of West Bohemia (UWB)

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium	
CO	Confidential, only for members of the consortium (including the Commission Services)	



European Commission  
Information Society and Media

<b>Title:</b>
Analysis Engine
<b>Author(s)/Organisation(s):</b>
Jan Jezek, Michal Kepka, Tomas Mildorf / UWB
<b>Working Group:</b>
WP5
<b>References:</b>
Grant Agreement No. 296282, Annex I Description of Work

<b>Short Description:</b>
This deliverable summarises the work performed and progress achieved within WP5, Task 5.2 Analysis Engine Development. This is the final report describing the server side of the Analysis Engine as well as links to the client side of the <i>plan4business</i> platform.
<b>Keywords:</b>
analysis engine, plan4business, thematic maps, Application Programming Interface, SQL queries

History:				
Version	Author(s)	Status	Comment	Date
001	Tomas Mildorf	draft	outline of the report, modified D5.1	02.12.2013
002	Jezek Jan	draft	reports	03.12.2013
003	Tomas Mildorf	draft	update of the introduction	04.12.2013
004	Jan Jezek	draft	API	10.12.2013
005	Jezek Jan	draft	thematic maps	17.12.2013
006	Tomas Mildorf	draft	Annex I created by Dmitri Kožuch	18.12.2013
007	Tomas Mildorf	draft	Reviewer 1 comments	19.12.2013
008	Tomas Mildorf	final	Reviewer 2 comments	19.12.2013
009	Tomas Mildorf	final	Figure 2 replacement	20.12.2013

Review:			
Version	Reviewer	Comment	Date
006	Simon Templer	Comments in the document	18.12.2013
007	Przemysl Turos	Comments in the document	19.12.2013

## Table of Contents

Table of Contents .....	3
List of Acronyms .....	4
List of Figures .....	5
1 Introduction.....	6
1.1 <i>plan4business</i> .....	6
1.2 Aim of the Report .....	6
1.3 Structure of the Report .....	6
2 Terminology.....	8
3 General Architecture .....	9
4 Analyses Engine.....	11
4.1 General Query Repository.....	11
4.2 General Queries API .....	12
4.3 Analysis Report Output .....	13
4.3.1 Report Designer .....	13
4.3.2 Report REST Services .....	14
4.3.3 Report Templates and their Content .....	15
4.4 Cartographic Output .....	16
5 Conclusion.....	18
References .....	19
Annex I – Thematic Maps.....	20

## List of Acronyms

API	Application Programming Interface
AVINET	Asplan Viak Internet
COSM	Czech Office for Surveying, Mapping and Cadastre
GIS	Geographic Information System
HALE	HUMBOLDT Alignment Editor
HILUCS	Hierarchical INSPIRE Land Use Classification System
HSRS	Help Service Remote Sensing
HTTP	Hypertext Transfer Protocol
INSPIRE	Infrastructure for Spatial Information in the European Community
ISOCARP	International Society of City and Regional Planners
KML	Keyhole Markup Language
PDF	Portable Document Format
RDBMS	Relational Database Management System
RDF	Resource Description Framework
REST	Representational State Transfer
SQL	Structured Query Language
URL	Uniform Resource Locator
UWB	University of West Bohemia in Pilsen
WMS	Web Map Service
WP	Work Package
XML	Extensible Markup Language

List of Figures

Figure 1 Three tier system of the plan4business platform .....9

Figure 2 General architecture .....10

Figure 3 Metadata table containing the information about the analysis result .....11

Figure 4 A web app for querying the plan4business database and displaying the results .....13

Figure 5 Jaspersoft iReport designer.....14

Figure 6 SVG map of a region .....15

Figure 7 Municipality report example .....16

Figure 8 Thematic map example .....17

# 1 Introduction

## 1.1 *plan4business*

*plan4business* is a European project running from April 2012 until March 2014 and co-financed by the 7<sup>th</sup> Framework Programme of the European Commission. The full title is *plan4business – a Service Platform for Aggregation, Processing and Analysing of Urban and Regional Planning Data*.

*plan4business* develops a service platform for aggregation, processing and analyses of urban and regional planning data in Europe. Harmonised data will be integrated into seamless, homogenous, constantly growing and updated trans-border dataset. The platform will enable spatial analyses across European datasets. The platform should serve not only as a catalogue of planning data but also as their integrator enabling user to search, view, analyse and download spatial planning data on European and regional levels. The main project objectives are the automation of harmonisation processes and possibilities of complex analyses.

The *plan4business* consortium comprises six organisations securing the project execution:

- Fraunhofer IGD - Fraunhofer Institute for Computer Graphics Research, Germany
- UWB - University of West Bohemia in Pilsen, Czech Republic
- HSRS - Help Service - Remote Sensing, s. r. o., Czech Republic
- ISOCARP - International Society of City and Regional Planners, The Netherlands
- GEOSYS - GEOSYSTEMS Polska, Poland
- AVINET - Asplan Viak Internet as, Norway

## 1.2 Aim of the Report

The *plan4business* project should significantly contribute to decision making in planning processes on various governmental levels and in cross-border activities. Next to issues of data availability and business modelling, the *plan4business* consortium is facing challenging problems of data integration, storage and analysis. These are the main issues that are being developed within WP5 Storage, Integration & Analysis Engines. This document is focused on the analysis part of this work package which was performed within Task 5.3 Analysis Engine Development.

The main objective of Task 5.3 was to develop the server part of the *plan4business* platform dealing with data analysis. The main features of the Analysis Engine are attuned according to the user requirements and marketing needs provided through WP2 Business Planning and WP3 Requirements Management and Service Pricing.

## 1.3 Structure of the Report

The document is structured in 5 chapters and 1 annex. The content of the chapters is as follows:

Chapter 1 contains a brief summary of the project, the main aim of the report and the structure of the document.

Chapter 2 contains definitions of terms that are essential for understanding of the content of this document.

Chapter 3 described the general architecture of the platform.

Chapter 4 describes the Analysis Engine and its features

Chapter 5 concludes the document.

Annex I – Thematic Maps – is a list of thematic maps which are available through the Thematic Map Viewer (<http://www.whatstheplan.eu/viewer>).

All the literature used for this deliverable is duly referenced. The list of citations is inserted at the end of the document.

## 2 Terminology

**Application Programming Interface (API)** – “An application programming interface (API) is a protocol intended to be used as an interface by software components to communicate with each other. An API is a library that may include specification for routines, data structures, object classes, and variables.” (Wikipedia contributors 2013a)

**HUMBOLDT Alignment Editor (HALE)** – “a tool for defining and evaluating conceptual schema mappings. The goal of HALE is to allow domain experts to ensure logically and semantically consistent mappings and consequently transformed geodata. Furthermore, a major focus is put on documentation of the schema transformation process and its impacts, e.g. in the form of lineage information attached to the resultant transformed data.” (Data Harmonisation Panel 2013)

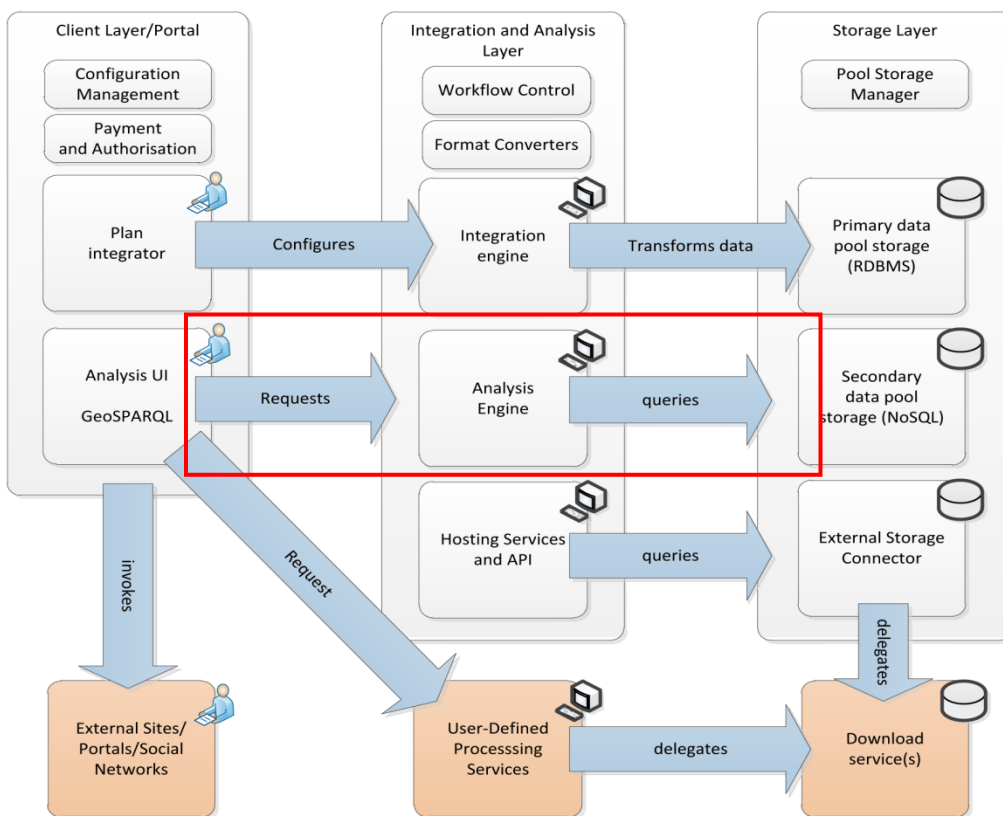
**Structured Query Language (SQL)** – the most prominent language to formulate queries against databases.



### 3 General Architecture

The *plan4business* platform is composed of three layers as depicted in Figure 1:

1. **Client Layer (Portal)** - user interface for performing data integration, management, analyses and visualisation.
2. **Integration and Analysis Layer** - engines for data harmonisation and data analyses. It includes API for better exploitation of the *plan4business* platform features in other applications.
3. **Storage Payer** - optimised storage for data and metadata.



*Figure 1 Three tier system of the plan4business platform (Fraunhofer 2012)*

In order to secure the platform components can be integrated and work as a single system, a general architecture listing the main components and their relationships was designed (Figure 2).

The central part of the platform is a metadata catalogue. In this case, the Micka catalogue developed by HSRS is used. The catalogue enables to store not only metadata about existing datasets, but also about analyses, map compositions and integration services that can be performed.

The Integration Engine accessing and harmonising data in the Storage Engine is supported by the HUMBOLD Alignment Editor (HALE). HALE should be one of the components of the *plan4business* portal (the left part of Figure 2) securing user interaction with data that are being integrated.

The Analysis Engine processes the requests given by users through the *plan4business* portal. The query is processed and the Analysis Engine accesses the data storage and retrieves query results that are then provided to users in standardised form.

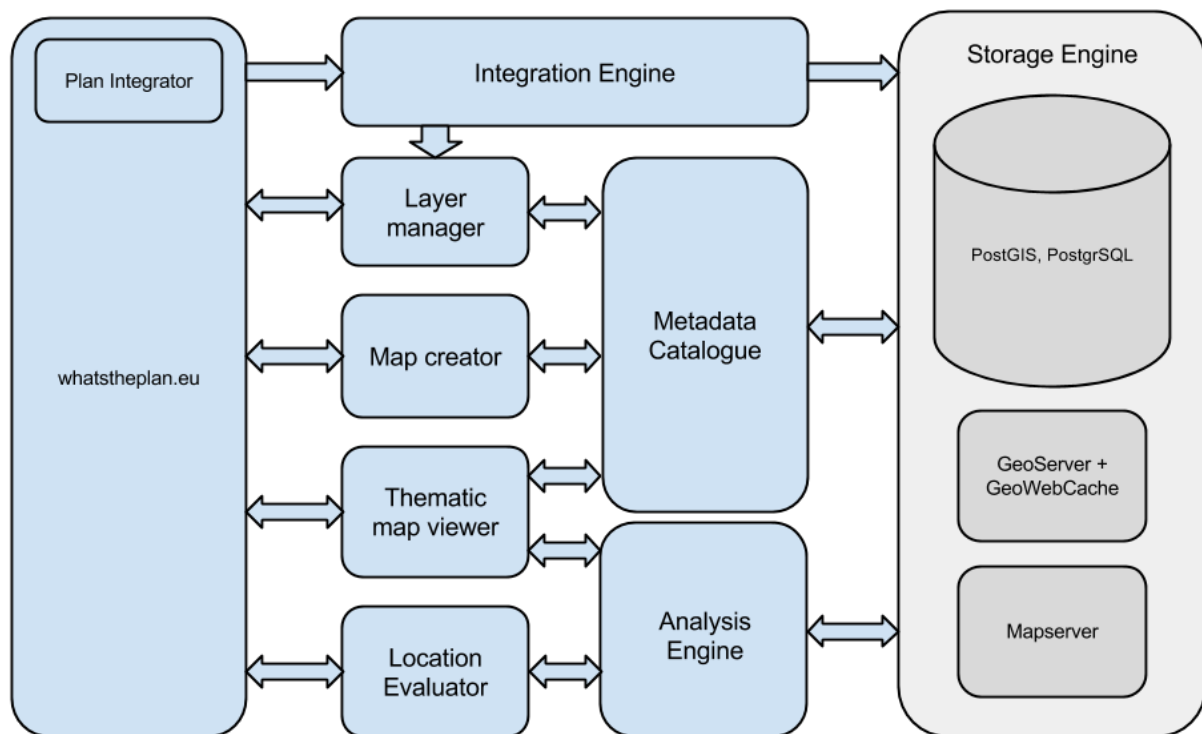


Figure 2 General architecture

## 4 Analyses Engine

The *plan4business* platform uses the open source PostgreSQL database with the PostGIS support programme for spatial data. The Analysis Engine offers two main possibilities to define particular analysis. One possibility is to perform a general query by using rest API that and common SQL. Such an interface is designed mainly for internal proposes and for expert users. The other possibility is to use predefined analysis templates designed by data experts beforehand. The analysis engine also provides an API for the analysis output and visualisation. Such a visualisation can be prepared in the form of thematic map or a report in PDF or HTML.

### 4.1 General Query Repository

While the analysed data are stored in various database schemas, the results of analyses are stored in a single schema. The results in that schema are organised through the *stored\_query* table depicted in Figure 3. The table contains the following information:

- *query\_id* – query identifier is used for data management,
- *sql\_query* – original user defined SQL query for the analysis,
- *result\_table\_name* - name of the result table,
- *time\_stamp* –continuously changing time stamp indicating either the time of the query initiation, editing or finalisation,
- *processing\_state* – the status of the current process: in process, finalised, deleted,
- *geometry\_column* – geometry type that can be used for visualisation of queries with particular geometry,
- *user\_id* – identifier of the user who set the query and has the right to edit it,
- *used\_time* – an indication whether time is used in the query as another dimension.

stored_query	
<i>query_id</i>	BIGINT
<i>sql_query</i>	CHARACTER VARYING(4000)
<i>result_table_name</i>	CHARACTER VARYING(60)
<i>time_stamp</i>	TIMESTAMP WITH TIME ZONE
<i>processing_state</i>	CHARACTER VARYING(600)
<i>geometry_column</i>	CHARACTER VARYING(20)
<i>user_id</i>	CHARACTER VARYING(30)
<i>used_time</i>	BOOLEAN

P **select\_1355249654959**

Figure 3 Metadata table containing the information about the analysis result (Ježek, Kepka, et al. 2013)

Each record contains a unique identifier for securing the connection between the query and the results. All database operations are managed by the database functions (RDBMS). RDBMS also ensures data consistency by utilising fully transactional behaviour.

## 4.2 General Queries API

The main part of the Analysis Engine runs on a server. This part ensures communication with users and forwarding requests to the database. Two main modules and one supportive module can be distinguished.

The first module ensures the reception of user queries and execution of the requests in the database. A query is received by a REST API through the HTTP protocol, the quality of the mandatory parameters is checked and method for further processing is selected based on the combination of the parameters. User query is stored together with other parameters into an object that can be then stored in Query Repository (the `stored_query` table). At the same time, the query is processed into an SQL command. This results in a new table. The object is then stored into the `stored_query` table together with the status of the query execution. The status is changed to “finished” as soon as the execution of the query is successfully finished.

The second module provides publication of user queries’ results. The REST service receives user requirements from the portal and then retrieves data from the database. The user requirement includes identification of the original query and bounding box of the map window where the results will be displayed. As soon as user requirements are received and parameters are checked, a utility for data retrieval from the database is called based on the combination of the parameters. Retrieved data are then converted from objects into the hash-map structure, which corresponds with the structure of the resulting KML file. Only the geometry is retrieved from the database directly in the KML format. Templates for data publication are applied to the resulting files before they are sent to the portal.

The supportive module contains methods for query management including checking the query status, accessing past queries and their deletion. All operations can be triggered through secured REST API.

The web application for performing such general queries has been prepared. Such an application provides the possibility to perform user defined queries and displaying query results without any major configuration (Figure 4). This approach requires knowledge about the data in the database and SQL querying. An example of such a query can be a selection of areas that are planned as residential areas (according to the urban plan) and that can be at the same time affected by floods.

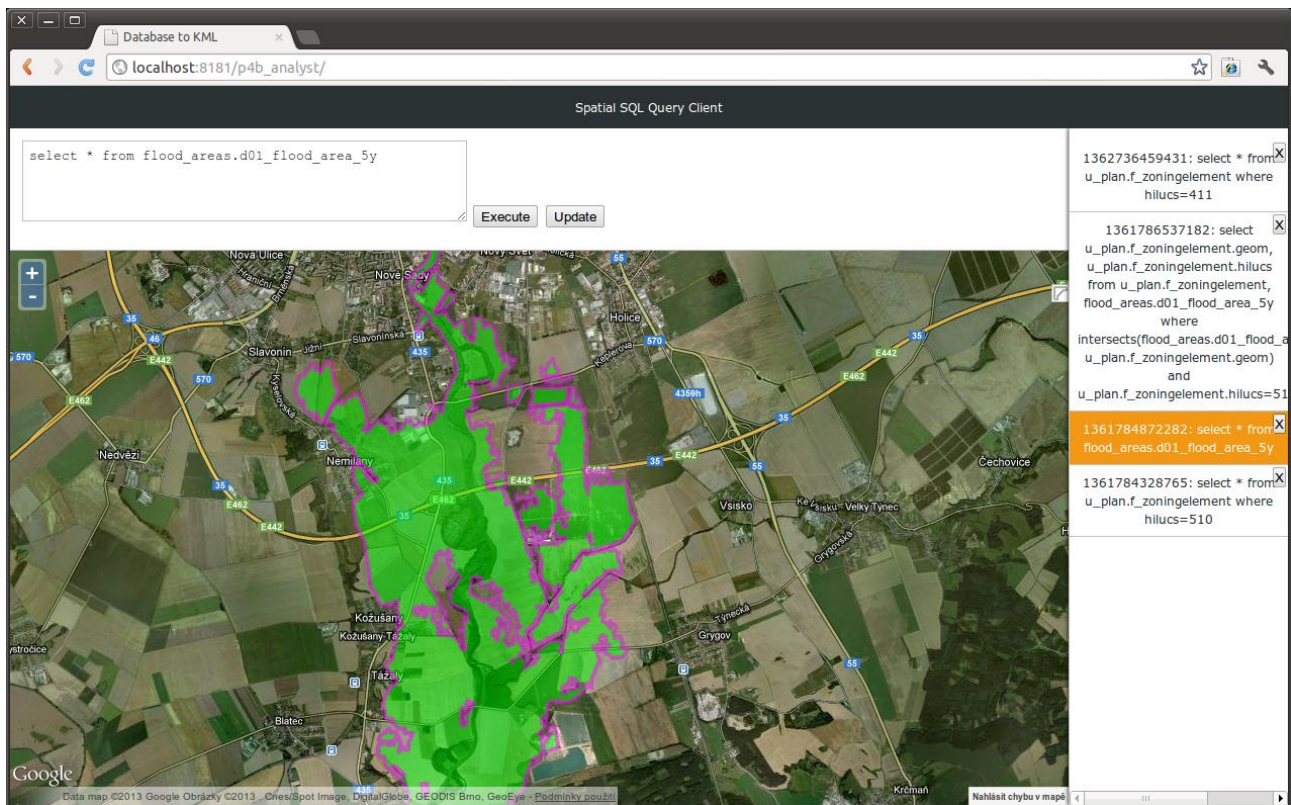


Figure 4 A web app for querying the plan4business database and displaying the results (Ježek, Mildorf, et al. 2013)

## 4.3 Analysis Report Output

The Analysis Engine provides the tools that enable the visualisation of a common analysis in the form of a comprehensive report that includes charts, tables and static maps. Through this framework a template for reports can be generated by data experts. These templates define user input parameters, the SQL code for particular analysis and the design and visualisation of the results. Such templates are based on Jaspersoft Studio<sup>1</sup> (an open source framework) for report preparation and processing.

### 4.3.1 Report Designer

The reports are being prepared using the desktop designer provided as a part of the Jaspersoft framework. This third party software enables simple configuration of analysis and its visualisation that can be done by data experts. Such a template in the XML format can be then stored into the database with proper metadata.

<sup>1</sup> <http://community.jaspersoft.com/>

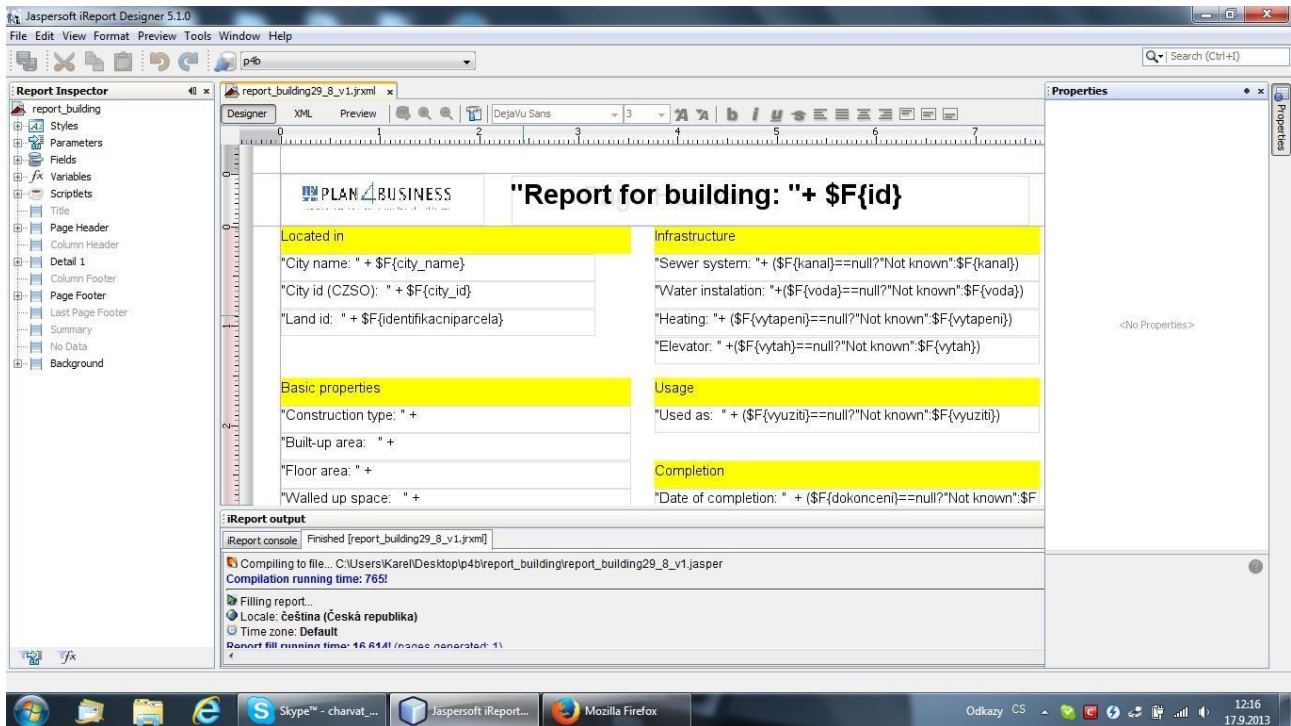


Figure 5 Jaspersoft iReport designer

The report templates are being compiled from XML to Java objects in runtime on the server side. Such a process is based on a third party Java library provided by Jaspersoft framework. The analysis module automatically provides the REST service for all the reports that are stored in the database including the possibility to set the parameters of a particular report.

### 4.3.2 Report REST Services

The reports are provided through REST services. Such a service automatically binds the report template to the URL that is based on report ID. An example of an HTTP request for the acquisition of a report in the PDF or HTML forms (based on http GET):

[http://www.whatstheplan.eu/analyst\\_p4b/rest/report/gethtml/municipality\\_report\\_en/params;input=540561](http://www.whatstheplan.eu/analyst_p4b/rest/report/gethtml/municipality_report_en/params;input=540561)

Where the `municipality_report_en` stands for an ID of the report and the `input=540561` stands for the report parameters (in this case it is municipality id).

Besides the main services focused on the reports, there are also additional services that provide specific output from the database in the graphical format (SVG). Such services are based on SVG templates that are convenient for more complex graphics and that are not available by the Jaspersoft software. An example of such a service is the SVG visualisation of a particular region. The URL of this service can be:

[http://www.whatstheplan.eu/analyst\\_p4b/rest/svg/nuts3/CZ032](http://www.whatstheplan.eu/analyst_p4b/rest/svg/nuts3/CZ032)

And the response is the SVG image in Figure 6 (where the nuts3 ID is CZ032).





*Figure 6 SVG map of a region*

Such services enrich the visual content of the reports by custom graphics.

The REST interface has been implemented in Java programming language and is based on JAX-RS library.

### 4.3.3 Report Templates and their Content

The following report templates have been prepared and implemented as a part of the Location Evaluator app:

- Report for buildings** - Report for buildings can be generated for each building in the Czech Republic. Each report is informing about the position of the building, its use and several basic properties such as construction type, build-up area, floor area, walled up space, number of floors and number of apartments. Furthermore, there can be found information about infrastructure and other equipment such as water installation, sewage system, connection to electricity, heating and elevator. These data are taken from RUIAN published by the Czech Office for Surveying, Mapping and Cadastre (COSMC). Availability of the information mentioned above depends on the availability of the original source. Not all the information was collected for all the buildings in Czech Republic, but COSMC is continuously updating them. In important part of the report is flood risk. It is possible to find out, whether the building is located in 5-years, 20-years, 100-years, or the biggest flood zone. The source of flood zones data is T. G. Masaryk Water Research Institute, public research institution.
- Report for municipalities** - Municipality reports can be displayed for each of 6253 municipalities (LAU2 level) in the Czech Republic and most districts (NUTS3 level) in Germany. Every individual report serves as a general overview of a municipality. Reports contain information about superior administrative units of the municipality, land use, economical factors, demography, housing, various kinds of sport or cultural facilities and tourism. There are also included results of the latest local elections. The reports are composed from various data sets published by the Czech Statistical Office (CZSO) which were imported to the plan4business database. Each report contains links to other

websites informing about the municipality (linked data). The websites contain general information, statistical information, budgets and debts of municipalities. An example of this report is in Figure 7.

- **Regional reports** - Regional reports are presenting information about NUTS 3 regions. These reports contain basic overview of economic data and demographic data. Other parts of the report are a structure of agricultural land and livestock. Reports are generated from imported regional data published by EUROSTAT. Availability of various kinds of data differ between individual countries and regions. There are currently two versions of the report. One for NUTS 3 regions in Czech Republic and one for NUTS 3 regions for the entire EU plus several other European countries. The structure of both kinds of regional reports is nearly the same at this moment with minor differences, but the template of the EU version is using more general queries dealing with missing data.

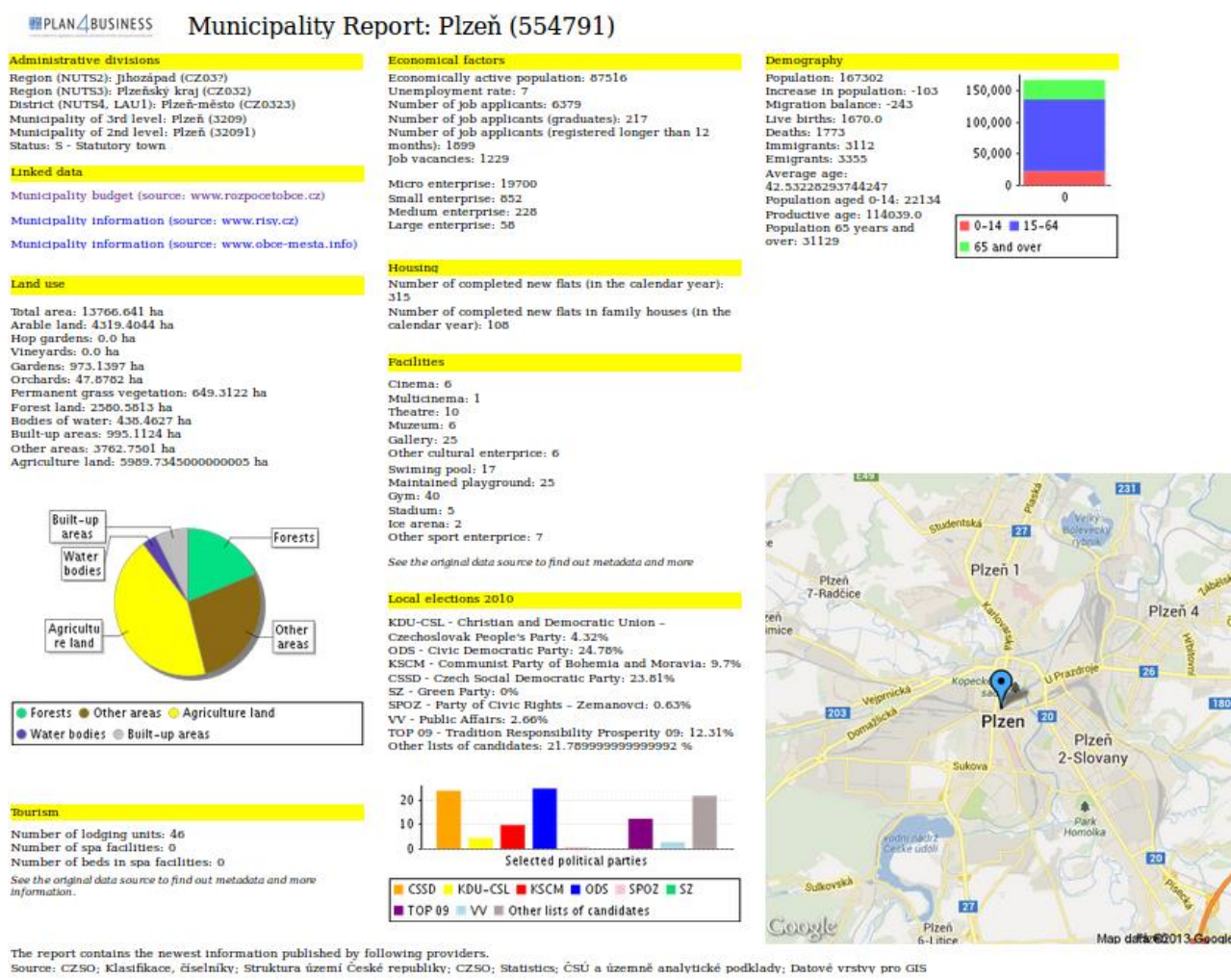


Figure 7 Municipality report example

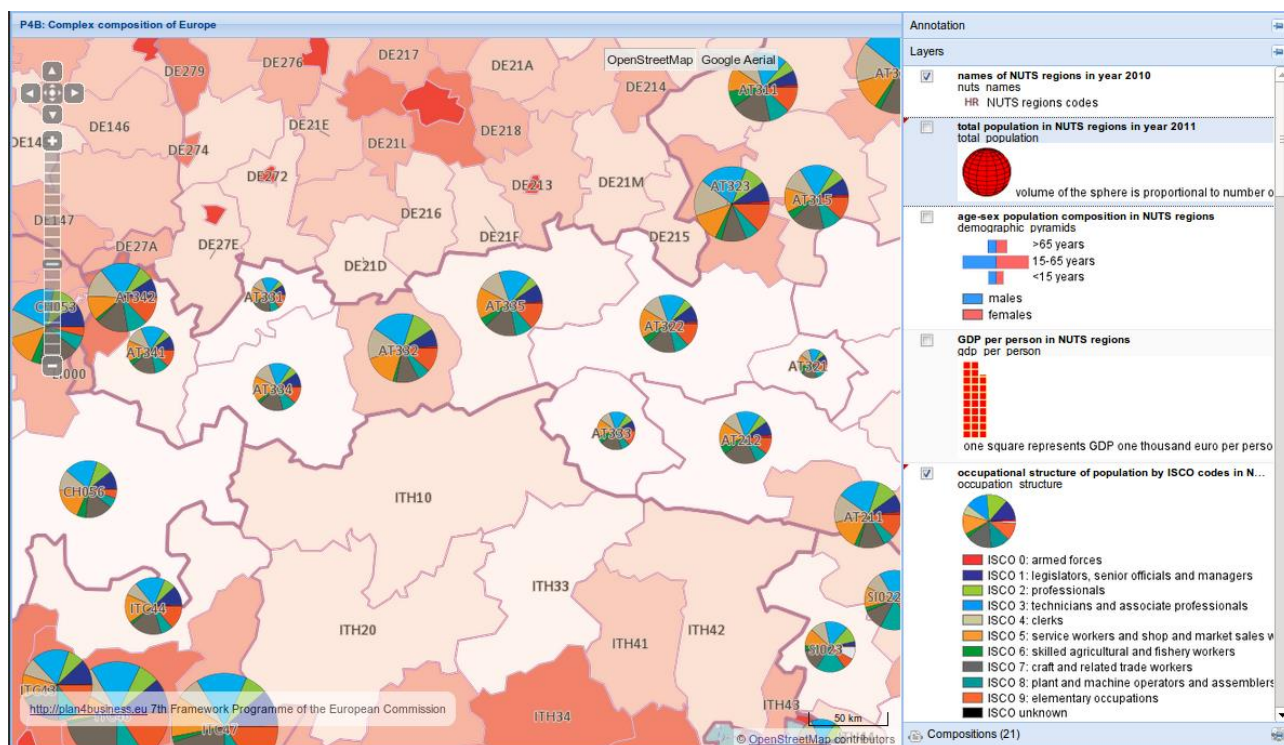
## 4.4 Cartographic Output

The Analysis Engine offers a possibility to visualise the data as a thematic map through thematic map viewer application. Thematic maps are prepared to visualise various datasets, an overlay of different layers. The



metadata of these thematic maps are collected in the metadata catalogue and they are used for searching through the Thematic Map Viewer. Based on the zoom level and the geographical position, a list of thematic maps is automatically offered. For map rendering, the MapServer software is used.

At this moment there are 47 thematic maps available. There are thematic maps of ranging from European to local levels. All the thematic maps are described in Annex I – Thematic Maps. The example of a complex thematic map of Europe displayed by Thematic Map Viewer is depicted in Figure 8.



*Figure 8 Thematic map example*

From the technical perspective, all the map layers are available as standardised WMS services. There is also a possibility to prepare such a composition by combining the data provided by users. The tools for composition preparation are part of the Map Creator app (see results of WP4 for more details).

## 5 Conclusion

The development of the Analysis Engine was successfully finalised. However, since there are additional user requirements and feedback from customers, the work on the Analysis Engine is ongoing. The work includes mainly adding additional data as an input for the analysis, expanding the geographical coverage, modification of the report templates, and providing some additional features. The solution is based on free and open source software and can be customised according to the wishes of our customers.

The report presents the general architecture of the entire system which has been implemented mainly within WP4 and WP5. It shows the links between the main components. The main focus is then given to the server side of the Analysis Engine which provides the communication between the client side of the platform (see D4.1.2 for more details) and the data storages (for more information on data storages please refer to D5.4 Storage Engine). Besides the communication, the Analysis Engine provides interpretation of data in the form of tables, structured texts, charts and maps. The Analysis Engine enables advanced portrayal of the analysis results.

The Analysis Engine can perform user defined queries. This feature is targeted at experts knowing the data pool, its structure and content. Predefined queries which are currently implemented for the Location Evaluator and the Thematic Map Viewer apps are suitable for non-experienced users. These tools are shaped for easy navigation and use. For more details on these apps, please refer to D4.1.2.

## References

- Data Harmonisation Panel, 2013. HUMBOLDT Alignment Editor. Available at: <http://www.esdi-community.eu/projects/hale>.
- Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e. V., 2012. Seventh Framework Programme, Grant Agreement No 296282 plan4business - A service platform for aggregation, processing and analysis of urban and regional planning data, Annex I - Description of Work.
- Google, 2013. KML Tutorial. Available at: [https://developers.google.com/kml/documentation/kml\\_tut](https://developers.google.com/kml/documentation/kml_tut).
- Ježek, J., Mildorf, T., et al., 2013. The Plan4business Approach to Transfer Open Data into Real Estate Businesses. In J. Hřebíček et al., eds. *Environmental Software Systems. Fostering Information Sharing*. IFIP Advances in Information and Communication Technology. Springer Berlin Heidelberg, pp. 588–596. Available at: [http://link.springer.com/chapter/10.1007/978-3-642-41151-9\\_55](http://link.springer.com/chapter/10.1007/978-3-642-41151-9_55) [Accessed October 8, 2013].
- Ježek, J., Kepka, M. & Mildorf, T., 2013. plan4business – SERVISNÍ PLATFORMA PRO AGREGACI, ZPRACOVÁNÍ A ANALÝZU ÚZEMNĚ PLÁNOVACÍCH DAT MĚST A REGIONŮ. In *Sborník sympozia GIS Ostrava 2013*. Symposium GIS Ostrava 2013. Ostrava: Vysoká škola báňská - Technická univerzita.
- Open Geospatial Consortium, 2012. Open Geospatial Consortium. Available at: <http://www.opengeospatial.org> [Accessed February 18, 2012].
- Wikipedia contributors, 2013a. Application programming interface. *Wikipedia, the free encyclopedia*. Available at: [http://en.wikipedia.org/w/index.php?title=Application\\_programming\\_interface&oldid=542275587](http://en.wikipedia.org/w/index.php?title=Application_programming_interface&oldid=542275587) [Accessed March 10, 2013].
- Wikipedia contributors, 2013b. Unified Modeling Language. *Wikipedia, the free encyclopedia*. Available at: [http://en.wikipedia.org/w/index.php?title=Unified\\_Modeling\\_Language&oldid=543637865](http://en.wikipedia.org/w/index.php?title=Unified_Modeling_Language&oldid=543637865) [Accessed March 17, 2013].

## Annex I – Thematic Maps

This table includes a list of thematic maps which can be accessed at <http://www.whatstheplan.eu/viewer>.

Name	Abstract	Extent	Data source	Language
<b>Spatial Plans</b>	Composition shows available spatial plans harmonized according to INSPIRE-HILUCS specifications.	Europe	Combined sources	English
<b>Cultural infrastructure of municipalities in Czech Republic</b>	The given composition shows distribution of cultural institutions in Czech Republic by LAU regions. It shows how many cinemas, multiplex cinemas, theatres, museums, galleries and other types of cultural institutions are contained in each LAU region of Czech Republic. The map itself consists of three main components: base layer (shows borders and codes of LAU regions), diagram map (that represents quantity of various cultural institution, situated in a region); and also clickable info-layers. The map composition should give viewer an impression about the development of cultural infrastructure in each given municipality of Czech Republic. The data is taken from Czech Statistical Department database and is for year 2012.	Czech Republic	Czech Statistical Ministry	English
<b>Economical entities in Czech Republic by LAU regions</b>	The given composition shows prevailing size of an economic entity and also their structure (by economic sectors) in Czech Republic by LAU regions. The map itself consists of four main components: base layer (shows borders and codes of LAU regions), choropleth map (showing prevailing economic entity size defined by the amount of people working at economic entities of different sizes), diagram map (that shows distribution of economical entities by economy sectors) and also queryable info-layers, that are clickable (show exact number of entities by sectors). Data used are taken from Czech Statistical Department Database and is for year 2012.	Czech Republic	Czech Statistical Ministry	English
<b>Hustota zalidnění</b>	Tato kompozice ukazuje počet obyvatel a hustotu zalidnění v rámci České republiky dle okresů a obcí. Kompozice má poskytnout pozorovateli představu o vzorech prostorového rozmístění obyvatelstva v Česku. Celá kompozice se skládá ze čtyř vrstev: podklad, zobrazující hranice a kódy okresů nebo obcí, jednoduchý kartogram, zobrazující hustotu obyvatel na km <sup>2</sup> , kartodiagram (kouli), jež objem je přímo úměrný počtu obyvatel, žijících v daném celku, a také klikatelné informační vrstvy. Data použita při sestavování kompozice jsou z databáze ČÚZK.	Czech Republic	Czech Statistical Ministry	Czech

Name	Abstract	Extent	Data source	Language
<b>Kulturní zařízení v českých okresech a obcích</b>	Diagramová mapa zobrazující počty různých typů kulturních zařízení v českých obcích. Data jsou převzata z databáze Českého statistického úřadu.	Czech Republic	Czech Statistical Ministry	Czech
<b>Population distribution in Czech municipalities of LAU2 and LAU1 levels</b>	The given composition shows distribution of population in Czech Republic by LAU regions. The viewer should get an idea of how many people live in each of LAU regions and also about how dense they are populated. The map itself consists of four main components :base layer (shows borders and codes of LAU regions), choropleth map (that shows density of population), spheres (volume of sphere is proportional to total number of people living in that region) and clickable info-layers. The data is taken from Czech Statistic Department database and is for year 2012.	Czech Republic	Czech Statistical Ministry	English
<b>Sport facilities in Czech municipalities</b>	The given composition shows distribution of sport facilities in Czech Republic by LAU regions. It shows how many swimming pools, maintained playgrounds, gyms, stadiums, ice rinks and other types of sport facilities are contained in each LAU region of Czech Republic. The map itself consists of three main components: base layer (shows borders and codes of LAU regions) and diagram map (that represents quantity of various sport facilities, situated in a region); and also clickable info-layers. The map composition should give viewer an impression about the development of sport infrastructure in each given municipality of Czech Republic. The data is taken from Czech Statistic Department database and is for year 2012.	Czech Republic	Czech Statistical Ministry	English
<b>Sportovní infrastruktura v českých okresech a obcích</b>	Sportovní infrastruktura v českých okresech a obcích. Zdroj dat: ČSÚ	Czech Republic	Czech Statistical Ministry	Czech
<b>Struktura a velikost ekonomických subjektů v českých okresech a obcích</b>	Struktura a velikost ekonomických subjektů v českých obcích. Zdroj dat: ČSÚ	Czech Republic	Czech Statistical Ministry	Czech
<b>Coarse particle pollution in Europe in year 2011</b>	The composition shows measurements of PM10 (coarse particles) air pollution from different stations around the Europe. The unit of measurements is $\mu\text{g}/\text{m}^3$ . The data is from EEA database and is for year 2011.	Europe	EEA	English

Name	Abstract	Extent	Data source	Language
<b>Czech Republic protected areas</b>	The composition shows nature protected areas, mineral deposit protected areas, etc.	Czech Republic	EEA	English
<b>Complex composition of Europe</b>	This is a complex composition containing data from many different tables (describing different aspects of life) from Eurostat. The given topics are visualized using different techniques. The data is for the administrative levels of NUTS0-3.	EU	Eurostat	English
<b>Cultivated land and its structure in NUTS regions in year 2000</b>	The map composition consists of four main componenets. Base layer which is just boarders and names of NUTS regions. Structural diagram map, that shows usage of cultivated land in NUTS regions across Europe; diagram map, that shows the amount of cultivated land in certain region and finally info-layers, that are clickable and display exact numbers(amount of cultivated land and structure of usage. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category, that it illustrates, in this given unit. The composition gives viewer an idea about the amount and usage of agriculture land in different NUTS regions. Data used are taken from Eurostat database. They are for year 2000.	EU	Eurostat	English
<b>Cultivated land and its structure in NUTS regions in year 2003</b>	The map composition consists of four main componenets. Base layer which is just boarders and names of NUTS regions. Structural diagram map, that shows usage of cultivated land in NUTS regions across Europe; diagram map, that shows the amount of cultivated land in certain region and finally info-layers, that are clickable and display exact numbers(amount of cultivated land and structure of usage. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category, that it illustrates, in this given unit. The composition gives viewer an idea about the amount and usage of agriculture land in different NUTS regions. Data used are taken from Eurostat database. They are for year 2003.	EU	Eurostat	English

Name	Abstract	Extent	Data source	Language
<b>Cultivated land and its structure in NUTS regions in year 2005</b>	The map composition consists of four main componenets. Base layer which is just boarders and names of NUTS regions. Structural diagram map, that shows usage of cultivated land in NUTS regions across Europe; diagram map, that shows the amount of cultivated land in certain region and finally info-layers, that are clickable and display exact numbers(amount of cultivated land and structure of usage. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category, that it illustrates, in this given unit. The composition gives viewer an idea about the amount and usage of agriculture land in different NUTS regions. Data used are taken from Eurostat database. They are for year 2005.	EU	Eurostat	English
<b>Cultivated land and its structure in NUTS regions in year 2007</b>	The map composition consists of four main componenets. Base layer which is just boarders and names of NUTS regions. Structural diagram map, that shows usage of cultivated land in NUTS regions across Europe; diagram map, that shows the amount of cultivated land in certain region and finally info-layers, that are clickable and display exact numbers(amount of cultivated land and structure of usage. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category, that it illustrates, in this given unit. The composition gives viewer an idea about the amount and usage of agriculture land in different NUTS regions. Data used are taken from Eurostat database. They are for year 2007.	EU	Eurostat	English

Name	Abstract	Extent	Data source	Language
<b>Demographic composition of population in NUTS regions in year 2011</b>	Following map composition shows age-structure of population in NUTS regions. It consists of three parts: basemap (NUTS regions borders and codes), choropleth map (that shows age-dependancy ratio) and population pyramid itself (that shows three main age groups: under 15 years (children), 15-65 years (people in the working age) and above 65 years (elderly people)). This map is intended to give viewer of impression of population age structure in different EU NUTS regions. Also it in a way illustrates the problem of population ageing in many parts of Europe. In many cases this map also can indicated correctly economically active regions (regions with small age-dependency ratio). Sometimes it can be difficult to estimate visually from demographic pyramids the exact number of people in each represented group. For this user can use getFeatureInfo option to see the exact numbers. The data is taken from Eurostat database and is for year 2011.	EU	Eurostat	English
<b>Educational structure in NUTS 1,3 regions in year 2001</b>	The following map compositions consists of three basic componenets choropleth map that shows percentage of people with high school education in given region, then also basic map with administrative borders of NUTS regions and its codes and finally diagram map representing population education structure by ISCED classification. Each square of diagram represents one percent of people. The data is taken from Eurostat database. The map composition should give a viewer an impression about percentage of people with university education in Europe, and also about the structure of people by their achieved level of education.	EU	Eurostat	English



Name	Abstract	Extent	Data source	Language
<b>GDP per capita in NUTS regions in year 2010</b>	The map composition consists of three main componenets. Base layer which is just borders and names of NUTS regions. Choropleth map, that shows if the GDP per capita in given NUTS region is higher or lower than EU average and by how many percents. For regions that have higher GDP than the average shades of red are used, and for regions that have less GDP than the average shades of blue are used. The third component is map diagram, that shows exact value of GDP per capita. Each square of map diagram corresponds to GDP of one thousand euros per year. The composition gives viewer an idea about the total monetary value of everything that is produced in given NUTS region and gives him opportunity to compare that value with other NUTS regions. Data used are taken from Eurostat database. They are for year 2010.	EU	Eurostat	English
<b>Livestock and its structure in NUTS regions in year 2000</b>	The map composition consists of four main componenets. Base layer which is just borders and names of NUTS regions. Structural diagram map, that shows livestock structure in NUTS regions across Europe; diagram map, that shows the amount of livestock units (see what is livestock unit: <a href="http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU">http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU</a> ) in certain region and finally info-layers, that are clickable and display exact numbers(amount of livestock units and its structure. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category. The composition gives viewer an idea about the amount of livestock and its structure in different NUTS regions. Data used are taken from Eurostat database. They are for year 2000.	EU	Eurostat	English

Name	Abstract	Extent	Data source	Language
<b>Livestock and its structure in NUTS regions in year 2003</b>	<p>The map composition consists of four main componenets. Base layer which is just boarders and names of NUTS regions. Structural diagram map, that shows livestock structure in NUTS regions across Europe; diagram map, that shows the amount of livestock units (see what is livestock unit: <a href="http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU">http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU</a> ) in certain region and finally info-layers, that are clickable and display exact numbers(amount of livestock units and its structure. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category. The composition gives viewer an idea about the amount of livestock and its structure in different NUTS regions. Data used are taken from Eurostat database. They are for year 2003.</p>	EU	Eurostat	English
<b>Livestock and its structure in NUTS regions in year 2005</b>	<p>The map composition consists of four main componenets. Base layer which is just boarders and names of NUTS regions. Structural diagram map, that shows livestock structure in NUTS regions across Europe; diagram map, that shows the amount of livestock units (see what is livestock unit: <a href="http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU">http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU</a> ) in certain region and finally info-layers, that are clickable and display exact numbers(amount of livestock units and its structure. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category. The composition gives viewer an idea about the amount of livestock and its structure in different NUTS regions. Data used are taken from Eurostat database. They are for year 2005.</p>	EU	Eurostat	English

Name	Abstract	Extent	Data source	Language
<b>Livestock and its structure in NUTS regions in year 2007</b>	<p>The map composition consists of four main componenets. Base layer which is just borders and names of NUTS regions. Structural diagram map, that shows livestock structure in NUTS regions across Europe; diagram map, that shows the amount of livestock units (see what is livestock unit: <a href="http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU">http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:LSU</a> ) in certain region and finally info-layers, that are clickable and display exact numbers(amount of livestock units and its structure. The cartographic technique of structural diagram assumes division of an area into colored stripes. The width of stripe is proportional to the percentage of certain category. The composition gives viewer an idea about the amount of livestock and its structure in different NUTS regions. Data used are taken from Eurostat database. They are for year 2007.</p>	EU	Eurostat	English
<b>Occupation of people by ISCO (for year 2001) codes and rate of unemployment (for year 2011) in NUTS 1,3 regions</b>	<p>The following map compositions consists of three main components choropleth map that shows percentage of unemployed people in given region, then also basic map with administrative borders of NUTS regions and its codes and finally diagram map representing population occupation structure by ISCO classification. The size of each diagram is proportional to number of employed people. The data is taken from Eurostat database. The map composition should give a viewer an impression about unemployment rates in Europe, and also about the occupation structure of employed people. Unfortunately data for occupational structure is old (for year 2001) and available just for NUTS0 and NUTS3 levels. Data for unemployment is for year 2011 and available just for NUTS0-NUTS2 levels.</p>	EU	Eurostat	English
<b>Population distribution in NUTS regions</b>	<p>The given composition shows distribution of population by NUTS regions. The viewer should get an idea of how many people live in each of NUTS regions and also about how dense they are populated. The map itself consists of three main components :base layer (shows borders and codes of NUTS regions), choropleth map (that shows density of population) and spheres (volume of sphere is proportional to total number of people living in that region). The data is taken from Eurostat database and is for year 2011.</p>	EU	Eurostat	English

Name	Abstract	Extent	Data source	Language
<b>Complex information about Germany</b>	This is a complex composition containing data from many different tables (describing different aspects of Germany) from German Statistical Department. The given topics are visualized using different techniques. The data is for the administrative levels of NUTS0-3 and is mostly for year 2011.	Germany	German Statistical Ministry	English
<b>Demographic composition of Germany</b>	This composition's aim is to provide complex view on demographic situation in Germany. It describes such topics as population size, population density, natural population change, net migration, population age structure. The given topics are visualized using different techniques. The compositions is usefull for those who either want to view the data about a certain region, and also for those who want to see and discover general patterns in data. The data is for the administrative levels of NUTS1-3 and is mostly for year 2011.	Germany	German Statistical Ministry	English
<b>Economical composition of Germany</b>	This composition describes following indicators : job density, total unemployment rate, unemployment rate among young people (15-24 years), employment structure of population according to sectors of economics (primary, secondary, tertiary), employment structure of population by specific branches and proportions of different types of companies by size (tiny, small, medium, big). The given topics are visualized using different techniques. The compositions is usefull for those who either want to view the data about a certain region, and also for those who want to see and discover general patterns in data (for example that unemployment rate is usually higher in municipalities that were part of the East Germany). The data is for the administrative levels of NUTS1-3 and is mostly for year 2011.	Germany	German Statistical Ministry	English
<b>Federal election in Germany in 2009</b>	This composition describes federal elections in year 2009. It shows the results of elections and also turnout (how many people came to vote). The data is for the administrative levels of NUTS1-3 and is mostly for year 2011.	Germany	German Statistical Ministry	English
<b>High school graduates in Germany</b>	This composition shows the percentage of people with university education and also the proportion between university graduates and dropouts. The data is for the administrative levels of NUTS1-3 and is mostly for year 2011.	Germany	German Statistical Ministry	English

Name	Abstract	Extent	Data source	Language
<b>Landuse in Germany</b>	This composition describes landuse in Germany. It is made in technique of structural cartogram. The data is for the administrative levels of NUTS1-3 and is mostly for year 2011.	Germany	German Statistical Ministry	English
<b>Ennis spatial plan</b>	The composition shows the original Ennis spatial plan and also derived spatial plan (spatial plan, that was by certain custom rules translated into Hierarchical INSPIRE Land Use Classification System (HILUCS) ). The bottom-most layer is topographic OSM basemap. Exploring the composition gives to an user insight of planned development of the area.	Ennis, Ireland	Irish Department of Environment, Community and Local Government	English
<b>Criminality in Irish municipalities</b>	AbstraktComposition displays annual data about number of crimes committed in 2013 year in Ireland. The data is taken from Ireland Central Statistics Office database and is available at the following web-adress: <a href="http://www.cso.ie/px/pxeirestat/statire/SelectVarVal/Define.asp?MainTable=CJA05&amp;PLanguage=0&amp;PXSid=0">http://www.cso.ie/px/pxeirestat/statire/SelectVarVal/Define.asp?MainTable=CJA05&amp;PLanguage=0&amp;PXSid=0</a> .	Ireland	Irish Statistical Ministry	English
<b>Olomouc Spatial Plan</b>	This is a composition for P4B Olomouc city.	Olomouc, Czech Republic	Olomouc cityhall	English
<b>Czech OSM road network</b>	The composition displays highways and residential street networks for Czech Republic. The data is taken from OSM database.	Czech Republic	OSM	English
<b>Czech Republic cemeteries</b>	The composition shows cemeteries in Czech republic	Czech Republic	OSM	English
<b>Pilsen Spatial Plan</b>	This is a composition for P4B	Pilsen, Czech Republic	Pilsen cityhall	English
<b>Age structure of population and it's old age dependency ratio in Polish LAU1 regions</b>	This composition containing data from Polish Statistical Department, that describes age structure of population and it's old age dependency ratio. The given topic is visualized using diagrams, that show both age structure of population (pre-working, working, post-working) and old age dependency ratio (which shows ratio between post-working and working people). The data is for the administrative level of LAU1 (powiat) and is for year 2012.	Poland	Polish Statistical Ministry	English

Name	Abstract	Extent	Data source	Language
<b>Complex information about Poland</b>	This is a complex composition containing data from 6 different tables (describing different aspects of Poland) from Polish Statistical Department. The given topics are visualized using different techniques. The data is for the administrative level of LAU1 (powiat) and is for year 2012.	Poland	Polish Statistical Ministry	English
<b>Employment structure of population and it's unemployment rate in Polish LAU1 regions</b>	This composition containing data from Polish Statistical Department, that describes employment structure of population and it's unemployment rate. The given topic is visualized using choropleth map (that shows unemployment rate) and diagrams, that show structure (by sectors) of employed people. The data is for the administrative level of LAU1 (powiat) and is for year 2012.	Poland	Polish Statistical Ministry	English
<b>Local Human Development Index (LHDI) and average salary in Polish LAU1 regions</b>	This composition containing data from Polish Statistical Department, that describes local human development index (LHDI) and average monthly salary. The given topic is visualized using choropleth map showing overall LHDI and diagrams, that show average monthly salary in given LAU1 region. The data is for the administrative level of LAU1 (powiat) and is for year 2012.	Poland	Polish Statistical Ministry	English
<b>Natural growth and net migration in Polish LAU1 regions</b>	This composition containing data from Polish Statistical Department, that describes population natural growth and net migration. The given topic is visualized using choropleth map showing overall population change and diagrams, that show in a graphical manner the total natural growth and net migration in given LAU1 region. The data is for the administrative level of LAU1 (powiat) and is for year 2012.	Poland	Polish Statistical Ministry	English
<b>Pollution of Polish LAU1 regions with gases and particulates</b>	This composition containing data from Polish Statistical Department, that describes area pollution with gases and particulates. Units of measurements are thousands of tons. The given topics are visualized using choropleth maps. The data is for the administrative level of LAU1 (powiat) and is for year 2012.	Poland	Polish Statistical Ministry	English
<b>Total population and it's density in Polish LAU1 regions</b>	This composition containing data from Polish Statistical Department, that describes total population and it's density. The given topic is visualized using choropleth map showing density and spheres, volume of which is proportional to total number of people living in given LAU1 region. The data is for the administrative level of LAU1 (powiat) and is for year 2012.	Poland	Polish Statistical Ministry	English

Name	Abstract	Extent	Data source	Language
<b>Communal elections in Czech municipalities in year 2010</b>	The given composition shows votes (by political parties) given by people in communal elections in Czech Republic in year 2010. In many municipalities as can be seen humongous number of votes are given for local candidates, not belonging to any big political party. The map itself consists of two main components: base layer (shows borders and codes of LAU regions) and structural-cartogram map (that displays percentage of votes given by various political parties). The map composition should give viewer an impression about how influential political parties are in each given municipality of Czech Republic. The data is taken from Volby.CZ database.	Czech Republic	Volby.cz	English
<b>Výsledky voleb 2010 do zastupitelstev českých obcí</b>	Výsledky voleb 2010 do zastupitelstev českých obcí. Zdroj dat: Volby.CZ	Czech Republic	Volby.cz	Czech