PLAN4BUSINESS

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

SEVENTH FRAMEWORK PROGRAMME

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WP4
References:,
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Short Description:
This deliverable includes a documentation of the system based on implemented features. This report describes the client side of the plan4business portal. It includes the design and implementation of version V2 of the portal within the first 18 months of the project duration. The next releases are expected in month 22 (V3).
Keywords:
Client, Collaborative Schema Integrator, Analysis UI Development, Plan Hosting, Feedback components, plan4business

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009	Przemysl Turos	Review form	04.10.2013

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List of acronyms

ACID	Atomicity, Consistency, Isolation and Durability
API	Application Programming Interface
AVINET	Asplan Viak Internet
CAS	Central Authentication Service
CDDA	Nationally Designated Areas
CLC	Corine Land Cover
CSV	*Comma-Separated Values*
FP	Framework Programme
GIS	Geographic Information System
GMES	Global Monitoring for Environment and Security
GML	Geography Markup Language
HALE	HUMBOLDT Alignment Editor
HILICS	Hierarchical INSPIRE Land Use Classification System
HSRS	Help Service Remote Sensing
HTTP	Hypertext Transfer Protocol
INSPIRE	Infrastructure for Spatial Information in the European Community
ISO	International Organisation for Standardization
ISOCARP	International Society of City and Regional Planners
JSON	Javascript Object Notation
KML	Keyhole Markup Language
LDAP	Lightweight Directory Access Protocol
OGC	Open Geospatial Consortium
OSM	OpenStreetMap
OWL	Web Ontology Language
OWS	OGC Web Services
PDF	Portable Document Format
RDBMS	Relational Database Management System
RDF	Resource Description Framework
SDI	Spatial Data Infrastructure
SQL	Structured Query Language
UML	Unified Modelling Language
URL	Uniform Resource Locator
UWB	University of West Bohemia in Pilsen
WKT	Well Known Text
WMS	Web Map Service
WP	Work Package
XML	Extensible Markup Language

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1 Introduction

1.1 Plan4business

Plan4business is a European project running from April 2012 until March 2014 and is co-financed by the 7th 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 users 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 The Aim of the Report

This deliverable summarises the work performed and progress achieved in Plan Integration & Analysis Clients of the plan4business project.

The main objective of WP4 is the design and development of the client part of the plan4businessplan4business platform, based on existing solutions where applicable, and the design of user interfaces (UI). The objectives specifically include:

- Integration of pilot applications;
- Integration and configuration of authentication, authorisation, DRM and payment components;
- Full environment for collaborative clients for integration of planning data,
- Client support for integration of data from distributed resources, which includes clients for data harmonisation and aggregation,
- Clients applications for data analysis supporting integration of analytical services,

- Provision of APIs for access to and hosting of spatial data based on OGC services, such as WMS, WFS and WCS,
- Social networking tools for feedback.

WP4 used the results of WP3 Requirements Management and Service Pricing. WP4 runs closely and in parallel with WP5 Storage, Integration & Analysis Engines. The report includes the work performed within 18 months in the following tasks:

- Task 4.1: Collaborative Schema Integrator Development dealing with design and implementation of client side of clients for the collaborative integration of spatial and non-spatial data into the plan4business data pool.
- Task 4.2: Analysis UI Development which includes the design and implementation of client applications for data analysis supporting integration of analytical services based on different interfaces.
- Task 4.3: Plan Hosting and Feedback components, which include design and implementation of clients supporting uploading and downloading services for planning documentation.

The design and implementation are according to the pilot applications as outlined in the extra document requested after the 1st Review - Business Model – Progress Report.

1.3 Structure of the Report

The document is structured in 11 chapters:

- **Chapter 1** contains a brief summary of the project, the main objectives of WP4 and the structure of the document.
- **Chapter 2** contains definition of used terminology.
- **Chapter 3** contains the management tools for the organisation of the development, source code control and issues tracking system.
- **Chapter 4** describes the agile methodology for the design and software development.
- **Chapter 5** describes the overall architecture of all the components and how these components are interlinked. The chapter includes also the implementation approach through pilot applications and description of service levels.
- **Chapter 6** describes the design of the user interface.
- **Chapter 7** describes the management tools of the platform.
- **Chapter 8** describes the pilot applications including Location Evaluator, Harmonise, thematic Map Viewer and Embed-Map.
- **Chapter 9** includes conclusions.

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

2 Terminology

Catalogue - consists of metadata in which definitions of database objects such as base tables, views (virtual tables), synonyms, value ranges, indexes, users, and user groups are stored. (Wikipedia)

Geography Markup Language (GML) - “OGC`s XML-based language for describing and encoding geospatial information. An application of XML, a specification developed by members of the Open GIS Consortium. http://www.opengis.org/techno/specs/00-029/GML.html ". GML is an XML encoding for spatial data. In a sense, it is a schema-writing language for spatial information.” (OGC 2012)

Geoportal - "A Web site that provides a view into a universe of spatial content and activity through a variety of links to other sites, communication and collaboration tools, and special features geared toward the community served by the portal." (OGC 2012)

HUMBOLDT Alignment Editor (HALE) – a tool for defining and evaluating conceptual schema mappings.

KML - is an XML notation for expressing geographic annotation and visualization within Internet browsers. (Wikipedia)

Mock-ups - is a scale or full-size model of a design or device, used for design evaluation, promotion, and other purposes. (Wikipedia)

OGC Web Service (OWS) - is the group of service specifications (or protocol standards) created and maintained by the OGC. (Wikipedia)

User interface (UI) - field of human–machine interaction, is the space where interaction between humans and machines occur.

Web Map Context (WMC) - are XML documents that contain all information needed to display a set of maps for a selected area and size. (OGC)

Web Map Service (WMS) - provides a simple HTTP interface for requesting geo-registered map images from one or more distributed geospatial databases. (OGC)

Web Map Tile Service (WMTS) - is an Open Geospatial Consortium (OGC) standard for providing map tiles (small images that are part of a map) via the internet. (OGC)

3 WP Management

WP4 is coordinated by HSRS. WP4 is divided into three tasks with the following responsibilities:

- Task 4.1: Collaborative Schema Integrator Development - Fraunhofer IGD,
- Task 4.2: Analysis UI Development – HSRS,
- Task 4.3: Plan Hosting and Feedback components – HSRS.

In order to secure a smooth design and development of all the platform components, a Redmine[1] management system was set-up by the Project Office (Figure 1). Redmine is a flexible and open source project management web application.

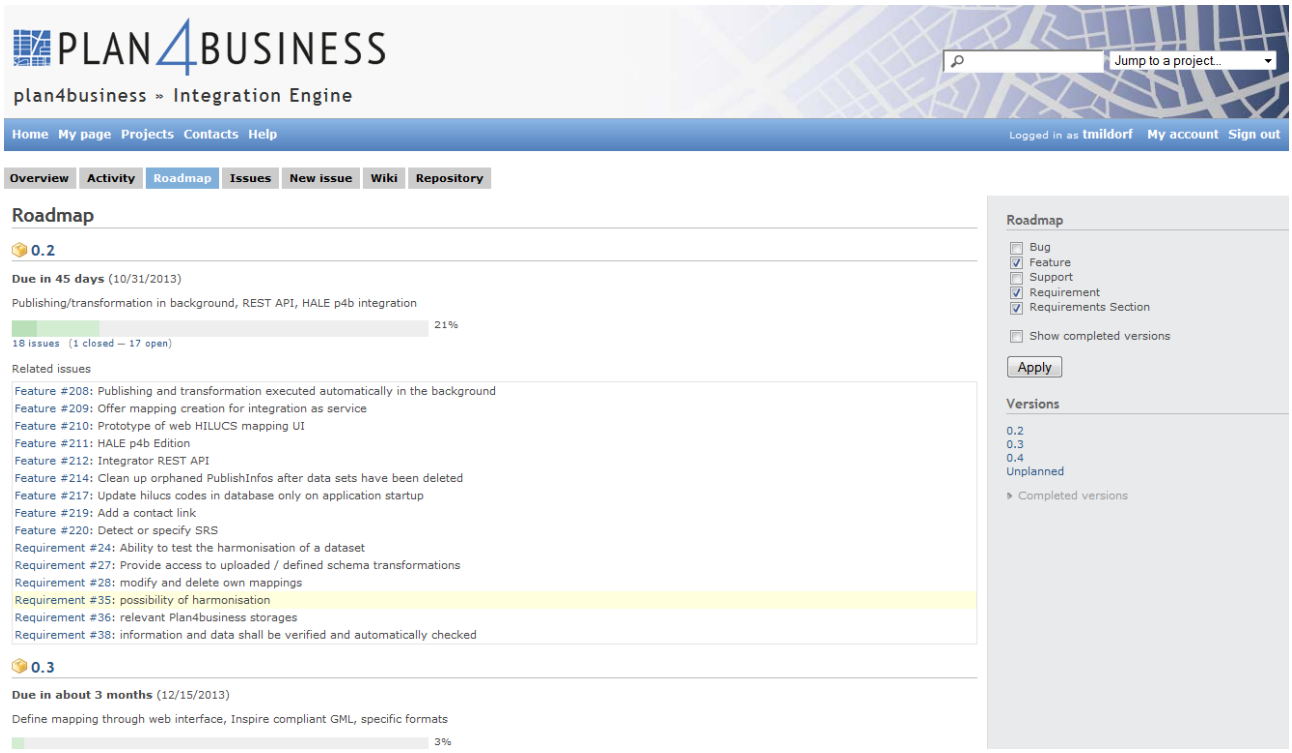

Figure 1 Redmine WP4 Requirements

Redmine serves for the following purposes:

- WIKI based documentation,
- issue tracking – bugs, new features, support issues and system requirements can be managed through issues assigned to a particular person and with specified deadline, priority, status, etc.

[1] http://www.redmine.org/

The Redmine system was structured according to the pilot applications which are interpreted as subprojects. For each pilot application a versioning system is applied. For a particular version of a pilot application a number of features and bugs are assigned. This enables to keep track of the progress.

For the management of the source code, source documentation and configuration files, several Git repositories are provided. The repositories can be accessed through a Gerrit[2] installation and they are integrated in the Redmine system. Gerrit is a web based code review system, facilitating online code reviews for projects using the Git version control system.

Gerrit helps avoiding errors getting into the code base, as code is reviewed by developers and could also be verified automatically by a continuous integration system. Basic access to the Gerrit system is restricted to project members, while access to individual underlying git repositories can be further constrained to subsets of project members. Access to Gerrit is available over SSH2 with public key authorization. Accounts for Gerrit and the repositories are managed by the project office and are given on a per-person basis. Any account can principally be either a committer or a reader account, i.e. not all accounts need to be allowed to commit.

[2] http://code.google.com/p/gerrit/

4 Overall Methodology

4.1 Agile Methodology

The design and development of the client side for the plan4business platform is conducted in WP4. WP4 should result in the design and development of the client side components of the plan4business service platform including the Authorisation, Authentication, Integration, Analysis and Plan hosting, API (Application Programming Interface) for integration of the Analysis Engine into other portals.

On the base of previous experiences it was decided to run the development in parallel to collection of user requirements. It enables to receive feedback from users, but also support user demands on the base of existing tools. The agile approach is also taken to software development, and it is a basic requirement for WP3 (Requirements Management and Service Pricing) that results are delivered early and often. The work is running closely with WP5 Storage, Integration & Analysis Engines, where server side is designed and implemented.

In the design and development of each client component, we aimed for a close loop of work team of WP4 and development team (WP5) and the requirements collection team (WP3). The design and development in WP4 started with a “code camp” workshop held in Pilsen in July 2012. The code camp was highly effective in communicating common coding policies and in actually solving technical issues. The work started with the design activities and infrastructure set-up as well as the creation of the initial data model for data integration and proposal of several use-cases.

The client components developed are based on existing tools and these tools are modified and extended on the basis of user requirements. For this purpose, a series of workshops aimed to different groups of stakeholders are being organised and a feedback on the development is tracked using a questionnaire for workshops’ participants.

A complete evaluation including formal testing is conducted within WP6 System Integration and Operation. The results of the complete evaluation are then fed back to the design and development team in WP4, who work in the second implementation phase to deliver the final application products.

In July/August 2013 the second Code Camp held in Pilsen was organised. The Code Camp 2013 helped in integration of the system components as well as development of the pilot applications. The Code Camp 2013 minutes are enclosed in Annex I.

4.2 Implementation Through Pilot Applications

On the basis of the first review results and also the feedback from the Advisory Board and stakeholder workshops, the development was shifted towards more user oriented applications. The plan4business team has realised that it has to go for a quick win in a given region or a country with specific applications. The first goal was to simplify the access to information for different types of users which are non-GI experts. The first

pilot application that has been implemented is the Location Evaluator. The development of the application was focused on the integration of existing data sources. Data integration and building of data repositories was recognised as a key aspect for success of the plan4business platform.

Other pilot applications include Thematic Map Atlas, Harmonise, Embed-Map and others. The complete list of applications is included in the extra document requested after the 1st project review - Business Model – Progress Report.

4.3 Service Levels

Based on the user requirements coming from WP3, business model developed in WP2 and the agile methodology used for the system design and implementation (research and development in WP4, WP5 and WP6), four Service Levels related Milestones 3 – 6 were defined. These Service Levels represent high level measures for a successful implementation of the user needs and the business model. These Service Levels were revised after the first project review and resulted in definition of Service Level 5 that is due in month 21.

A specific focus of these Service Levels is on a staged rollout of services to be offered by the *plan4business* platform. By using this staged approach, the platform starts to attract customers with concrete and useable services from the early stage of the development. These early results are valuable in providing feedback and in testing the infrastructure.

The five Service Levels are:

Service Level 1 (Milestone 3, month 9): This level includes examples of various components of the future platform which are not necessarily integrated but they show the basic functions that can be further elaborated and extended. This level includes:

- a data storage for disharmonised spatial and non-spatial data,
- a common data model for harmonised data based on the INSPIRE Directive,
- mechanisms for data integration into the common data model,
- features (platform prototype) for data display and simple navigation,
- utilisation of pan-European datasets related to spatial planning from scattered resources.

The developed components are used for showcases during workshops, presentations and other meetings in order to provide potential customers an idea of the future platform and its functions and get feedback from end users.

Service Level 2 (Milestone 4, month 12): The main goal for this level is to make the platform prototype publicly available and extend it by the following features:

- analysis of harmonised spatial data based on user requirements (this should include not only predefined queries but also a possibility for user defined queries),
- advanced visualisation tools,

- user customised data mining queries,
- retrieval of the data mining and analysis results for display,
- prototype management tools for data upload, download and publication using OGC Web Services,
- catalogue of spatial planning data,
- creation of user defined map compositions.

Service Level 3 (Milestone 5, month 15): This service level includes improvement of the features from previous service levels and in addition the following features will be utilised:

- mapping functions for maps' customisation based on identified use-cases,
- integration of the harmonisation tools into the platform,
- integrated metadata for analyses, map compositions and integration schemas,
- extended data management tools enabling maintenance of different versions of datasets,
- first releases of pilot applications – Location Evaluator and Thematic Map Viewer.

Service Level 4 (Milestone 6, month 18): This service level includes improvement of the features from previous service levels, their integration into the platform and in addition the following features will be utilised:

- new design of the user interface,
- advanced portrayal of the analysis result in a form of a table, chart or a report.
- support of most of the data formats defined by the users,
- tools for embedding maps into external applications,
- generation of a report from a selected area including information such as data availability, data quality, data source and non-spatial data that are integrated with spatial data.
- integration of single components into an integrated platform.

Service Level 5 (month 21) – additionally, the Service Level 5 was designed. It includes:

- data download,
- tools for utilising feedback from users of spatial planning data,
- support of more complex queries by using the primary data storage as well as the secondary data storage,
- additional user applications for investors, design and implementation of a brownfield database,
- integration of advertisement into the portal,

- payment module,
- components’ update.

5 Overall Architecture

The plan4business system is a comprehensive and complex system, built on flexible and scalable layers, interacting through a set of defined services, ensuring performance and security.

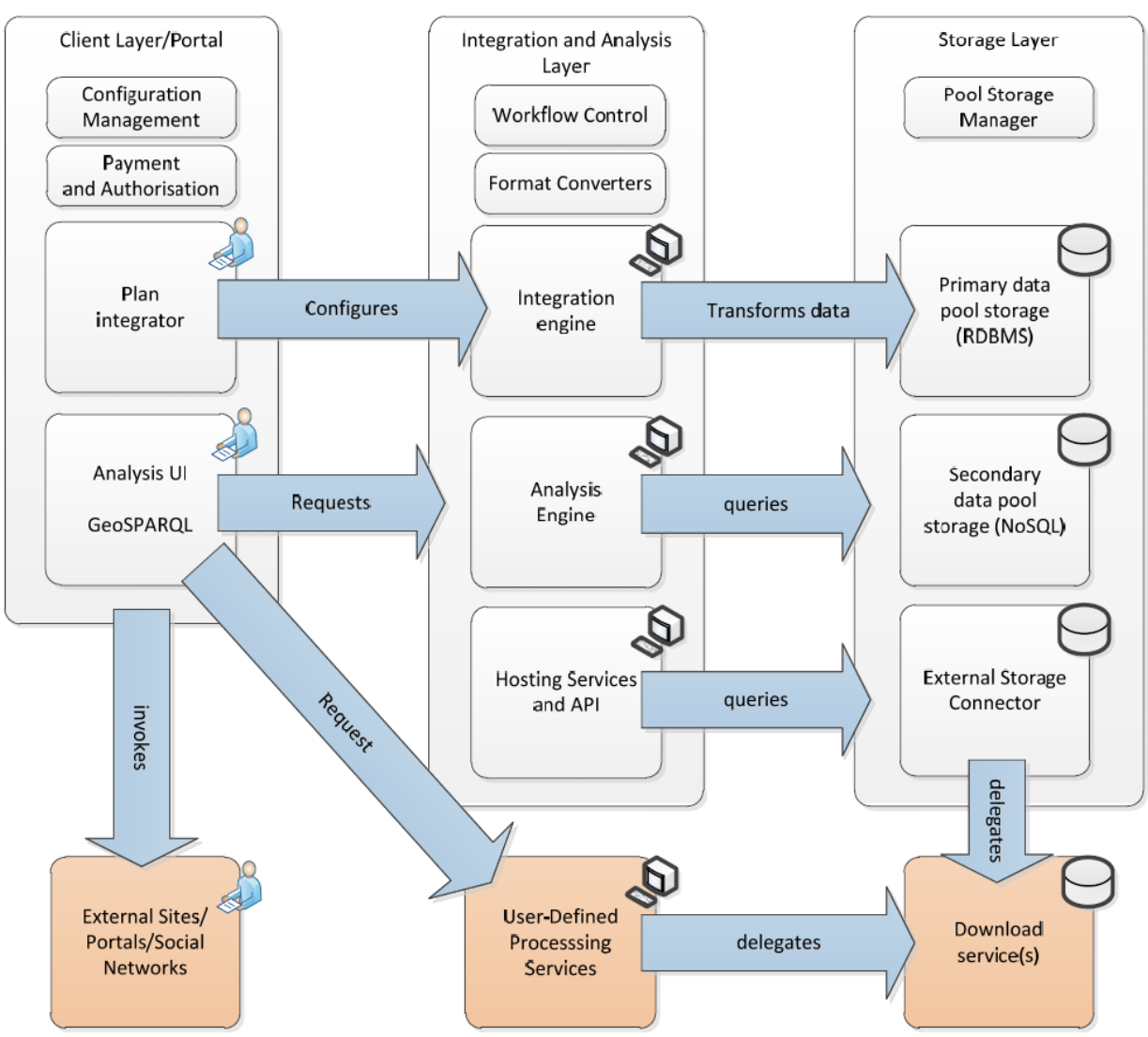

Figure 2 plan4business overall architecture

The three layers are:

- **Application** layer, consiting of user portals and interfaces for handling data, administrating the system and for data access, including analyses and data downloading.
- **Service** layer, with services for data integration, analyses, data access, processing and data hosting.
- **Data** layer, with data storage and download services.

The architecture is inspired by the technical architecture designed through the FP6 project Humboldt and eContentPlus project Plan4all (ref. plan4all D5.1 Data Sharing Requirements, chapter 2.2).

6 User Interface

The objective of the plan4business client side is to provide a set of user interfaces enabling the human user to easily interact and utilise the components of plan4business to support user's tasks and objectives in respect of accessing and using data for planning purposes.

6.1 Work Done and Progress Achievements

AVINET in cooperation with HSRS prepared a set of mock-ups for the introductory page (crossroad) that will be accessible at htt://www.whatstheplan.eu. This page will redirect user to particular applications and tools. It will also incorporate advertisements, will be multilingual and later will be designed for mobile devices and tablets (see Figure 3). The user will have a possibility to register. After login, the user will access full range of applications, tools and functions.

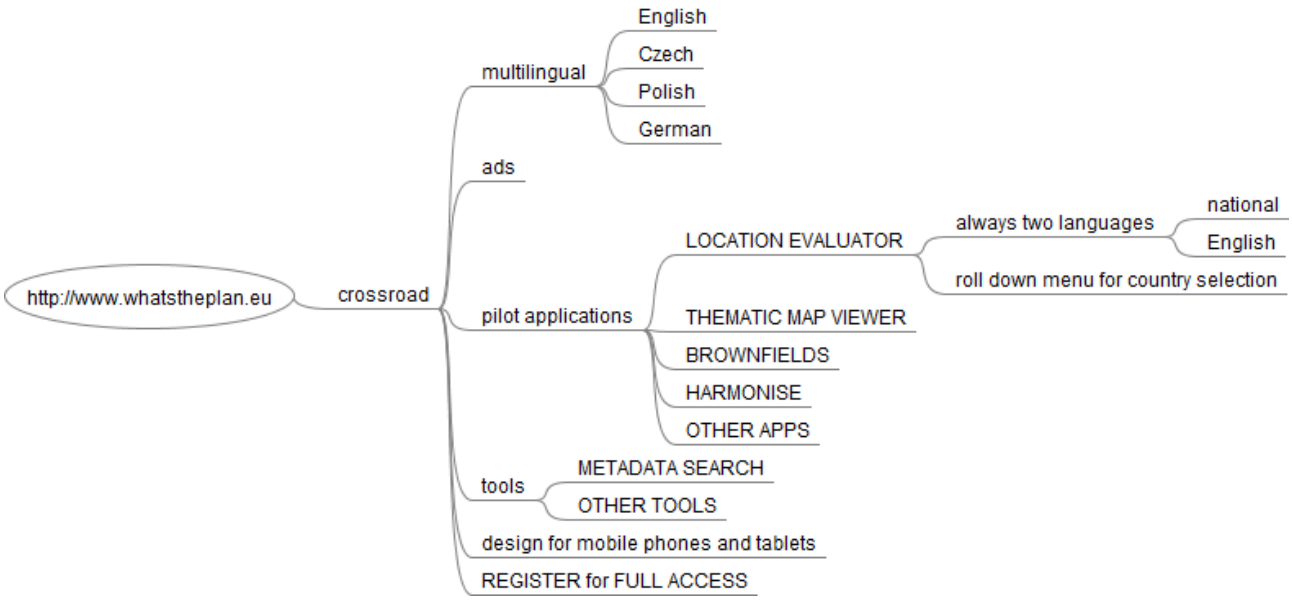

Figure 3 Structure of the introductory page

The sample of the graphical design for the introductory page is depicted in Figure 4. The graphical design for the Thematic Map Viewer (one of the pilot applications) is shown in Figure 5.

Figure 4 Graphical design of the introductory page (crossroad)

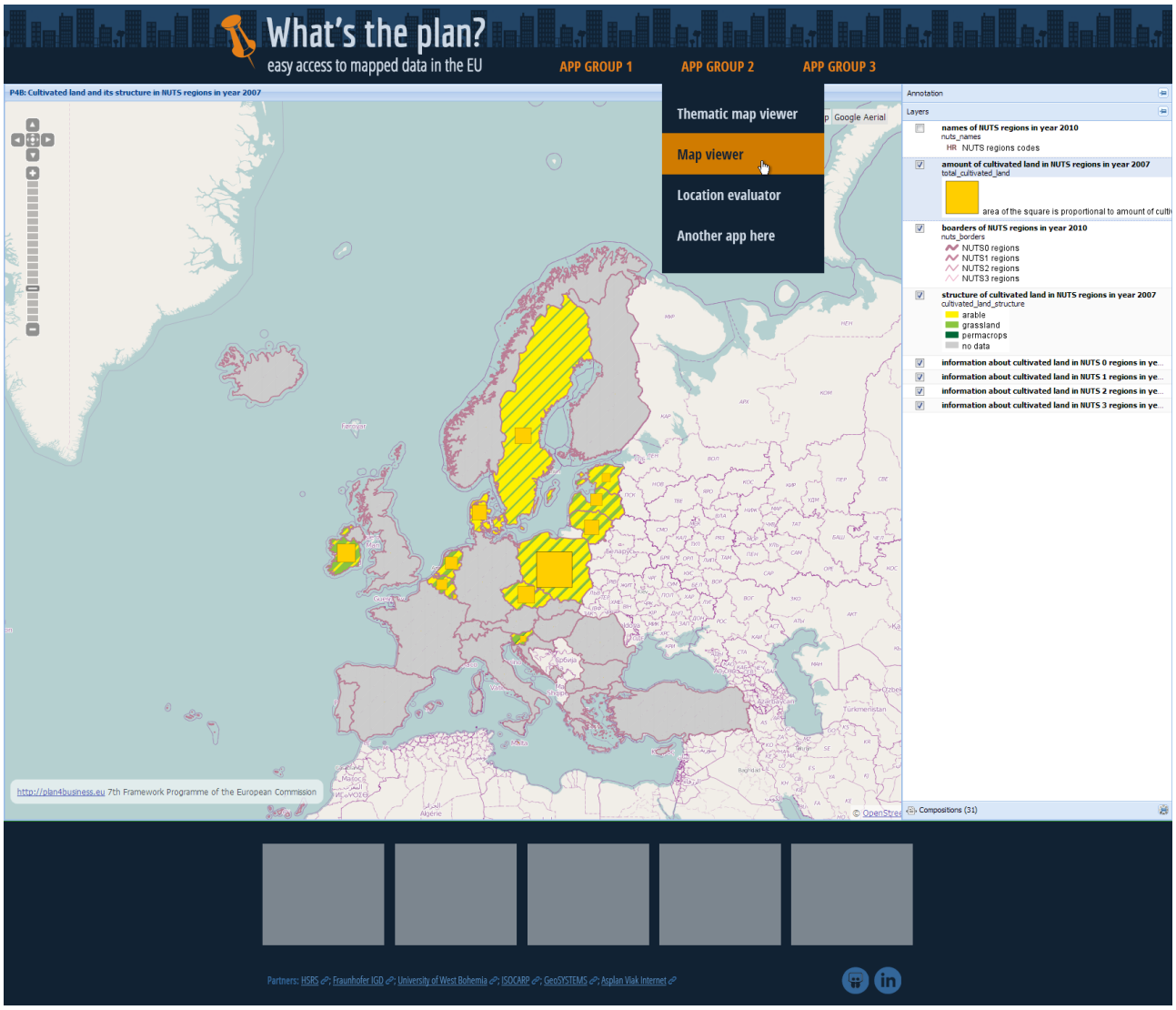

Figure 5 Graphical design of the Thematic Map Viewer

6.2 Next Steps

The user interfaces will be finalised and then implemented by HSRS. The user interface will be incorporated into the Liferay solution described in Section 7.1 and made publicly available.

7 Management tools

7.1 Liferay

The plan4business platform is based on the Liferay[3] solution. It is a web platform orchestrating all the geoportal components and other gadgets, portlets, pages etc. Liferay enables administrators to define the content and the system of the menu, to publish articles, images, links etc., to publish predefined map compositions, to publish RSS channels etc. There are many other functions that can be used and that are described in detail in the manual of Liferay available at http://www.liferay.com/. Liferay is focused on usability and simplicity for end users but also on clarity and security of the implementation.

7.2 User Management

The plan4business platform is composed of single components such as Integration Engine or Analysis Engine. The Liferay solution described in previous section enables to integrate these components. In order to manage user identification and access rights, authorisation and authentication mechanisms were put in place. The authorisation and authentication terms are often used interchangeably. The following definitions should clarify the difference between them:

- **Authentication** is a mechanism that securely identifies user within a system. It verifies the identity of the user by for example a password or a fingerprint.
- **Authorisation** is a mechanism that specifies access rights to the content or other resources.

In other words, authentication is the process of verifying that "you are who you say you are", authorisation is the process of verifying that "you are permitted to do what you are trying to do." Authorisation thus presuppose authentication. (Wikipedia contributors 2012a)

The plan4business platform enables users to control access to all their resources stored on the portal using the authentication and authorisation mechanisms. Registered users can be authenticated by credentials including the email address and a password.

Unregistered users can create an account using a simple form depicted in Figure 6 by filling in the name, date of birth, gender, username and email address. The creation of the user account is protected by CAPTCHA[4] ensuring that the form is filled in by a person.

[3] http://www.liferay.com/

[4] http://en.wikipedia.org/wiki/CAPTCHA

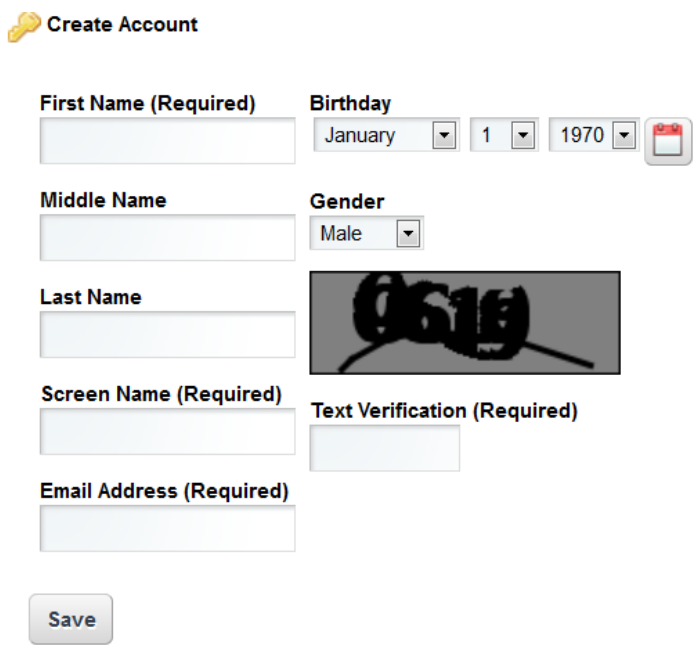

Figure 6 Registration

The registration of users as well as the provision of permissions (authorisation) can be managed by the system administrator.

7.3 HSlayers

The visualisation client HSlayers was developed by HSRS. It is a JavaScript-based WebGIS map application built using the HSLayers JavaScript library. It extends OpenLayers and adds new functionalities including WMS and WFS client, printing of hard copy maps, vector editing capabilities and others.

7.4 Metadata Catalogue Micka

MICKA is a complex system for metadata management (metadata creation, editing, storing, etc.) used for building SDI or geoportal solutions. It contains tools for editing and management of metadata for spatial information, web services and other sources (documents, web sites, etc.). It includes online metadata search engine, portrayal of spatial information and download of spatial data to local computer.

MICKA is a metadata catalogue that fully complies with the ISO 19115 standard and is fully compliant with the INSPIRE principles. It can be integrated with map applications and it is multilingual. The web catalogue service uses OGC specifications (standards).

MICKA is compatible with obligatory standards for European SDI building (INSPIRE). Therefore it is ready to be connected with other nodes of prepared networked metadata catalogues (its compatibility with pilot European geoportal is continuously being tested).

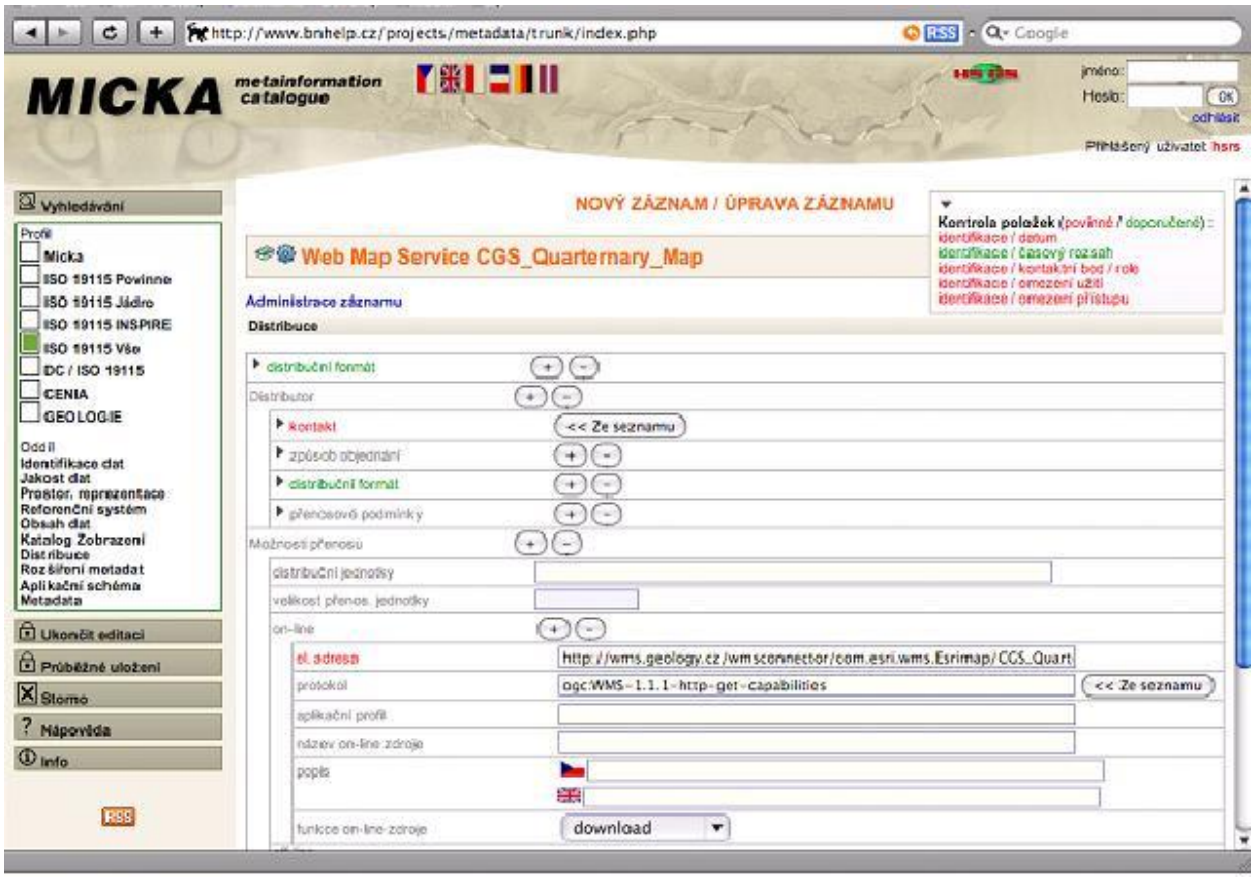

Figure 7 Micka – metadata catalogue

7.5 LayMan - The Layer Manager

For easy management, access control and publishing of geodata, the LayMan tool has been developed.

Publishing of geodata starts with uploading the file on the server:

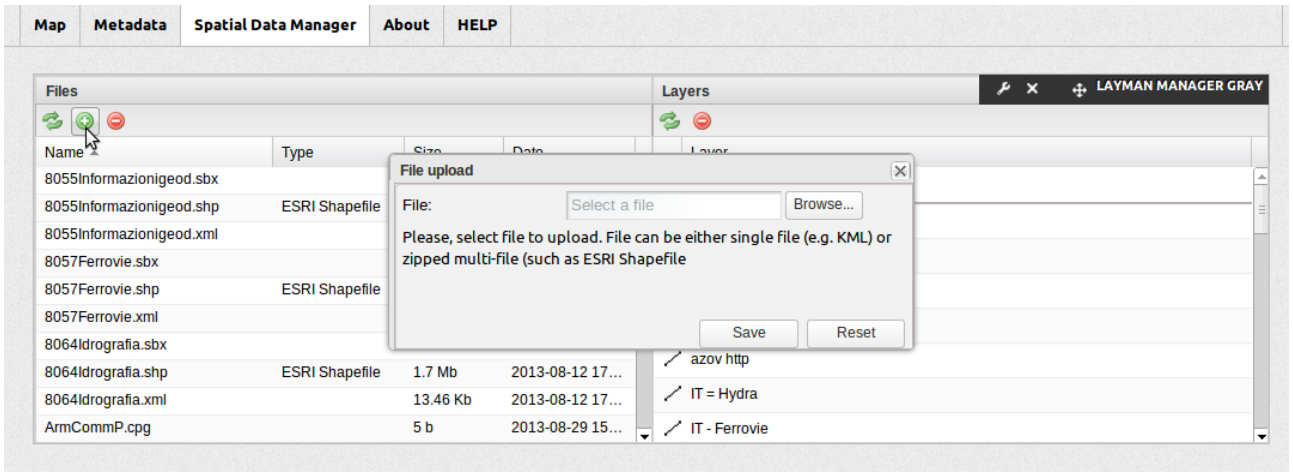

Figure 8 Data upload

After uploading, basic info about the file can be displayed, and several actions are available:

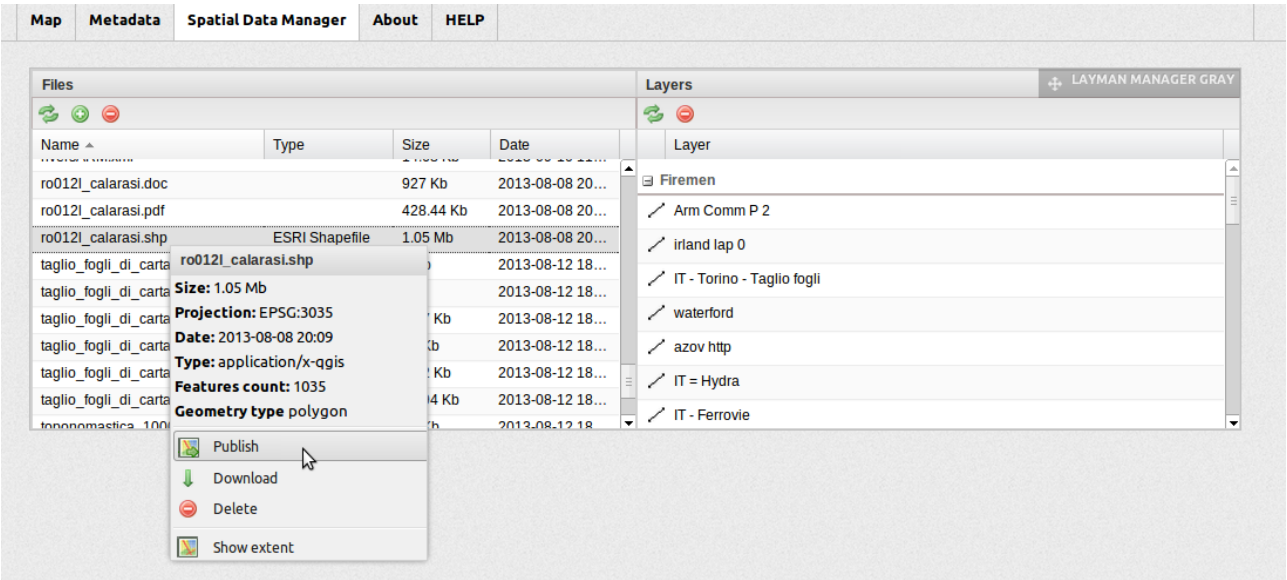

Figure 9 Data management interface

Upon "Publish" click, the publishing dialog is opened:

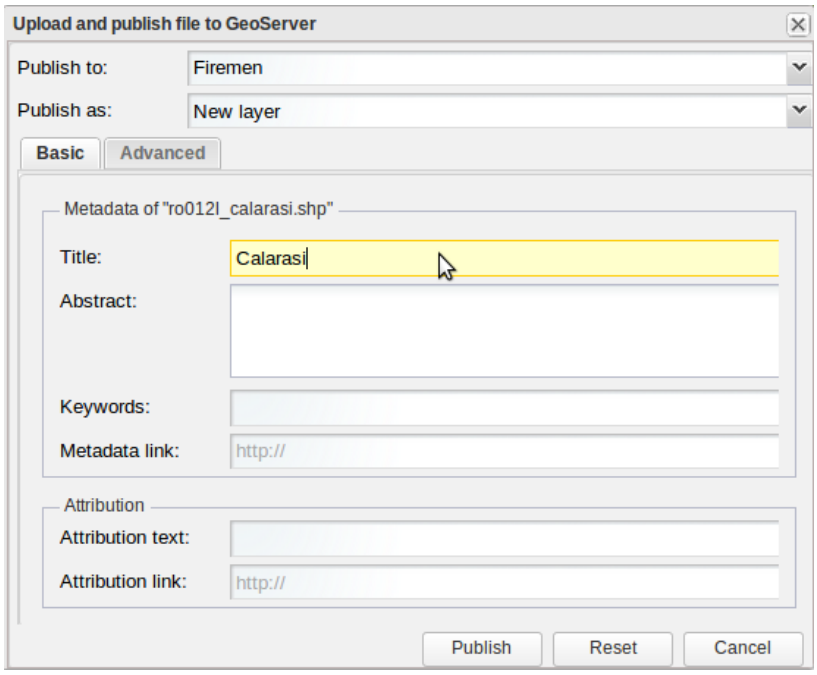

Figure 10 Publishing data

Each user can be member of several user groups. In the publish dialog the user needs to select the group he/she wants to publish the file into. (Each group has its own database schema and GeoServer workspace.)

Then the choice is made, whether it will be published as a new layer, or if an already existing layer should be overwritten. Then the basic configuration is filled in.

On the Advanced tab, user can adjust the bounding box and detected SRS, if needed. Also, the read access to the layer can be granted to other groups:

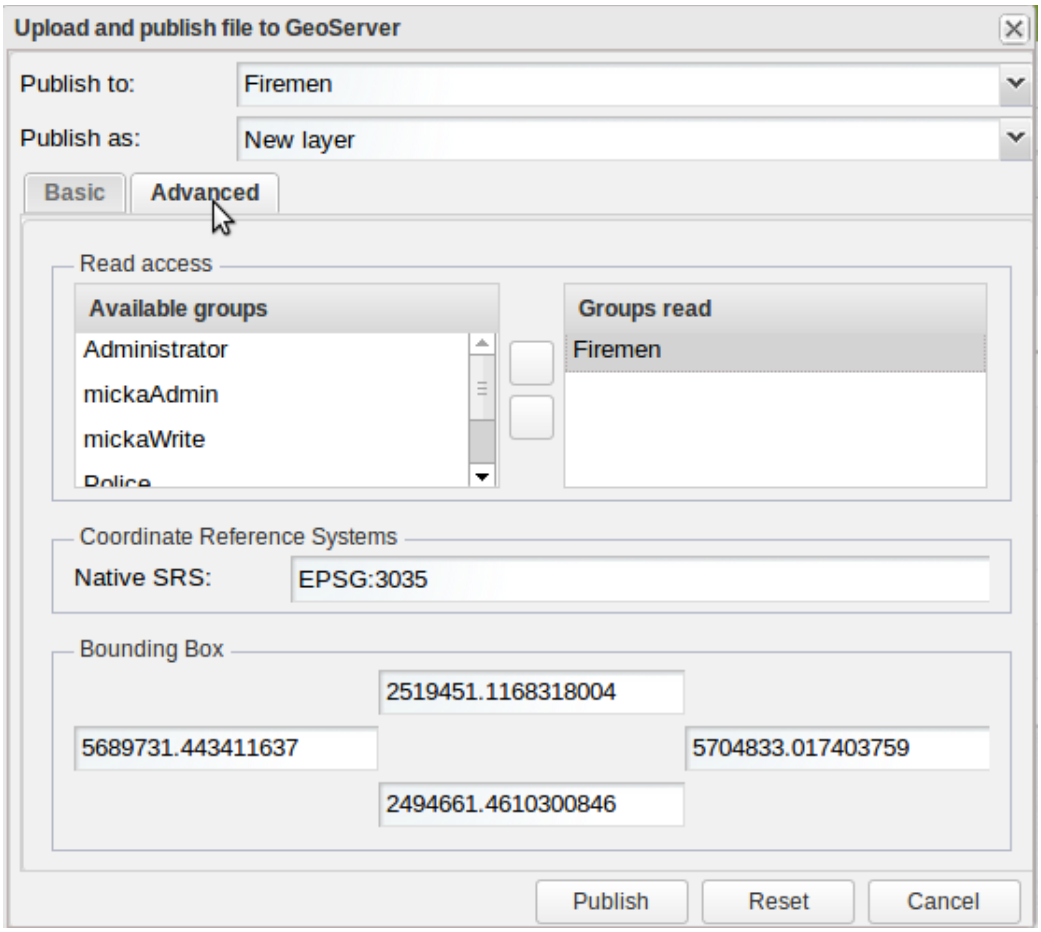

Figure 11 Advanced tab for inserting dataset information

After publishing of the layer, it appears in the right side of the layer manager and several actions are available:

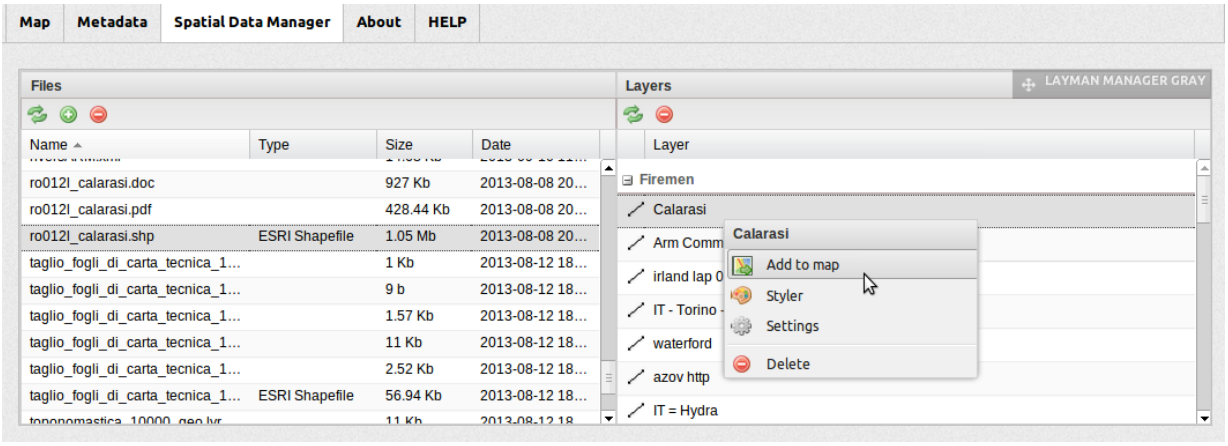

Figure 12 Data manager – published map on the right side

The user can show the layer in the map:

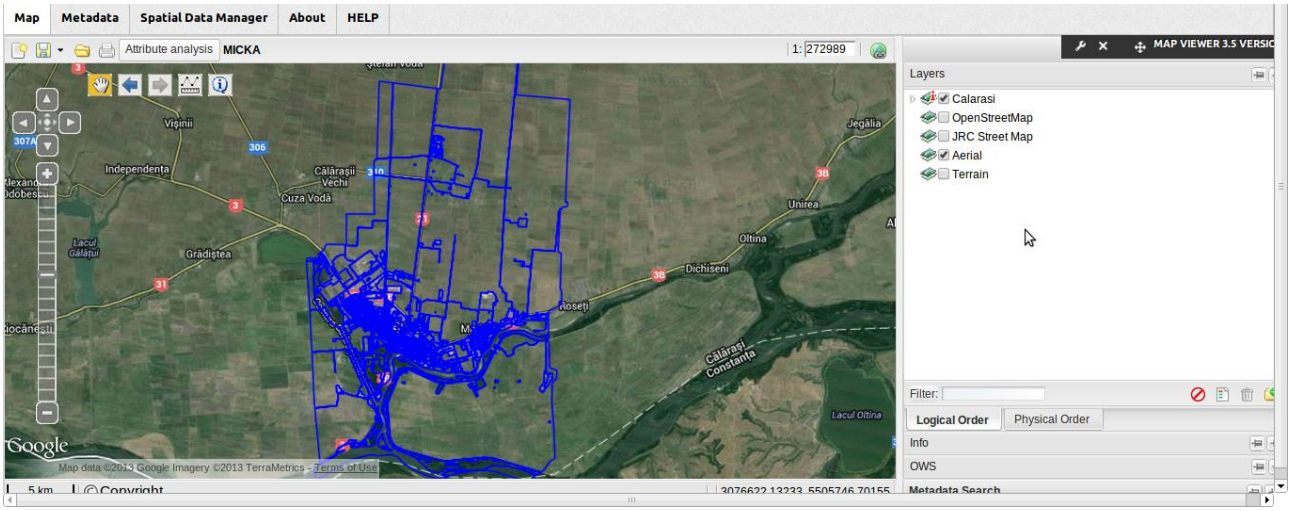

Figure 13 Portrayal of the layer in the map

Going back to Spatial Data Manager, the Styler can be opened:

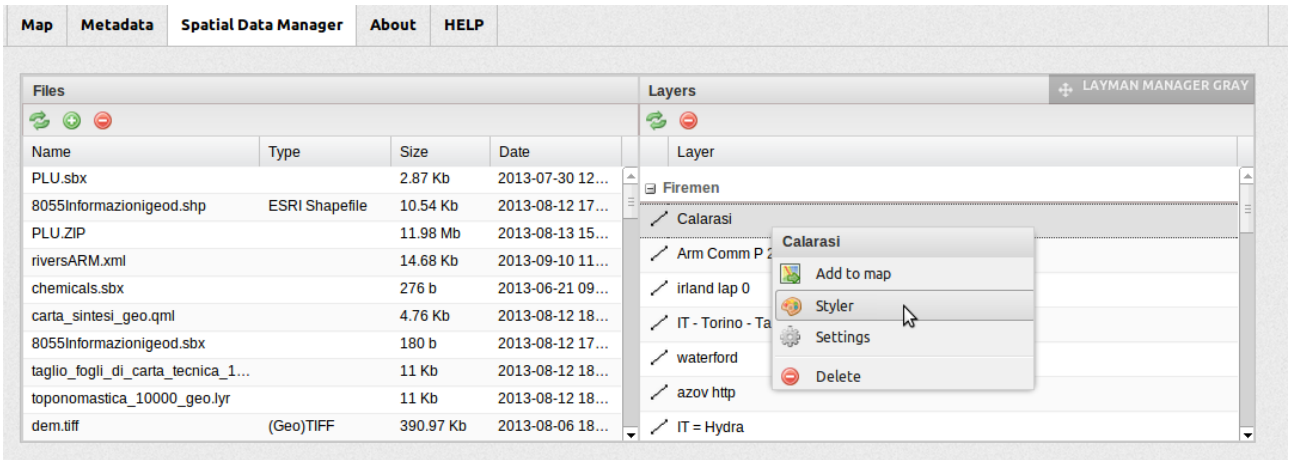

Figure 14 Opening of the styler

In Styler, the current default style of the layer is shown:

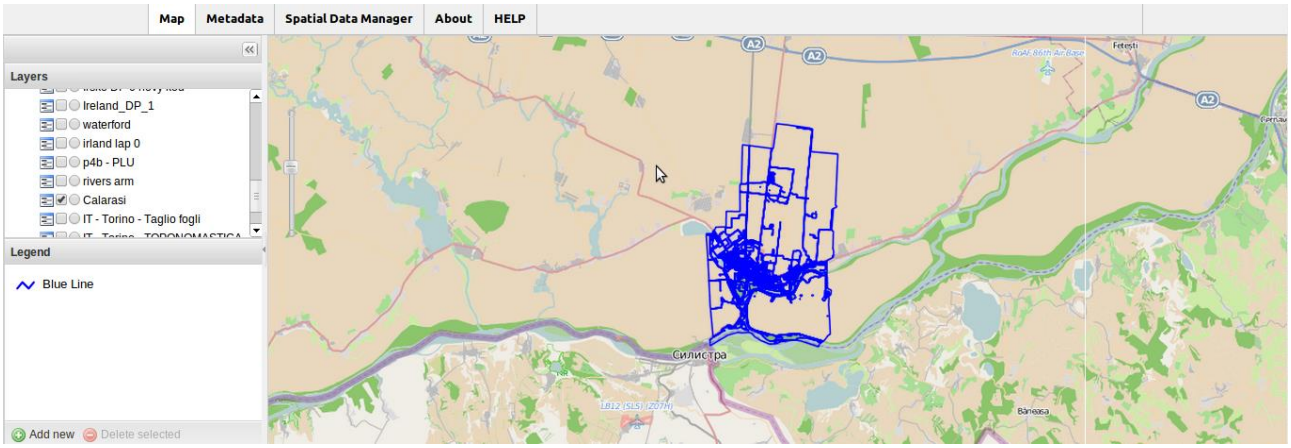

Figure 15 Default style in Styler

Now let's create new style and add a new legend item. A window opens, where we specify the basic properties, the colour and such:

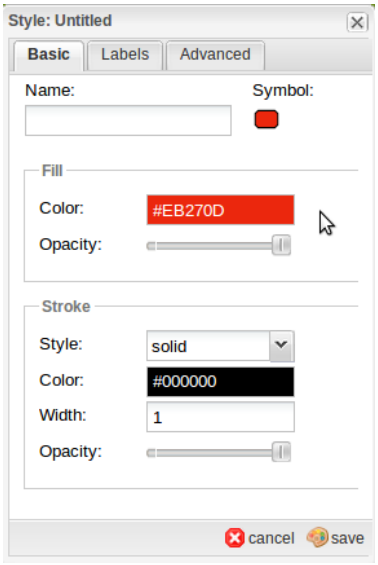

Figure 16 Specifying the style to be applied

On Labels tab, we can decide to show some labels:

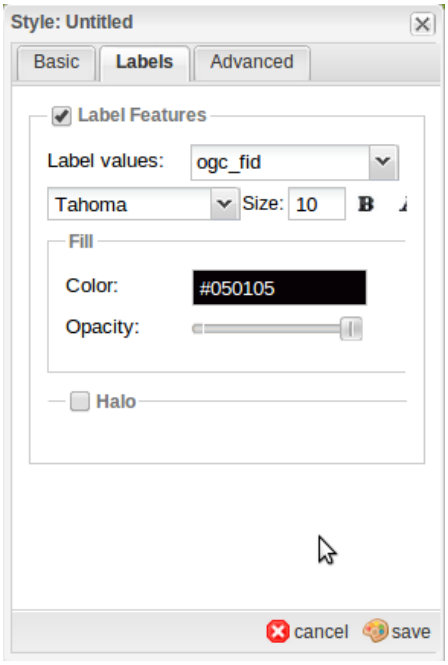

Figure 17 Labels management

On Advanced tab, we define the constrains to apply:

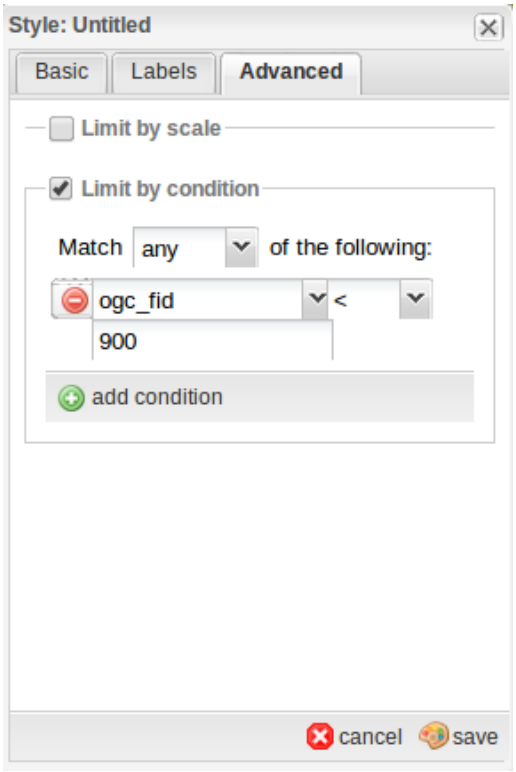

Figure 18 Constrains specification

(scr11)

Let's save it. Now we can create another rule, to define a second legend item:

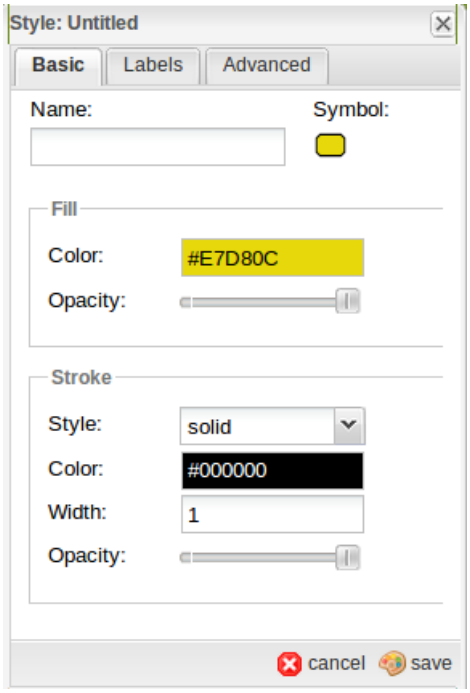

Figure 19 Definition of a second legend item

We have chosen a different colour and we define a complimentary condition:

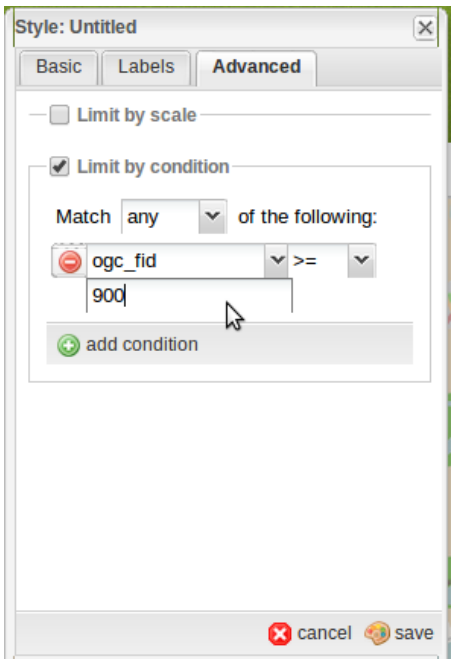

Figure 20 Advanced setting

We save that and see the result of the new style we have just defined:

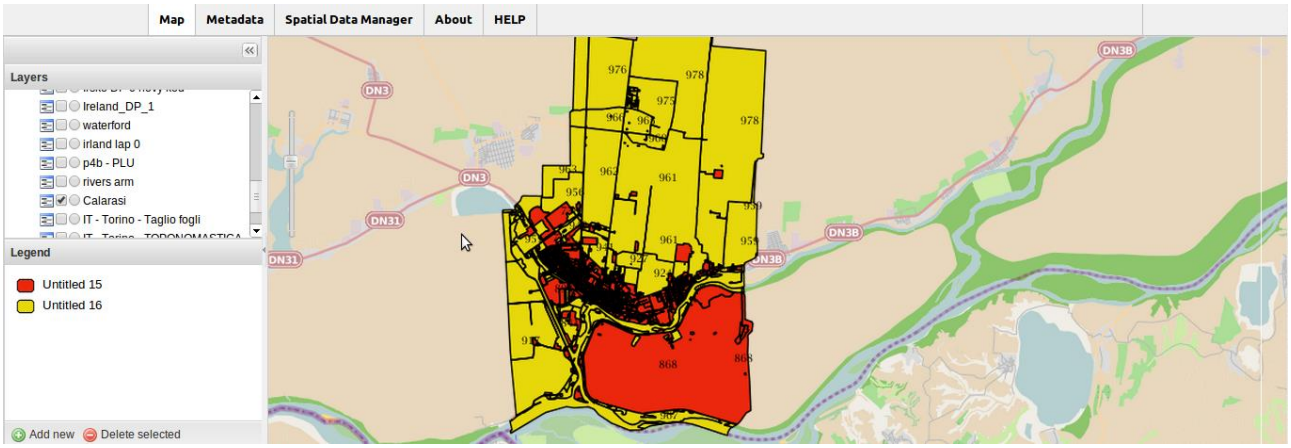

Figure 21 New style applied

When we switch to the map, the layer is shown with the new style:

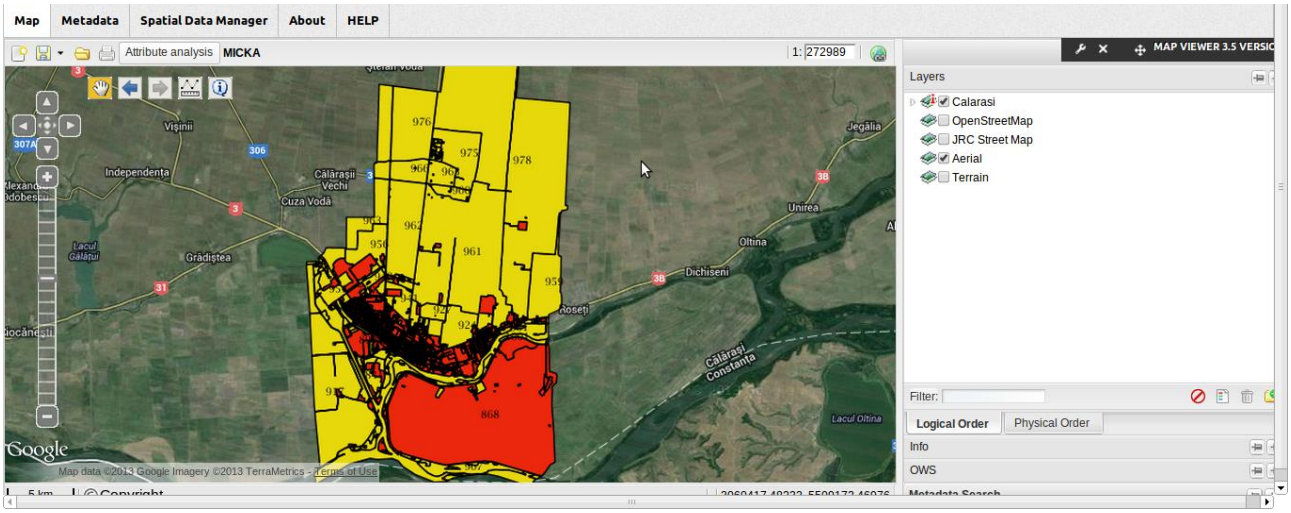

Figure 22 Portrayal of the layer with the new style

8 Pilot Applications

8.1 Location Evaluator

8.1.1 Objectives

Location Evaluator is application that aims to provide easy access to data available in data pool. These data should be visualized in human readable and understandable way in the form of *reports* generated in the PDF or HTML formats. Version 1.0 has been finished 08/19/2013 and contains feature described below.

Target user group

Target user group of Location Evaluator is general public with interests in publicly available information related to spatial domain.

Main benefits for users are:

- Easy access to different data sources from one application.
- Access to derived information that is composed as a combination (a query) across multiple data sources.
- Visualization of data that helps to understand them better.
- Linking the data between each other as well as linking to third party sources.

8.1.2 Work Done and Progress Achieved

User Interface

User interface consists of three main components:

- **Background map** – Background map is used to help user to find the place of his interest by browsing the map. Currently there is possibility to choose Open Street Map and Google Imageries.
- **Overlay map** – This map is used to select particular spatial feature to get report about. Currently there are three levels of overlay data:
    - region (nuts3)
    - municipality (nuts4)
    - general point of interest (buildings, parcels)
- **Search** – textual searching for city, region or municipality. Location evaluator uses the free GeoNames geographical database which covers all countries and contains over 10 million geographical names.
- **Generate report** – component to specify format of report to be prepared. Currently only HTML and PDF is supported. Particular report is being generated on the fly by using services from the plan4business Analysis Engine.

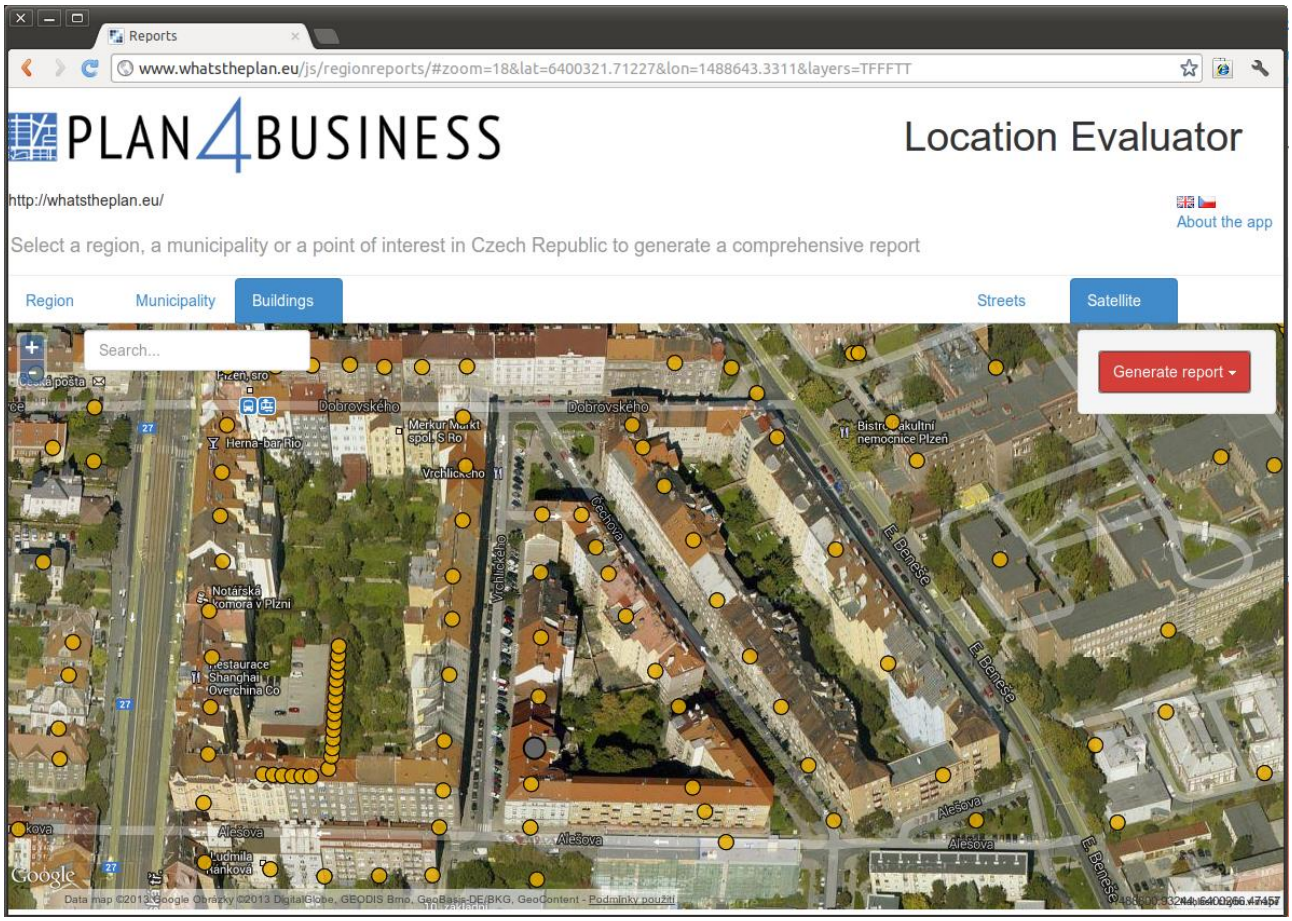

Figure 23 User interface of the Location Evaluator

Client side

The client part of the software is developed using Javascript and HTML with usage of well know open source libraries. These are:

- OpenLayers - used for mapping part
- JQuery - used for as controller of workflow
- Bootstrap – used for components of user interface

Server side

The server side of the Location Evaluator is solved by Analysis Engine (described in 5.1). For the propose of this application we have significantly extend the Analysis Engine to support also output of analysis not just in the form of JSON, but also in the form of documents (*reports)* in HTML and PDF.

The main concept of reports is to have a possibility to prepare such reports in the form of general template. These templates are then inserted into the database and finally they are connected to user interface. One of the main objectives of such solution was to make the preparation of such templates easy also for no programmers.

From above reasons we have tested and evaluated as good solution the Jasper open source framework. This framework provides desktop software that can be used by no programmers to connect to the database and prepare template for report. On other side the Jasper framework also provides libraries that can be used by developers to compile such template and generate the report form it in various format.

For easy access to reports we have designed and implemented the rest API as part of the Analysis Engine. These services are connected and reused in Location Evaluator.

For the location evaluator three main reports have been prepared.

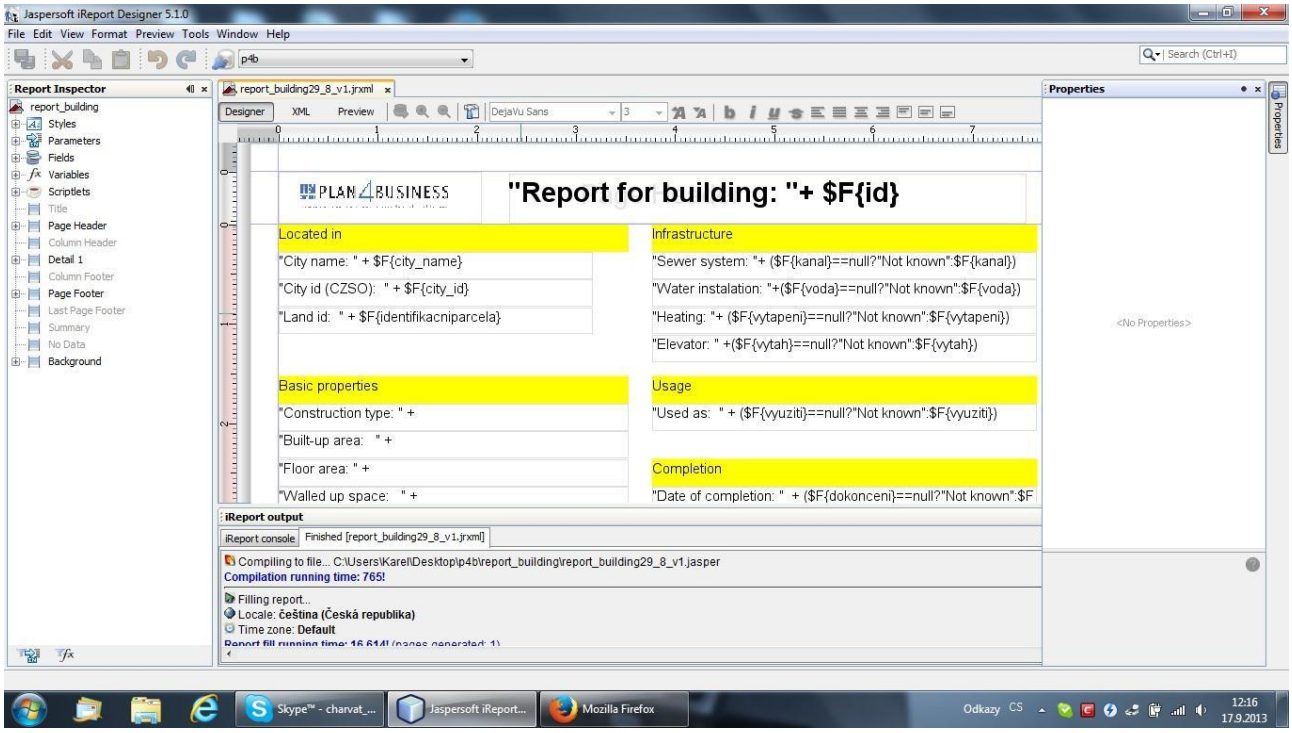

Figure 24 iReport Designer – template preparation

Data and spatial scope

For the pilot application the following datasets were used:

Czech Statistical Office (CZSO)

- **Code list of cities**
- **Territorial analytical data for each municipality**. The selected subset of published dataset involves mainly basic demography statistics and land use.
- Subset of **selected statistical data for individual municipalities.** From this data set, we are using mainly information about number of various kinds of facilities (educational facilities, sport facilities, cultural facilities...) in individual municipalities.
- Data about **number of economic entities by size categories** (number of employees) in each municipality.
- **Local elections** data.

Ministry of Labour and Social Affairs

- **Unemployment** data from individual municipalities.

Czech Office for Surveying, Mapping and Cadastre (COSMC)

- **RUIAN**

T. G. Masaryk Water Research Institute, public research institution.

- **Flood zones** data

Eurostat

- **Regional data** on the NUTS3 level involving demographic indicators, socio-economic data about structure of agricultural land.

The version 1.0 of the pilot application covers currently the area of the Czech Republic. The application offers a possibility to generate on the fly report for:

- 13 regions (Figure 25),
- 6251 Municipalities (Figure 26),
- 4 074 559 Buildings (Figure 27).

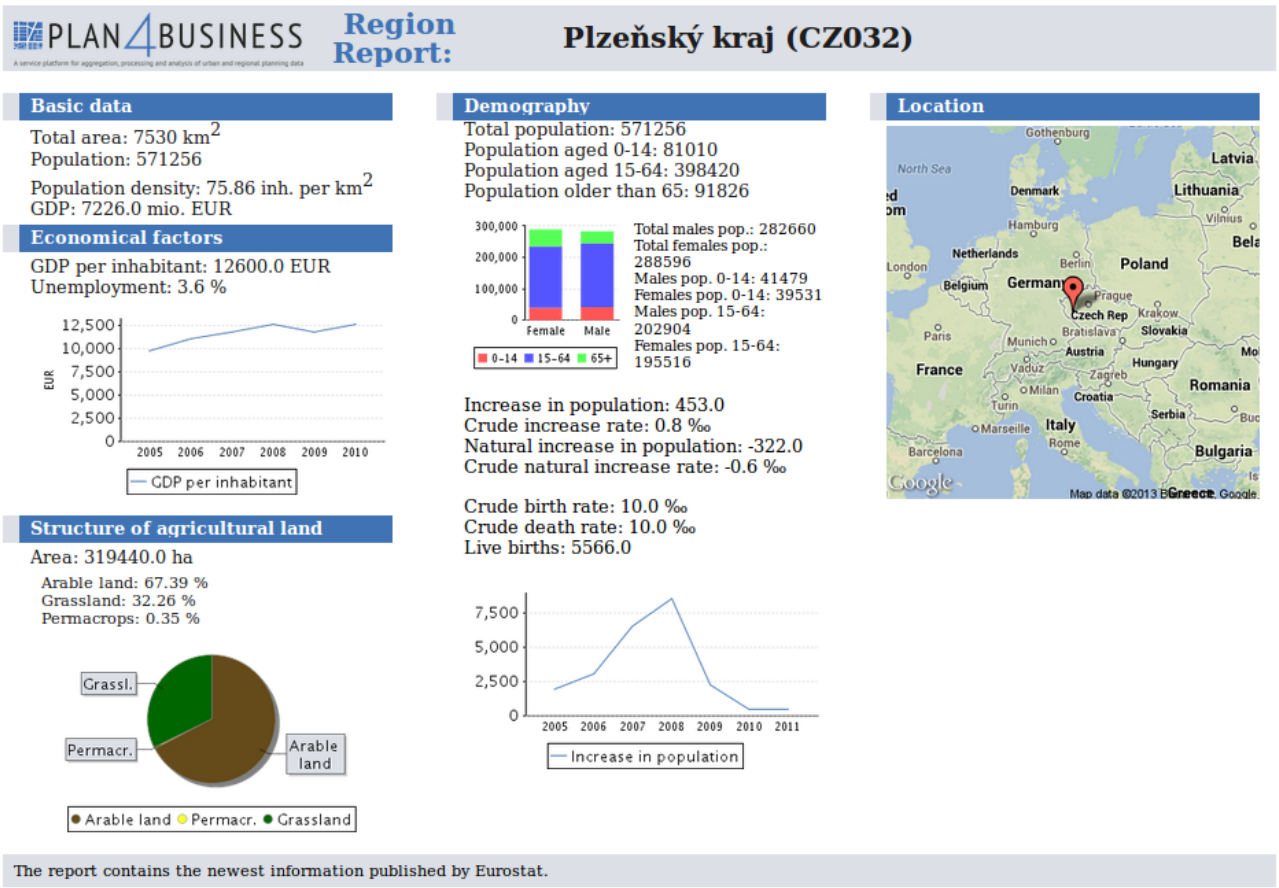

Figure 25 Region report example

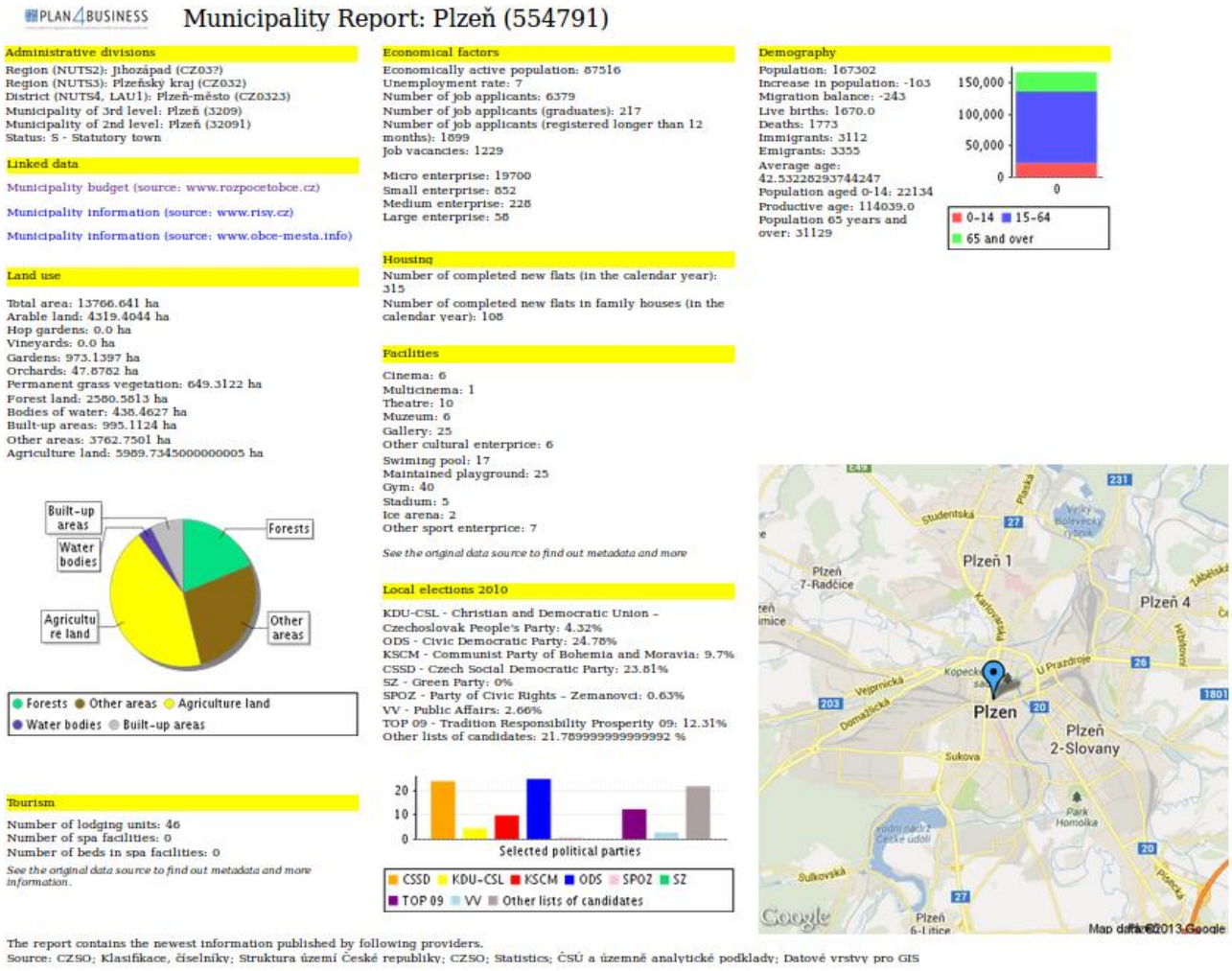

Figure 26 Municipality report example

PLAN4BUSINESS

PLAN4BUSINESS

Report for building: 21665966

Located in

City name: Praha

City id (CZSO): 554782

Land id: 2384834101

Infrastructure

Sewer system: Connection to sewer system

Water instalation: With water pipe

Heating: Other (inlluding without heating)

Elevator: Without elevator

Basic properties

Construction type: Not known

Built-up area: Not known

Floor area: Not known

Walled up space: Not known m

Number of floors: Not known

Number of apartments: 6

Usage

Used as: Apartment building

Completion

Date of completion: Not known

Flood risk

Located in zone of largest flood: Yes

Located in zone of 100-year flood: Yes

Located in zone of 20-year flood: No

Located in zone of 5-year flood: No

Linked data and reports

Report for city: Praha

Report contains information published by following providers.
CZECH OFFICE FOR SURVEYING, MAPPING AND CADASTRE (COSMC);RUIAN;
T. G. Masaryk Water Research Institute, public research institution; DIBAVOD

Report generated at 2013-09-17 13:49:44.0

http://www.plan4business.eu/ **http://whatstheplan.eu/**

Figure 27 Building report example

8.1.3 Next Steps

Further development will be focused on improving the report content. Technically, it is possible to add there any results of any analysis based on the datasets available in the data pool. The main focus will be on routing features so that the reports can contain also information about accessibility of most important places in the surroundings (e.g. bus station, train station). Future work is also focused on collecting additional datasets like criminality, air pollution and similar. Utilisation of urban planning data is also under the focus,

but is greatly influenced by data availability. The last point is to extend the spatial extent of the application to other countries.

8.2 Harmonise (Collaborative Schema Integrator)

8.2.1 Objectives

This task includes the design and implementation of the client side for the collaborative integration of spatial and non-spatial data into the plan4business data pool. The work encompasses the **design and implementation of the web interface** for the data upload and harmonisation workflow. The following functionalities and components are foreseen:

- **Data source upload** for all datasets that will be stored in the primary data pool.
- Configuration of the “Integration Engine” component (= Schema Mapping Component + Plan Matcher Component) to do the actual data integration:
  - for vector data: the **Schema Mapping Component** supports data transformation for Existing and Planned Land Use (into a simplified INSPIRE Data model) in HALE;
  - for raster data: the **Plan Matcher Component.**

8.2.2 Work Done and Progress Achieved

Components for Service Levels 1, 2, 3 and 4 were implemented and integrated with the existing infrastructure of the Liferay portal. New tasks for Service Level 5 were identified.

In the following text we first give an overview on the overall workflow that is related to data upload and integration. This workflow describes the interaction of the user (Data Provider) with the system for the data upload as well as the subsequent processing steps required for integration and writing into the database (related to the Integration Engine described in D5.1). This comprehensive workflow description is then followed by a detailed description of the Web Interface developed for organising the data upload and integration workflow.

Concept of Integration Workflow

The following four figures provide an overview of the workflow for integration of vector data sets using the Plan Integrator UI and the Integration Engine (see D5.1).

Figure 28 Top Level Integration Workflow gives an overview on the overall process of data integration. The main activities in the top level integration process are uploading data for integration, storing it in its original form and creating tasks for the integration of the different files/documents into the primary data pool. These tasks serve to decouple the data upload from the actual integration, and later on store the integration configuration. As simplification, the completion of the tasks is displayed in the process model in linear order,

with each task being finished completely, but in the implementation later on integration tasks may be completed partial and started or continued independently of each other.

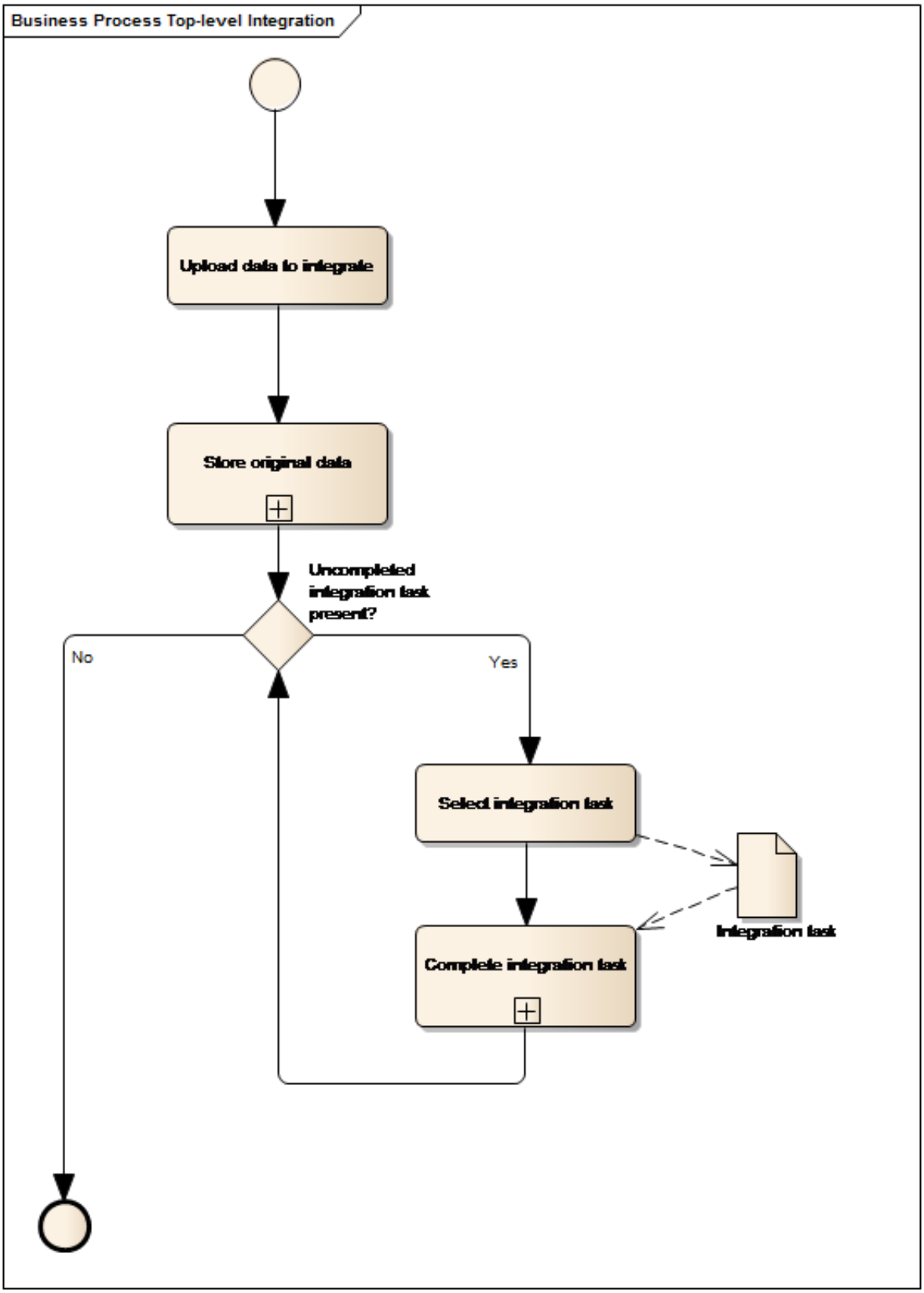

Figure 28 Top Level Integration Workflow

The remaining three figures showcase specific details about the sub-processes of “Store original data”, the complete integration “Store original data”, “Complete integration task” – and more specifically as part of the integration task “Schema Mapping” – are sketched in detail. The proposed workflows are an initial draft and are subject to change in the further progress of the project.

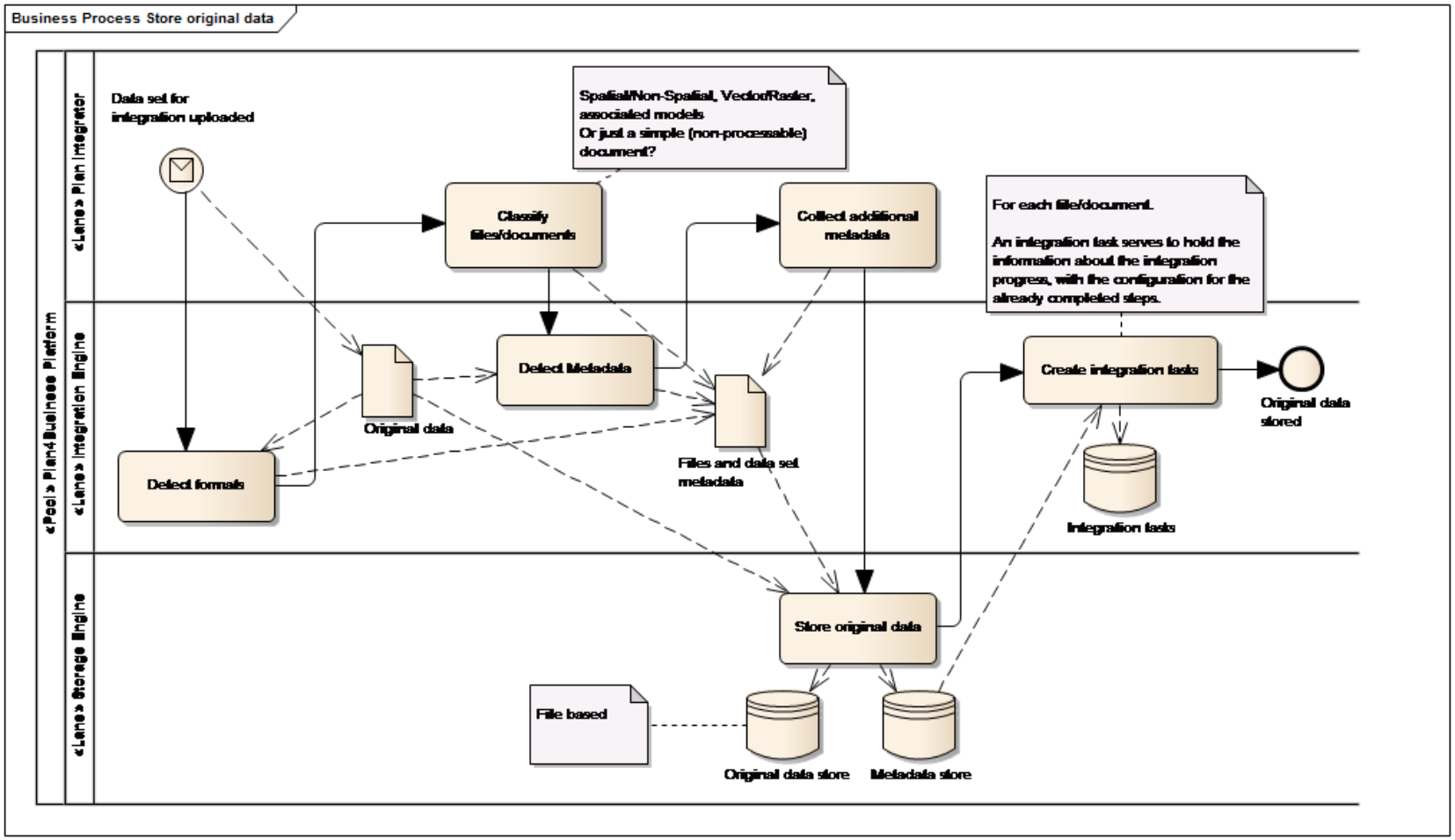

Figure 29 Workflow for storing original planning data sets

In the process “Storing original data” (Figure 29), the uploaded files are processed, classified and metadata is collected. As a result, the original data set and file/document metadata has been stored in the system. For each file/document an integration task is created that controls the further integration into the system to make the data usable for visualization and analysis.

Figure 31 below shows the process of completing an integration task. As a result the data is stored in the primary data pool. During the process, data is handled differently according to its format. One activity necessary for translating vector data to the plan4business models is Schema Mapping. Like many of the other activities in this process it is rather complex by itself, and is not just restricted to the Integration Engine component but involves also the Plan Integrator and through that the data curator.

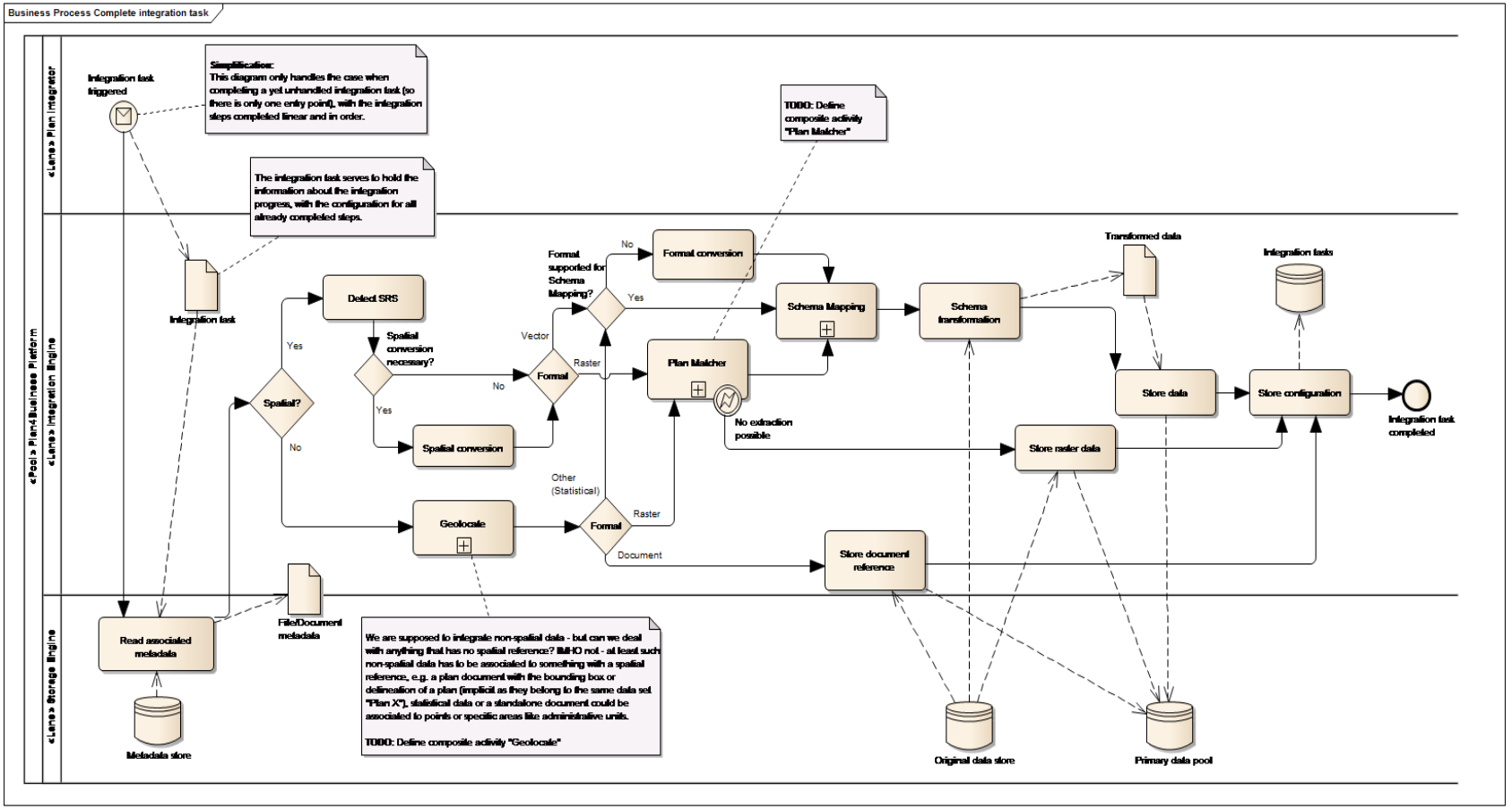

Figure 30 Workflow for the actual schema integration I

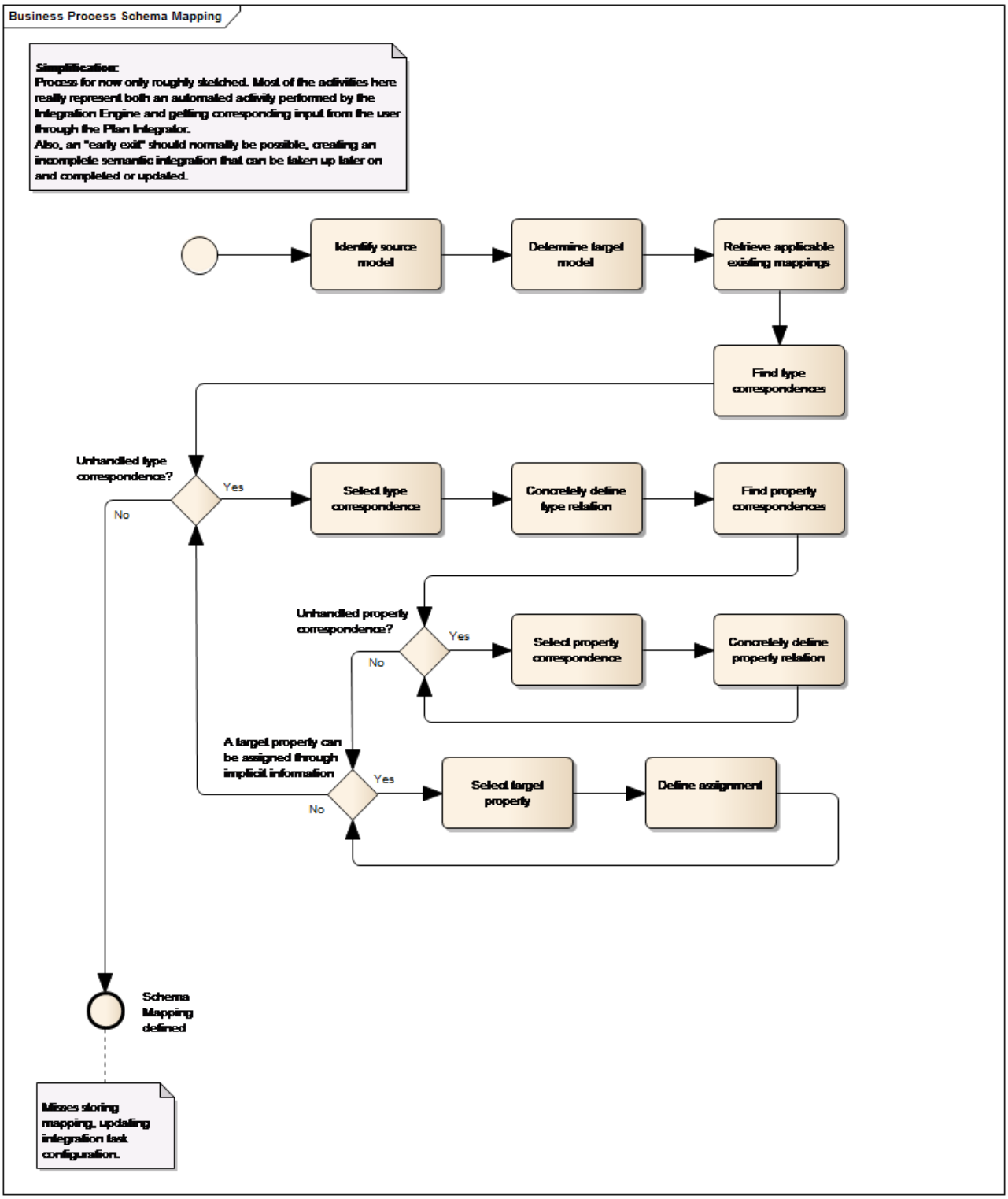

Figure 31 Workflow for the actual schema integration II

Design and Implementation of the Web Interface

Figure 32 provides an overview on the implementation levels roughly defined for the plan integrator component in relation to the developments for the Integration Engine (see D5.1).

The following description focuses on the implementation status reached so far, which is the interface for uploading data and mapping projects (level A in Figure 32). The functionality maps to the workflow depicted in Figure 29 on storing original data and partly also to the workflow depicted in Figure 31 on the actual schema integration.

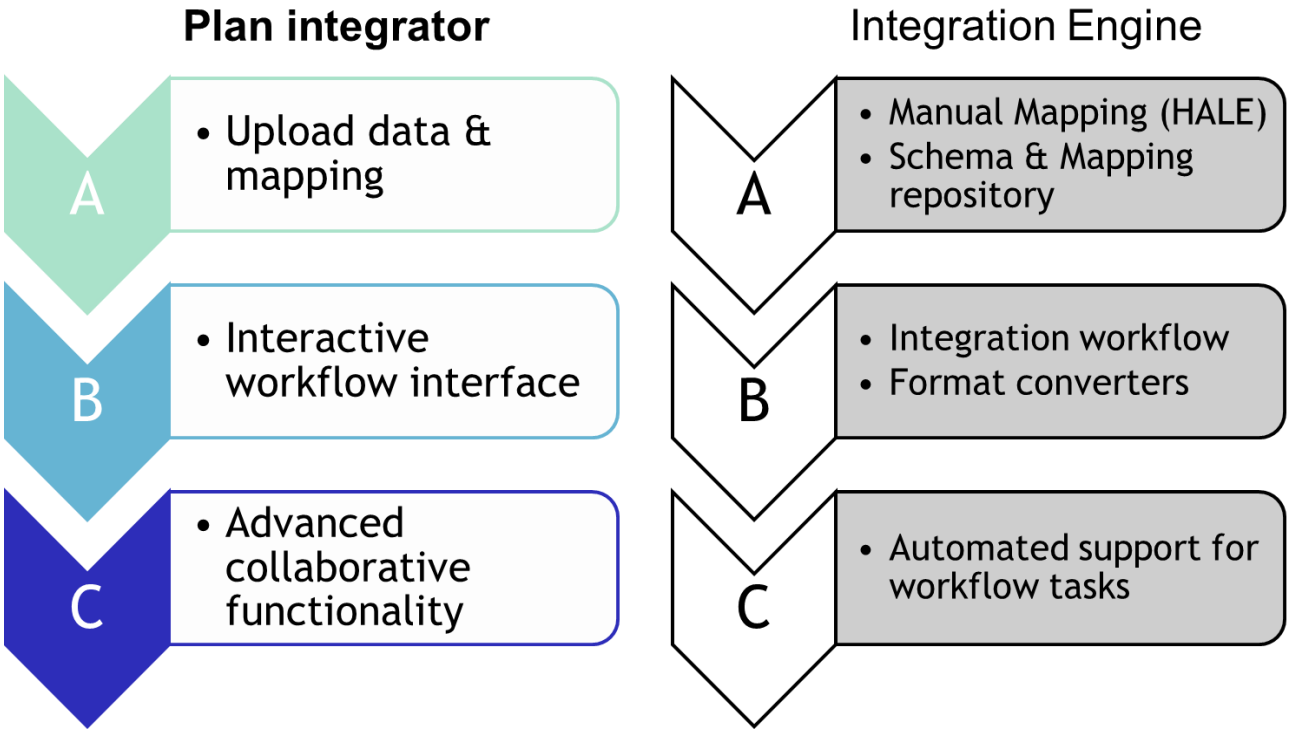

Figure 32: Rough implementation levels for the Plan Integrator components and related status of the implementation progress with the Integration Engine

The Plan Integrator is now fully integrated with the Liferay portal. Accessing the Plan Integrator can only be done after logging into the portal. Initially the Plan Integrator presents the user with an overview on how (s)he can contribute to the plan4business platform and what services will be available on the data afterwards. The three main steps from the user's point of view are (see also Figure 33):

1. Uploading data or registering a data source
2. Defining the schema mapping for harmonisation with the plan4business data model
3. Publishing the integrated data in various ways

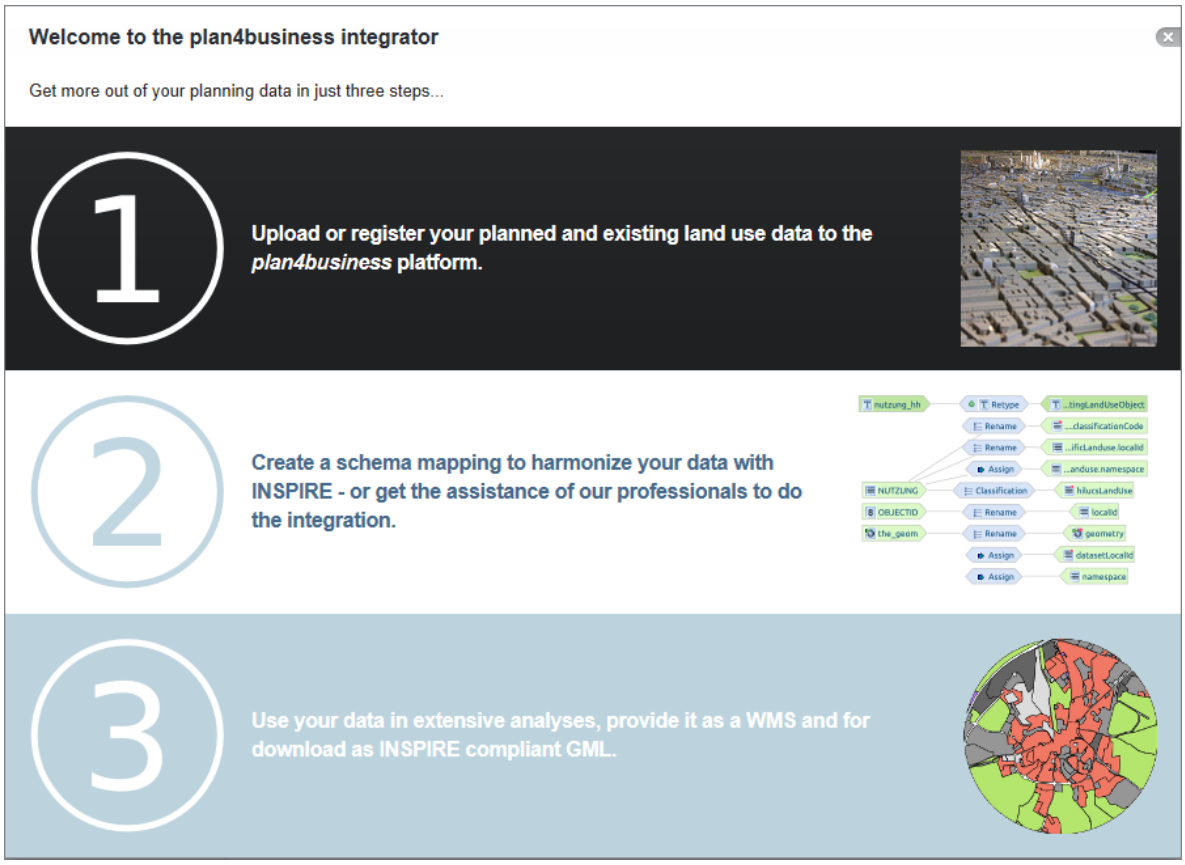

Figure 33 Basic steps for the user in the Plan Integrator

The workflow as currently implemented in the Plan Integrator Interface is the following. Source data is uploaded and stored in the plan4business file system and related metadata is stored in the primary data pool. We have implemented the primary data pool with a PostGIS database, as explained in detail in D5.1. All data formats can be uploaded into the system; but for the schema transformation currently only data based on Shapefiles is supported. Uploaded files are organised in data sources. A data source may contain multiple files of various kinds, which are classified as vector data, raster data, documents or schemas. This allows that all relevant regulations, plans or other related sources can be grouped together. For example, for all datasets on planned land use it is very important to have also the related regulations uploaded and available for the end users.

For each “Data source” an explicit spatial reference is stored. This is either automatically extracted from the data files uploaded or it will be requested from the user via sketching a bounding box on a map. While uploading the source data, the user is requested to specify some additional metadata, e.g. a name for the plan or plans, an abstract and the spatial reference system.

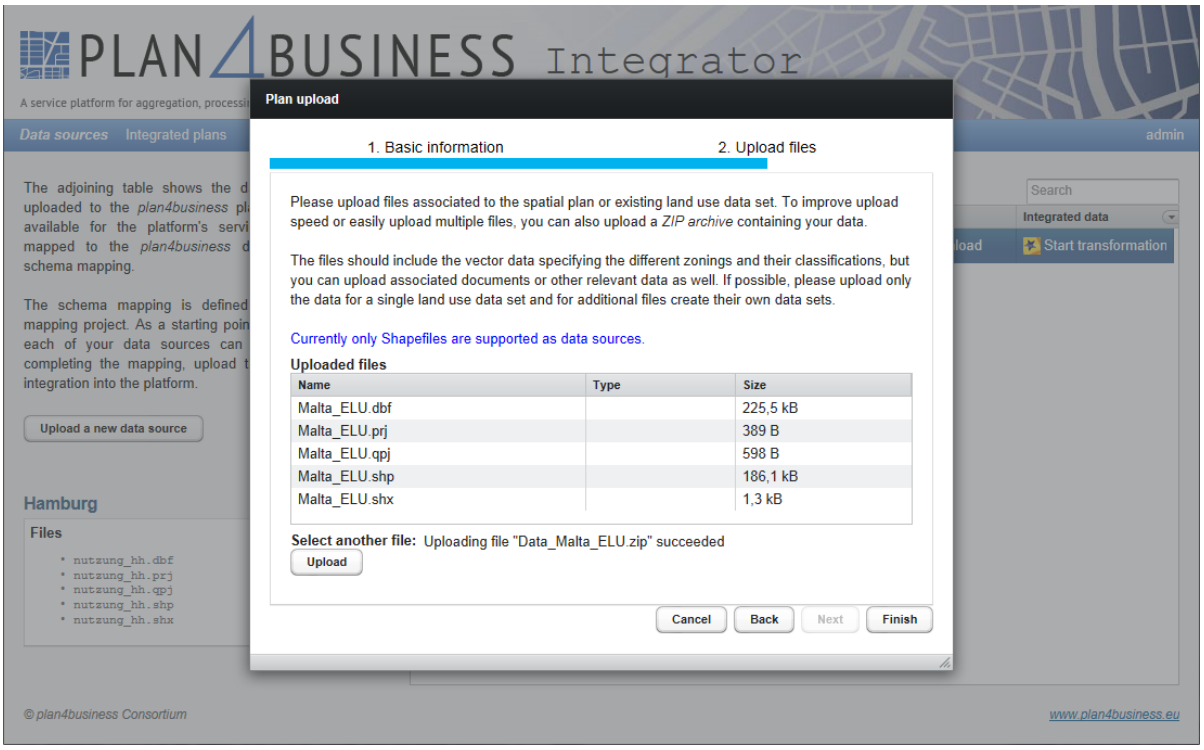

Figure 34: Data upload wizard

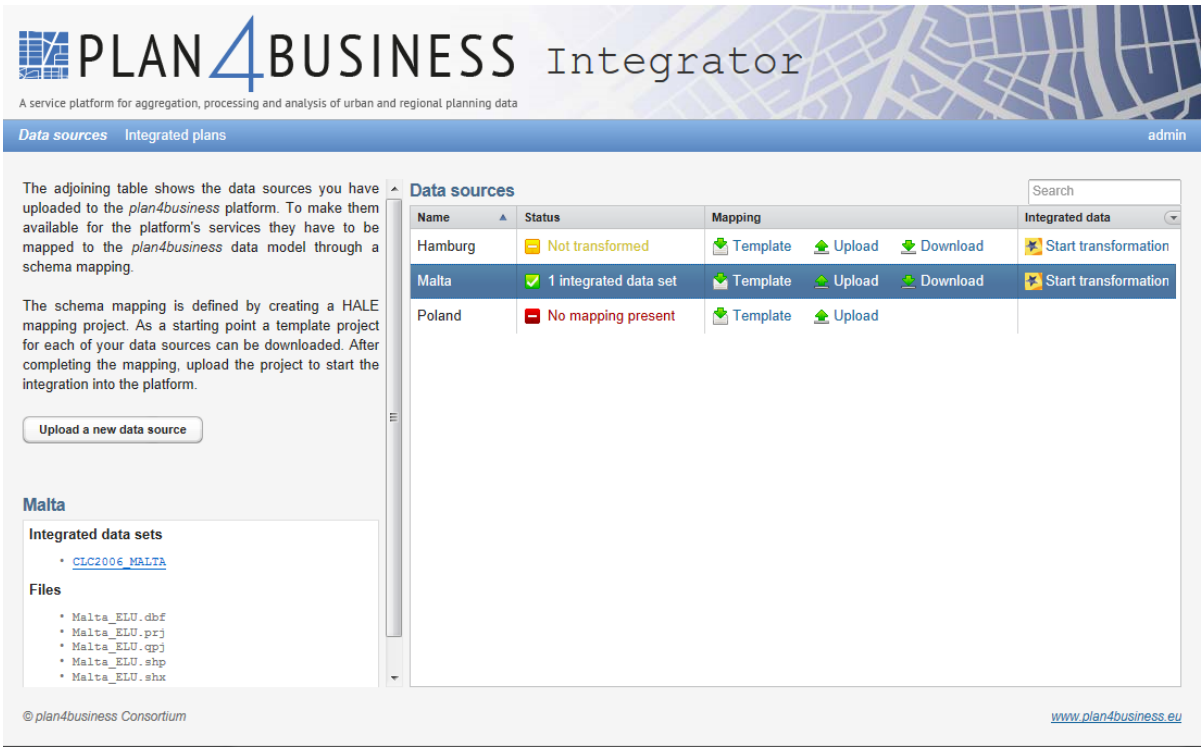

Figure 35 User data source overview with status

After the data source and its metadata have been defined and stored in the database by the users, the next step involves the definition of a HALE mapping project needed for the integration towards the INSPIRE Data Model for Land Use.

The users have the possibility to either choose an existing mapping project from the storage, or to define a new project from scratch. If no mapping projects for the source data exist, a new mapping project will be created. The Plan Integrator provides the user with a download for a template project, which includes the source schema and data that are part of the data source, as well as the target schema, which is the simplified INSPIRE represented by the plan4business intermediate schema.

Once a mapping project is available, the transformation process can be easily executed on the source data. The transformation runs based on HALE Server components as part of the Integration Engine. The results of the transformation process, the harmonized set of existing or planned land use data is then integrated into the primary database. Once in the database, the plans can be published. Figure 36 shows how the users can inspect their integrated plans in the Plan Integrator.

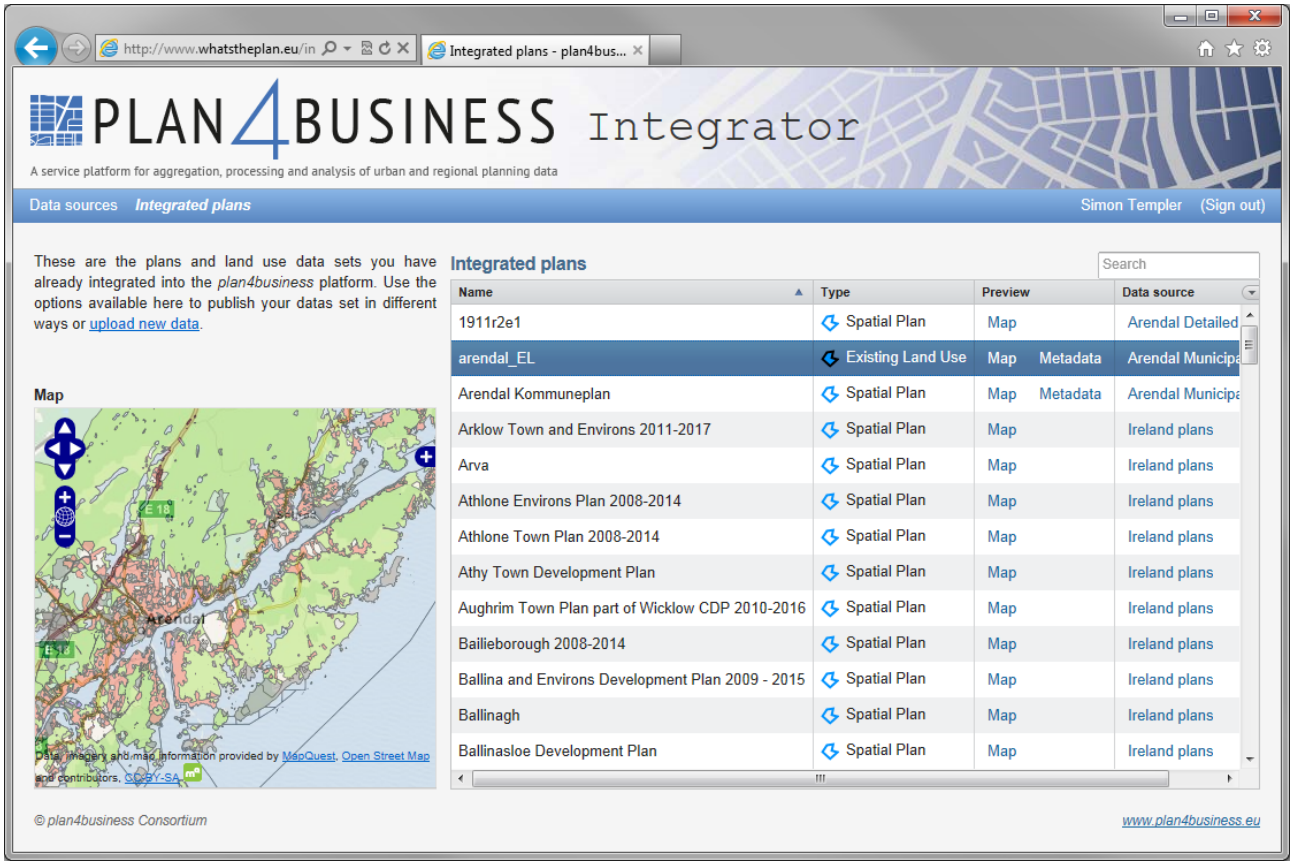

Figure 36 Integrated plans with map preview

Currently, the mapping has to be defined offline in the HALE desktop application. For the next implementation level, i.e. level B in Figure 32, an interactive workflow will be implemented that enables the definition of the mapping project based on specific information collected from the data provider on the source data. This will include the mapping table between the original classification of land use applied on the source data to the HILUCS classification used in the INSPIRE data model for land use. These mappings will be stored, analysed and exploited in order to support other users with their mapping tasks on the Land Use classification.

8.2.3 Next Steps

Further development will be focused on improving the user experience and supporting the user in the process of data integration.

In the current workflow, the creation of the mapping in HALE still is the biggest obstacle for the user. By guiding the user through the mapping process and providing contextual help we aim to make using HALE for the schema mapping a task that can not only be performed by expert users. For this we will create a plan4business edition of HALE that will include a number of plan4business specific functionalities and content. Interacting with the plan4business platform will be made easier through direct communication between HALE and the REST API currently in development for the Integration Engine.

To further lowering the barrier to defining the schema mapping, in parallel a user interface for an interactive workflow specifically tailored for creating a mapping for integration of land use vector data into the platform is developed. This workflow will be part of the Plan Integrator's web interface. Figure 37 shows an example workflow where the necessary information to define the mapping is supplied by the user step by step.

How integrating data into the p4b platform might work - a simple example

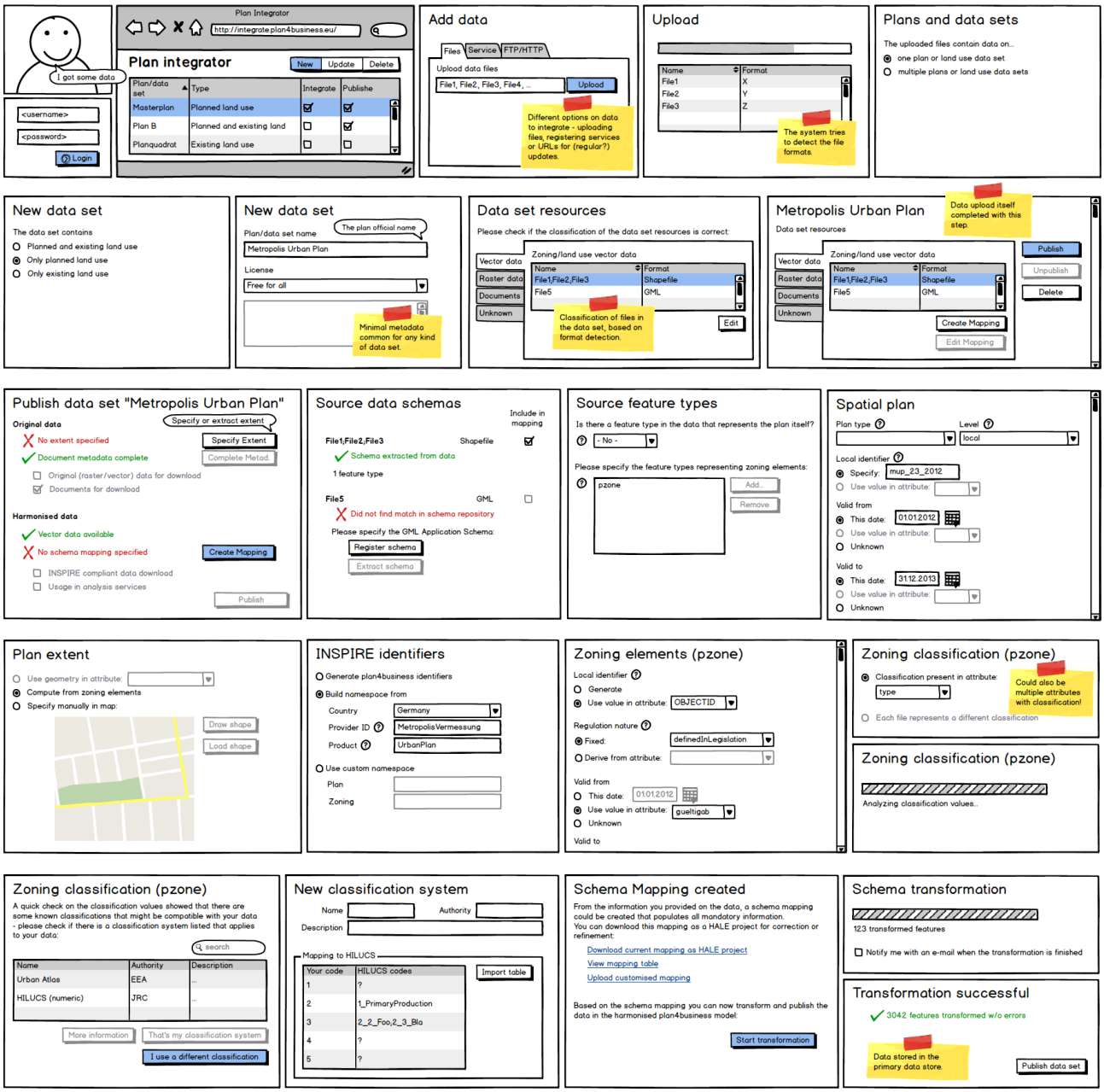

Figure 37 Interactive example workflow for integration of Land Use data

8.3 Thematic Map Viewer

One of the major plan4business outcomes is the Thematic Map Viewer. The main objective of this application is to visualise data stored in our database in a user friendly way. Due to the fact that the database contains many data-layers, a grouping of these layers took place - into thematic compositions. By now, we have created about 30 compositions. Most of them are related to socio-economic and demographic indicators such as GDP, average monthly salary, unemployment rate, employment structure (by sectors), local human development index (LHDI), population size and density, net migration and natural growth and

age dependency ratio. Not all of the compositions are related to human development. Some of them, like structure of agricultural lands, structure of livestock, environment pollution by gases and particulates, are from other areas.

When entering the application you can see bounding boxes of available compositions in the map and also a list of the available compositions on the right. When the user points at a composition in the list on the right, its bounding box is highlighted in the map.

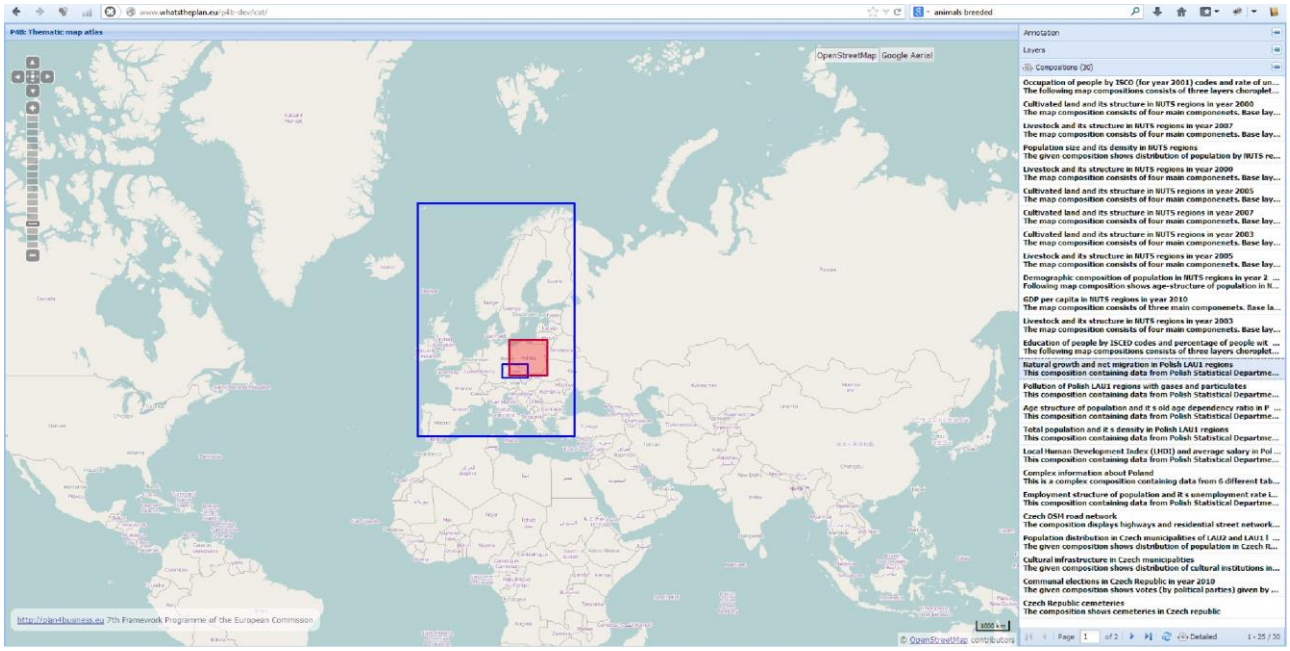

Figure 38 Bounding boxes of map compositions

There are three main data sources for the map compositions. Firstly, it is a public database of Eurostat (compositions covering the entire Europe). Secondly, it is the Czech Statistical Office and thirdly, it is the Polish Statistical Office. All of the three bounding boxes are shown in the map. Also in our database we have data from German Statistical Department and some cities (mostly from Ireland and Poland) spatial and development plans, that we are preparing to visualize in course of next weeks.

What distinguishes us from another applications that are also visualising statistical data and producing thematic maps is that we use many more techniques of thematic cartography and also that we don't use any commercial software that one needs to pay for.

For instance, if one takes a look on the following applications: Statistical Atlas by Eurostat (http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/) based on commercial ArcGIS, and also at Regional Statistics Illustrated still by Eurostat (http://epp.eurostat.ec.europa.eu/cache/RSI/) again based on ArcGIS, one can see that visualisations made are all quite standard (choropleth maps technique) and simple. Also all these visualizations are meant for certain level of administrative units i.e., with changing scale user still sees the same administrative units.

The same weaknesses can be seen on the Google initiative (Public Data). The module allows just certain, quite poor selection of methods to visualise spatial data (choropleth maps, also point symbols of varying size).

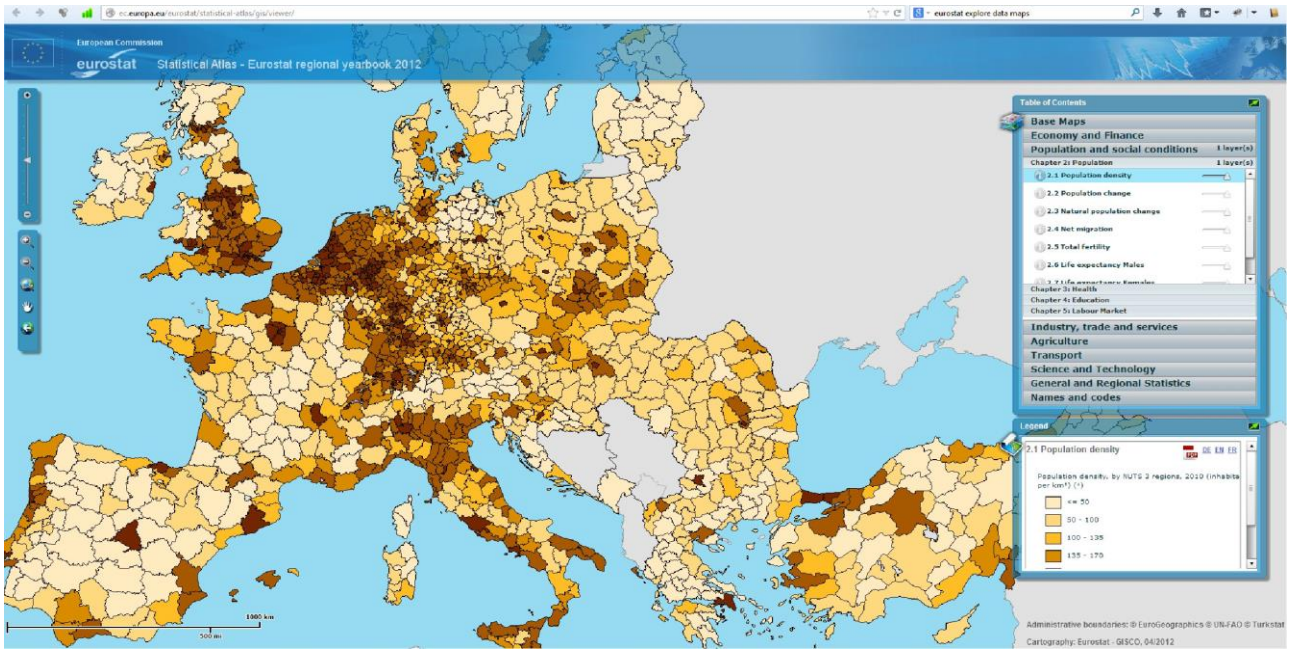

Figure 39 Example of EUROSTAT

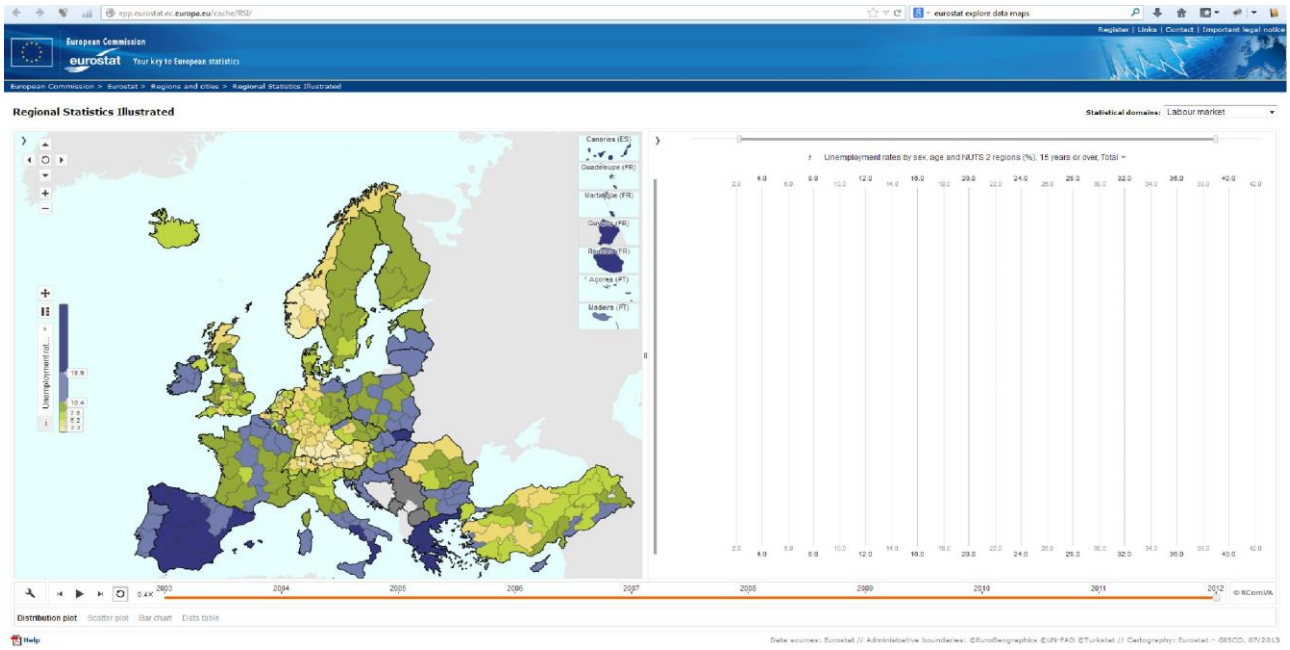

Figure 40 Example of EUROSTAT

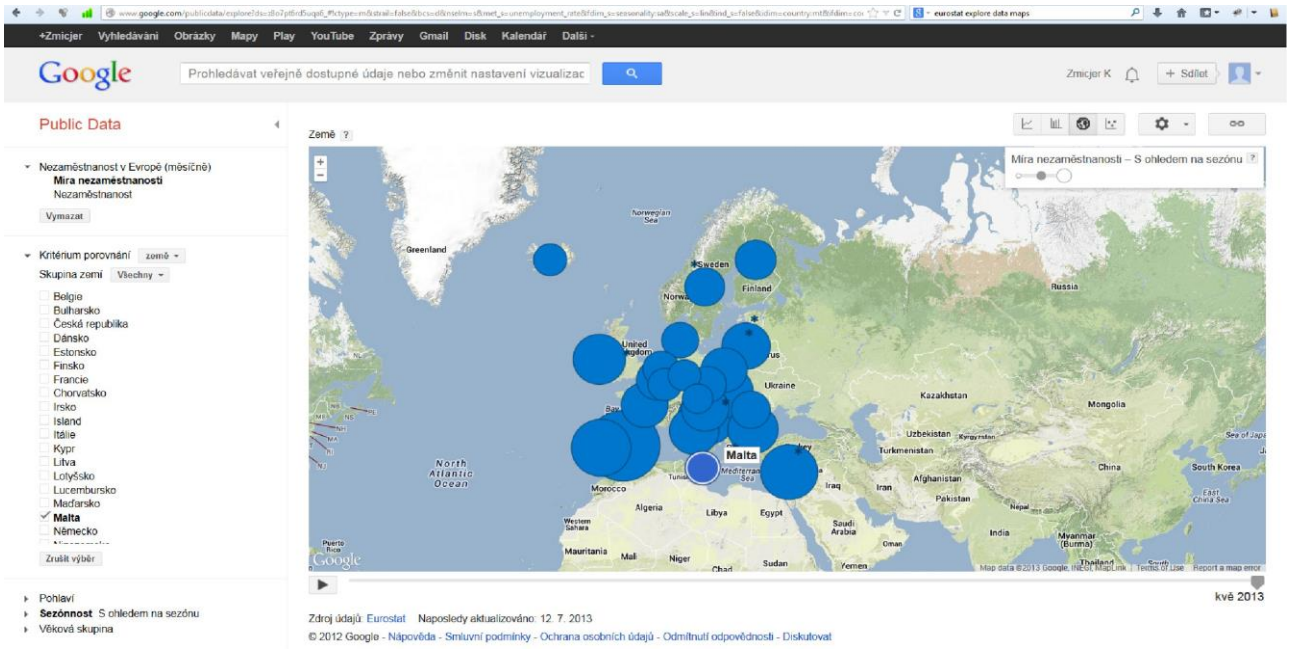

Figure 41 Example of Google

On the contrary, in our Thematic Map Viewer we try to explore all variety of methods of thematic cartography to visualize spatial statistical data. The main results of this initiative are:

- The Thematic Map Viewer;
- Evaluation of suitability of different methods from thematic cartography to visualize certain data;
- Evaluation of data (its quality most of all) taken from multiple sources;
- Scripts (tools) for generating certain diagrams, cartograms and other methods of visualisation.

Here one can see implementations of different methods of thematic cartography that are quite normal (usual) for printed maps, but at the same time are quite untypical for digital cartography.

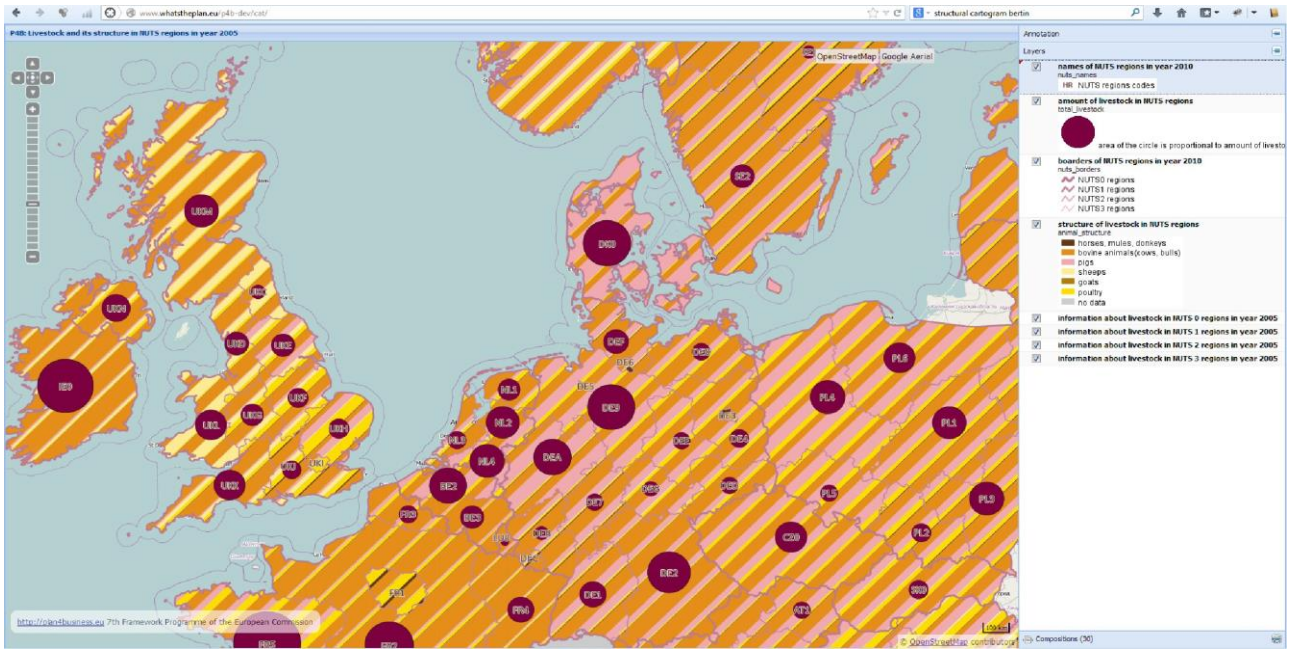

Figure 42 Plan4business maps

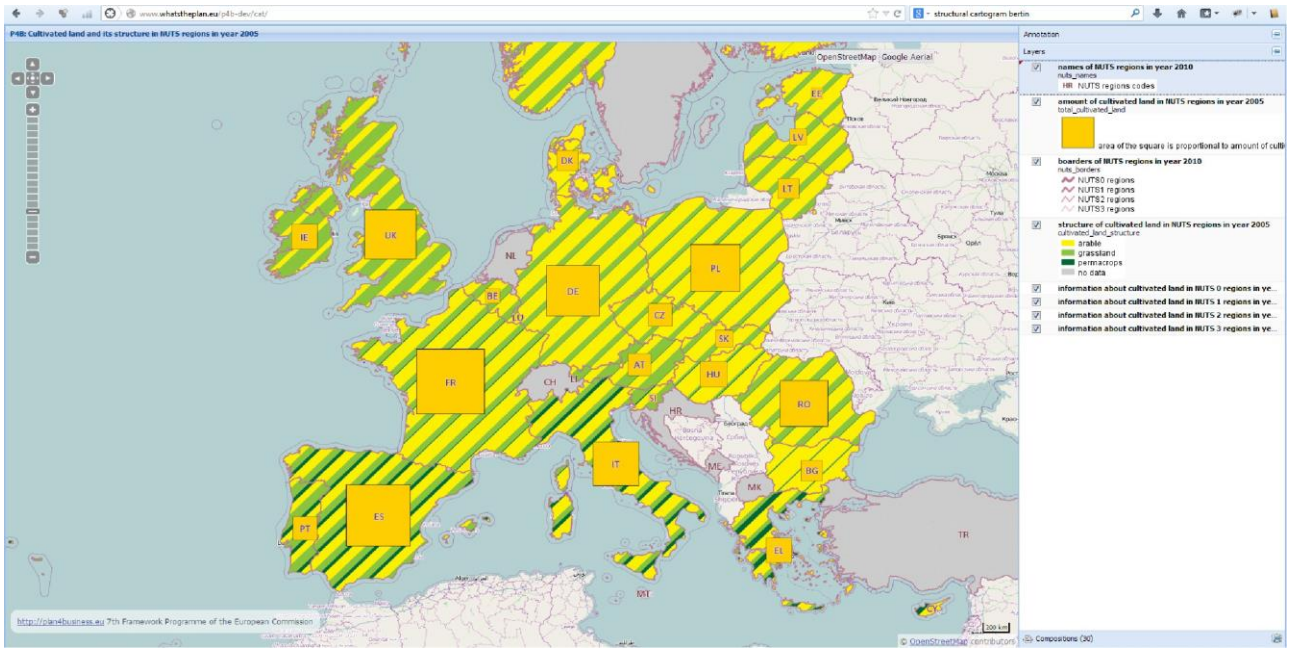

Figure 43 Plan4business maps

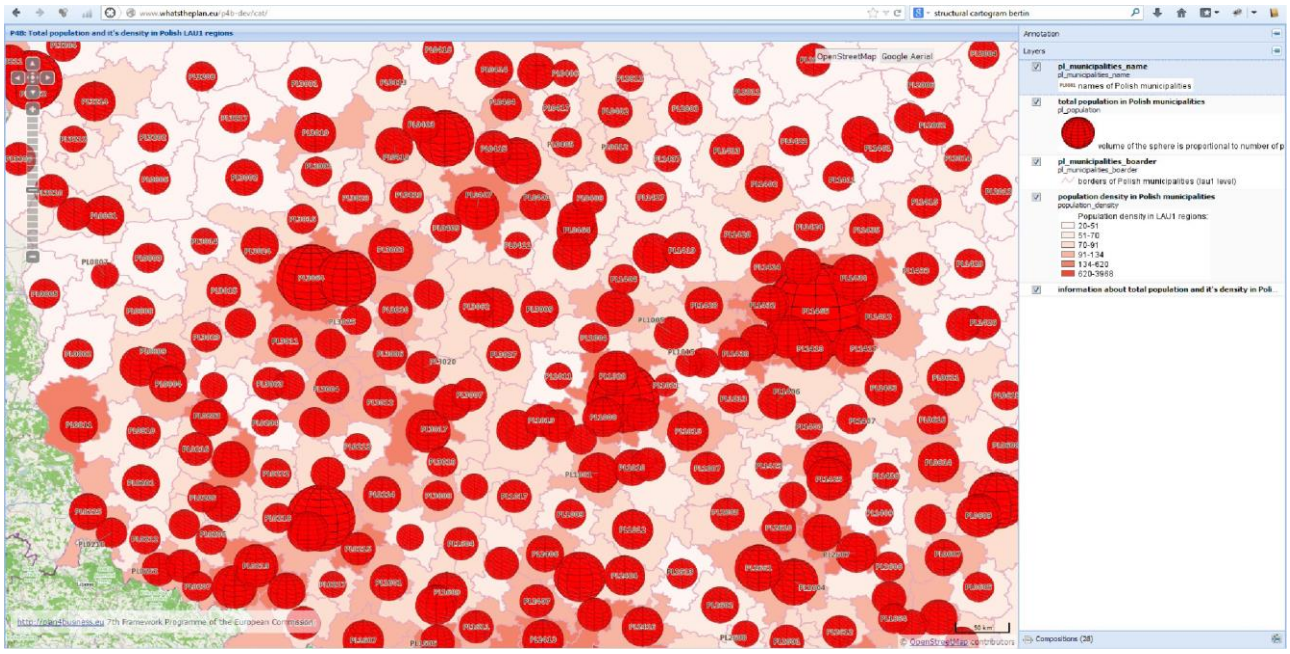

Figure 44 3D symbols.

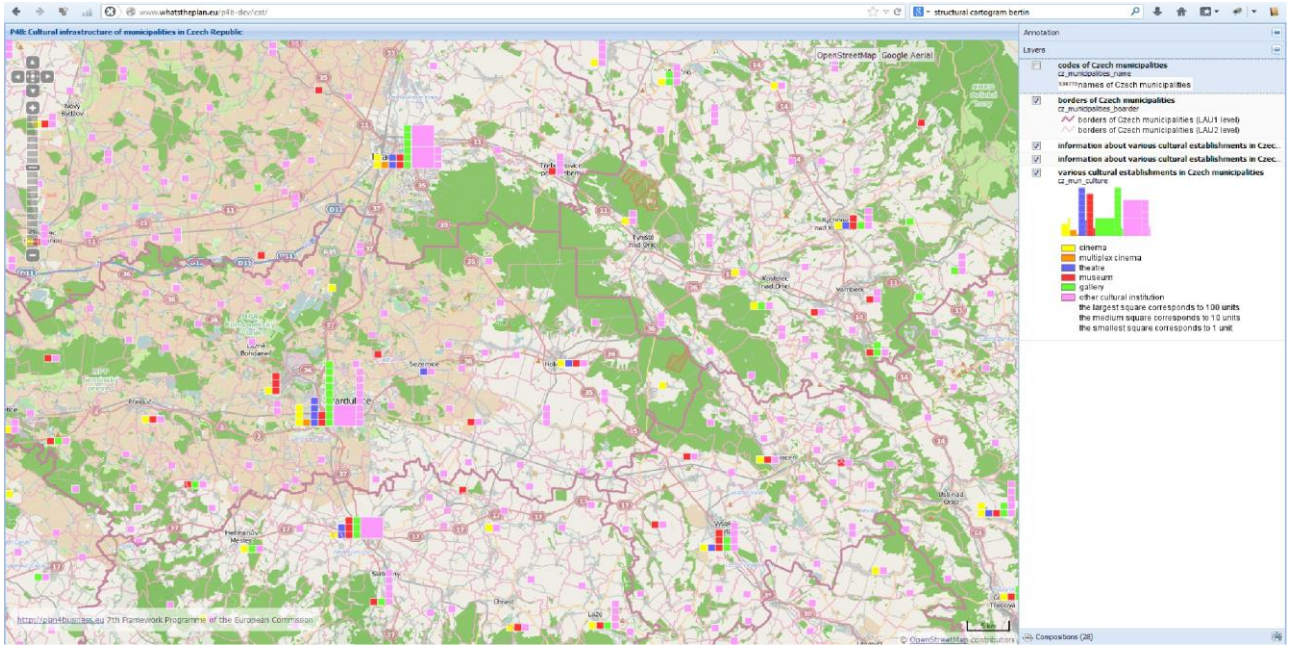

Figure 45 Segmented diagram

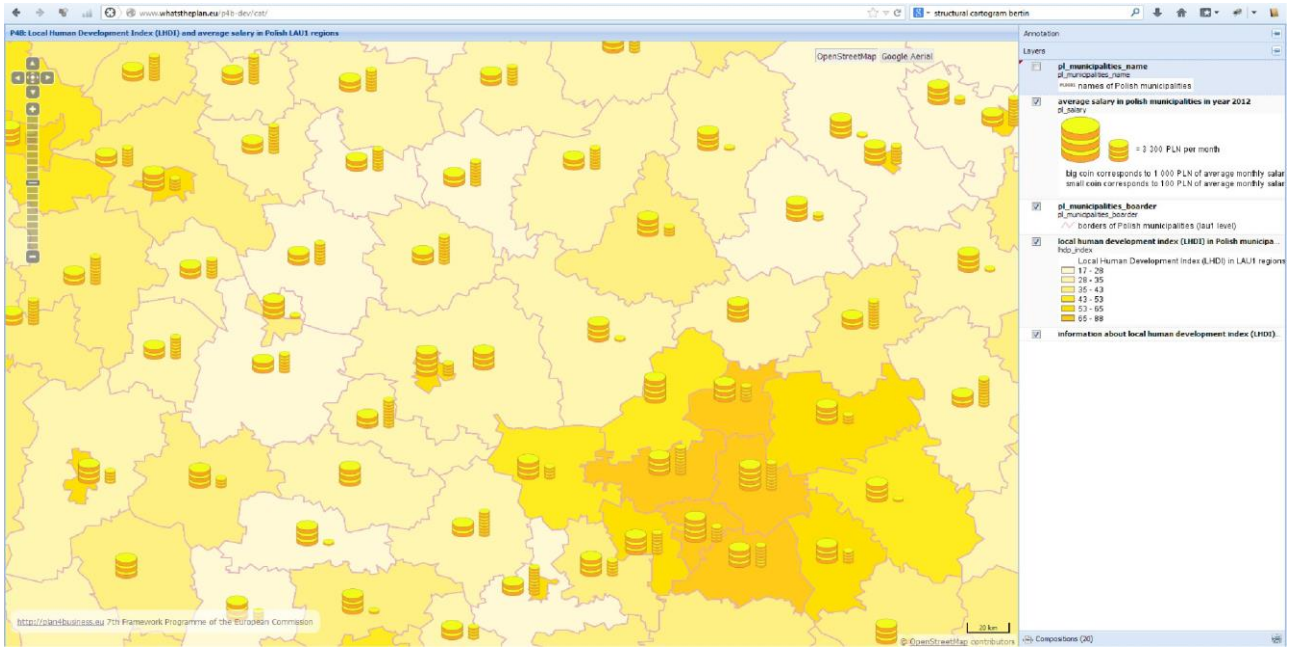

Figure 46 Segmented diagram

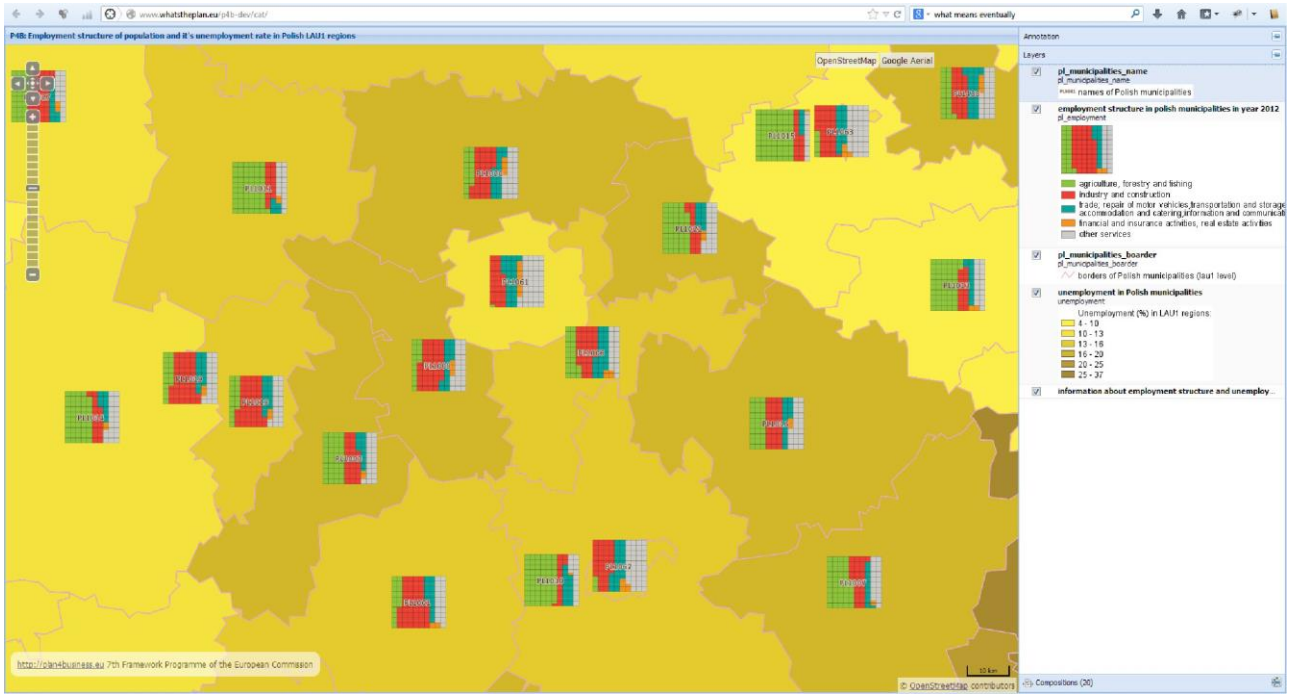

Figure 47 Structural diagram

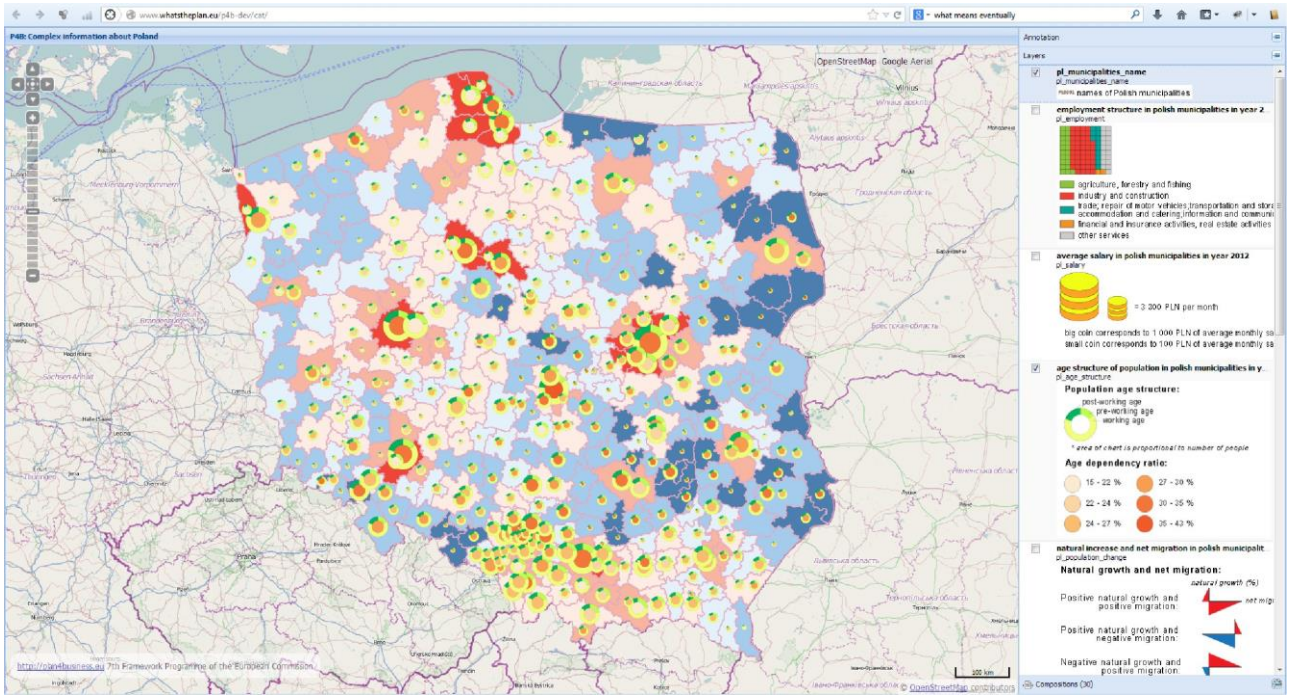

Figure 48 Structural diagram

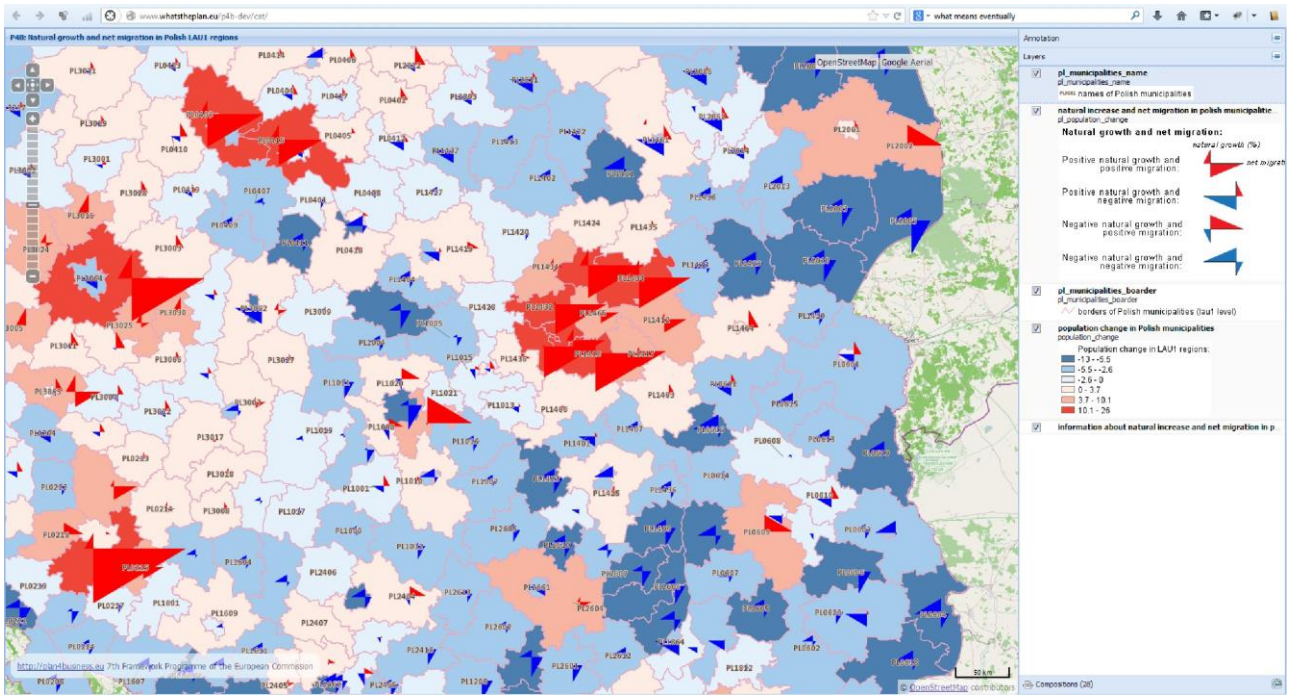

Figure 49 Structural diagram

The whole technical process behind the generation of compositions is as follows:

1. Look through the data and check that it doesn't contain some obvious mistakes (let's say percentages of each category add up more/less than 100% etc.).
2. Upload data to the database depending on the type of data (if it is just table with statistical data (.xls, .csv etc.) or shapefile: through COPY function of PostgreSQL or using LayMan/shp2pgsql/ogr2ogr.
3. Select an appropriate method of visualization.
4. Create and fill additional attributes by sql scripts if needed (for example attribute 'interval' if we want to classify the data into intervals or attribute size or for instance if we are representing the whole size of population with spheres to calculate the radius of the sphere etc.).
5. If needed generate diagrams and definition of SYMBOLS to paste in mapfile by plr scripts. Create mapfile itself, create WMS services.
6. Using our HSLayers client create and save a composition using certain thematically related compositions that we've just created.
7. Make composition public.

The process as can be seen is just half-automated and it is because in thematic cartography many decisions need to be taken by cartographer himself.

8.4 Embed-Map

This pilot application enables user to create a map in the Thematic Map Viewer and insert it as an embedded object into any HTML pages. Users can define parameters which affect how the map will look like in the target HTML page (currently the width and height of the embedded map).

There are three types of a resulting inserted map window:

- Pure HTML – this type is based on pure HTML and does not contain any other UI components
- Simple ExtJS – this type uses ExtJS library for generating UI container
- Advanced ExtJS – this type uses ExtJS library also as Simple ExtJS type and also contains another UI components (tree with list of all layers in map)

An example of generation of the code for the embedded map window is depicted in Figure 50.

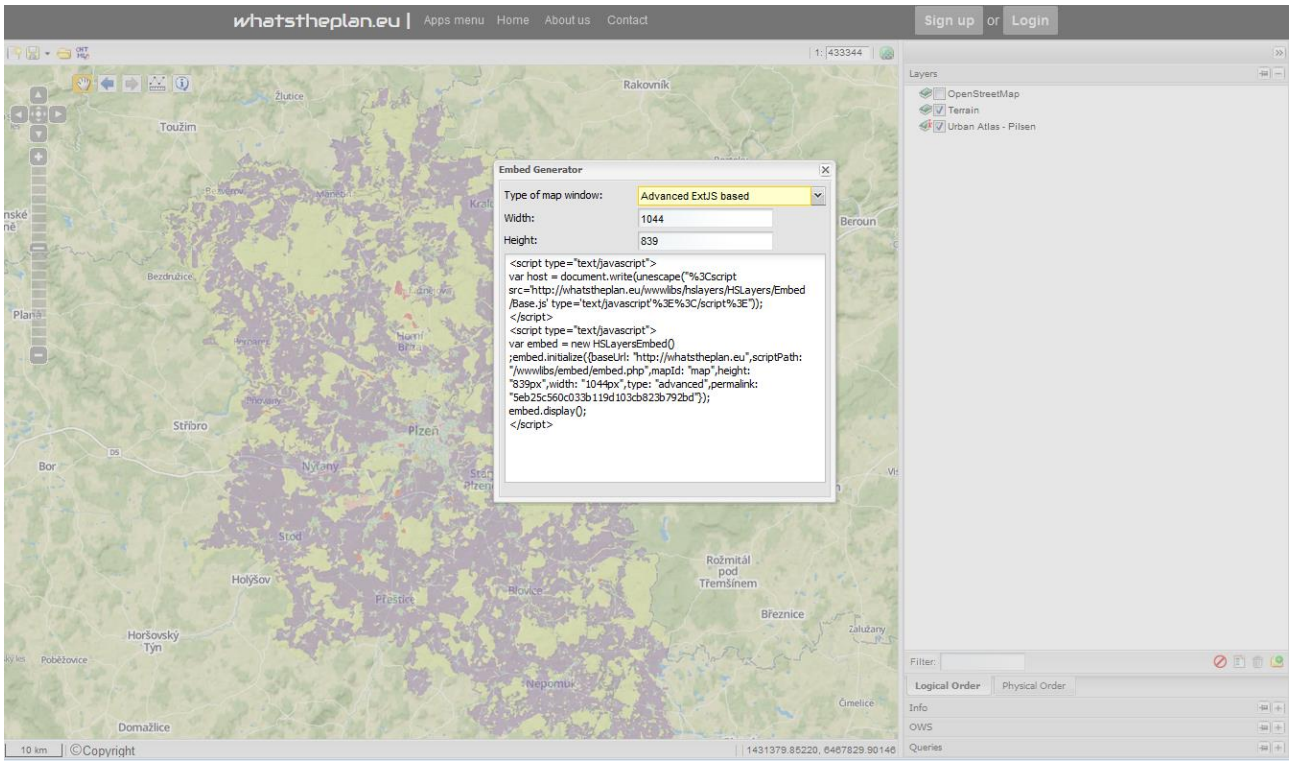

Figure 50 Generation of the code for the embedded map windows

9 Conclusions

The implementation of pilot applications is a major step in the plan4business implementation. A rapid progress in development was done and the platform reached a maturity that enables public testing of the following applications – Location Evaluator and Thematic Map Viewer. The main achievements of the period are:

- design and implementation of user interface,
- integration of management tools for uploading and harmonisation of data,
- implementation of user application and their integration with user interface,
- publishing of available data,
- visualisation of available data,
- preparation of thematic maps.

The progress achieved in this period provides a good starting point for the commercialisation of the entire platform.

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