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Plan4all

Data Deployment Stage 1

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[1] OJ L 79, 24.3.2005, p. 1.

Content

1. Introduction

1.1.   Objectives

The main goal of the Task 7.2 is the spatial planning data deployment in project regions. Existing local, regional or national data has been transformed into data following new common conceptual models using transformers implemented in WP6. Data has been published using web map clients and/or OGC web services.
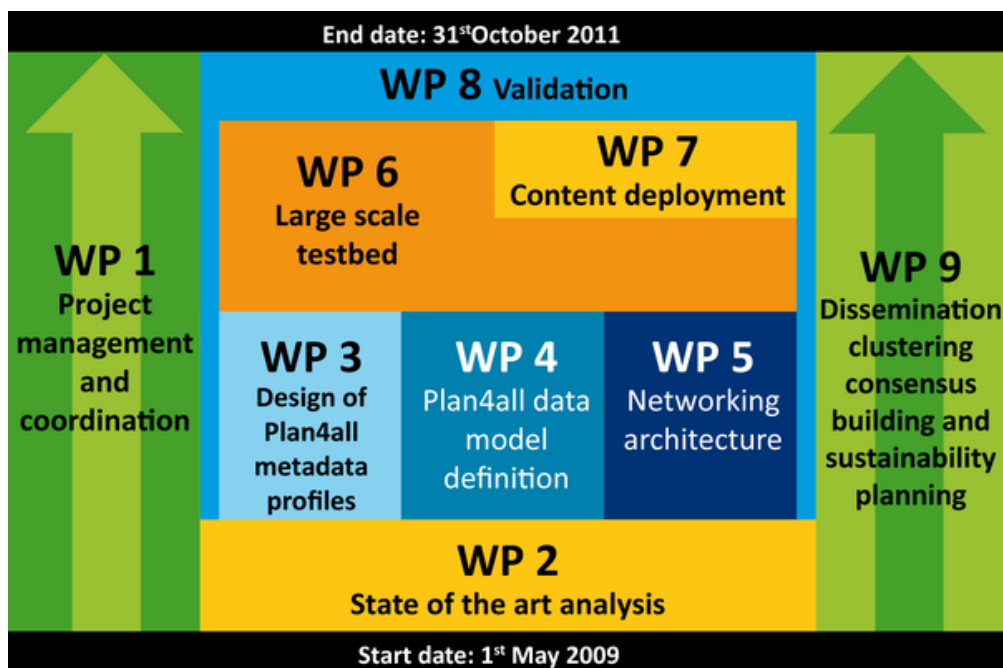
The task of Data Deployment depends on the results of WP3 (connected metadata), WP4 (conceptual models), WP5 (Networking Architecture) and WP6 (Large scale testbed). The deployment of data and metadata is running in two stages to guarantee validation of concept and platform. Currently is reported the first stage (M16 – M24).

1.2. Report Overview

Introduction into the task T7.2 is mentioned in Chapter 1

Chapter 2 describes conceptual data models (LandUse and LanCover) proposed by WP4 in more details.

Chapter 3 presents steps in harmonisation process and an overview of INSPIRE themes solved by individual Plan4all partners.

Data deployment in project regions during the first stage is introduced in Chapter 4. Each partner offers own detail description of source data, methods of transformation, transformation scheme, publication and outputs. The important parts of each regional report are comments and recommendations to the next project period.

Final results of all Plan4all partners are summarized in Chapter 5.

Acquired conclusions and recommendations for next period cover the document in the Chapter 6.

2. Conceptual Models

The first stage of the Task 7.2 Data Deployment has been focused on regional/local spatial data testing and transformation into Land Use and Land Cover conceptual data models proposed by WP4. Land Use model has been modified on the basis of requirements from project partners. The test will continue in the second stage and will be extended also to other INSPIRE themes specified in DoW.

2.1.   Conceptual Model LandUse

Description of Land Use: Land Use is a rather complex theme that has different definitions. Therefore, it was necessary to clarify the description of the theme. The definition of Land Use taken from INSPIRE is "Territory characterized according to its current and future planned functional dimension or socio-economic purpose (e.g. residential, industrial, commercial, agricultural, forestry, recreational)." The former element of this definition associates the land use concept with a functional aspect related to socio-economic characteristics. The latter specifies a sequential aspect of the land use concept by expressing it in terms of operations on land, meant to obtain products and/or benefits through its resources.
When analyzing this description, some further aspects have been detected, which suggest to consider also features related to the planner's point of view, such as the involvement of different sectors, e.g. environmental, and the planning levels, e.g. from local to national. This investigation led to design a data model general enough to include different systems acting on land and affecting it significantly.

Important feature types and attributes:
Features representing a land use plan strongly depend on their typology. However, a minimal set can be identified which determines the structure to be taken into account during its development, namely boundary of plan/regulation, category area, regulation area, restriction area, and elements within a plan (road boundaries, building boundaries, forest/agricultural land boundaries etc). Consequently, important attributes are land use category, land use regulation category, land use restriction category, present/existing or proposed/planned/future, legal reference, date of entry into force, link to text regulations for each area.

In the following a brief description of salient characteristics of the data model proposed in WP 4.2 is given. The focus of the model consists of two necessary classes, namely PlanObject and PlanFeature, referring to the plan itself and its composition in terms of indications, respectively.
The "PlanObject" class bears information about the plan itself; all other information is related to this class. It specializes the administrative information and is related to specifications for the graphical output, the textual parts of the plan, and the raster files referring to old plans in paper form:
-    "AdministrativeInformation": information on the administrative situation and on the planning process, e.g. name of the responsible authority, date of adoption of the plan, legal validity of the plan, etc.;
-    information regarding the specifications for the graphical outputs, if any ("GraphicalInformation");
-    files containing the textual parts of the plan ("TextualInformation" and "TextualRegulation");
-    raster files referring to old plans in paper form ("Raster").

Land Use Conceptual model proposed by WP4
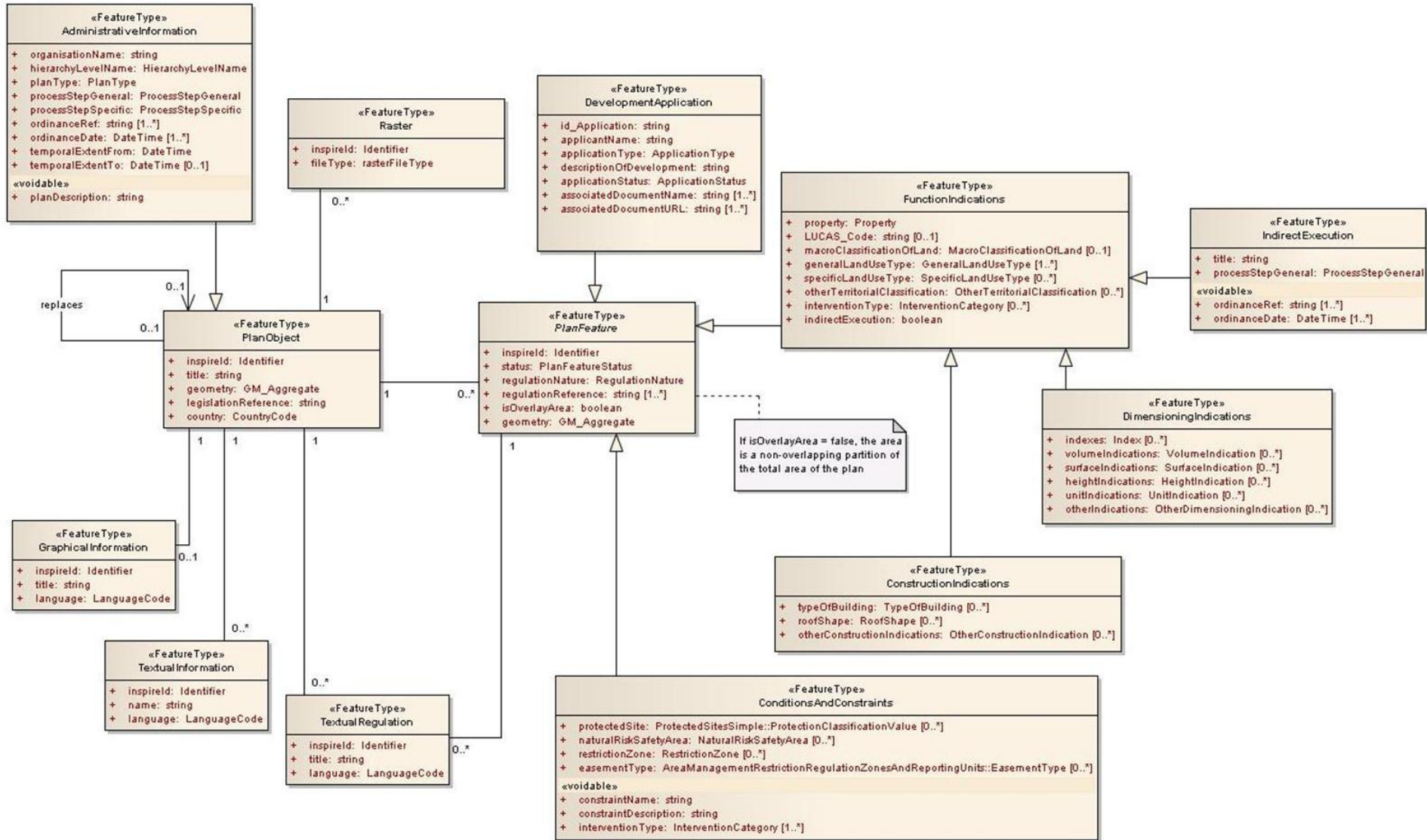
Also related is the PlanFeatureClass which specializes all kinds of indications, from the most general classification of the municipal land (e.g. urbanized/to be urbanized/rural/natural), down to the specific function for the single land parcel. Also conditions and constraints acting on urban development are specialization of the PlanFeature class. Into more detail the single planning information ("PlanFeature") is related to:

- "FunctionIndications", comprising all kinds of necessary indications, from the most general classification of the municipal land (e.g. urbanized/to be urbanized/rural/natural), down to the specific function for the single land parcel. These indications can be about dimensions ("DimensioningIndications"), the type of construction ("ConstructionIndications"), and/or indirectly executable ("IndirectExecution"), in the case that the task of specifying in detail the function of a certain area is entrusted to other plans;
- "ConditionsAndConstraints" acting on urban development, both coming from outside the plan and generated by the plan itself;
- administrative information regarding the procedures for issuing building permits and other kinds of authorisations referring to the same plan ("DevelopmentApplications").

Modifications of the Land Use Conceptual Data Model

Because the original conceptual LandUse model proposed by WP4 was too complex and it was very difficult to find harmonisation relations between original source data from regions, the WP7 team decided to modify conceptual model towards to simpler version.

The figures below present modifications of LandUse model for testing in the first stage of data deployment.

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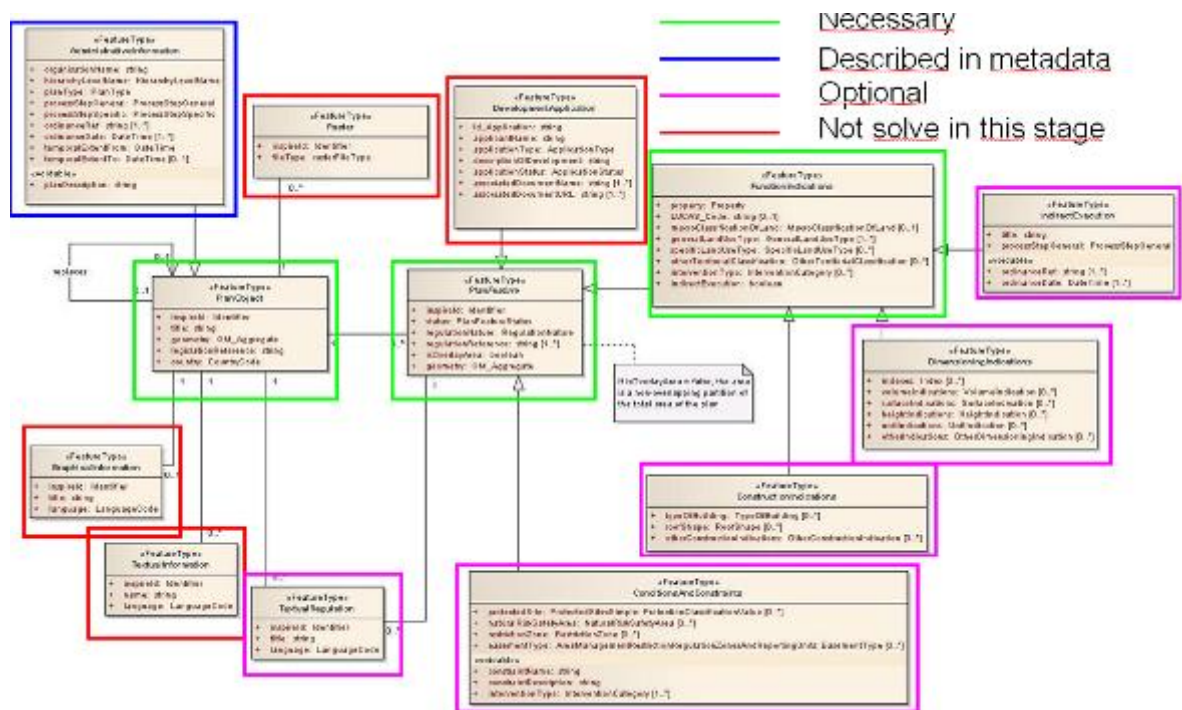
WP7 team agreed list of attributes that have been solved during the first stage. The most important is the attribute GeneralLandUseType that is key field for harmonisation of data from different regions. The other obligatory fields are highlighted yellow colour. The grey fields are optional in this stage of data deployment.

PlanObject	
	InspireID
	Title
	Geometry
	LegislationReference
	CountryCode
Plan Feature	
	inspireId
	status
	regulationNature
	regulationReference
	isOverlayArea
	geometry
Function Indications	
	property
	LUCAS_Code
	macroClassificationOfLand
	generalLandUseType
	specificLandUseType
	otherTerritorialClassification
	interventionType
	IndirectExecution

Indirect Execution	
	title
	processStepGeneral
Dimensioning Indications	
	indexes
	volumeIndication
	surfaceIndication
	heighIndication
	unitIndication
	otherIndication
Construction Indications	
	typeOfBuilding
	roofShape
	otherConstructionIndication
Condition and Constrains	
	protectedSite
	naturalRiskSafetyArea
	restrictionZone
	easementType
Textual Regulation	
	inspireId
	title
	language

The proposed schema also contains a set of enumerations and code lists meant to specify, and possibly extend, values of the domain attributes.

Modified enumerations are listed below:

GeneralLandUseType
Residental
Industrial
Commercial
Services
Parks
Natural
Agriculture
Water
TransportInfrastructure
MiningQuarrying
TechnicalInfrastructure
Other

MacroclassificationOfLand
Urbanised
ToBeUrbanised
Rural
Natural
Other

ProcessStepGeneral
NotStarted
Elaboration
Adoption
LegalForce
Obsolete

Status
Existing
Planned

2.2. *Conceptual model LandCover*

Definition of Land Cover: (INSPIRE, 2007)

Physical and biological cover of the earth's surface including artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies.

Description: Land cover data represent a (bio)physical description of the earth surface. It concerns to broad applications in many fields of human activity, whose unique goal is in nature conservation, monitoring the impact of industrial and agricultural processes and planning and project activities. Land cover typology includes features such as artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies. In this way it is different from the land use data dedicated to the description of the use of the earth surface.

Each typology of the above elements is divided in separate subgroups in order to describe all features useful for environmental matters and existing in Europe and is produced with an adequate minimum area threshold ("Minimum mapping Unit").

Land cover is described by the hierarchical nomenclature system, which classes must be defined and kept in time in order to identify land cover changes within time series.
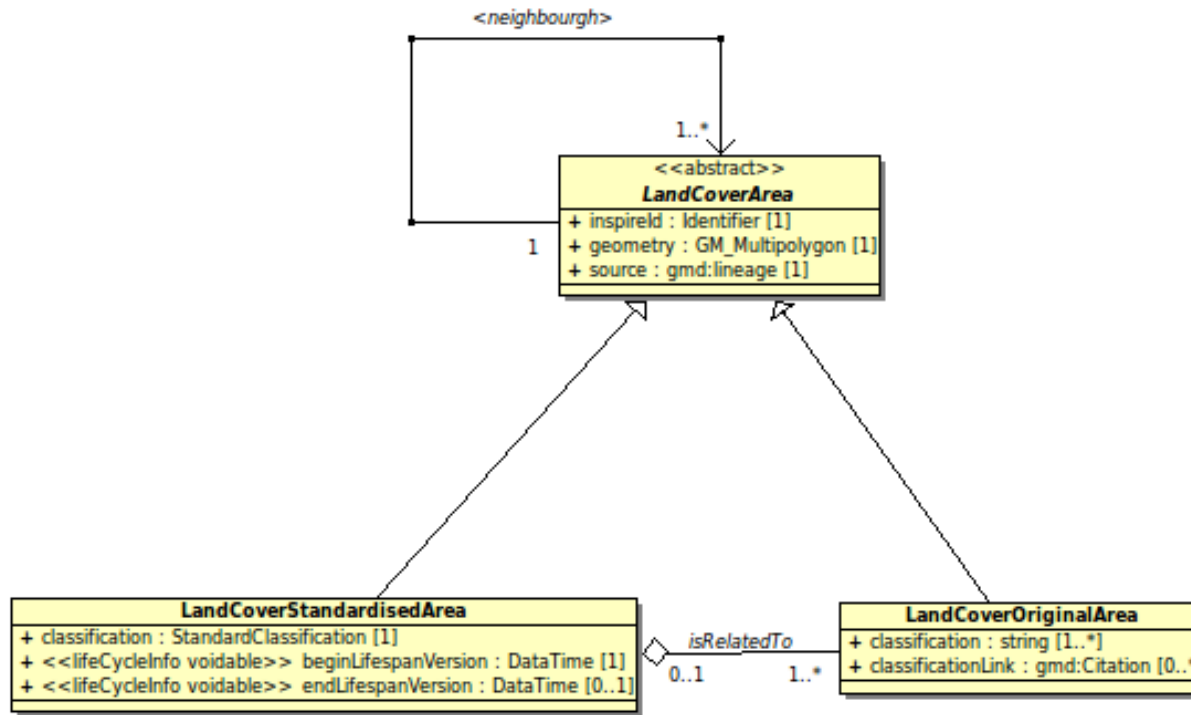
Land cover information has to be homogenous and comparable between different locations in Europe, based on the infrastructures for Land Cover information created by the Member States (if existing), and made available and maintained at the most appropriate level. Classification should be consistent with LCCS and CORINE.

Important feature types and attributes:

Six basic features should be considered, namely artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, and water bodies. Each of these features should be then divided in features or subgroups.

The basic element of the data model is a homogeneous area in terms of land cover. Homogeneity of the area is determined by two parameters – the detail of the model and the classification used. Such an area relates to other homogeneous areas in terms of land cover (indicated by the relation neighbourhood in the model), because data of the theme land cover are connected to continuous surface. The model consists of two main classes, namely LandCoverStadardisedArea, and LandCoverOriginalArea. LandCoverStandardisedArea is defined as a homogeneous area in the term of land cover within the meaning of standard classification. As for the standard classification system, the CORINE land cover has been chosen and embedded within the enumeration, but this nomenclature can be replaced by others (e.g. LUCAS or FAO LCCS) based on different requirements. The second main class LandCoverOriginalArea is a homogeneous area in the term of land cover within the meaning of a more detailed (in most cases original and/or national) classification system. This area will be defined to keep potential original data including geometry. These two classes inherit common attributes (inspireId, geometry and source) from the abstract class LandCoverArea. Geometry is defined as the Multipolygon, which is defined by one or more Polygons, referenced through polygonMember elements.

Land Cover Conceptual Model:

3. Harmonisation process

Spatial planning data exist in very different formats and data structures in European countries. Plan4all team proposed the harmonisation process where the source data from countries is converted into the general data structure. This data structure is created on the basis of Plan4all conceptual models. In this stage of the project, the harmonised data are presented as map layers in web map clients or through web services.

The principle of spatial data harmonisation is presented at the figure:
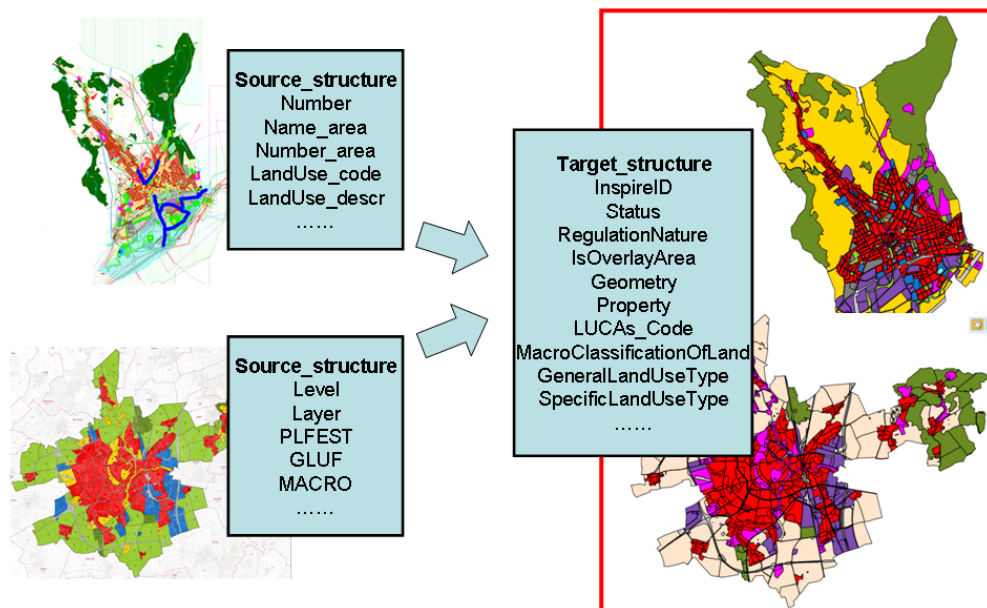
The harmonisation process in the Task 7.2 has been divided into 4 steps:

1. Preparation of the source data – sometimes the spatial planning data is not in GIS structure, needs to be modified or transformed into another format

2. Description of the source data structure – the exact description of the source data enables better understanding of data and definition of the transformation table. The description includes a scheme of data structure, description of object types and Code lists or enumerations.

3. Data structure transformation – it is a process where data from the original source structure is transformed into the target structure. The target data structure is created on the basis of conceptual models. The transformation has two levels – at first, the transformation of features has to be specified and then also transformation of code lists or enumerations must be defined for each transformed attribute. The transformation can be done through transformation tools or directly through SQL query.

4. Publication – there are several ways how to publish the harmonised data stored in the target structure. The Plan4all regions test the publication of the harmonised spatial planning data in their own web map applications and also provided the data through OGC web services WMS and WFS.

4. Deployment in Regions

4.1.   HF - LandUse

4.1.1. General description of source data

Within the WP7 of the Plan4all project, HF tests a pilot for LandUse data of Municipality of Sumperk. The municipality urban plan and its original data have been prepared by the Knesl+Kyncl Architects company and the data is available in DGN (graphical data) and DOC, PDF (textual data) formats.

HF modified the original data for publication in web map application. HF prepared referential raster data and shp files from the original dgn files. The form of the textual part of the urban planning documentation has been modified in order to connect graphical entities with relevant text.

The process of common publication of spatial planning data is presented at the figure:
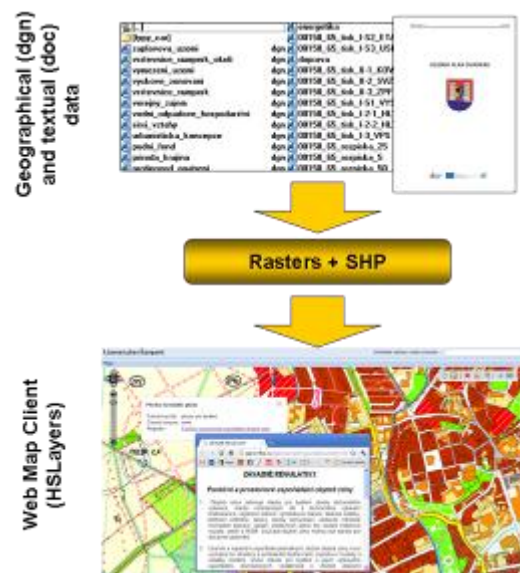
The spatial planning data are published through web map application called "e-UP" (electronical Urban Plan) which is based on the HSLayers client.

"e-UP" allows easy and user-friendly displaying of a local plan on the web. The main design of the local plan concept, which can be divided into several theme layers, is included among the data layers. A reconnaissance city map, a cadastral map or an orthophoto linked via the WMS web service can be displayed as referential data. Further information layers of the local plan concept – such as territory studies, public works, etc. – can be displayed over these basic layers. The e-UP application is offered in the form of a service.

This way the un-harmonised data is published. This data (SHP) presents input into transformation and harmonisation process. The output data in a structure based on conceptual models can be published the same way the source data – in web map client and also through web services WMS or WFS.

4.1.2. Detail Description of Source Data

In the case of Sumperk urban planning data, the harmonisation process is built up on the source data in the SHP file. This file contains all important data regarding land use specification.

4.1.2.1. Scheme

The base structure of the source data is presented in the table. Originally the field are described in Czech language, for purpose of the Plan4all project is joined also description in English and example of values.

Source_structure	Description	attribute_example
CISLO	Feature Number (ID)	345
NAZEV_PI	Name of the Feature	.656
Cis_PI	Name Number of the Feature (from Name of the Feature)	656
Kod_Vyuz	Land Use Code	SX
Pop_Vyuz	Land Use Description (from Land Use Code)	Plochy smíšené obytné
Kod_RP	Development Area Code	P11
Kat_RP	Development Area Category (from area code)	P
Pop_KatRP	Development Area Description (from D. Area Category)	Plocha přestavby
Cis_RP	Development Area Number (from (D. Area Code)	11
Vymera	area	0,5
Zastav	Volume Indication	15-35 %
MAX_VYS_ZA	Height Indication	13/17
Kod_Strukt	Code of a structure of built-up area	B
Pop_Strukt	Description of a structure of built-up area	Blokový typ
Dalsi_Pod	Other requirements	currently not filled in
Podm_Vyuz	Regulations	currently not filled in
Pozad_RO	Requirements on Development Area	currently not filled in
US	Studies	currently not filled in

4.1.2.2. Important Features, Attributes and Code Lists

The table describe source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: Cislo		
Value type:	number	
Definition:	ID of the feature	
Code List:		
Attribute: Kod_vyuz		
Value type:	string	
Definition:	Land Use Code	
Code List	SX	Residental Mixed Areas
	OV	Public Services - Infrastructure
	OK	Public Services - Commercial
	OS	Public Services - Sports

	RN	Leisure Time Activities on the Natural Areas
	ZV	Public Green
	VS	Manufacture Mixed Areas
	TX	Technical Infrastructure
	X	Specific
	NS	Undeveloped Mixed Areas
	RZ	Leisure Time Activities - Gardening
	NL	Forests
	DX	Transport Infrastructure
	PV	Public Spaces
	W	Water

Attribute: Kat_RP

Value type:	string	
Definition:	Category of the Development Area	
Code List	Z	Planned Building up
	P	Planned Redevelopment
	K	Planned Change in Countryside

Attribute: Zastav

Value type:	string
Definition:	Volume Indication – percent of area used for buildings
Code List	Value

Attribute: MAX_VYS_ZA

Value type:	string
Definition:	Height Indication – allowed buildings height
Code List	Value

4.1.3. Transformation

4.1.3.1. Transformation method

It is possible to use several different tools for data transformation from the source data structure into the target data model. The target conceptual LandUse data model developed in WP4 is quite complicated. Therefore in the first stage of data deployment, HF solved the transformation and harmonisation process directly by editing of target data structure.

Transformation and harmonisation steps:

- The target structure has been established on the basis of LandUse conceptual data model defined in WP4. Because this conceptual data model is not fully corresponding to the source data structure, some modifications have been proposed and only some of the fields have been used. The target database is PostGIS.
- The transformation (harmonisation) scheme have been defined in two steps
  - The scheme for attributes transformation
  - The scheme for values transformation – comparison of enumerations of the source and target data
- The target PostGIS tables have been filled on the basis of transformation (harmonisation) schemes

4.1.3.2. Transformation scheme

The first step in the harmonisation process is definition of the source and target features and attributes

The scheme below shows relations between target data and source data
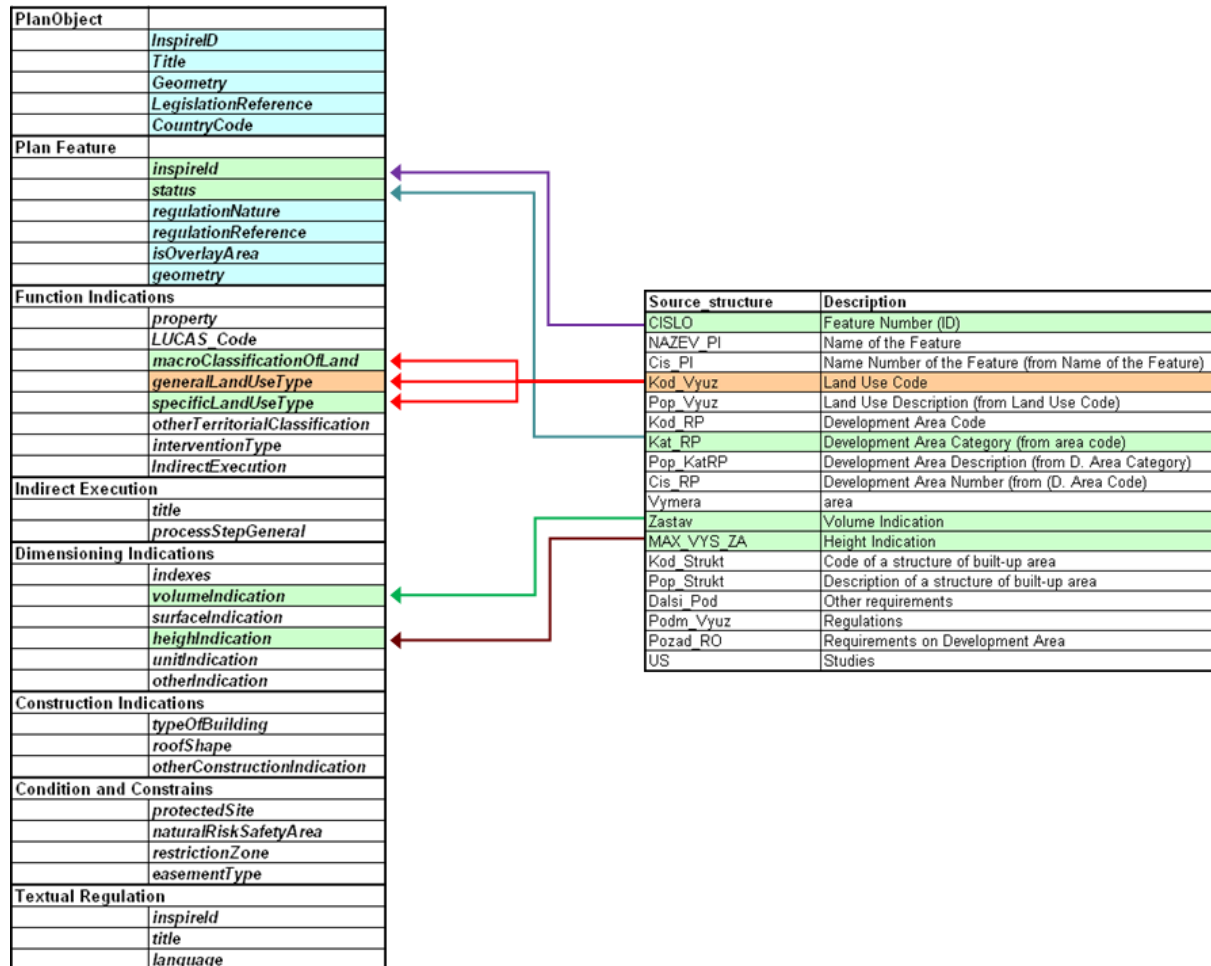
In the case of HF data, the blue fields are filled in one-time because each of these fields has the same value for all record. These types of fields have much more metadata then data character, but it could be important to have this type of information stored together with other data within the Plan4all project.

Red field means a field the most important for harmonisation process in Land Use Theme. The target field GeneralLandUseType will be the main field mandatory for every project partner's region. The GeneralLandUseType is filled in by field Kod_vyuz (Land Use Code) in the source data. The same source field (Kod_vyuz) is used also for filling in the fields MacroClassificationOfLand and SpecificLandUseType. The differences consist in the diverse transformation of attribute's values (see attributes transformation)
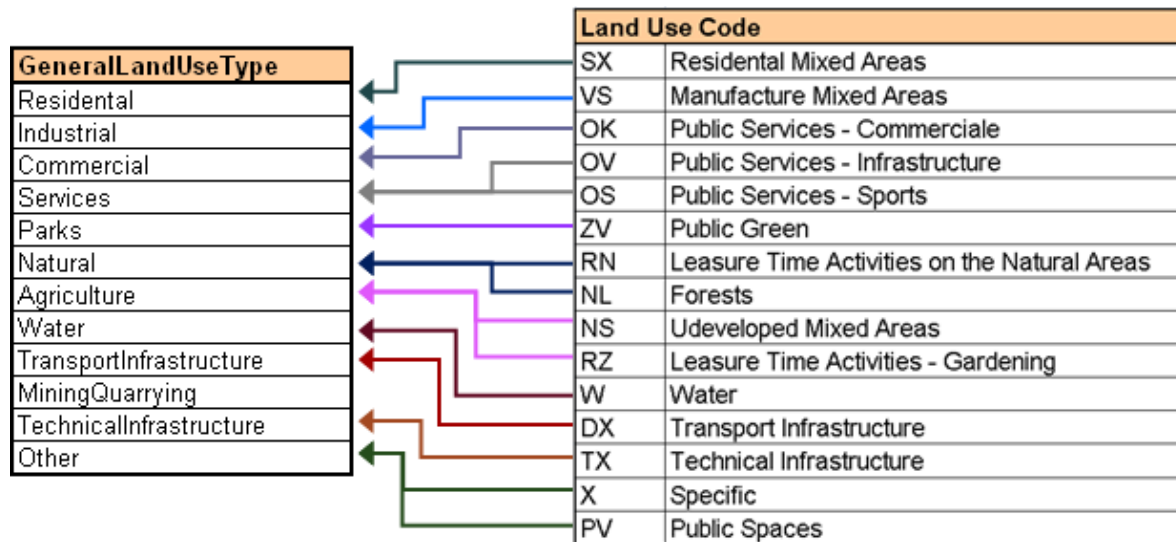
The target field PlanFeature: InspireID is filled in by Cislo (Feature Number) of the source data and PlanFeature: Status is going from Kat_RP (Development Area Category). There are also two fields of indications that can be filled in the target data – VolumeIndication and HeightIndication – relevant fields in the source are Zastav and Max_Vys_Za.

When the features and attributes relations are known, it is necessary to define a relation between source and target values (code lists).

Transformation schemes of target and source code lists:

GeneralLandUseType

The transformation of values is visible at the scheme below:

GeneralLandUseType		Land Use Code	
Residental		SX	Residental Mixed Areas
Industrial		VS	Manufacture Mixed Areas
Commercial		OK	Public Services - Commerciale
Services		OV	Public Services - Infrastructure
Parks		OS	Public Services - Sports
Natural		ZV	Public Green
Agriculture		RN	Leasure Time Activities on the Natural Areas
Water		NL	Forests
TransportInfrastructure		NS	Udeveloped Mixed Areas
MiningQuarrying		RZ	Leasure Time Activities - Gardening
TechnicalInfrastructure		W	Water
Other		DX	Transport Infrastructure
		TX	Technical Infrastructure
		X	Specific
		PV	Public Spaces

Sometime is a problem to explicitly determinate right relation between source and target values, because the source can cover more target values, for example "Undeveloped Mixed Areas" could be presented as Agriculture, Natural, Water, Other, ... Thus the transformation process should be manage by expert in spatial planning. In any case, the output cannot be absolutely the same as a source and comparison of several harmonised data sets from different regions have only partial conformity.

Status

If the source attribute Kat_RP (Development Area Category) is not filled in, the feature exists. If the field is filled in by any value that means the feature is planned

Status		Development Area Category	
Existing		Z	Planned Building up
Planned		P	Planned Redevelopment
		K	Planned Change in Countryside

MacroClassificationOfLand

The attribute MacroClassificationOfLand is filled in on the basis of two source fields – Kat_RP (Development Area Category) and Kod_Vyuz (Land Use Code).
The transformation key shows:
- if Kat_RP contents "P" (Planned Redevelopment), the area is Urbanised
- if Ka t_RP contents "Z" (Planned Building up), the area is ToBeUrbanised
- if Kat_RP contents "K" or is empty, the Macroclassification must be defined on the basis of Land Use Code.

The transformation relations are shown in the scheme:
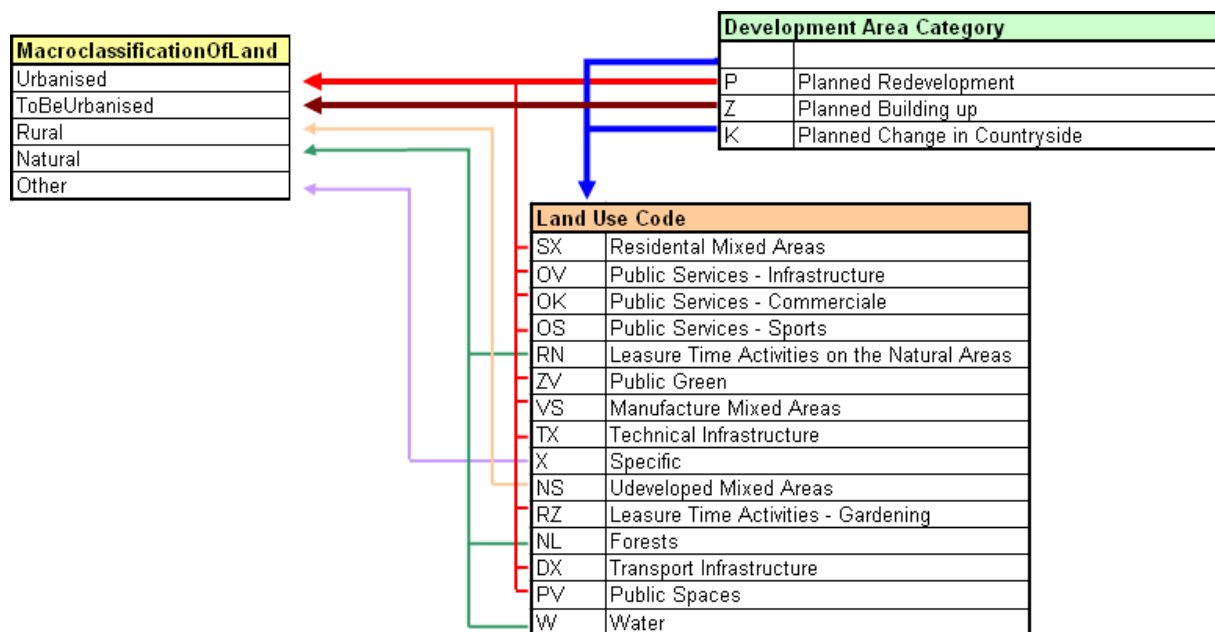
4.1.4. Publication

The data from the target PostGIS database can be published in a web map application or through web services WMS and/or WFS. The data has been published in the ETRS projection (EPSG:3035). The colour presentation is based on the agreed colour scheme.

4.1.4.1. Web Map Client

HF has published the harmonised data in a simple web map application that is based on HSLayers client. Several fields have been chosen from the structure and map layers have been generated for them on the basis of agreed colour schemes.
The displayed map layers:
- Plan Feature Status
- General Land Use
- Height Indications
- Volume Indications

Examples of harmonised map layers
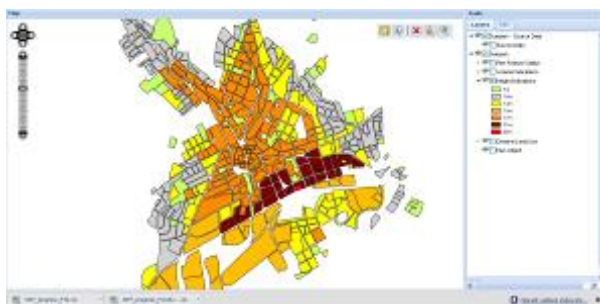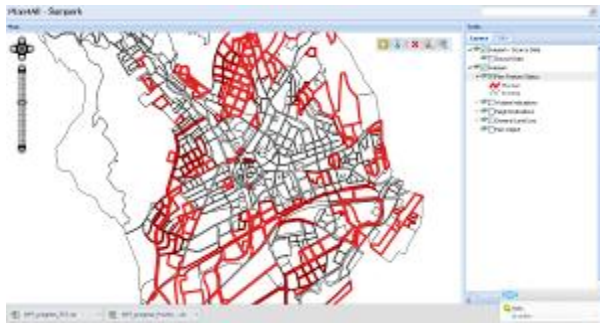
The web map application is available on the address:
http://vm-glog.wirelessinfo.cz/demo/mapviewer/index_en.html?project=Plan4AllSumperk

4.1.4.2. Web Services

The harmonised data has been published also as Web Map Service (WMS) and Web Feature Service (WFS)
Links for the services:
WMS: http://vm-glog.wirelessinfo.cz/cgi-bin/mapserv.exe?SERVICE=WMS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\sumperk.map

WFS: http://vm-glog.wirelessinfo.cz/cgi-bin/mapserv.exe?SERVICE=WFS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\sumperk.map

Examples of WMS connection on the Czech National INSPIRE portal and on the Plan4all project portal.
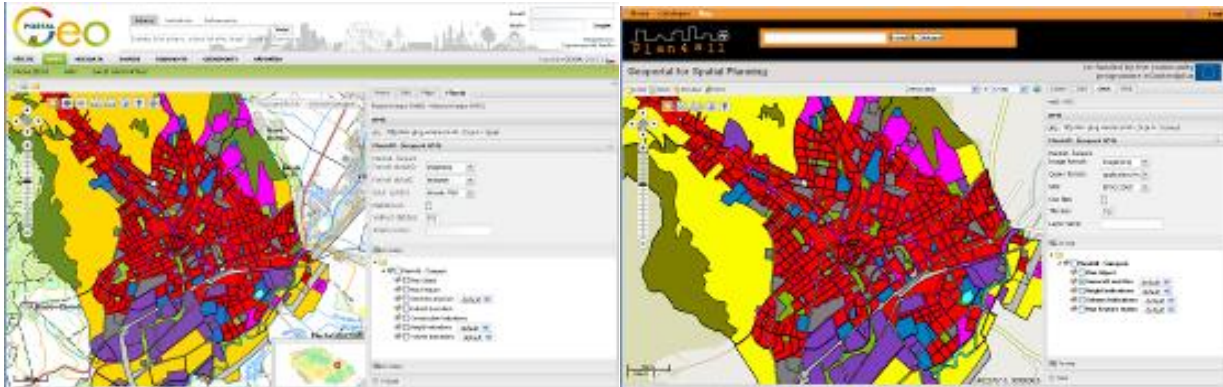
4.1.5. Results

4.1.5.1. Comments on Conceptual Models

The conceptual model Land Use proposed by WP4 is very complex and in the fact it covers the whole area of Territorial Planning, not only specific Land Use. WP7 team proposed an abridgment of the target database structure based on the conceptual model. This simplified structure is more understandable and better for definition of harmonisation relations.

HF has tested spatial planning data of Municipality of Sumperk. Using the simplified target data structure, HF has created 4 harmonised data layers. The data should have got the same presentation as harmonised data from other regions.

4.1.5.2. Recommended changes

The initial problems with identification of relations between source and target structures have been mostly solved by simplification of the target data model. Nevertheless, there still exist several tasks to solve in the next project period:

- clarification of attribute values – to better understand to source-target relations it will be suitable to create and describe precise definition of the source data. There does not exist any fixed standard for planning data in Czech Republic and the definition should help to harmonise the different data in the same way.
- Assessment of the potential metadata fields – to take into consideration to move these fields into metadata profile or leave them together with other spatial data
- To define final map layers of harmonised data – the layers are presented on the basis of specific attributes. It is necessary to clarify a range of attributes values and specify colour and symbol presentation for them.
- To specify key attributes for harmonised data (GeneralLandUseType in the case of Plan4all data model) and agreed the code list with the best value specification for all project partners.

- To test publicated WMS and WFS in different systems together with other spatial planning data. To test also publication in different coordination systems and projections – probably will be deeply solved in WP8.

The possible change from WP4 conceptual models into INSPIRE data specification has been announced in the end of the first project period. The comments and recommendation mentioned above fix well also into work on any other data model in the second period of data deployment.

4.2. *Olomouc*

4.2.1. General description of source data

At this time, Olomouc Land Use Plan is in preparation. For Plan4all project outputs from draft phase are used.

Similar to Sumperk, Olomouc urban plan is prepared by the Knesl + Kyncl Architects company, but CAD data models and used land use classification is a little bit different. Olomouc Plan draft was prepared in CAD technology, using Bentley's Microstation design file format (DGN V8). CAD data model is well described in XLS sheets, so it is possible to proceed mapping to target model. Textual parts are in DOC format. Both graphical and textual part of draft is published in PDF format on web page: http://www.olomouc.eu/uzemni-planovani/koncept-uzemniho-planu/obsah-konceptu_(cesky)

Internal structure of plan follows national legislation - Building Act No. 183/2006 Coll. and subsequent Decrees. Responsible parts of Decree No.501/2006 Coll. describing basic categories of Land Use types in Czech planning practise were used as reference materials for preparing SpecificLandUseType Codelist.

For target Plan4all Land Use data model only 3 source design files are responsible to use:
- Definition of Built-up area
- Areas with different land use
- Areas, where subsequent documentation has to be elaborated.

4.2.2. Detail Description of Source Data

As an input original DGN files from plan draft are used. CAD designs were imported to SHP and adjusted to be ready for reclassification.

Import of CAD data into GIS requires geometry check. In CAD drawing polygons are often unclosed. In our case – in ArcGIS SW we used Repair geometry tool to correct such problems.

4.2.2.1. Scheme

Olomouc plan draft - source data scheme (relevant DGN files):
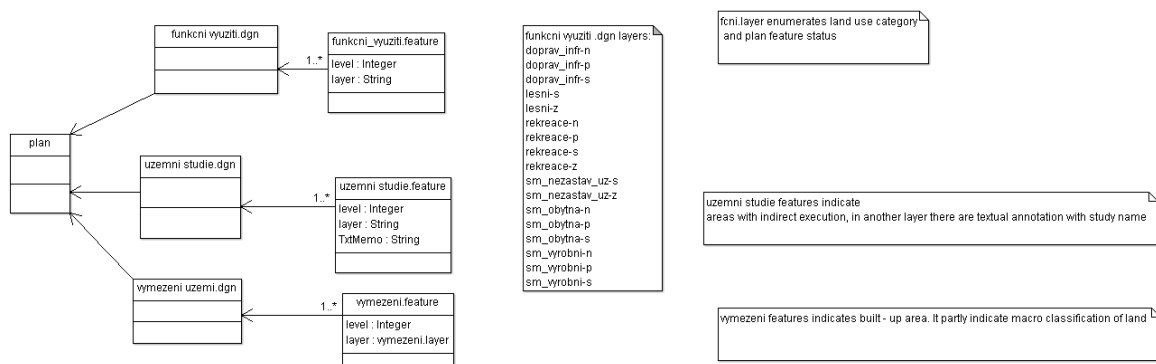
We used three CAD files:
- funkcni vyuziti.dgn (Areas with different land use)
- uzemni studie.dgn (Areas, where subsequent documentation has to be elaborated)
- vymezeni uzemi.dgn (Definition of Built-up area)

Definition of built-up area delimits value built_up in MacroClassificationOfLand
Areas, where subsequent documentation has to be elaborated refer to IndirectExecution
Areas with different land us are differentiated in CAD levels by their status (planned, stabile, rebuilt, change) and land use category.

4.2.2.2. Features and Code Lists

Funkcni vyuziti.dgn

Attribute: Layer name		
Value type:	string	
Definition:	Functional Code; Status Code	
Code List	doprav_infr-n	traffic - planned
	doprav_infr-p	traffic - rebuild
	doprav_infr-s	traffic - stabile
	lesni-s	forests - stabile
	lesni-z	forests - planned
	rekreace-n	leisure time activities – planned development
	rekreace-p	leisure time activities
	rekreace-s	leisure time activities - stabile
	rekreace-z	leisure time activities
	sm_nezastav_uz-s	combined undeveloped
	sm_nezastav_uz-z	combined undeveloped
	sm_obytna-n	mixed residential
	sm_obytna-p	mixed residential
	sm_obytna-s	mixed residential
	sm_vyrobni-n	combined manufacture
	sm_vyrobni-p	combined manufacture
	sm_vyrobni-s	combined manufacture

Explanation of postfixes:
-n - development areas
-p – rebuild – Land Use change in built-up areas
-s – stabile areas – both built up and non-developed
-z – Land Use change in undeveloped areas,

Vymezeni uzemi.dgn
-only polygons with built-up area definition,
Notice: Build up area contains all areas

uzemni studie.dgn

Attribute: annotation	
Value type:	string
Definition:	Name of requested planning study

UP_olomouc.shp (source data after import to GIS and adjustment):

Attribute: FID		
Value type:	number	
Definition:	ID of the feature	
Code List:		
Attribute: Layer		
Value type:	string	
Definition:	Land Use Code; status code, macro code)	
Code List	doprav_infr-n	traffic - planned
	doprav_infr-p	traffic - rebuild
	doprav_infr-s	traffic - stabile
	lesni-s	forests - stabile
	lesni-z	forests - planned
	rekreace-n	leisure time activities – planned development
	rekreace-p	leisure time activities
	rekreace-s	leisure time activities - stabile
	rekreace-z	leisure time activities
	sm_nezastav_uz-s	combined undeveloped
	sm_nezastav_uz-z	combined undeveloped
	sm_obytna-n	mixed residential
	sm_obytna-p	mixed residential
	sm_obytna-s	mixed residential
	sm_vyrobni-n	combined manufacture
	sm_vyrobni-p	combined manufacture
	sm_vyrobni-s	combined manufacture
Attribute: Join_count		
Value type:	bolean	
Definition:	Indirect Execution	
Attribute: TxtMemo		
Value type:	string	
Definition:	Name of study (Indirect Execution Title)	
Attribute: Id		
Value type:	bolean	
Definition:	Built-up area	

4.2.3. Transformation

Transformation of source data into target scheme is described in 3 steps below.

1st step – import to GIS and geometry check.

2nd step – SHP union and reclassification of attributes based on accessible formations.

3rd step – import to PosGIS and completing attributes

4.2.3.1. Transformation method

1st step – import DGN files into SHP was done in ArcGIS SW, relevant attribute to classify Land Use are Level or Layer (cad attributes from import). Mapping of selected annotations included in CAD files to be attributes of polygon Features.

2nd step - analysis on imported datasets started with union analysis tool in ArcGIS to divide original plan features to get features with homogenous character according to Plan4all land Use data model characteristic. Reclassification is based on SQL queries. Scheme of reclassification is evident from scheme below.

Premises:

- Original functional codes will be used as SpecificLandUseType attribute (see codelist below)
- Available attributes from source data will be mapped to following attributes:
  - PlanFeature Status
  - MacroClassificationOfLand
  - GeneralLandUseType
  - IndirectExecution (bolean in source data after import to GIS)
  - IndirectExecution:Title (TxtMemo in source data after import to GIS)
- Other non voidable attributes (common for all features in different tables of target scheme database) will be batch processed in 3rd step

3rd step - import to database tables according to filled attributes and dividing features to target scheme database tables, publishing of target data. Batch filling of attributes common for all features in individual tables (e.g. Title of plan, LegislationReference etc..). Target database was made by HF project partner and this step was done in close cooperation.

4.2.3.2. Transformation scheme

Transformation scheme (2nd step of transformation):

not matched features = Other

Layer
doprav_infr-n
doprav_infr-p
doprav_infr-s
lesni-s
lesni-z
rekreace-n
rekreace-p
rekreace-s
rekreace-z
sm_nezastav_uz-s
sm_nezastav_uz-z
sm_obytna-n
sm_obytna-p
sm_obytna-s
sm_vyrobni-n
sm_vyrobni-p
sm_vyrobni-s

Status
Existing
Planned

Layer
doprav_infr-n
doprav_infr-p
doprav_infr-s
lesni-s
lesni-z
rekreace-n
rekreace-p
rekreace-s
rekreace-z
sm_nezastav_uz-s
sm_nezastav_uz-z
sm_obytna-n
sm_obytna-p
sm_obytna-s
sm_vyrobni-n
sm_vyrobni-p
sm_vyrobni-s

GeneralLandUseType
TransportInfrastructure
Natural
Services
Other
Residential
Industrial
Commercial
Parks
Agriculture
Water
MiningQuarying
TechnicalInfrastructure

List of attributes for batch filling in 3rd step:

Plan Object
       InspireID
       Title
       Geometry
       LegislationReference
       CountryCode
PlanFeature
       RegulationNature
       RegulationReference
       IsOverlayArea

Geometry
IndirectExecution
ProcessStepGeneral (all studies are supposed to elaborate)

Code List

Proposed Codelist for Specific Land Use Type is Czech example based on national legislation – Decree No. 501/2006 Col. on general land use requirements § 3 – 19 http://www.uur.cz/images/uzemnirozvoj/stavebnirad/vyhlasky/en/Decree501.pdf . This Decree specifies basic types of Land Use categories that have o be used in Plans in Czech Republic. In plans these categories could be more divided and specified, but categories used in land use plans must refer to basic ones.

SpecificLandUseType	
Definition:	Specific indication on the land use of an area.
Stereotypes:	«codeList»
Value: Residential	
Definition:	Residential grounds are usually delimited separately in order to assure conditions for dwelling in a quality environment that offers undisturbed and safe stay and everyday recovery and relaxation of its inhabitants, accessibility of public spaces and public services.
Value: LeisureTimeActivities	
Definition:	Leisure time activities grounds are usually delimited separately in order to assure conditions for recovery and relaxation within a quality environment..
Value: PublicServices	
Definition:	Public services grounds are usually delimited separately in order to assure conditions for suitable situation, accessibility, and use of public services constructions, and to create conditions for their utilisation in accordance with their purpose..
Value: PublicSpaces	
Definition:	Public spaces grounds are usually delimited separately in order to assure conditions for adequate situation, extent, and accessibility of public spaces plots, and for their use in accordance with their importance and purpose..
Value: MixedResidential	
Definition:	Mixed residential grounds are usually delimited separately if it is not reasonable, taking into account the development character, its urban structure, and way of its use, to segment an area into residential grounds and public services, and it is necessary to exclude situating constructions and facilities, that degrade environment quality within the area, e.g. for mining, metallurgy, chemistry, heavy engineering, rehabilitation services..
Value: TransportInfrastructure	
Definition:	Transport infrastructure grounds are usually delimited separately if the use of transport infrastructure and facilities grounds due to heavy traffic and its negative impacts excludes ranking such grounds among areas with other way of use, and further when delimiting of transport grounds is necessary for transport accessibility assurance, e.g. production spaces, public services areas for retail shops, raw materials mining areas..
Value: TechnicalInfrastructure	

Definition:	Technical infrastructure grounds are usually delimited separately when use of these technical infrastructure grounds excludes their classification as grounds of other land use type, and when other use of these grounds is impossible. In other cases only the routes of technical infrastructure are delimited within the grounds of other land use type.

Value: ManufactureAndWarehousing

Definition:	Manufacture and warehousing grounds are usually delimited separately if the use of grounds for e.g. manufacture constructions and warehousing, and agriculture constructions2, due to negative impacts over these grounds borders, excludes classification of the grounds with such impacts as areas of other land use type.

Value: CombinedManufacture

Definition:	Combined manufacture grounds are usually delimited separately when it is not reasonable to segment the area, due to its character, into e.g. manufacture and warehousing grounds, transport and technical infrastructure grounds, minerals mining grounds, and specific grounds.

Value: AquaticAndWaterResources

Definition:	Aquatic and water resources grounds are delimited in order to assure conditions for water management, protection against water harmful impacts or drought, regulation of area regimen, and other purposes stipulated by legal regulations dealing with water, landscape protection and preservation.

Value: Agriculture

Definition:	Agriculture grounds are usually delimited separately in order to assure conditions for prevailing agriculture use.

Value: Forest

Definition:	Forest grounds are usually delimited separately in order to assure land use conditions for forest.

Value: Natural

Definition:	Natural grounds are usually delimited separately in order to assure conditions for landscape protection and preservation

Value: CombinedUndeveloped

Definition:	Combined undeveloped grounds are usually delimited separately when it is not reasonable to segment the area, due to the undeveloped area character or its protection, into e.g. water areas, water resources, agriculture grounds, and forests.

Value: MineralsMining

Definition:	Minerals mining grounds are usually delimited separately in order to assure conditions for economic minerals and raw materials use, and protection of environment at mining and minerals processing activities.

Value: Specific

Definition:	Specific grounds are usually delimited separately in order to assure specific conditions required, in particular, for constructions and facilities of country defence and security, civil defence, prison service, storages of hazardous materials; related transport and technical infrastructure grounds may be included in the specific grounds.

Value: Other

Definition:	In special, justified cases, provided that the reasons are included in the

rationalization of a general nature measure by which a plan is issued, there may be specified grounds with different land use than stipulated above .

4.2.4. Publication

Data from target PostGIS database are published in map client and through web services (WMS, WFS)

4.2.4.1. Web Map Client

Publication of Olomouc data is similar to publication of Sumperk. Published are map layers:

- General Land Use
- Specific Land Use (color scheme according to Plan draft)
- Indirect Execution
- Plan Feature Status

URL of map client:
http://vm-glog.wirelessinfo.cz/demo/mapviewer/index_en.html?project=Plan4AllOlomouc

4.2.4.2. Web Services

The harmonised data has been published also as Web Map Service (WMS) and Web Feature Service (WFS) Used CRS is ETRS89 EPSG:3035.

```
WMS link
http://vm-glog.wirelessinfo.cz/cgi-
bin/mapserv.exe?SERVICE=WMS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\o
lomouc.map

WFS link
http://vm-glog.wirelessinfo.cz/cgi-
bin/mapserv.exe?SERVICE=WFS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\o
lomouc.map
```

Example of WMS (General land Use layer) service connection using Plan4all portal map client:
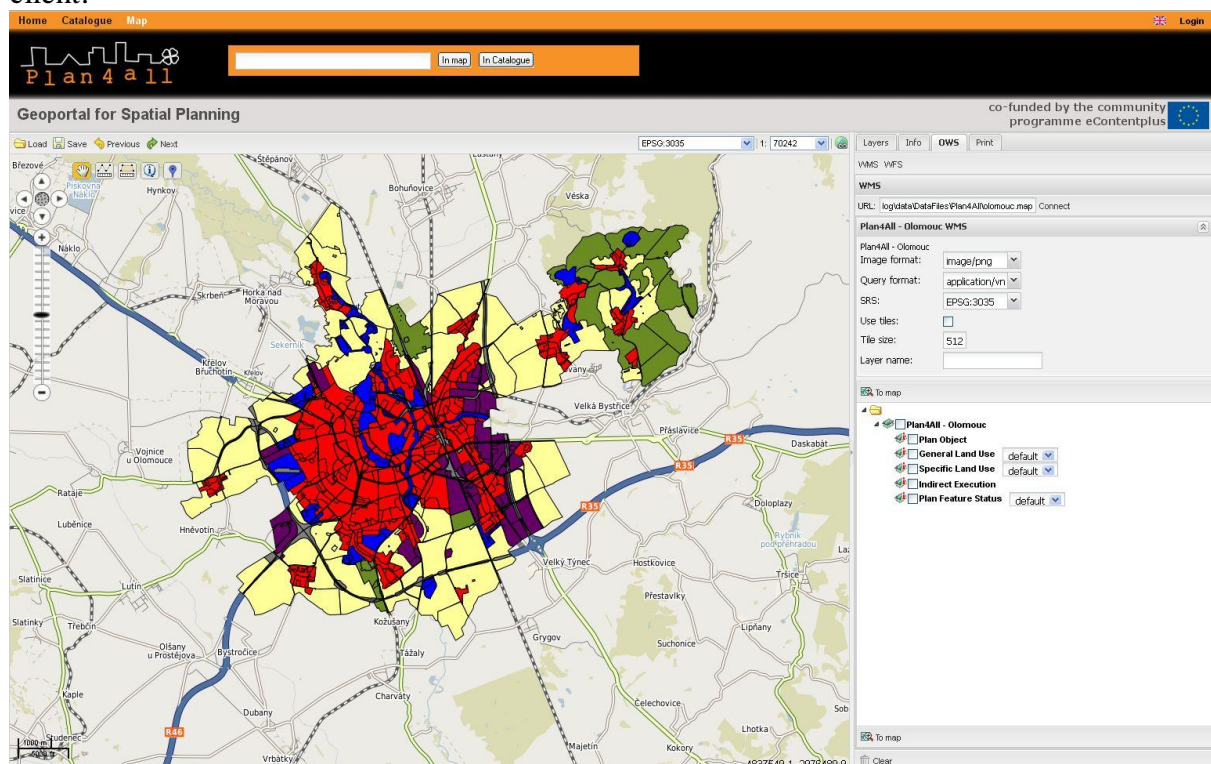
4.2.5. Results

4.2.5.1. Comments on Conceptual Models

Pla4all Land Use data model is complex to cover spatial planning theme. Includes Part of metadata records, classes for non- digital planning documentation as well as digital data relevant to spatial planning, sometimes overlapping to another INSPIRE themes and

dependencies like development applications. But complexity of this model is also weakness. It is very important to be expert both in model specification and land use planning to be able proceed mapping source plan categories into data model ones. Mapping source Land Use categories to GeneralLandUseType categories is crucial part of reclassification and is strongly depending on operator skills.

General notices on Land Use data model:
- Overlaps with metadata records (AdministrativeInformation)
- Property attribute is senseless when areas do not match cadastral plots.
- GeneralLandUseType multiplicity is problematic when using mixed functions in source data. Target dataset is ambiguous
- ProcessStepGeneral Enumeration – „Not started" value is missing
- InterventionCategory Codelist – Public Works should be there

4.2.5.2. Recommended changes

Main problem of understanding to data model classes and attribute values is lack of codelist and enumeration values description or explanation. Especially in the field of Land Use categories is problem of terminology used in different countries (and sometimes even regions). It means that the same values may imply different meaning to people from different countries and consequently harmonised datasets may be correct in technical way, but illusory in heart of matter. Primary it is not problem of data model, but consequence of differencies in spatial planning in European countries.

Experiences of transforming Olomouc plan draft into target Plan4all Land Use data model lead to next recommendations:

- Remove AdministrativeInformation class from data model (completely double with Plan metadata profile)

- Change GeneralLandUseType multiplicity to 1..1

- Extend ProcessStepGeneral enumeration value „NotStarted"

4.3. TDF

4.3.1. General description of source data

Source data used for tests is Corine Land Cover 2006 for territory of Latvia. Data are produced according Corine Land Cover mapping requirements.
Source data are in ESRI Shapefile format within LKS92/Latvia-TM (EPSG:3059) projection.

4.3.2. Detail Description of Source Dataddd

In the case of the CLC2006 of the Latvia, the harmonisation process is built up on the source data in the ESRI Shapefile format. This file contains all important data regarding land cover specification.

4.3.2.1. Scheme

The base structure of the source data is presented in the table. Originally the field are described according CLC standard.

Source_structure	Description	Attribute_example
CLC06_LV_	Unique numeric id (identifier)	9
ID	Unique string identifier	LV-123
CODE_06	Corine land cover encoding	231
AREA_HA	Area in hectares	50.85
AREA	Area in hectares	50.85
PERIMETER	Perimeter in meters	7012.876
REMARK	Free text remark	NULL

4.3.2.2. Features and Code Lists

The table describe source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: CLC06_LV_
  Value type: integer
  Definition: Unique numeric id (identifier)
  Code List:

Attribute: ID
  Value type: string
  Definition: Unique string identifier
  Code List:

Attribute: CODE_06
  Value type: integer
  Definition: Corine land cover classes
  Code List   111 Continuous urban fabric
              112 Discontinuous urban fabric

121 commercial and transport units""
122 commercial and transport units""
123 commercial and transport units""
124 commercial and transport units""
131 dump and construction sites""
132 dump and construction sites""
133 dump and construction sites""
141 non-agricultural vegetated areas""
142 non-agricultural vegetated areas""
211 Non-irrigated arable land
212 Permanently irrigated land
213 Rice fields
221 Vineyards
222 Fruit trees and berry plantations
223 Olive groves
231 Pastures
41 Annual crops associated with permanent crops
242 Complex cultivation patterns
243""Land principally occupied by agriculture
244 Agro-forestry areas
311 Broad-leaved forest
312 Coniferous forest
313 Mixed forest
321 Natural grasslands
322 Moors and heathland
323 Sclerophyllous vegetation
324 Transitional woodland-shrub
331 ""Beaches
332 Bare rocks
333 Sparsely vegetated areas
334 Burnt areas
335 Glaciers and perpetual snow
411 Inland marshes
412 Peat bogs
421 Salt marshes
422 Salines
423 Intertidal flats
511 Water courses
512 Water bodies
521 Coastal lagoons
522 Estuaries
523 Sea and ocean

## 4.3.3. Transformation

4.3.3.1. Transformation method

Main tasks in transformation are simple manipulations with attribute data and geometries. Actions are performed using PostgreSQL + PostGIS, but it can be performed using also Quantum GIS, KOSMO GIS or any other GIS application completely or some parts from described process steps.

Steps using SQL:
1. CODE_06 transform from integer to string;
2. Dissolve neighbour geometries with equal Corine Land Cover codes (action is performed just for security reasons, such cases in dataset should not be);
3. Building multi-polygons form simple polygons by equal Corine Land Cover codes.

Steps using desktop (eg. KOSMO GIS), depending from used application some of steps are easier for end users but some are non optimal due application functionality limitations:

1)Kosmo GIS desktop is possible to perform Dissolve function.
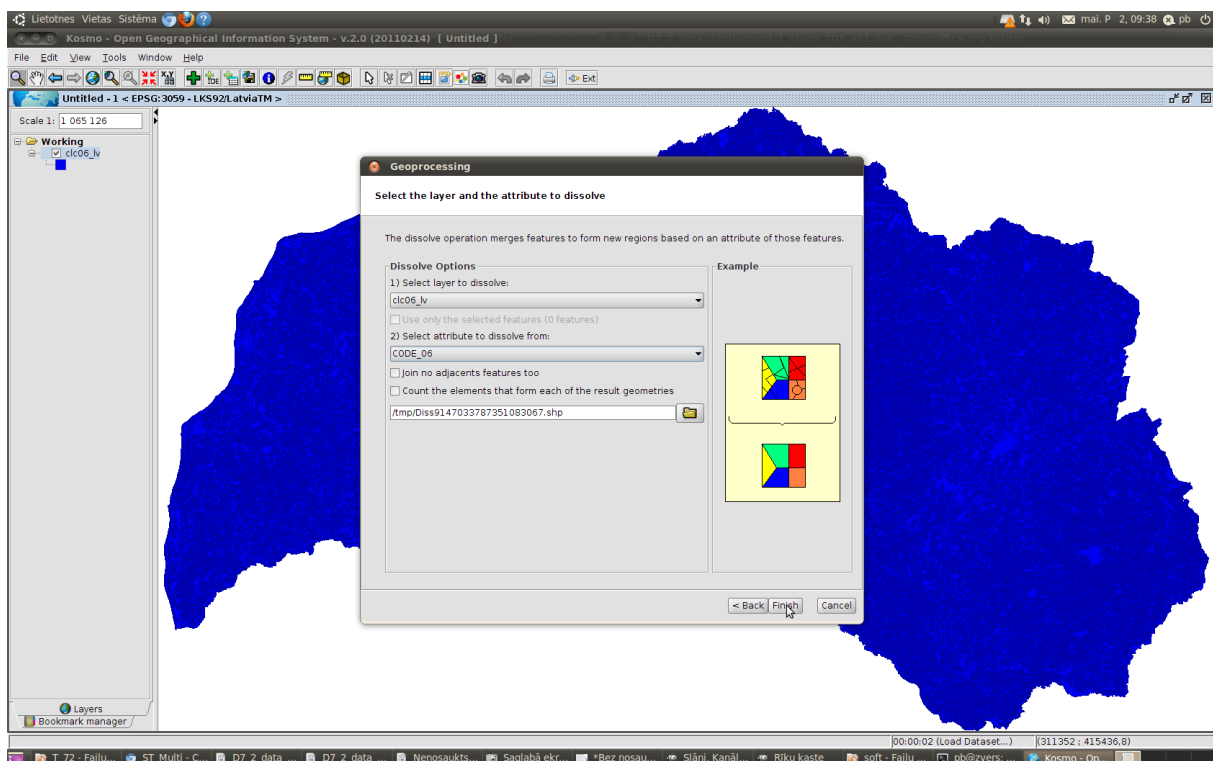
2)Build multi-polygons

This step can be performed in 2 ways:
- as described in SQL example Step 3
- since Kosmo GIS do not have function to build multi polygons can be used Quantum GIS. This approach requires following steps due limited multi-polygon building functionality:
  o split shapefile so that in each shapefile is only one land cover class
  o build for each land cover class new multi-polygon shapefile
  o merge new each land cover class multi-polygon shapefiles into one shapefile

4.3.3.2. Transformation scheme

Field name	Field description	Attribute example	Field Type
CLC06_LV_	Unique numeric id (identifier)	9	integer
ID	Unique string identifier	LV-123	string
CODE_06	Corine land cover encoding	231	integer
AREA_HA	Area in hectares	50.85	decimal
AREA	Area in hectares	50.85	decimal
PERIMETER	Perimeter in meters	7012.876	decimal
REMARK	Free text remark	NULL	text
SHAPE	Geometry field	(geometry in WKB format)	geometry

Field name	Field description	Field Type
inspireId	Unique INSPIRE identifier	Characret (0 .. 20)
CodCorine	Corine land cover encoding	Characret (0 .. 20)
Geometry	Geometry field	GM_multipolygon

Value to string

Dissolve ST_Union

Build Multipolygons From Simple Polygons (ST_Multi)

4.3.4. Publication

The data publication is performed using CCSS & HSRS developed Geoportalu sing OGC compliant services. System provided functionality:

- Search: search of data and metadata using Micka metadata solution
- OGC services: CWS, WMS, WFS, WCS.
- Downloads: data file download, via HTTP, to use with local applications.
- Map Viewer: a rich functionality web client HSLayers

The data has been published in the ETR projection (EPSG:3035) and local LKS92/Latvia-TM (EPSG:3059).

Deployment environment main components are:

- Debian GNU/Linux

- PotgreSQL+PostGIS

- MapServer

- CCSS GeoPortal (HSLayers, Micka, Ext)

As desktop client can be used any application able to use OGC WMS, WFS or CSW services like gvSIG, QuantumGIS, Open JUMP, uDig and other.

4.3.4.1. Web Map Client

The harmonised data is published in a simple web map application that is based on HSLayers client, already embedded in GeoPortal. As background map is used subset from Open Street Map.

4.3.4.2. Web Services

All web services are available in http://geoportal.tdf.lv

4.3.5. Results

4.3.5.1. Comments on Conceptual Models

Model is well understandable because is similar to Corine Land Cover that is well known and accessible for reference.

4.3.5.2. Recommended changes

In some cases probably is reasonable to add possibility to use and define "user defined" or "local" land cover types that can be in special cases highlighted, but keeping connection to models StandardClassification.

4.4. *LGV Hamburg*

4.4.1 General description of source data

Within WP7 of the Plan4ll project, LGV Hamburg transforms the preparatory land-use plan for the entire area of Hamburg (scale 1:20.000) and as an example in the first step one binding land-use plan (scale 1:1.000) in the Plan4all land use object model. Legal basis for these two types of spatial plans is the German "Federal Building Code".

4.4.2 Detail Description of Source Data

For the exchange of digital planning data between actors involved in planning processes, as well as for the internet-based visualisation of planning data to potential users, a digital harmonised data exchange format is needed. For this reason a semantic data model (XPlanung) and a neutral exchange format (XPlanGML) for urban planning data is developed since 2003 in Germany. XPlanung (http://www.xplanung.de) belongs to Germany's national eGovernment strategy pursued by the federal government, federal-state governments and municipal administrations "Deutschland-Online". The developed standard XPlanGML relies on the international standard GML 3. XPlanGML formalizes all legal regulations relevant for urban planning from a juridical point of view. XPlanGML objects have a two dimensional geometrical representation. The XPlanGML objects and their corresponding attributes represent legal restrictions and regulations. Restrictions may be formulated geometrically (e.g. specification of the area where buildings are allowed or forbidden) and / or attributive (e.g. specification of a maximal height, number of storeys or occupancy index of a building). If a specific regulation cannot be formalized by a set of attributes, integration into the XPlanGML data model as free text is possible. Optionally, this text can be related to specific parts of the planning area. The use of XPlanGML for exchanging spatial data is just a recommendation, using XPlanGML is not regulated by law.
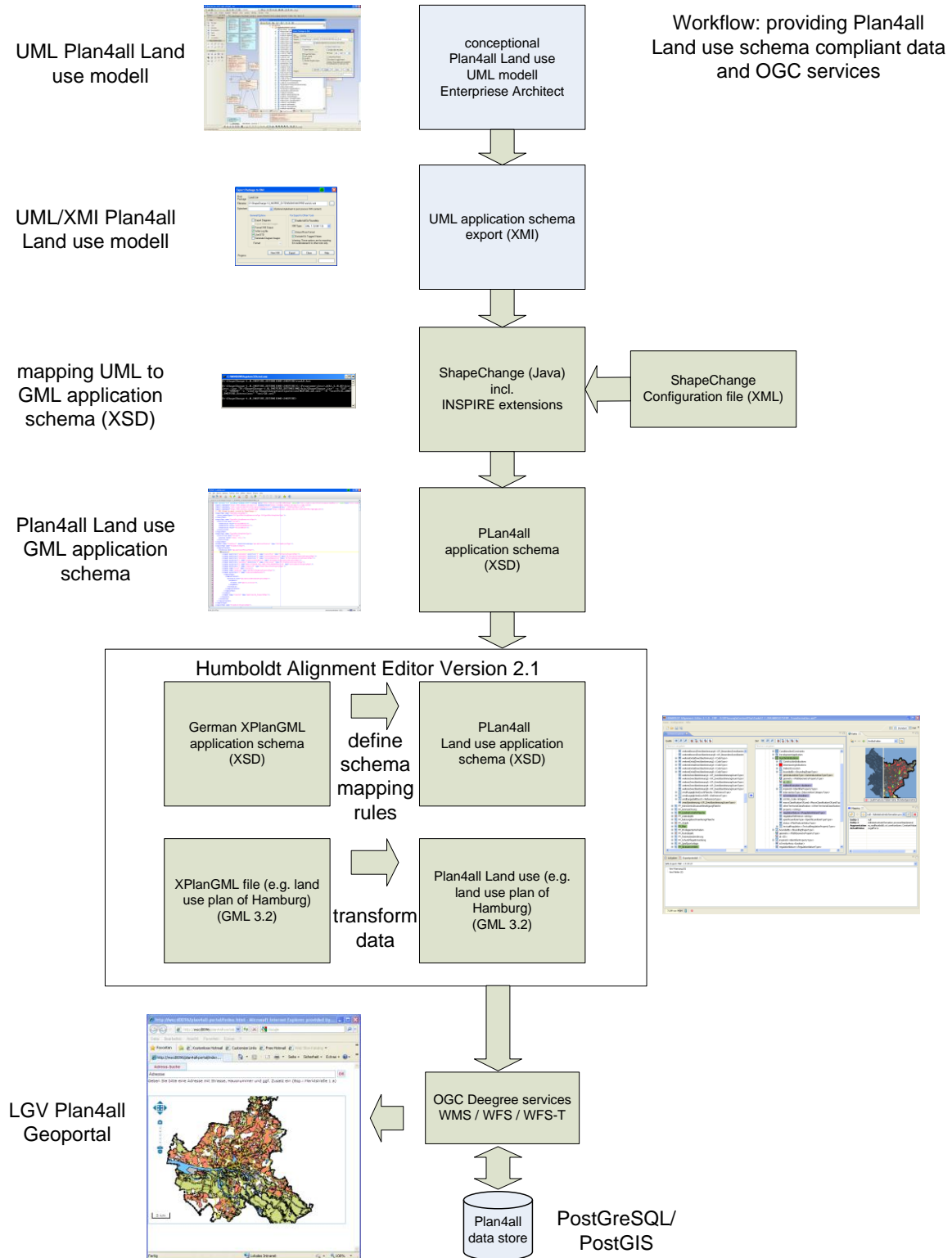
The data base source for transformation to Plan4all GML files are XPlanGML files. The preparatory land-use plan for Hamburg XPlanGML file is generated on shape files as source datasets with the "XPlanGML-Toolbox" provided by the "Karlsruhe Institute of Technology, Institute for Applied Computer Science" (http://www.iai.fzk.de/www-extern/index.php?id=683&L=1). The XPlanGML-Toolbox is a prototypic implementation of the XPlanGML standard. It is designed as simple software tool for generating XPlanGML models on base of existing planning documents (shape file data), for reading and writing XPlanGML data sets and for visualising XPlanGML with SVG vectorgraphics.

The binding land-use plan is designed with the AutoCAD application "WS-LANDCAD" and exported as XPlanGML data set
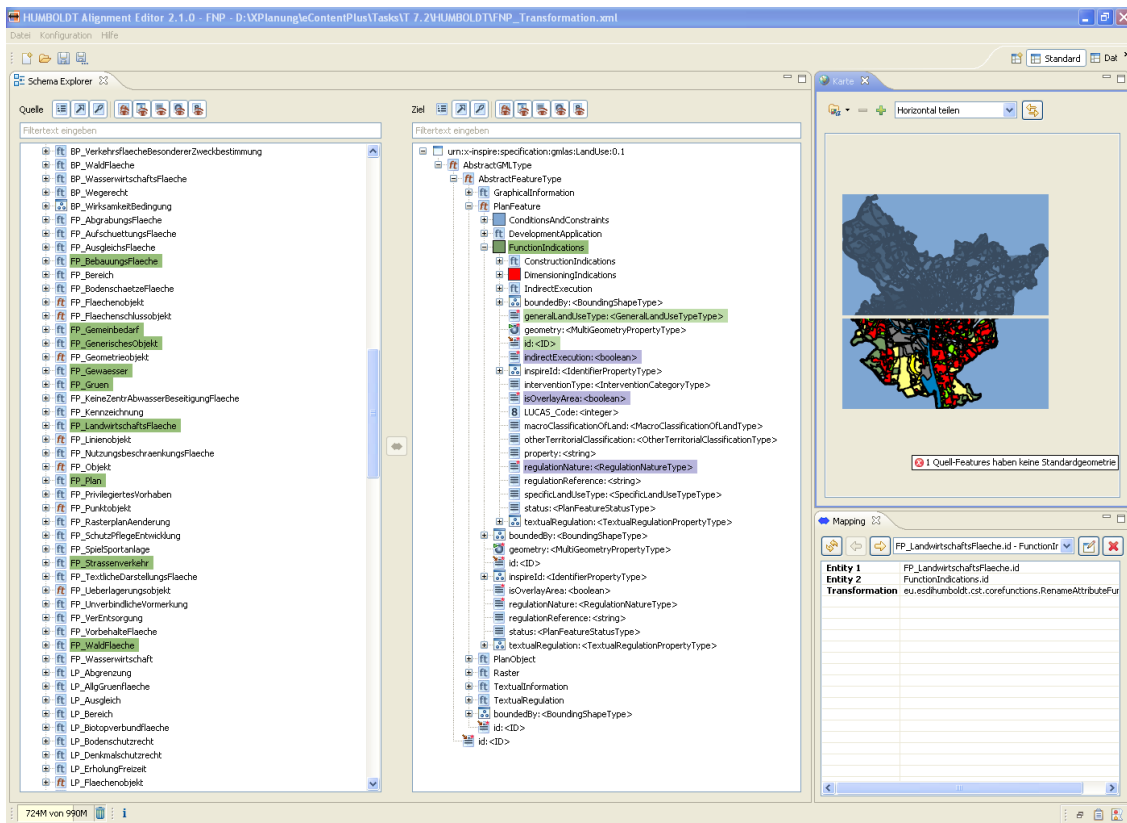
(http://www.widemann.de/produkte/wslandcad/xplanung/xplanung.htm).

4.4.3 Transformation

4.4.3.1 Transformation method

UML Plan4all Land use modell

conceptional Plan4all Land use UML modell Enterpriese Architect

Workflow: providing Plan4all Land use schema compliant data and OGC services

UML/XMI Plan4all Land use modell

UML application schema export (XMI)

mapping UML to GML application schema (XSD)

ShapeChange (Java) incl. INSPIRE extensions

ShapeChange Configuration file (XML)

Plan4all Land use GML application schema

PLan4all application schema (XSD)

Humboldt Alignment Editor Version 2.1

German XPlanGML application schema (XSD)

define schema mapping rules

PLan4all Land use application schema (XSD)

XPlanGML file (e.g. land use plan of Hamburg) (GML 3.2)

transform data

Plan4all Land use (e.g. land use plan of Hamburg) (GML 3.2)

LGV Plan4all Geoportal

OGC Deegree services WMS / WFS / WFS-T

Plan4all data store

PostGreSQL/ PostGIS

4.4.3.2 Transformation scheme

source XPlanGML data model			target Plan4all data model		
object	**attribut**	**value**	**object**	**attribute**	**value**
FP_Plan			**AdministrativeInformation**		
	name			title	
		Flächennutzungsplan FHH			Flächennutzungsplan FHH
	id			id	
				hierarchyLevelName	
					SpatialPlan.state
	TypeOfPlan			planType	
		PreparatoryLandusePlan			PreparatoryLandUsePlan
	municipality			organisationName	
		Freie und Hansestadt Hamburg			Freie und Hansestadt Hamburg
	status			processStepGeneral	
					LegalForce
	legalSituation			processStepSpecific	
		Effectiveness			Adopted
				indirectExecution	
					false
FP_ LandUseType			**FunctionIndications**		
	id			id	
	generalLandUseTypeArea			generalLandUseType	
		GeneralResidentialZone			Residential
		MixedDevelopmentZone			Other
		IndustrialCommercialDevelopmentZone			IndustrialCommercial

SpecialDevelopmentZone OtherDevelopmentZone isOverlayArea no legalNature BindingOnlyForAuthorities	SpecialDevelopmentZone Other isOverlayArea no regulationNature BindingOnlyForAuthorities indirectExecution false

FP_AgricultureArea
 id
 purpose
  GeneralAgriculture
 isOverlayArea
  no
 legalNature
  BindingOnlyForAuthorities
	FunctionIndications
	 id
	 generalLandUseType
	  Agriculture
	 isOverlayArea
	  no
	 regulationNature
	  BindingOnlyForAuthorities
	 indirectExecution
	  false

FP_WatercoursesArea
 id
 purpose
  Waterarea
 isOverlayArea
  no
 legalNature
  BindingOnlyForAuthorities
	FunctionIndications
	 id
	 generalLandUseType
	  Water
	 isOverlayArea
	  no
	 regulationNature
	  BindingOnlyForAuthorities
	 indirectExecution
	  false

FP_GreenArea
 id
 purpose
  Park
  SportsGround
  Playground
  Campsite
  Swim
  LeisureRecreation
  Cemetery
 isOverlayArea
  no
 legalNature
  BindingOnlyForAuthorities
	FunctionIndications
	 id
	 generalLandUseType
	  Green
	  Green
	  Green
	  Green
	  Green
	  Green
	  Green
	 isOverlayArea
	  no
	 regulationNature
	  BindingOnlyForAuthorities
	 indirectExecution
	  false

FP_PublicPurposeArea id purpose	**FunctionIndications** id generalLandUseType

	PublicAdministration		ServicesOfGeneralInterest
	ScienceSchool		ServicesOfGeneralInterest
	Church		ServicesOfGeneralInterest
	Social		ServicesOfGeneralInterest
	Health		ServicesOfGeneralInterest
	Culture		ServicesOfGeneralInterest
	Sport		ServicesOfGeneralInterest
	OtherDevelopmentZone		ServicesOfGeneralInterest
isOverlayArea		isOverlayArea	
	yes/no		yes/no
legalNature		regulationNature	
	BindingOnlyForAuthorities		BindingOnlyForAuthorities
		indirectExecution	
			false

FP_InformationForTheRecord		**FunctionIndications**	
SpecialLaw	id		id
	typeOfDesignation		generalLandUseType
	Habour		IndustrialCommercial
	isOverlayArea		isOverlayArea
	no		no
	legalNature		regulationNature
	BindingOnlyForAuthorities		BindingOnlyForAuthorities
		indirectExecution	
			false

FP_InformationForTheRecord		**FunctionIndications**	
FP_RailTafficLaw	id		id
	typeOfDesignation		generalLandUseType
	RailroadLines		RailwayTrafficInfrastructure
	RailWayStation		RailwayTrafficInfrastructure
	isOverlayArea		isOverlayArea
	yes/no		yes/no
	legalNature		regulationNature
	BindingOnlyForAuthorities		BindingOnlyForAuthorities
		indirectExecution	
			false

FP_InformationForTheRecord		**FunctionIndications**	
FP_AirTrafficLaw	id		id
	typeOfDesignation		generalLandUseType
	AirPort		OtherTrafficInfrastructure
	isOverlayArea		isOverlayArea
	yes/no		yes/no
	legalNature		regulationNature
	BindingOnlyForAuthorities		BindingOnlyForAuthorities
		indirectExecution	
			false

FP_RoadTrafficArea		**FunctionIndications**	
	id		id

purpose	generalLandUseType
Motorway	RoadTrafficInfrastructure
Throughway	RoadTrafficInfrastructure
TrafficRoute	RoadTrafficInfrastructure
isOverlayArea	isOverlayArea
yes/no	yes/no
legalNature	regulationNature
BindingOnlyForAuthorities	BindingOnlyForAuthorities
	indirectExecution
	false
FP_AreaForSupplyAndDisposal	**FunctionIndications**
id	id
purpose	generalLandUseType
Electricity	TechnicalInfrastructure
Gas	TechnicalInfrastructure
DrinkingWater	TechnicalInfrastructure
Sewage	TechnicalInfrastructure
WasteDisposal	TechnicalInfrastructure
isOverlayArea	isOverlayArea
no	no
legalNature	regulationNature
BindingOnlyForAuthorities	BindingOnlyForAuthorities
	indirectExecution
	false
FP_ForestArea	**FunctionIndications**
id	id
purpose	generalLandUseType
Forestry	AreasOfNaturalInterest
isOverlayArea	isOverlayArea
no	no
legalNature	regulationNature
BindingOnlyForAuthorities	BindingOnlyForAuthorities
	indirectExecution
	false

4.4.4 Publication

4.4.4.1 Web Map Client
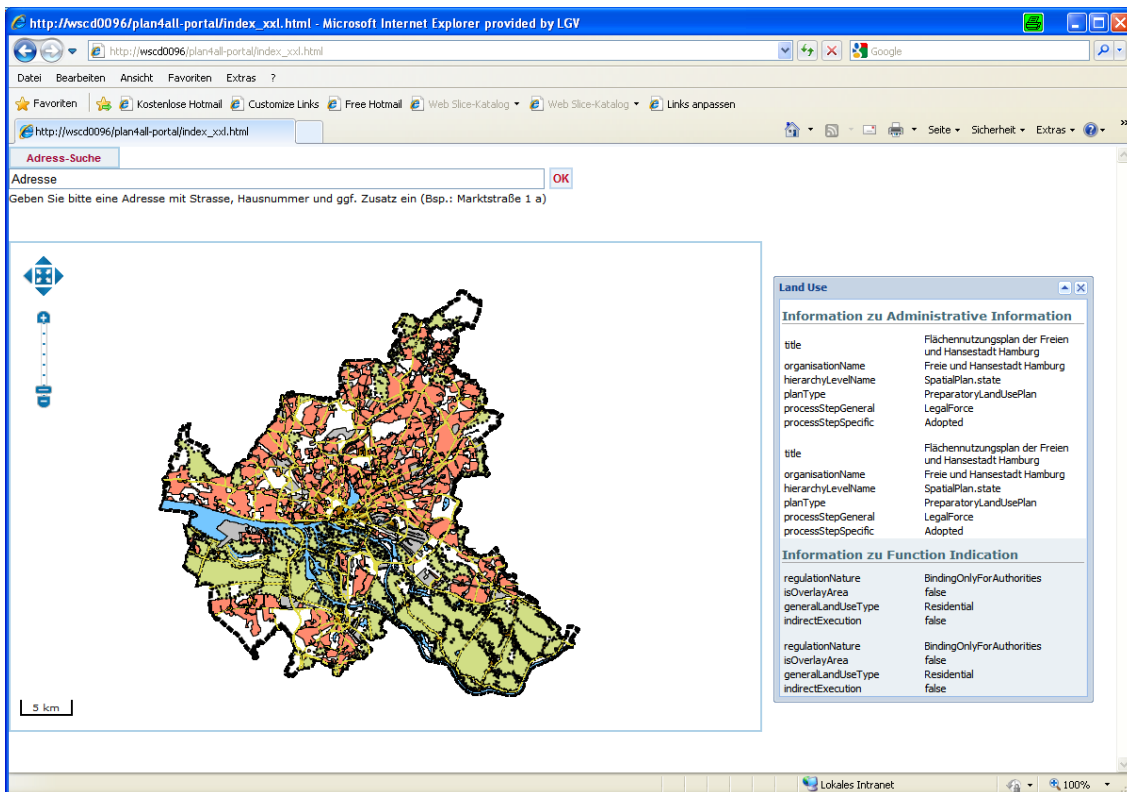
Open Layers based mapping client providing a Plan4all object model compliant WMS serives

4.4.4.2 Web Services

The OGC WMS/WFS services providing Plan4all object model compliant data are currently only availible in the intranet of the Free and Hanseatic City of Hamburg. But these services will be available soon also in the internet.

4.4.5 Results

4.4.5.1. Comments on Conceptual Models

The conceptional Plan4all Land use model covers the entire area of spatial planning between the country and the local level. But it is nearly impossible to represent spatial concepts on country and regional level like "central places / population growth center", "development axes", "spatial order categories" or "settlement developments: priority areas, reserve area/site, suitable area for development" within this model. These concepts can only be mapped to the extensible Plan4all code list "OtherTerritorialClassification". Especial on the European level an arrangement of spatial concepts and a matching to European regional policies and European public funding projects might be of interest.

In the "GeneralLandUseType" enumeration list a value for representing "mixed use areas" is missing.

In the conceptional Plan4all Land use model too many attributes are mandatory classified. According to German planning law e.g. it is not necessary to differentiate between already "Urbanized" areas and areas "ToBeUrbanised" in a spatial plan. These circumstances apply also to the required attributes "PlanFeatureStatus" and "InterventionCategory". We don't

have this information and the effort to collect this information retroactively is too high. So the mandatory attributes should be reduced. Furthermore we haven't defined the layout of the required "inspireId" Identifier in the Plan4all context. In this context it is not feasible to leaf this attribute required.

The existing association connectors between the several classes of the Plan4all Land use model don't have names.

On the basis of the conceptional Plan4all Land use model it is not possible to match dimensioning and construction indications to just one feature type. Until now the structure of the model requires to match land use intensity values to the feature type "DimensioningIndications" and to match construction type values to the feature type "ConstructionIndication". In the case to one object in a spatial plan dimensioning as well as construction indications are applied these object has be to mapped to two different Plan4ll features types.

4.4.5.2. Recommended changes

- Add an attribute and define an enumeration list representing spatial concepts on country and regional level with proposed values:

  - **development axes:** planned linear concentration of settlements areas, traffic routes and main services by axial growth

  - **central places / population growth center**: according to the central place theory a hierarchy of settlements - regional centre, sub regional centre, key inland town, sub-urban town, key settlement

  - **spatial order categories:** spatial categories (spatial order categories, area types) are areas defined in terms of specific criteria in which comparable structures exist and where similar spatial planning goals are pursued. Spatial categories can be defined in terms of settlement structure, quality, or potential

  - **settlement developments: priority areas, reserve area/site, suitable area for development:** area of varying size which is particularly suitable for one or several functions of a larger area and therefore, is to be protected and developed according to regional planning policies

  - **interregional significant open spaces and their protection**

- Add an enumration value „MixedUseDevelopment" to the enumeration list: "GeneralLandUseType" with the meaning: "Development zone comprising housing as well as commercial facilities and other uses which do not conflict with its residential use.

- Redefine the multiplicity of following attributes:

  - featureType: PlanObject; attributes: inspireID: Identifier (0..1), legislationReference: CI_Citation (0..1)

  - featureType: FunctionIndications; attribute: property: CharacterString (0..1)

- featureType: PlanFeature; attributes: inspireID: Identifier (0..1), status: PlanFeatureStatus (0..1), regulationReference: CharacterString (0..1)

- featureType; AdministrativeInformation attributes: ordinanceRef: CharacterString (0..1), ordinanceDate: DateTime (0..1)

- fetaureType; ConditionsAndConstraints, attributes: constraintDescpription: CharacterString (0..1), interventionType: InterventionCategory (0..1)

- fetaureType; GraphicalInformation, attribute: inspireID: Identifier (0..1)

- fetaureType; TextualInformation, attribute: inspireID: Identifier (0..1)

- fetaureType; TextualRegulation, attribute: inspireID: Identifier (0..1)

- fetaureType;Raster, attribute: inspireID: Identifier (0..1)

- Define names of the source and target elements of the association connectors. Otherwise it very difficult to identity these associations in a schema mapping tool like HALE.
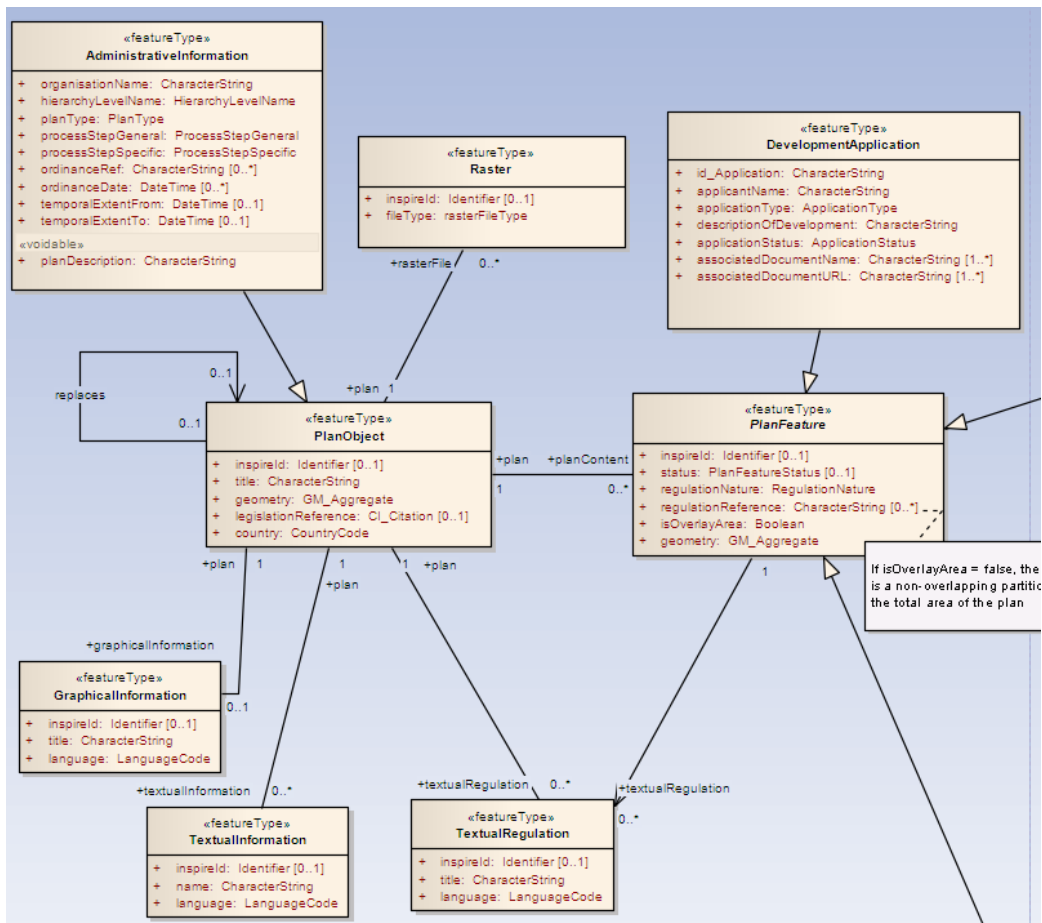
Figure: Proposal for the naming of association connectors

4.5. ZPR - LandUse

4.5.1. General description of source data

Within the WP7 of the Plan4all project, ZPR tests a pilot for LandUse data of Jelgava city and Jelgava County. The original data have been prepared by Jelgava city and Jelgava local authorities and the data is available in DGN (graphical data) and DOC, PDF (textual data) formats.

ZPR modified the original data for publication in Zemgale geoportal (http://gisdb.zpr.gov.lv/gis/Default.aspx). ZPR prepared referential shp files from the original dgn files according to the developed **"Unified methodological guidelines for the spatial planning in Zemgale region"** (joint land use type (zoning) classification in Zemgale region):

PAMATGRUPA	APAKŠGRUPA	VIETAS AR ĪPAŠIEM NOTEIKUMIEM[1]	APZĪMĒJUMS
DZĪVOJAMĀ APBŪVE /DZ/	MAZSTĀVU DZĪVOJAMĀ APBŪVE /DzM/	DzM-1, DzM-2... utt.	
	VAIRĀKSTĀVU DZĪVOJAMĀ APBŪVE /DzV/	DzV-1, DzV-2... utt.	
PUBLISKĀ APBŪVE /P/		P-1, P-2... utt.	
RAŽOŠANAS APBŪVE /R/	RAŽOŠANAS OBJEKTI UN NOLIKTAVAS /RR/	RR-1, RR-2... utt.	
	DERĪGO IZRAKTEŅU IEGUVES TERITORIJA /RD/	RD-1, RD-2... utt.	
TEHNISKĀ APBŪVE /T/		TSI-1, TSI-2... utt.	
ŪDEŅI /Ū/		Ū-1, Ū-2... utt.	
MEŽI /M/			
ZAĻUMVIETAS /Z/	ĪPAŠAS NOZĪMES ZAĻUMVIETAS /ZĪ/	ZĪ-1, ZĪ-2... utt.	
	CITAS KOPTĀS ZAĻUMVIETAS /ZC/	ZC-1, ZC-2... utt.	
LAUKU ZEMES /L/		L-1, L-2... utt.	

The process of common publication of spatial planning data is presented at the figure:

The spatial planning data are published through Arc GIS Desktop application in the Zemgale Norwegian grant project geoportal and also the same data are published on Zemgale Plan4all geoportal (http://giz.zpr.gov.lv/catalogue/?anytext=Jelgava&type=&menuId=menu0).
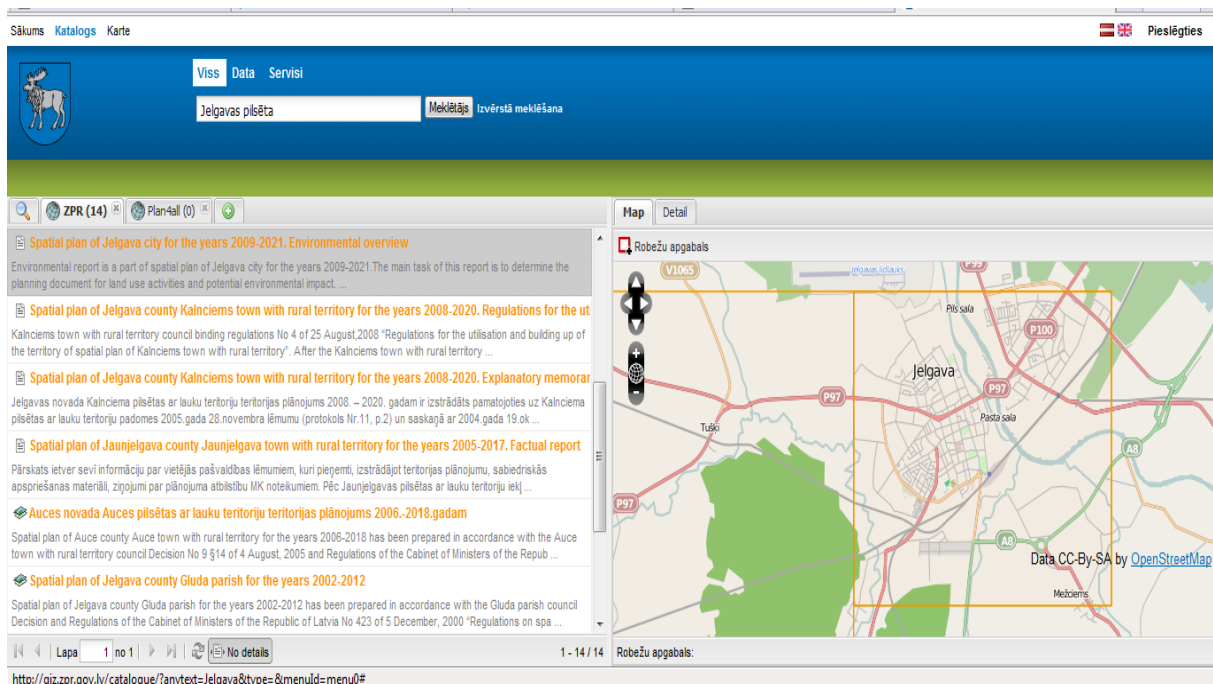

This way the harmonised data according to Zemgale planning region methodology is published through web services WMS and WFS, but also could be harmonized according to the Plan4all LandUse model.

4.5.2. Detail Description of Source Data

In the case of Jelgava city planning data, the harmonisation process is built up on the source data in the SHP file. This file contains all important data regarding land use specification.

4.5.2.1. Scheme

The base structure of the source data is presented in the table. Originally the field are described in Latvian language, for purpose of the Plan4all project is joined also description in English and example of values.

Source_structure	Description	attribute_example
VEIDS	Planned use type	DzM - low storey building
INDEKSS	Area with special requirements	DzM
PLATIBA	Area (m2)	100,52
TER_VIEN	Territorial unit	Jelgava
ADMIN_TER	Administrative unit	Tervetes novads
LAYER	CAD layer level	2
PIEZIMES	Free text remark	NULL

4.5.2.2. Features and Code Lists

The table describe source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: VEIDS

   Value type: string

   Definition: Planned use type

Code List:	DzM	Low storey building
	DzV	Several storey building
	RR	Production objects and warehouses
	RD	Territory of mineral deposits
	T	Technical building site
	Ū	Water
	M	Forests
	ZĪ	Special importance green areas
	ZC	Other cultivated green areas
	L	Field land

Attribute: INDEKSS

Value type:	string
Definition:	Area with special requirements
Code List:	DzM	Low storey building
	DzV	Several storey building
	RR	Production objects and warehouses
	RD	Territory of mineral deposits
	T	Technical building site
	Ū	Water
	M	Forests
	ZĪ	Special importance green areas
	ZC	Other cultivated green areas
	L	Field land

Attribute: PLATIBA

Value type:	integer
Definition:	Area (m2)
Code List	-

Attribute: TER_VIEN

Value type:	string
Definition:	Administrative unit
Code List	-

Attribute: LAYER

Value type:	string
Definition:	CAD layer level
Code List	-

4.5.3. Transformation

4.5.3.1. Transformation method

It is possible to use several different tools for data transformation from the source data structure into the target data model. The target conceptual LandUse data model developed in WP4 is quite complicated. Therefore in the first stage of data deployment, ZPR solved the transformation and harmonisation process directly by editing of target data structure.
Transformation and harmonisation steps:

- The target structure has been established on the basis of LandUse conceptual data model defined in WP4. Because this conceptual data model is not fully corresponding

to the source data structure, some modifications have been proposed and only some of the fields have been used. The work database is ESRI Shapefile.

- The transformation (harmonisation) scheme have been defined in two steps
    - The scheme for attributes transformation
    - The scheme for values transformation – comparison of enumerations of the source and target data
- The target ESRI Shapefile has been filled on the basis of transformation (harmonisation) schemes.

Transformed data to P4a data model:
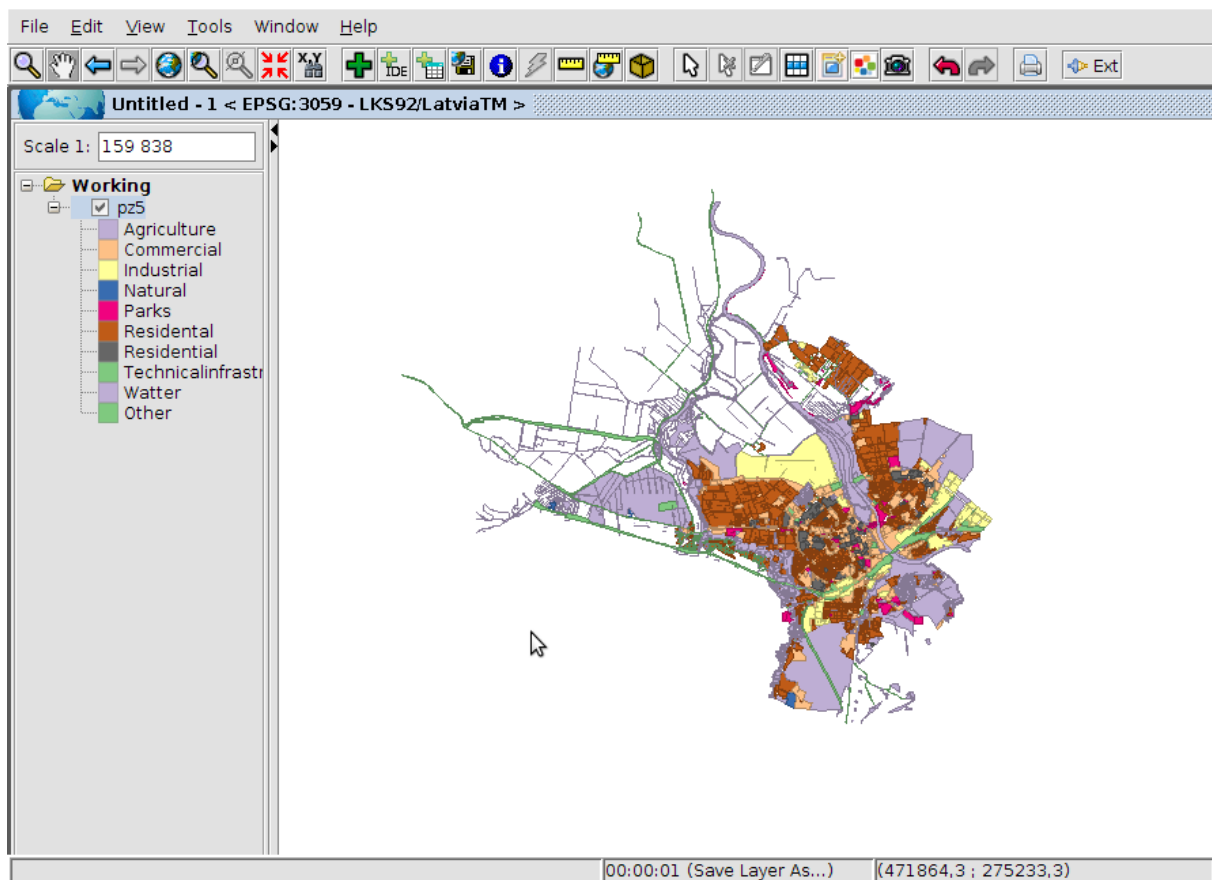
Transformed data by height indication:
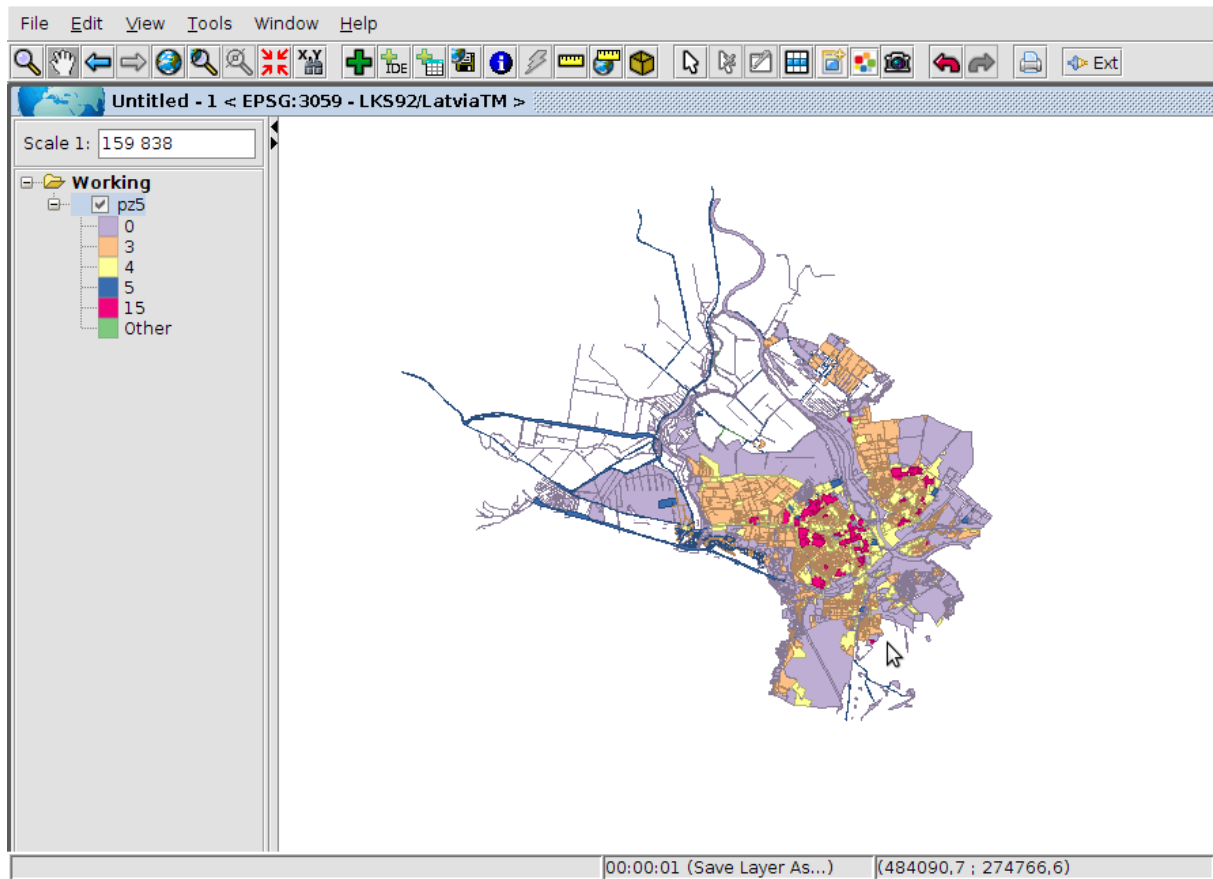
4.5.3.2. Transformation scheme

The first step in the harmonisation process is definition of the source and target features and attributes.

The scheme below shows relations between target data and source data

PlanObject	
	InspirelD
	Title
	Geometry
	LegislationReference
	CountryCode
Plan Feature	
	inspireId
	status
	regulationNature
	regulationReference
	isOverlayArea
	geometry
Function Indications	
	property
	LUCAS_Code
	macroClassificationOfLand
	generalLandUseType
	specificLandUseType
	otherTerritorialClassification
	interventionType
	IndirectExecution
Indirect Execution	
	title
	processStepGeneral
Dimensioning Indications	
	indexes
	volumeIndication
	surfaceIndication
	heighIndication
	unitIndication
	otherIndication
Construction Indications	
	typeOfBuilding
	roofShape
	otherConstructionIndication
Condition and Constrains	
	protectedSite
	naturalRiskSafetyArea
	restrictionZone
	easementType
Textual Regulation	
	inspireId
	title
	language

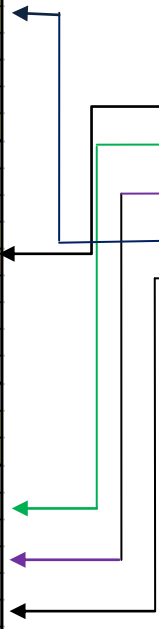| Source_structure	Description
VEIDS	Planned use type
INDEKSS	Area with special requirements
PLATIBA	Area (m2)
TER_VIEN	Territorial unit
ADMIN_TER	Administrative unit
LAYER	CAD layer level
PIEZIMES	Free text remark

GeneralLandUseType	Land Use Code	Description
Residential	DzM	Low storey building territories
	DzV	Several storey building territories
Commercial	P	Public building territories
Industrial	RR	Production objects and warehouses territories
Natural	RD	Territories of mineral deposits
TechnicalInfrastructure	T	Technical building sites territories
Water	Ū	Surface water territories
Agriculture	M	Territories used for forestry
Parks	ZĪ	Special importance green areas
	ZC	Other cultivated green areas
Agriculture	L	Land use territories

4.5.4. Publication

The data publication is performed using CCSS & HSRS developed Geoportalu sing OGC compliant services. System provided functionality:

- Search: search of data and metadata using Micka metadata solution
- OGC services: CWS, WMS, WFS, WCS.
- Downloads: data file download, via HTTP, to use with local applications.
- Map Viewer: a rich functionality web client HSLayers

The data has been published in the ETR projection (EPSG:3035) and local LKS92/Latvia-TM (EPSG:3059).

4.5.4.1. Web Map Client

ZPR has published the harmonised data in a simple web map application that is based on HSLayers client. Several fields have been chosen from the structure and map layers have been generated for them on the basis of agreed colour schemes.
The displayed map layers:
- Plan Feature Status
- General Land Use
- Height Indications
- Volume Indications
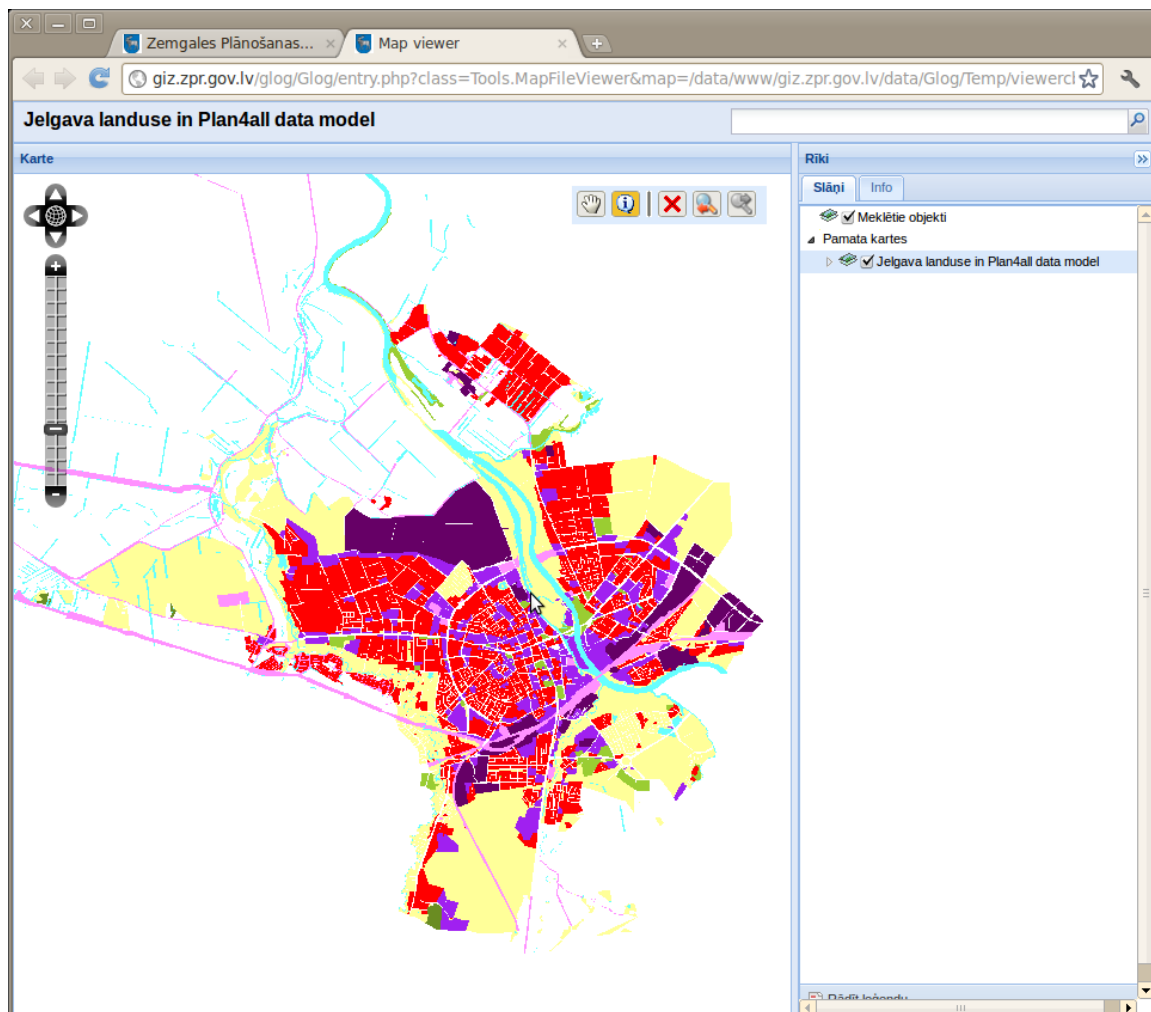
4.5.4.2. Web Services

The harmonised data has been published also as Web Map Service (WMS) and Web Feature Service (WFS)

Links for the services:

Links for the services:

WMS: http://giz.zpr.gov.lv/glog/Glog/entry.php?class=Mapman.MapmanWms&mapProject=mapproject7&instance=&SERVICE=WMS&REQUEST=GetCapabilities

WFS:

http://giz.zpr.gov.lv/glog/Glog/entry.php?class=Mapman.MapmanWfs&VERSION=1.0.0&mapProject=mapproject7&instance=&SERVICE=WFS&REQUEST=GetCapabilities

Map Viewer:

http://giz.zpr.gov.lv/glog/Glog/entry.php?class=Tools.MapFileViewer&map=/data/www/giz.zpr.gov.lv/data/Glog/Temp/viewercb4dcf8dd64c5060b7f255cd8fc7b899.map&language=lav&useToolsPanel=true&useLayerSwitcher=true&showTopPanel=true&showMapTitle=true&useDataObjects=true

4.5.5. Results

4.5.5.1. Comments on Conceptual Models

The conceptual model Land Use proposed by WP4 is very complex and covers the whole area of Territorial Planning, not only specific Land Use. From the other hand it is very difficult to propose a unified and standardized model for Land Use planning (or spatial planning) for different countries, where almost all files and formats are unique and unstandartized. Zemgale standardized methodology provides more detailed specification.
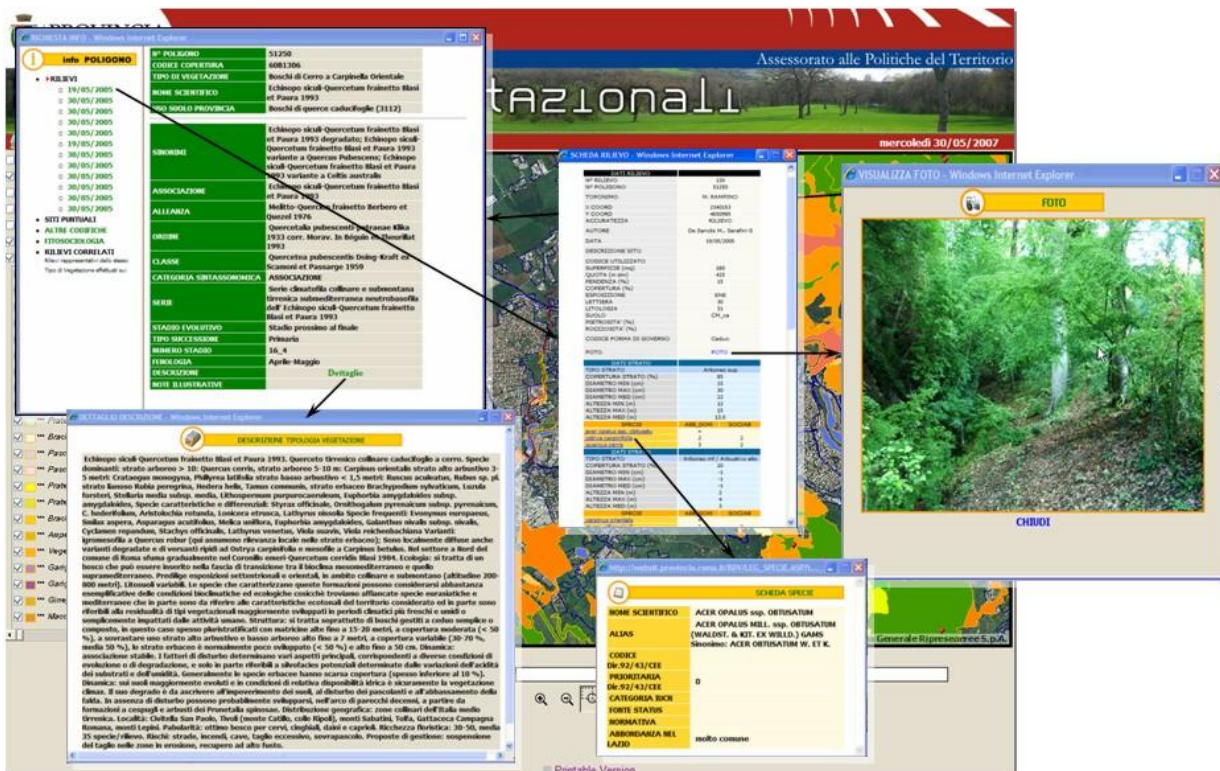
4.6. PROVROMA - HYPER

4.6.1. General description of source data

In this stage of the WP7 of the Plan4all project, PROVROMA tests a pilot for LandCover data of the Province of Rome

The Vegetation Data Bases of the Province of Rome, obtained from phytosociological relief campaigns, from photo interpretation of color digital orthophotos IT2000 and from classification of multispectral data and SPOT5 Landsat 5-7, represent an tool for the interpretation and the theming of vegetation cover according to the main encoding recalled from the scientific literature, from regulatory and technical documents (phytosociological classes to the levels of class, order, alliance and association; EUNIS codes, Corine Biotopes, Corine Land Cover, Habitat's Directive 92/43 / EEC).

Using web you can get the theming of interested area according to the main phytosociological classes (class, order, alliance, association), based on land cover: "Corine Land Cover IV-V level" using the EUNIS codes, Corine Biotopes, Habitats (Directive 92/43/EEC) and query the database to obtain the distribution of any class of the systems mentioned above in provincial territory. It is also possible, starting from any polygon of real vegetation, to consult the relief of field sites inside and / or relief tables related to the same type of vegetation distributed in the same landscape units and / or in the entire provincial territory.

This way the un-harmonised data is published. This data (SHP) represents the input into transformation and harmonisation process. The output data in a structure based on conceptual models will be published the same way the source data – in web map client and also through

web services WMS or WFS – i.e. exploiting the PostgreSQL-PostGIS based SDI described in the following.

4.6.2. Detail Description of Source Data

In the case of the Vegetation Data Bases of the Province of Rome, the harmonisation process is built up on the source data in the SHP file. This file contains all important data regarding land cover specification.

4.6.2.1. Scheme

The base structure of the source data is presented in the table. Originally the field are described in Italian language, for purpose of the Plan4all project is joined also description in English and example of values.

Source_structure	Description	Attribute_example
Id_area_syntaxon	Unique numeric id (identifier)	3
Cod_syntaxon	Syntaxon relation code	67F0402
Cod_corine	Relation code attributed to polygon as Corine land cover encoding	231
Cod_corine_biotope	Relation code attributed to polygon as Corine Biotopes encoding	34.8
Cod_habitat	Relation code attributed to polygon as encoding of Community interest habitat	6220
Cod_Eunis	Relation code attributed to polygon as EUNIS encoding	E1.61
Cod_serie	Syntaxon relation code as encoding of vegetation series	16
Evol_syntaxon	Generic indication of syntaxon evolutionary position inside succession	Stadio prossimo all'iniziale
Succ_syntaxon	Type of succession syntaxon belongs	Secondaria
Cod_stadio	Syntaxon relation code as encoding of syntaxon developmental stage than a specific vegetation series	16_2
Cod_geosigmeto	Relation code attributed to polygon as relative geosegment encoding	4
SHAPE	Geometry	

4.6.2.2. Features and Code Lists

The table describe source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: Id_area_syntaxon	
Value type:	number
Definition:	ID of the feature
Code List:	

Attribute: Cod_corine		
Value type:	string	
Definition:	Relation code attributed to polygon as Corine land cover encoding	
Code List	1	Superfici Artificiali
	111	Zone Residenziali A Tessuto Continuo
	112	Zone Residenziali A Tessuto Discontinuo E Rado
	121	Aree Industriali, Commerciali E Dei Servizi Pubblici E Privati
	122	Reti Stradali, Ferroviarie, Opere D'arte E Infrastrutture Tecniche
	123	Aree Portuali
	124	Aereoporti
	131	Aree Estrattive
	132	Discariche
	133	Cantieri
	141	Aree Verdi Urbane
	142	Aree Ricreative E Sportive
	211	Seminativi In Aree Non Irrigue
	212	Seminativi In Aree Irrigue
	22	Colture Permanenti
	221	Vigneti
	222	Frutteti E Frutti Minori
	223	Oliveti
	224	Altre Colture Permanenti
	2241	Pioppeti
	2242	Noceti
	2243	Eucalipteti
	231	Prati E Pascoli Avvicendati
	241	Colture Temporanee Associate A Colture Permanenti
	242	Sistemi Colturali E Particellari Complessi
	243	Aree Prevalentemente Occupate Da Colture Agrarie Con Presenza Di Spazi Naturali Importanti
	244	Aree Agroforestali
	3	Territori Boscati E Ambienti Seminaturali
	311	Boschi Di Latifoglie
	3111	Boschi Di Leccio
	31111	Leccete A Viburno
	31112	Leccete A Orniello
	3112	Boschi Di Querce Caducifoglie
	31122	Querceti Di Roverella

31124 Cerrete Termoigrofile Mediterranee
31126 Cerrete Dell'italia Meridionale
3113 Boschi Di Latifoglie Mesofile
31134 Boschi Misti A Dominanza Di Carpino Nero
3114 Boschi Di Castagno
31143 Castagneti Dell'italia Meridionale
3115 Boschi Di Faggio
3116 Boschi Di Specie Igrofile
31163 Pioppo-Olmeti Ripariali
31171 Robinieti
312   Boschi Di Conifere
3121 Boschi Di Pini Mediterranei E Cipresso
31213 Rimboschimenti Di Pino Domestico
31221 Rimboschimenti Di pino nero
313   BOSCHI MISTI DI CONIFERE E LATIFOGLIE
32   ZONE CARATTERIZZATE DA VEGETAZIONE ARBUSTIVA E ERBACEA
321   PRATI-PASCOLI NATURALI E PRATERIE
3211 Praterie aride calcaree
3212 Praterie aride silicicole
3214 Praterie mesofile
322   BRUGHIERE E CESPUGLIETI
3221 Arbusteti montani
3222 Arbusteti termofili
32222 Pruneti
3223 Arbusteti xerofili
32231 Ginestreti
3231 Macchia
32311 Macchia a fillirea e lentisco
32314 Macchia a leccio
3232 Gariga
32321 Gariga a lentisco
331   SPIAGGIA, SABBIE, DUNE
3311 Vegetazione psammofila litorale
332   ROCCE NUDE, FALESIE, RUPI E AFFIORAMENTI
334   AREE PERCORSE DA INCENDI
41   ZONE UMIDE INTERNE
4121 Canneti a fragmite
421   PALUDI SALMASTRE
511   CORSI D'ACQUA, CANALI, IDROVIE
512   BACINI D'ACQUA
521   LAGUNE

4.6.3. Transformation

4.6.3.1. Transformation method

As in Vegetation database is indicated the CORINE encoding to harmonize data, is necessary to transform in our code which arrives until the 5th level of detail grouping to the 3rd level,

cutting off the last 2 characters. After the adjacent geometries grouped for the above mentioned code will be joined.

4.6.3.2. Transformation scheme

4.6.4. Publication

The data publication is performed through a Geosite, i.e. a SDI hosting OGC services which are accessible from any compatible client application and a web viewfinder of maps which provides the basic viewing functions. The web is structured in the following sections:

- Search: find information available using metadata
- OGC services: CWS, WMS, WFS, WCS.
- Downloads: data file download, via HTTP, to use with local applications.
- Map Viewer: a lightweight, web based, map viewer that provides the basic viewing functions for the data

The SDI is fully conformant with standard open source SDIs, according to the following architecture.
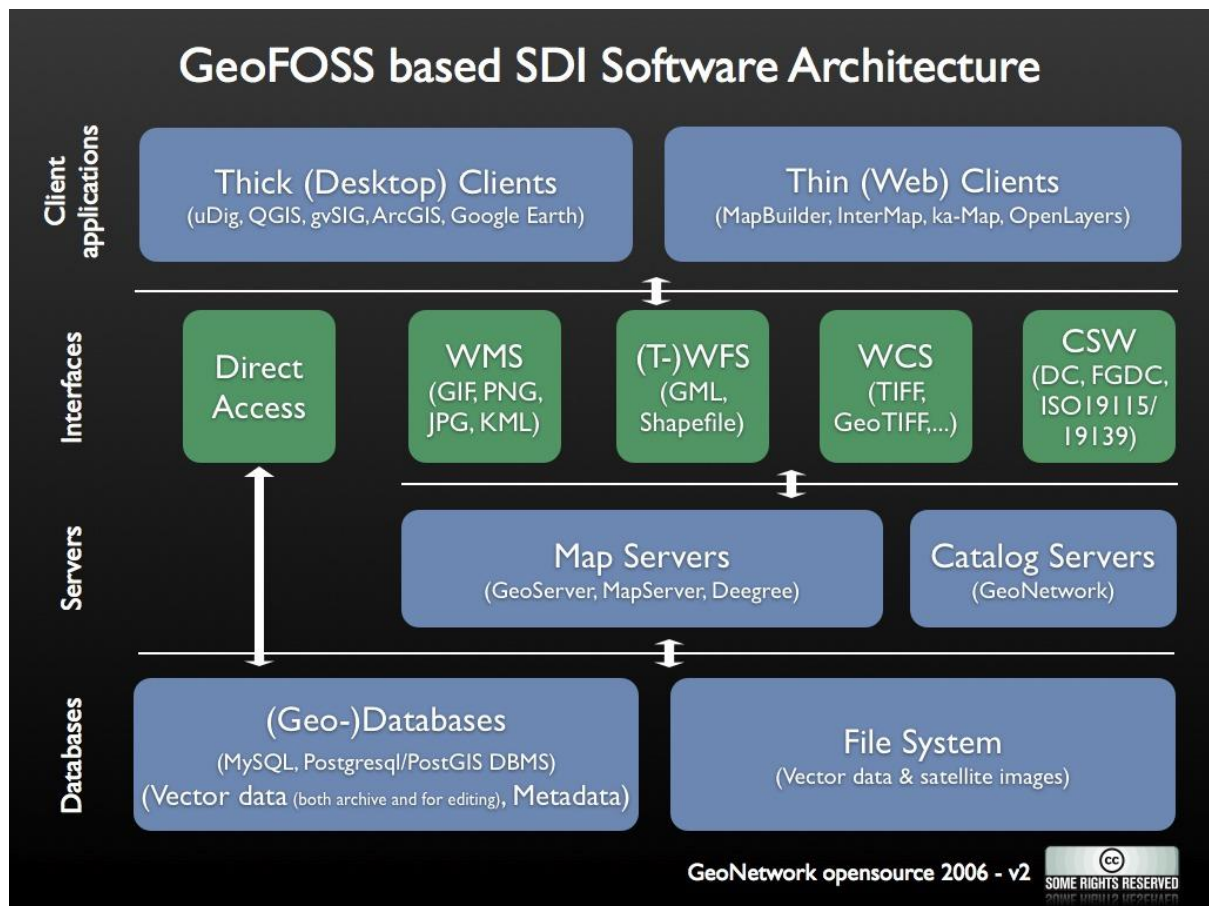
Open source SDI architecture (source http://geonetwork-opensource.org)

Where the main components are deployed integrating the following open source technologies:

- Geo-database: PostgreSQL 8.4 along with PostGIS 1.5 spatial extension
- Map server and map services (view, download, SRS transform): Geoserver
- Catalogue management and services: GeoNetwork
- Thin client (web front-end): based on Geoexplorer, GEOExt, Openlayers
- Thick client (desktop front-end, GIS authoring, thematisation):
    - uDig
    - QGis

Infrastructure description

The SDI has been build using opensource tools. Basically, GeoNetwork in order to provide searching services in metadata (CSW), GeoServer in order to provide map/features/visualization/download services (WMS and WFS) and PostgreSQL/PostGIS for vector data and metadata along with filesystem for shapefile data and/or raster.

All services are working in a virtual machine with one processor 2.5 GHz, 2 GB of RAM memory and a Windows Server 2008 32bit operating system.

The published spatial data are stored as spatial tables and as shapefiles.

Technology details

Basically, the technological stack for services is java-based according to the following:

- DBMS with spatial extension, accessed through JDBC
- Java JVM 1.6 as runtime
- Tomcat 6 as application server

To provide a runtime environment to fundamental services components, i.e. GeoNetwork and Geoserver.

All this applications run on a Windows 2008 Server 32bit operating system, but notice that all SDI components are fully cross-platform.

4.6.4.1. Web Map Client

The Geosite provides a web map client (user´s interface/front-end to local map services), based on client-side opensource technologies, i.e. javascript libraries Geoexplorer, GEOExt, Openlayers, and implementing a lightweight, web based, map viewer.

The map viewer is a thin client of the data services of the underlying SDI (WMS, WFS), that provides the basic viewing functions for the data:

- Add local layer (from local map service),
- Add remote layer (from remote map services),
- Pan,
- Zoom in,
- Zoom out,
- Zoom to extent,
- Identify feature (info),
- Display legend,
- Measure length/area,
- Query layer by location and/or by attributes,
- Download local layer(s)

The map viewer is available at the following URL:

Map viewer	http://plan4all.hyperborea.com/geoexplorer

In the following some screenshots of the map viewer are provided.
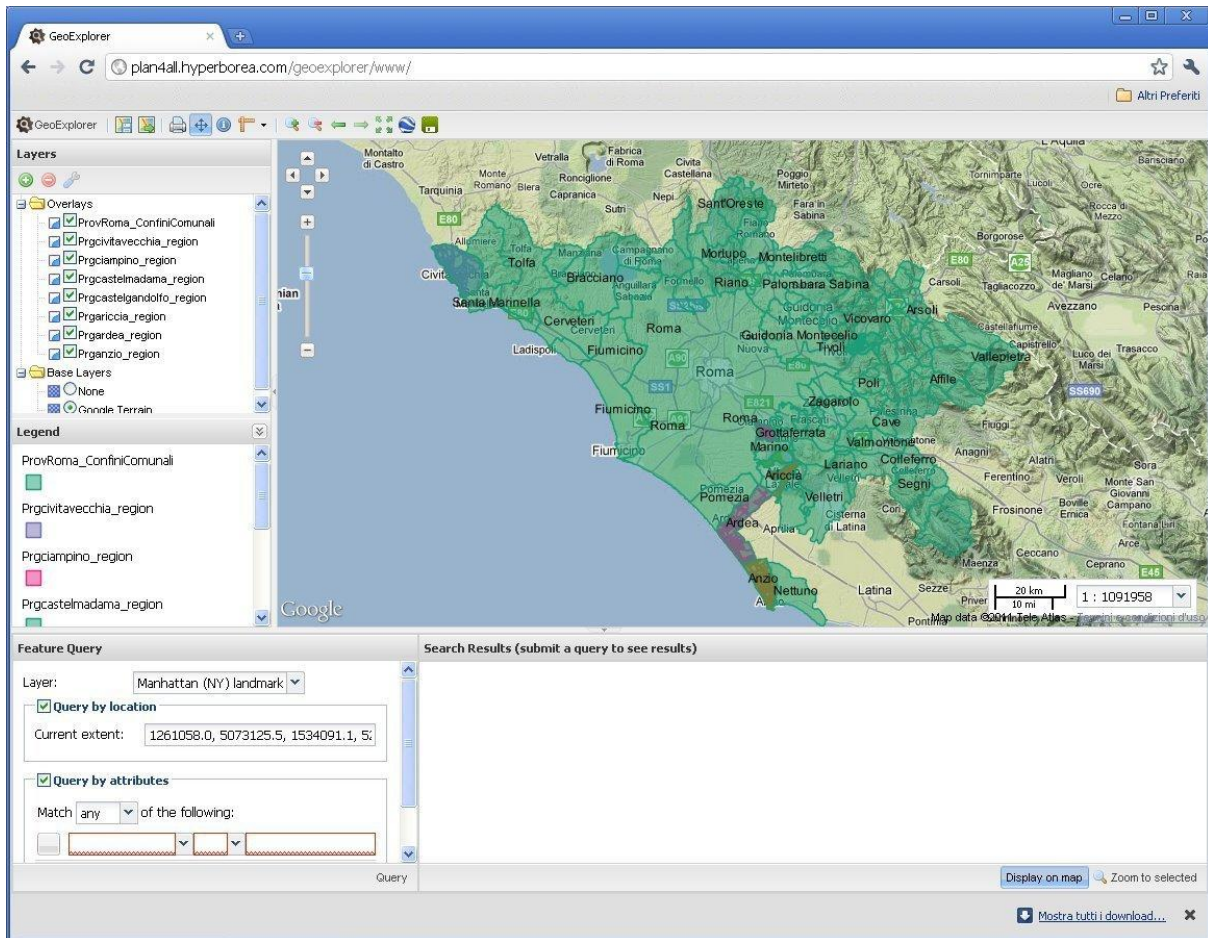
Figure 1 - Map viewer user interface
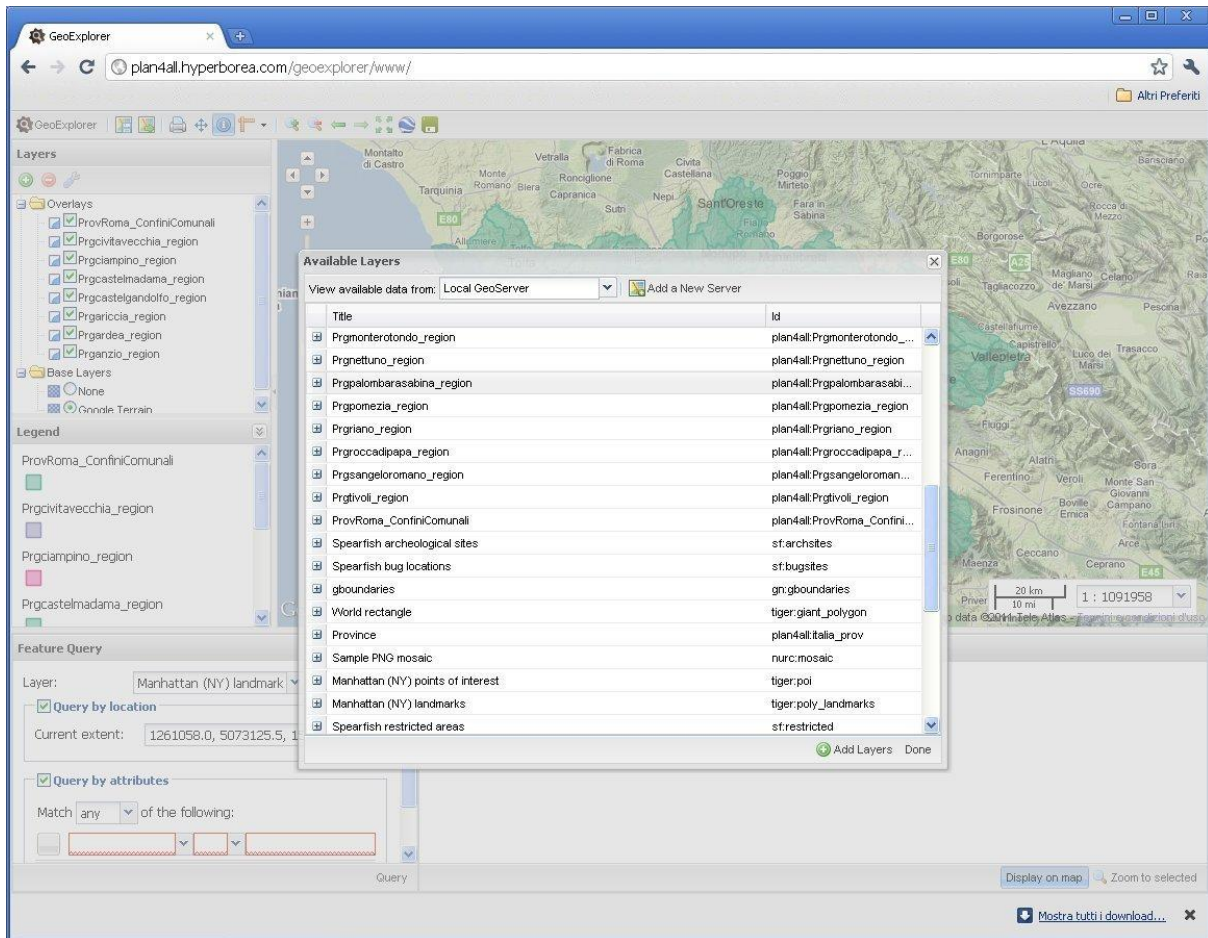
Figure 2 - User interface to add layers from map service
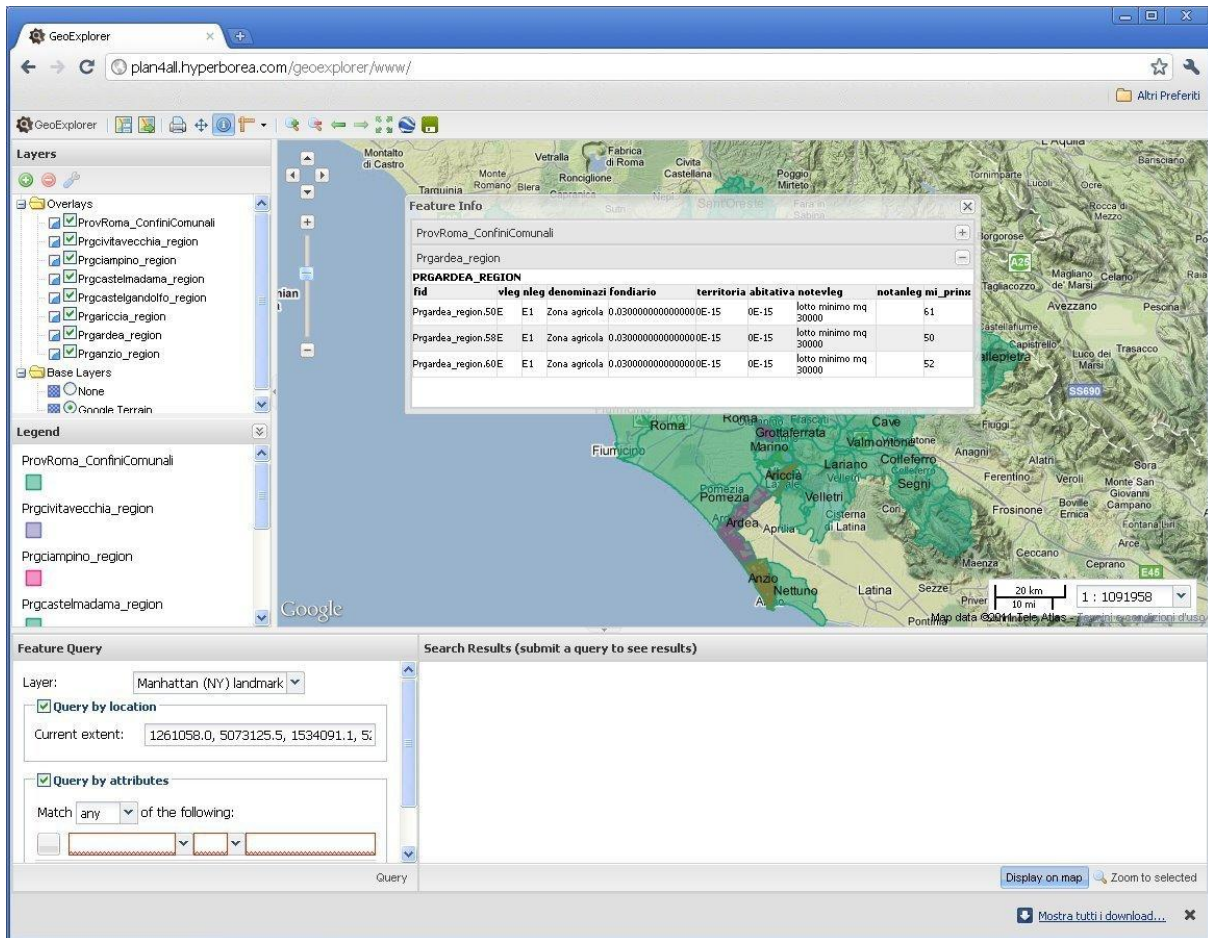
Figure 3 - Feature info
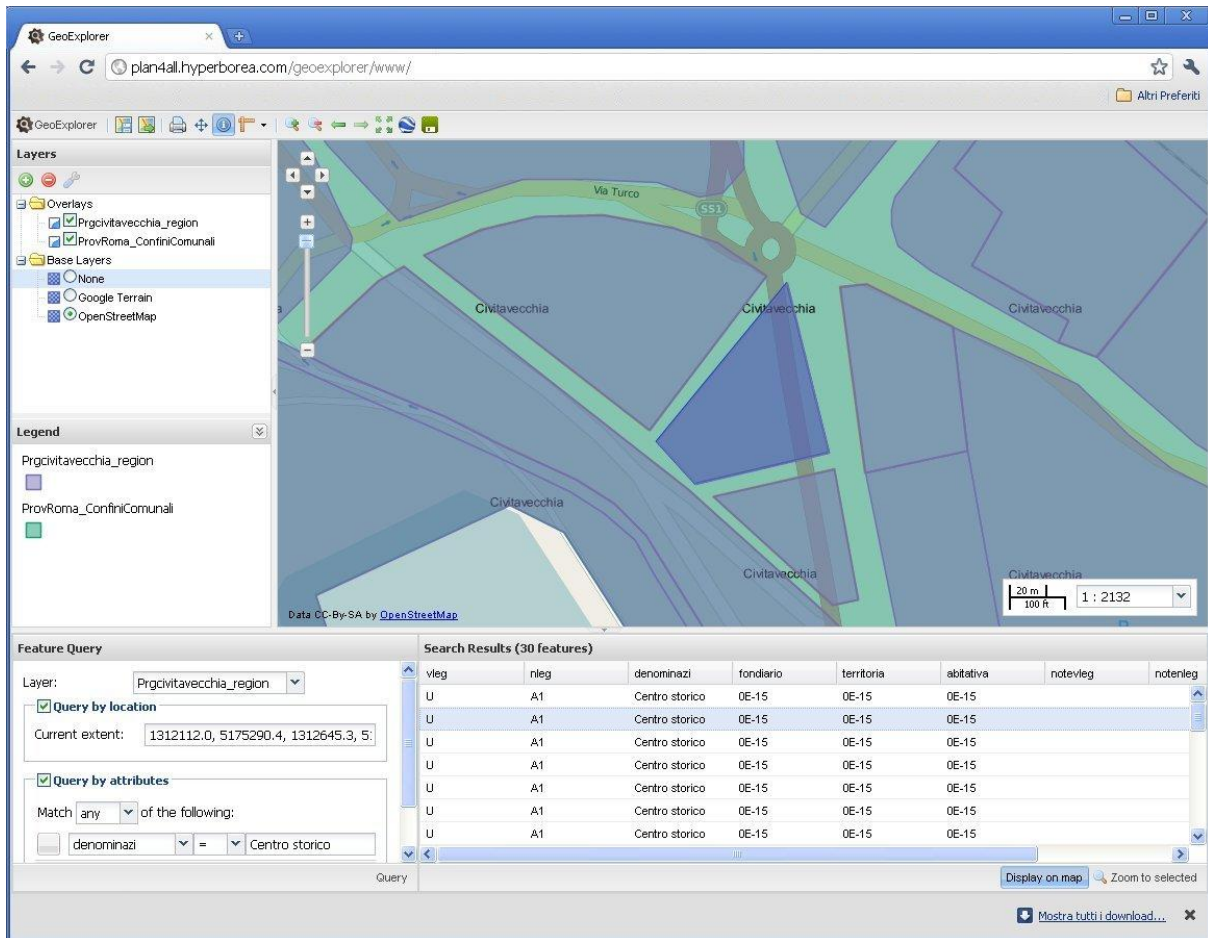
Figure 4 - Feature query by location and attributes
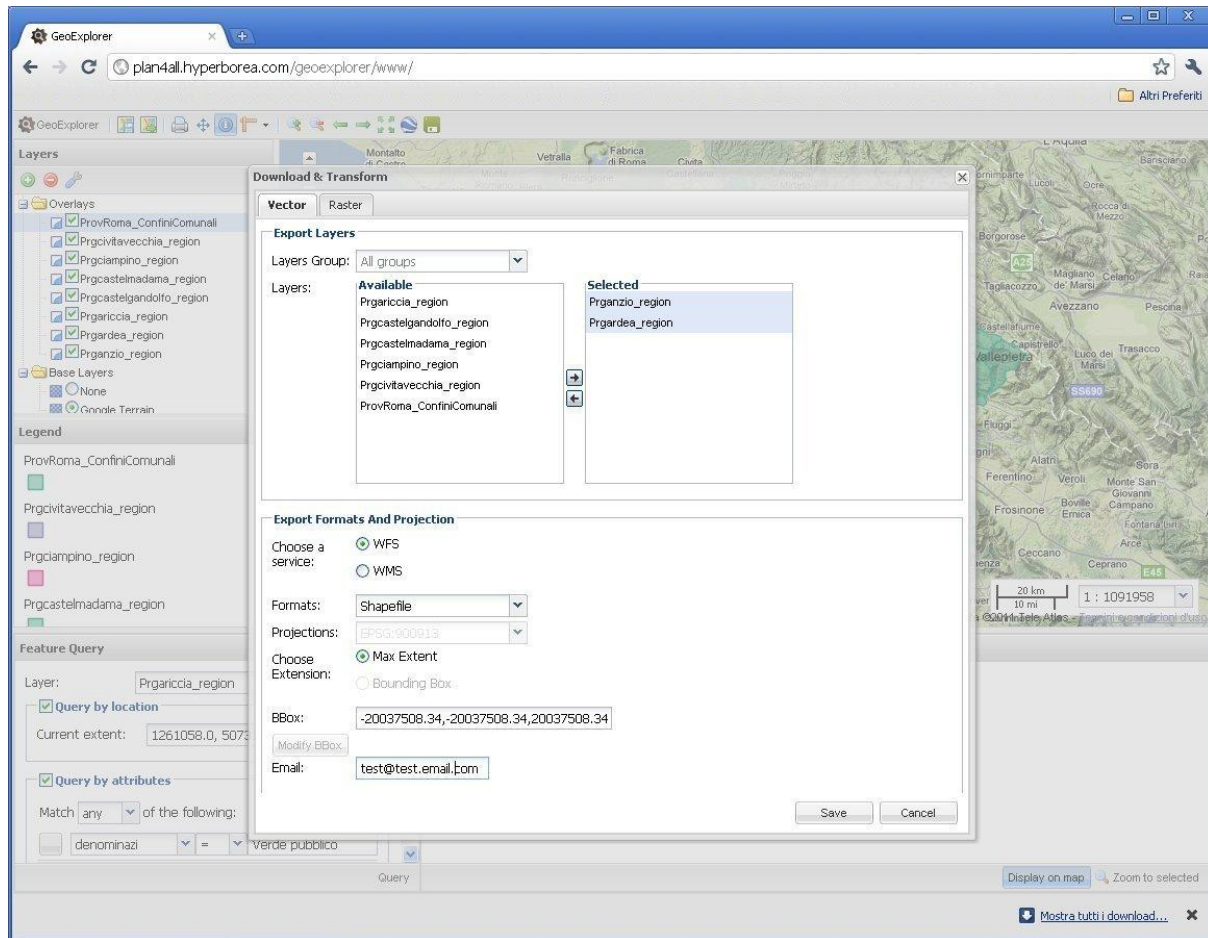
Figure 5 - Download data user interface
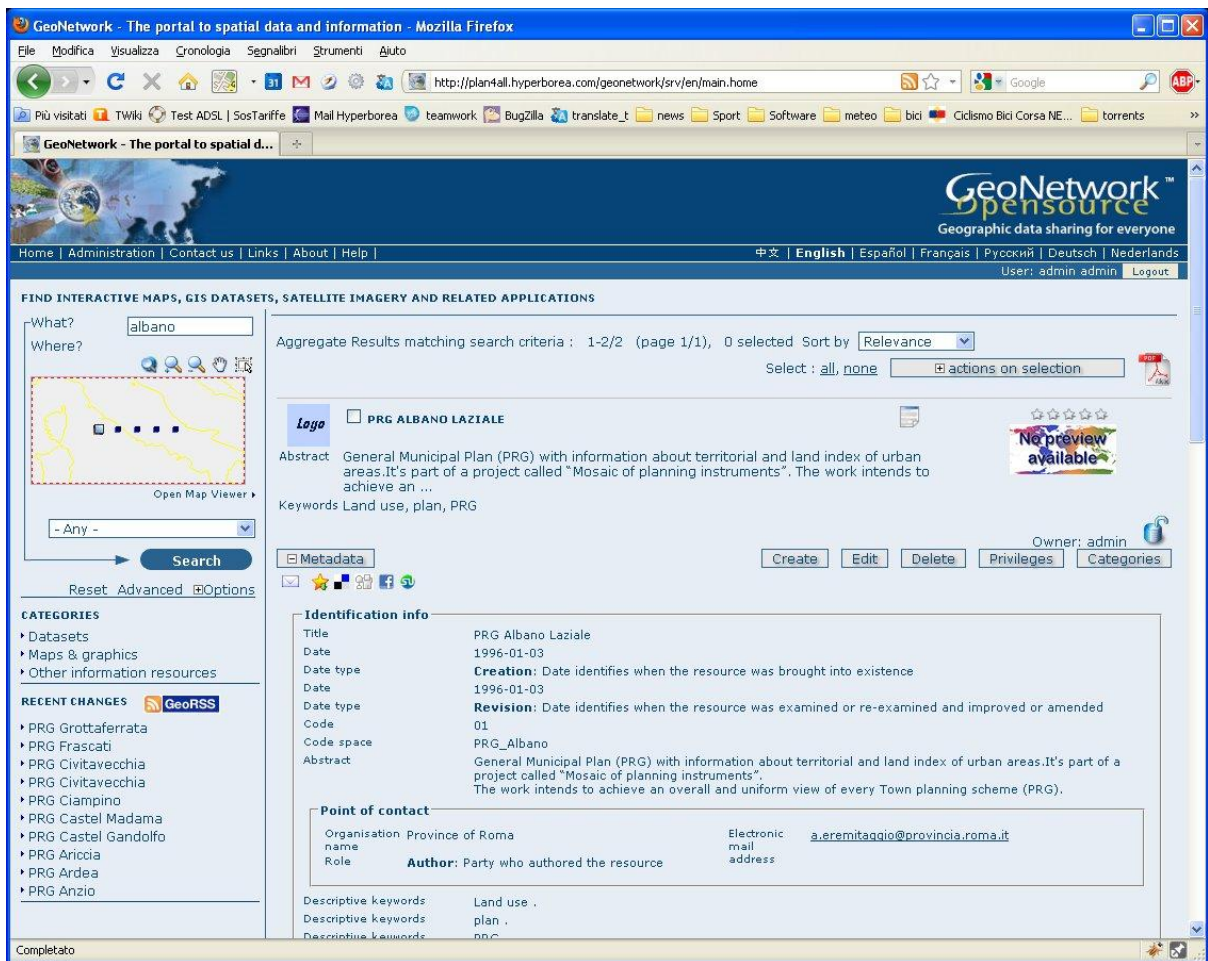
4.6.4.2. Web Services

The Geosite provides standard OGC web services for metadata and data stored in the SDI:

- Map service (WMS)
  - View,
  - SRS transform ,
  - Download (PDF, PNG, JPG, SVG, Tiff),
- Feature service (WFS)
  - View,
  - SRS transform ,
  - Download (CSV, GML, GML2, GML3, GeoJSON, Shapefile),
- Catalogue service (CWS)
  - Search/discover,
  - Bind

Catalogue services (Geonetwork)
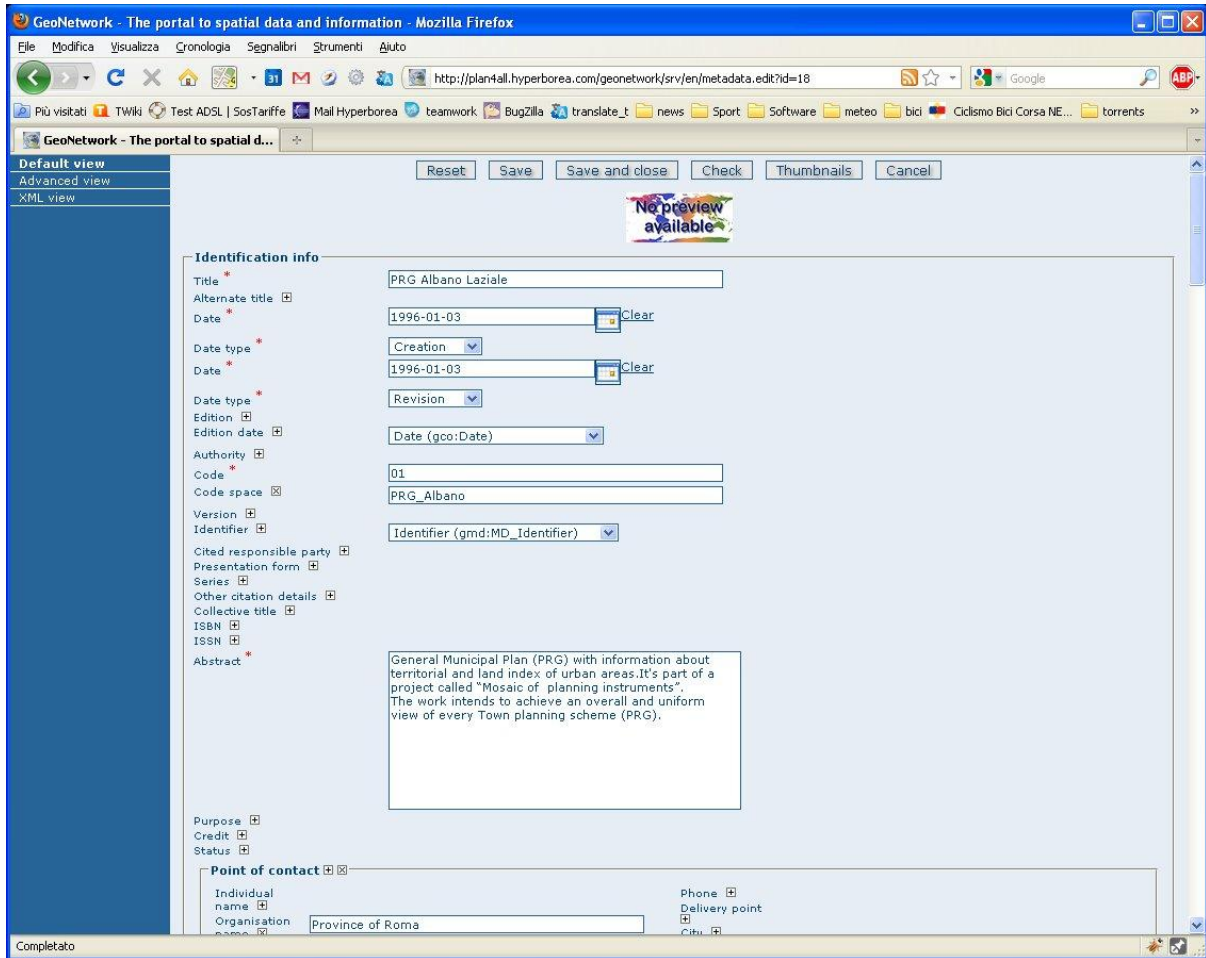
A catalogue management tool – i.e. *Geonetwork* - has been provided in order to publish standard OGC catalogue services and to allow creation, editing and search of metadata. In the following pictures are displayed interfaces of GeoNetwork on sample metadata of a map service.

Metadata in GeoNetwork

Metadata editing in GeoNetwork

Metadata storage is automatically kept by Geonetwork in the PostgreSQL/PostGIS instance.

Interactive search/download: besides the consultation via CSW protocol, it is possible to do an interactive direct search through the GeoNetwork web interface, which allows also metadata download as PDF or XML.

GeoNetwork metadata search/access/download

Data services (Geoserver)

A map server – i.e. *Geoserver* - has been provided in order to publish data through standard OGC map services. Also, along with the "download" functionality of the map viewer, the data downloading services are also provided through the direct download of files from the appropriate section in the web (HTTP protocol), using the standard Geoserver user interface over registered layers and allowing direct download in different formats through WMS and WFS services.

Data from different layers are available both as spatial tables in a PostgreSQL database (using PostGIS spatial extension) and as shapefiles.
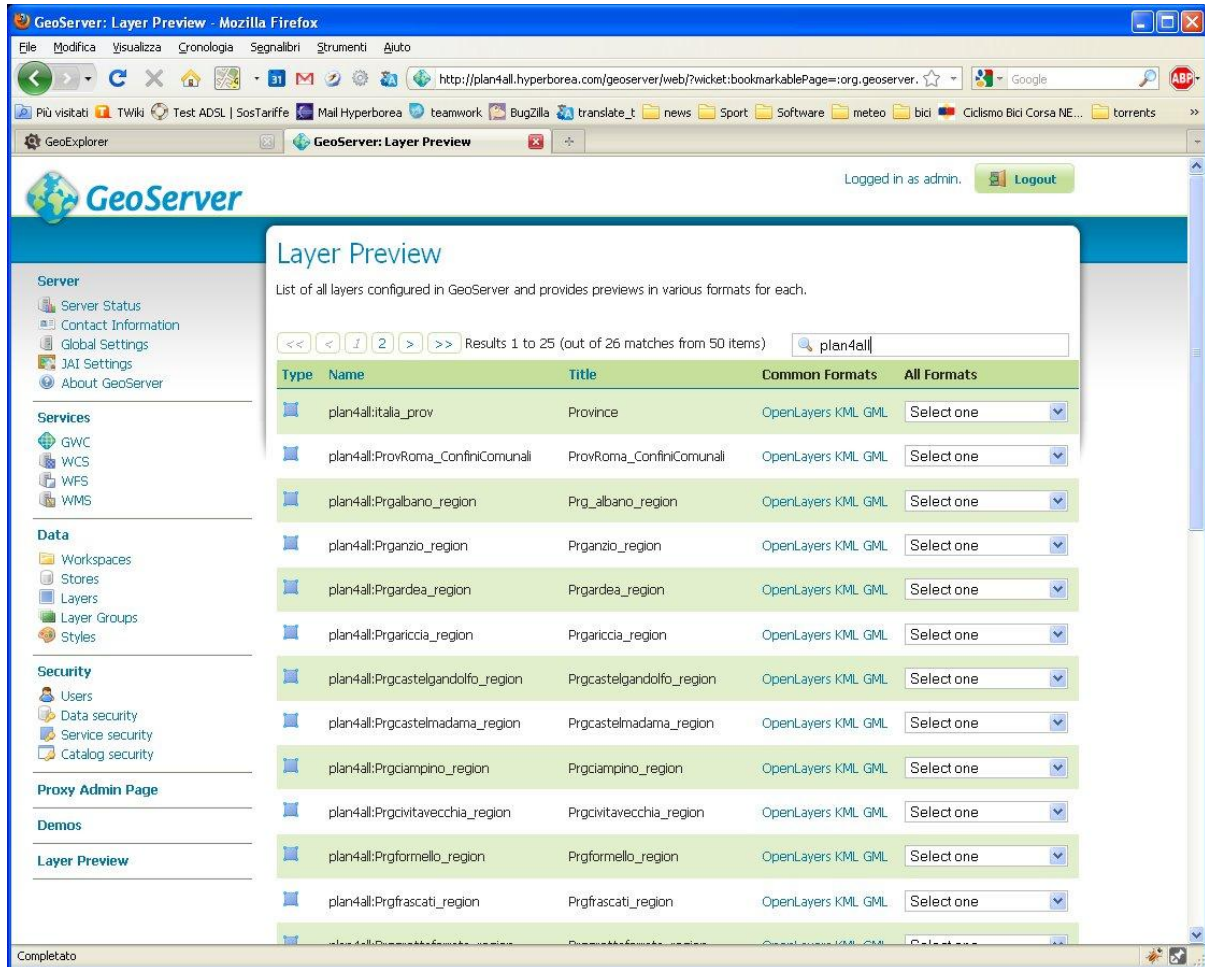
Preview/download section

Links

In the following tables are listed the links to SDI services.

Map server	http://plan4all.hyperborea.com/geoserver
WMS service	http://plan4all.hyperborea.com/geoserver/ows?service=wms&version=1.1.1&request=GetCapabilities
WFS service	http://plan4all.hyperborea.com/geoserver/ows?service=wfs&version=1.1.0&request=GetCapabilities
CSW service	http://plan4all.hyperborea.com/geonetwork/srv/en/csw?REQUEST=GetCapabilities&SERVICE=CSW&ACCEPTVERSION=2.0.0,0.7.2&outputFormat=application/xml
Metadata Search	http://plan4all.hyperborea.com/geonetwork

4.6.5. Results

The results of data transformation will be reported in the next reporting period.

4.7. FTZ

4.7.1. General description of source data – Land Cover

FTZ (MT) produced 2 maps that pertain to the Plan4All requirements. The descriptions of the two layers are as follows:

    i)   Land Cover
    ii)   Landuse

Land Cover Mapping in Malta was initiated as part of the accession exercise carried out to conform to the priority dataflow requirements as established by the European Environment Agency. The initial exercise was carried out for CLC2000 and was validated based on a 100% parameter take as sampling was deemed difficult due to the small area of the islands. A second run was carried out for CLC2006, where the opportunity was taken to carry out CLC1990 and change analysis for 1990-2000 and 2000-2006. The layer used for Plan4All is based on the CLC2006 map, which includes 19 categories (agriculture with significant area of natural vegetation, airports, complex cultivation patterns, coniferous forest, continuous urban fabric, discontinuous urban fabric, dump sites, green urban areas, industrial or commercial units, mineral extraction sites, mixed forest, non-irrigated arable land, port areas, salines, sclerophyllous vegetation, sea and ocean, sparsely vegetated areas, sport and leisure facilities, and vineyards).

The mapping exercise was based on the analysis of different data sources, mainly remotely-sensed data employing Landsat TM7, and data pertaining to the National Mapping Agency at MEPA (Malta Environment & Planning Agency) that includes base maps, orthoimagery, thematic data and insitu surveys. For document creation and metadata, such are available from the EEA CDR website (attached).

4.7.2. Detail Description of Source Data

4.7.2.1. Scheme

The scheme used for Land Cover was that identified by the Plan4All guidelines and the Application Schema was the "Land Cover" Schema. As most of the attributes were not included in the original CLC2006 map, new datasets had to be integrated in order to follow this schema.

Source Attribute
Code2006
Description
Area
Perimeter
Comment
Error
Done

4.7.2.2. Important Features, Attributes and Code Lists

Object type was in Mapinfo (.tab) polygon format which had been verified by the EEA LandCover Topic Centre validation team on 22/6/2007.

The Codelists used for this layer include the following.

Note that the attribute names are truncated due to the transformation from MapInfo (.tab) to ESRI (.shp) format.

The table describes source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: Code2006		
Value type:	number	
Definition:	ID of the feature	
Code List:		

Attribute: Description		
Value type:	string	
Definition:	Land Cover Code	
Code List	CODE2006	DESCRIPTION
	111	Continuous urban fabric
	112	Discontinuous urban fabric
	121	Industrial or commercial units
	123	Port areas
	124	Airports
	131	Mineral extraction sites
	132	Dump sites
	141	Green urban areas
	142	Sport and leisure facilities
	211	Non-irrigated arable land
	221	Vineyards
	242	Complex cultivation patterns
	243	Agriculture with significant area of natural vegetation
	312	Coniferous forest
	313	Mixed forest
	323	Sclerophyllous vegetation
	333	Sparsely vegetated areas
	422	Salines
	523	Sea and ocean

4.7.3. Transformation

4.7.3.1. Transformation method

For both LandCover and LandUse datalayers, the transformation method used was mainly one from a GI format to another GI format with projection formats being required as follows:

a) Data transformation

All data was already in a spatial format and additional features not in the original dataset were added through SQL querying in order to conform to the data requirements for the Plan4All transformation output.

The source for Landcover was that produced for CLC2006 and the transformation process was enabled through the linking of Code2006 to InspireID and the Description was linked to Classification in the target data. The additional information was sourced from the metadata documentation provided on the EEA CDR.

Attributes	Schema Codelist
INSPIREID	*InspireID*
GEOMETRY	*Geometry*
SOURCE	*Source*
CLASSIFICA	*Classification*
BEGINLIFES	*beginLifespanVersion*
ENDLIFESPA	*endLifespanVersion*
CLASSIFI0	*classificationLink*

Source Attribute		Attributes	Schema Codelist
Code2006		INSPIREID	*InspireID*
Description		GEOMETRY	*Geometry*
Area		SOURCE	*Source*
Perimeter		CLASSIFICA	*Classification*
Comment		BEGINLIFES	*beginLifespanVersion*
Error		ENDLIFESPA	*endLifespanVersion*
Done		CLASSIFI0	*classificationLink*

The transformation process for both datalayers was carried out through SQL (Table update) queries in MapInfo and the respective updates where copied for the target ;layer. Note that Maltese legislation incorporates both planning and environment and covers all the national areas, thus attributes are populated throughout by the reference to the national legislation. In addition, there are no sub-national legislative planning and environmental legislation except for specific areas that have been indicated in the respective cell.

The main problem envisaged in the transformation was that most attributes had to be given a "string" type. In addition, during conversion to shp format, the attribute headings were

truncated due to ANSI conversion protocols. The relative source and final names are listed in the codelist above.

b) Spatial transformation process

The spatial transformation was more complex due to the fact that Malta holds all its data in a truncated ED50 format which required the following steps in order to be converted to the final required projection:

    i)   Restoration of the truncated 4 in Northings and 39 in Eastings;
    ii)   Reprojecting to WGS84: EPSG: 36233;
    iii) Conversion to shp format from .tab format;
    iv) Colour schemes are lost in the transition and need to be recreated in the geoserver.

4.7.4. General description of source data – Land Use

The Landuse map for Malta was created for this project as based on the CLC mapping exercise with additional review of areas that pertain to specific development planning and environmental legislation. Malta has a series of maps that have been created for local planning purposes, quasi-equivalent to NUTS4/LAU1,which however do not have a harmonised attribute as well as spatial structure thus they were used only for comparative and specific use review.

Landuse in Malta is highly mixed, however most of the areas have a predominance of one main use which is mainly residential with commercial and industrial areas situated in specific locations.

The landuse attributes were those agreed at the Olomouc workshop (agriculture, commercial, industrial, mining/quarrying, natural, other, parks, resedental, services, transport infrastructure) and for each area the relevant legislation was consulted due to the fact that Malta as of 2010 has a combined development planning and environmental law, which identifies different levels of use and protection through a series of subsidiary legislation. Prior to 2010, there were two separate planning and environmental laws.

The data sources included development planning zoning, predominant landuse and data from the various spatial maps created for the legislative process inclusive of development application process, environmental protection and resource mapping.

4.7.5. Detail Description of Source Data

4.7.5.1. Scheme

The scheme used for Land Use was that identified by the Plan4All guidelines and the Application Schema was the "Land Use" Schema. The attributes had to be restructured to conform to the requirements for the Plan4All map and the attributes were updated

accordingly. Source datasets were acquired from the Landcovermap, a planning datalayer and the CDDA (Environmental protection) datalayer.

Source Attribute
Code
Description
Area

Source Attribute (Planning)
Code
Legislation

Source Attribute (CDDA)
Area
Legislation
Protection

4.7.5.2. Important Features, Attributes and Code Lists

Object type was in Mapinfo (.tab) polygon format.

The Codelists used for this layer include the following.

Note that the attribute names are truncated due to the transformation from MapInfo (.tab) to ESRI (.shp) format.

The table describes source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: Code

Value type:	number
Definition:	ID of the feature based on CLC
Code List:	

Attribute: Description

Value type:	string
Definition:	Land Use Code based on CLC2006

Code List

CODE2006	DESCRIPTION
111	Continuous urban fabric
112	Discontinuous urban fabric
121	Industrial or commercial units
123	Port areas
124	Airports
131	Mineral extraction sites
132	Dump sites
141	Green urban areas
142	Sport and leisure facilities
211	Non-irrigated arable land

	221	Vineyards
	242	Complex cultivation patterns
	243	Agriculture with significant area of natural vegetation
	312	Coniferous forest
	313	Mixed forest
	323	Sclerophyllous vegetation
	333	Sparsely vegetated areas
	422	Salines
	523	Sea and ocean

Attribute: Legislation (Planning)

Value type:	string
Definition:	Legislation Date Planning
Code List:	

Attribute: Legislation (Environment)

Value type:	string
Definition:	Legislation Date Environment
Code List:	

Attribute: Protection (Environment)

Value type:	string
Definition:	Protection Type
Code List:	

4.7.6. Transformation

4.7.6.1. Transformation method

The source for Landuse was that based on both Landcover and a number of datasets; one designating landuse legislation and another the CDDA (environmental protection areas as required by the EEA). In addition references were made to the Structure Plan (1988) documentation. The transformation process was enabled through the linking of Code to InspireID and the Description was linked to Classification in the target data through an area designation as it fitted within the target designation such as residential, quarrying.

Attributes	Schema Codelist
INSPIREID	*InspireID*
GENERALLAN	*generalLandUseType*
STATUS	*Status*
MACROCLASS	*macroClassificationOfLand*
PROCESSSTE	*processStepGeneral*
TITLE	*Title*
GEOMETRY	*Geometry*
LEGISLATIO	*LegislationReference*
COUNTRYCOD	*CountryCode*

REGULATION	*regulationNature*
REGULATION	*regulationReference*
ISOVERLAYA	*isOverlayArea*
PROPERTY	*Property*
LUCAS_CODE	*LUCAS_Code*
SPECIFICLA	*specificLandUseType*
OTHERTERRI	*otherTerritorialClassification*
INTERVENTI	*interventionType*
INDIRECTEX	*IndirectExecution*
INDEXES	*Indexes*
VOLUMEINDI	*volumeIndication*
SURFACEIND	*surfaceIndication*
HEIGHINDIC	*heighIndication*
UNITINDICA	*unitIndication*
OTHERINDIC	*otherIndication*
TYPEOFBUIL	*typeOfBuilding*
ROOFSHAPE	*roofShape*
OTHERCONST	*otherConstructionIndication*
PROTECTEDS	*protectedSite*
NATURALRIS	*naturalRiskSafetyArea*
RESTRICTIO	*restrictionZone*
EASEMENTTY	*easementType*
LANGUAGE	*Language*

Source Attribute		Attributes	Schema Codelist
Code		INSPIREID	InspireID
Description		GENERALLAN	generalLandUseType
Area		STATUS	Status
		MACROCLASS	macroClassificationOfLand
Source Attribute (Planning)		PROCESSSTE	processStepGeneral
Code		TITLE	Title
Legislation		GEOMETRY	Geometry
		LEGISLATIO	LegislationReference
		COUNTRYCOD	CountryCode
		REGULATION	regulationNature
		REGULATION	regulationReference
		ISOVERLAYA	isOverlayArea
		PROPERTY	Property
		LUCAS_CODE	LUCAS_Code
		SPECIFICLA	specificLandUseType
		OTHERTERRI	otherTerritorialClassification
		INTERVENTI	interventionType
		INDIRECTEX	IndirectExecution
		INDEXES	Indexes
		VOLUMEINDI	volumeIndication
		SURFACEIND	surfaceIndication
		HEIGHINDIC	heighIndication
		UNITINDICA	unitIndication
		OTHERINDIC	otherIndication
		TYPEOFBUIL	typeOfBuilding
		ROOFSHAPE	roofShape
Source Attribute (CDDA)		OTHERCONST	otherConstructionIndication
Area		PROTECTEDS	protectedSite
Legislation		NATURALRIS	naturalRiskSafetyArea
Protection		RESTRICTIO	restrictionZone
		EASEMENTTY	easementType
		LANGUAGE	Language

The transformation process for both datalayers was carried out through SQL (Table update) queries in MapInfo and the respective updates where copied for the target ;layer. Note that Maltese legislation incorporates both planning and environment and covers all the national areas, thus attributes are populated throughout by the reference to the national legislation. In addition, there are no sub-national legislative planning and environmental legislation except for specific areas that have been indicated in the respective cell.

The main problem envisaged in the transformation was that most attributes had to be given a "string" type. In addition, during conversion to shp format, the attribute headings were truncated due to ANSI conversion protocols. The relative source and final names are listed in the codelist above.

c) Spatial transformation process

The spatial transformation was more complex due to the fact that Malta holds all its data in a truncated ED50 format which required the following steps in order to be converted to the final required projection:

v) Restoration of the truncated 4 in Northings and 39 in Eastings;
vi) Reprojecting to WGS84: EPSG: 36233;
vii) Conversion to shp format from .tab format;
viii) Colour schemes are lost in the transition and need to be recreated in the geoserver.

4.7.6.2. Transformation scheme

The transformation scheme used was similar for both datasets with the following process being used:

i) Data is gathered from the agency serving as custodian for that layer;
ii) The metadata provided was analysed;
iii) The attributes were reviewed for their compatibility with the Plan4All requirements;
iv) New attributes were added and the cells were populated as per Plan4All codelists;
v) The layer was then converted to conform to the spatial requirements for eventual uploading to a geoserver (refer to 4.3.1b).

4.7.7. Publication

4.7.7.1. Web Map Client

The webmap client used was geo server (http://ftzgeo.org:8080/geoserver/web)

The following steps were employed for both Landocver and lanuse maps:

i) Data was saved in the relevant folder through ftp transfer;
ii) Maps were structured through Stores, Layers and colour schemes;
iii) Since all maps lost their fill content (colour) during the transformation process, two colour schemes were created using sld for use through the map portal. However, the colour schemes have yet to be activated through sld editing on final approval of the Landuse colour scheme. In the case of the Landcover layer the colour scheme created by the EEA was used[1].

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[1]   http://www.eea.europa.eu/data-and-maps/data/corine-land-cover-2006-raster/corine-land-cover-classes-and/clc_legend.csv/at_download/file
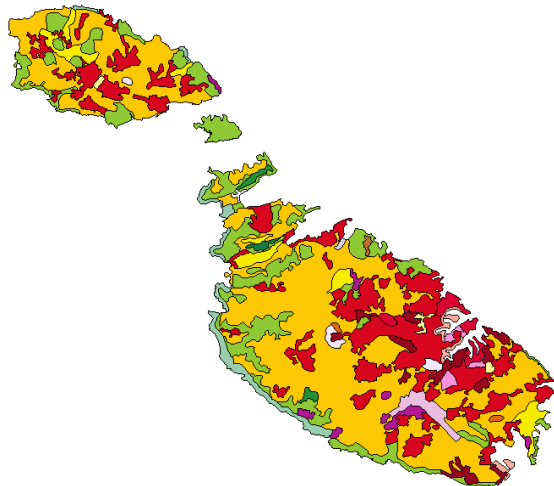
Original CLC Colour Scheme
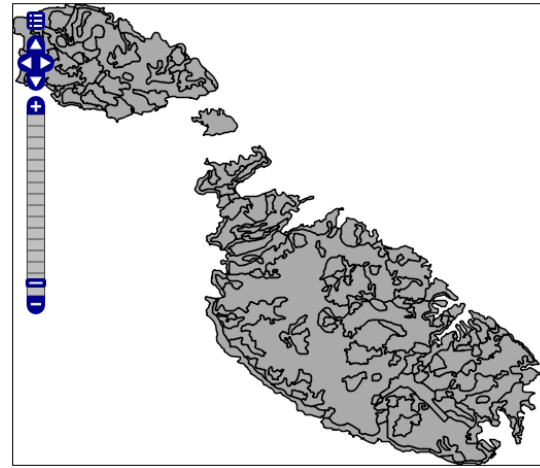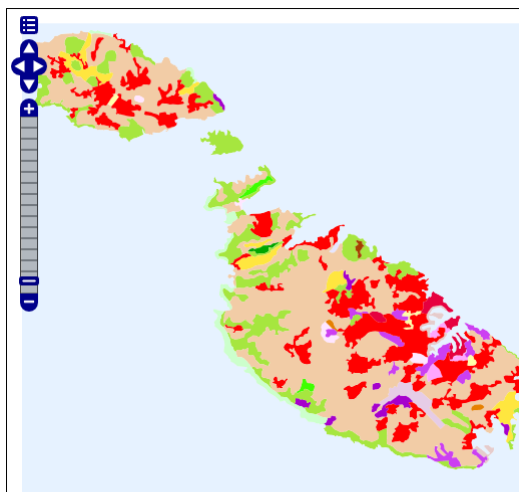
Initial GeoServer Output

Final GeoServer Output

4.7.7.2. Web Services

The services offered by the system are WMS, WFS, whilst metadata services are provided through a link to the Plan4All metadata service where these files were stored in both xml and xls formats.

The main data layers are made available through OpenLayers format incorporating WMS and WFS services:

LandCover
http://ftzgeo.org:8080/geoserver/wms?service=WMS&version=1.1.0&request=GetMap&layers=CorineLandcover:CLC2006_UTM_region&styles=&bbox=426573.732,3962764.804,461831.604,3993551.661&width=512&height=447&srs=EPSG:32633&format=application/openlayers

Landuse
http://ftzgeo.org:8080/geoserver/wms?service=WMS&version=1.1.0&request=GetMap&layers=CorineLandcover:LandUse_MALTA_WGS84_region&styles=&bbox=426502.308,3962580.738,461759.848,3993367.302&width=512&height=447&srs=EPSG:32633&format=application/openlayers

4.7.8. Results

4.7.8.1. Comments on Conceptual Models

Whilst it is sometimes difficult to bring together the different datasets in order to conform to the Plan4All requirements, the conceptual models served as a veritable exercise in comprehensiveness due to their holistic and detailed approach.

Attributes used: An attempt was made to identify data sources that would aid in the completion of the required attributes, which in Malta are mostly covered by one Act and by related subsidiary legislation. As there is only one spatial planning agency that also holds the national mapping agency and the environment protection directorate, most of the data had been structured in spatial format at national level for the development areas and at detailed areas for the environmental protection zones. This situation aided the partners to create one map that gives an outline of the different cover/use pertaining to those areas.

It must be noted that a future update to such an exercise should also take up data from the local plans, development schemes by type and actual detailed landuse at 1:1000 level or larger scales. As the base for CLC and subsequently landuse was that of 1:25,000 as compared to base-data of 1:2500 the level of detail for the resultant maps calls for further development should this exercise be updated at a post-project stage.

This would allow for the population of attributes that were not included in this output, mainly due to lack of data or non existence of the dataset run such as the LUCAS which experienced projection problems at JRC and Malta during the sampling preparation phase. The attributes that were not populated are: property, LUCAS_Code, specificLandUseType, otherTerritorialClassification, interventionType, volumeIndication, unitIndication, otherIndication, otherConstructionIndication, naturalRiskSafetyArea and easementType.

4.7.8.2. Recommended changes

There are very few recommendations to take into account, which essentially revolve around the fact that the Conceptual Models reflect their name: they are concepts that require tweaking and need to consider different levels of conformity: local-national (NUTS 2,3,4,5 as compared to NUTS 1) and national-supernational (Nuts 1 as compared to EU). Each level has its own hurdles to overcome and the attempt by Plan4All is both bold and innovative as it attempts to bring together these different levels. The main recommended changes would be to include an information sheet on the difficulties experienced in order to align and aggregate the data across the local and regional areas and then up to the national and supernational levels. The different professions, software and methodologies used in the countries is too great to compile in one document but drafting such a sheet would allow policy and decision makers to understand the hurdles yet facing spatial information. The CLC1990-2000-2006 runs proved that this can be done if one uses a harmonisation of the top-down (model) and bottom-up approach (users-data creation) and Plan4All is working well along this approach.

4.8. *GEORAMA*

4.8.1. General description of source data

Within the WP7 of the Plan4all project, Georama tests a pilot for LandUse data of Patras city and Greece. The original data have been prepared by Georama and the data is available in the Geoserver.

Georama modified the original data for publication in GeoServer. The link is:
http://plan4all.georama.org.gr/geoserver/web/?wicket:bookmarkablePage=:org.geoserver.web.demo.MapPreviewPage

Georama prepared the final map with the ArcGis tool using the data above.

4.8.2. Detail Description of Source Dataddd

In our case, the harmonisation process is built up on the source data in the ESRI Shapefile format. This file contains all the data needed.

4.8.2.1. Scheme

The base structure of the source data is presented described according the INSPIRE standard.

4.8.2.2. Features and Code Lists

In this section are described source data features, attributes and code lists important for data transformation and harmonisation.

4.8.3. Transformation

4.8.3.1. Transformation method

The main task in transformation is simple. There are manipulations with attribute data and geometries. The actions we made were performed using ArcGis, but it can be performed using other tools and applications like PostGis, Quantum GIS, KOSMO GIS and generally GIS applications, following the process steps.

Steps using SQL:
1. CODE transform from integer to string;
2. Dissolve neighbour geometries with equal Georama Land Cover codes
3. Building multi-polygons form simple polygons by equal Georama Land Cover codes.

Steps using desktop (in our case ArcGis).

1)ArcGis desktop is possible to perform Dissolve function.
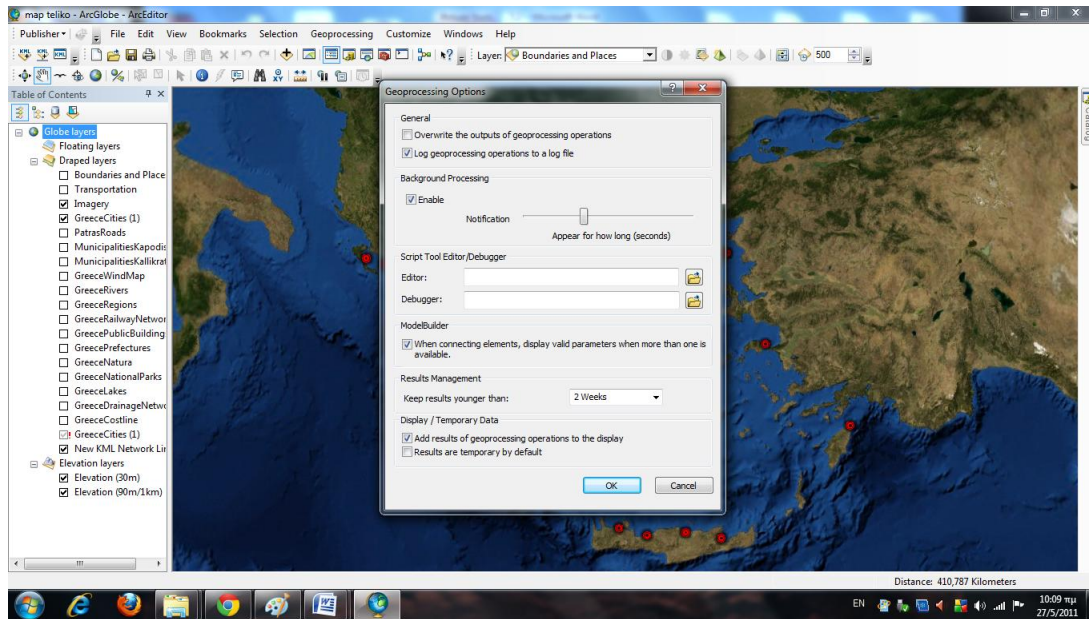
2)Build multi-polygons

This step can be performed as described in SQL example

4.8.3.2. Transformation scheme

This section is made according to the Transformation method.

4.8.4. Publication

The data publication is performed using GeoServer OGC compliant services.

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4.8.4.1. Web Map Client

The harmonised data is published in a simple web map application and is embedded in GeoServer.

4.8.4.2. Web Services

All web services are available in the GeoServer

4.8.5. Results

4.8.5.1. Comments on Conceptual Models

Recommended changes

4.9. NASURSA – Land Cover

4.9.1. General description of source data

The Territorial Strategy of Navarre (ETN), an autonomous region in Spain, envisions the future territorial development of the region, based on the principles stated in the European Spatial Development Perspective (ESDP), defining some strategic objectives and a numerous set of directives. Based on this strategy, spatial plans (POT) are currently being elaborated for the five sub regions of Navarre.

The territorial spatial plans (POT) are made of both geographic layers (datasets according to INSPIRE terminology) and documents. In the frame of the project, 4 datasets are chosen to be part of Plan4all deployment, in order to test harmonization and interoperability of data:

- Delimitation of territorial spatial plans:

POT areas are defined using areas and subdivision of areas stated in the Territorial Strategy of Navarre. Those areas form the basis of spatial planning at intermediate scale, which is considered the most suitable for the purposes of infrastructures, equipments and services planning. The definition of areas is carried out by aggregation of municipalities according to the regional and urban systems.
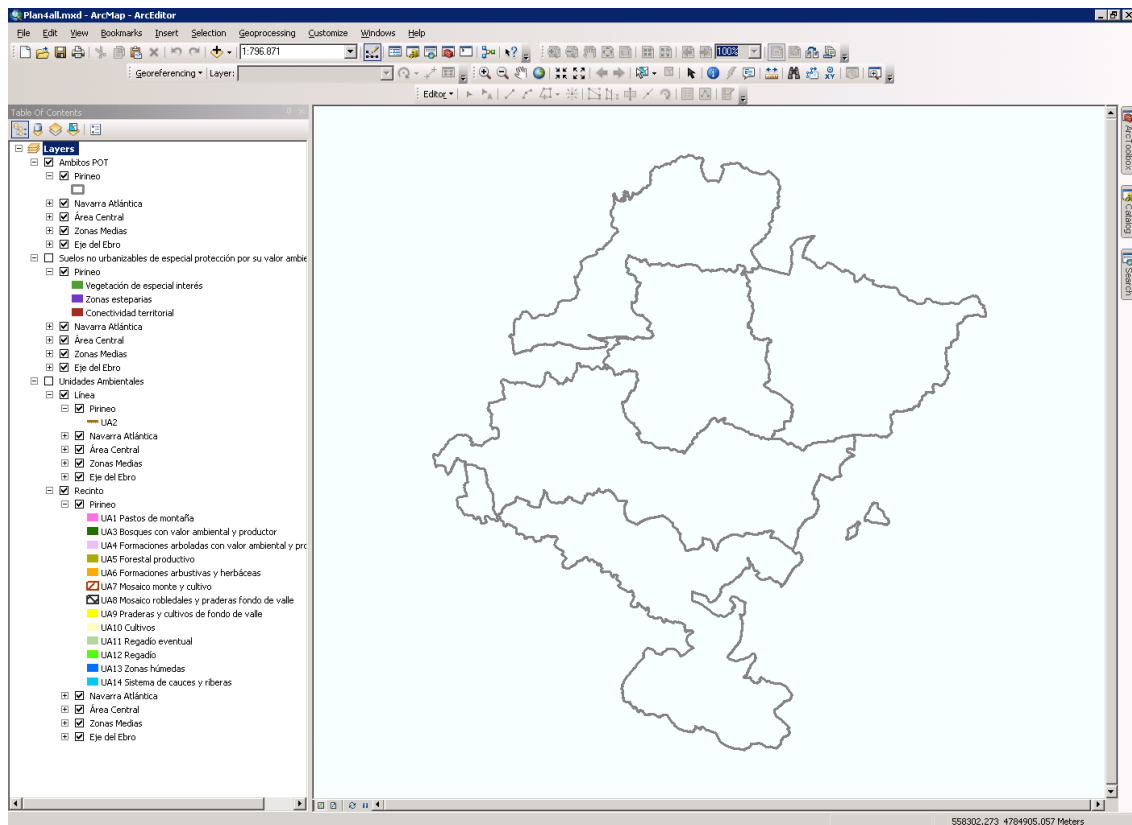
Names of POT areas are:
- POT 1: Pyrenee Mountains
- POT 2: Atlantic Navarre
- POT 3: Central Area
- POT 4: Middle Areas
- POT 5: Ebro Axis

- Environmental Units (cliffs):

The Territorial Development Model (MDT) designed in the Territorial Spatial Plan (POT) is interpreted according to a top-down model: ridge, slope and valley. This model allows for a universal interpretation that helps to analyze, measure and plan the processes, functions and uses (water, land, biomass, biodiversity, connectivity and landscape) in the different natural regions, basins and POT areas at different scales of the territory.

The final goal of the model used is to facilitate a comprehensive analysis of the functions of the land protected from urban development in the global processes, and the consequences at both regional and local level, according to sustainability, conservation and landscape criteria.

The units in this dataset are: UA2 - Cliffs. This dataset should be used together with dataset Environmental Units (except cliffs).

It is generated from diverse thematic and cartographic sources. The main source is the Crops and Uses Map of Navarre (1:25,000). The existing natural vegetation (both potential vegetation as well as a "snapshot" of current uses) combines the different natural, historical and human factors that have determined, and currently maintain, the territory.

The Vegetation Series Map of Navarre (1:50,000), the Potential Vegetation Map (1:25,000), the Agrarian Classes Map (1:100,000), Geologic Cartography, Geomorphological Maps, Relief Map, Flood Areas and other documents have also been used for the definition of the different blocks that make up every environmental unit, as well as to point out those units that could have a quality that deserve to be protected.

- Environmental Units (except cliffs):

The Territorial Development Model (MDT) designed in the Territorial Spatial Plan (POT) is interpreted according to a top-down model: ridge, slope and valley. This model allows for a universal interpretation that helps to analyze, measure and plan the processes,

functions and uses (water, land, biomass, biodiversity, connectivity and landscape) in the different natural regions, basins and POT areas at different scales of the territory.

The final goal of the model used is to facilitate a comprehensive analysis of the functions of the land protected from urban development in the global processes, and the consequences at both regional and local level, according to sustainability, conservation and landscape criteria.

The units in this dataset are: UA1 - Mountain pasture, UA3 - Forests with environmental and productive values, UA4 - Wooded formations with environmental and productive value, UA5 - Productive woods,

UA6 - Bush and herbaceous formations, UA7 - Mosaic of mountain and crops, UA8 - Mosaic of oak woods and grassland, bottom of valleys, UA9 - Grassland and crops, bottom of valleys,

UA10 - Crops, UA11 - Seasonal irrigation, UA12 - Irrigation, UA13 - Wetlands, UA14 - River system.

This dataset should be used together with dataset Environmental Units (cliffs).

It is generated from diverse thematic and cartographic sources. The main source is the Crops and Uses Map of Navarre (1:25,000). The existing natural vegetation (both potential vegetation as well as a "snapshot" of current uses) combines the different natural, historical and human factors that have determined, and currently maintain, the territory.

The Vegetation Series Map of Navarre (1:50,000), the Potential Vegetation Map (1:25,000), the Agrarian Classes Map (1:100,000), Geologic Cartography, Geomorphological Maps, Relief Map, Flood Areas and other documents have also been used for the definition of the different blocks that make up every environmental unit, as well as to point out those units that could have a quality that deserve to be protected.

- Land with special protection from urban development due to environmental qualities

This dataset represents four categories:

1. Vegetation of special relevance (VEI): natural plant formations valuable due to their singularity at the Navarre level. Current legislation allows their use in the frame of continuity and preservation.

2. Areas of special interest for fauna - Steppe areas (AEIF): locations where cereals are grown in dry land and take in a representative and stable population of steppe birds that, due to habitat interest and importance, require protective measures with a sustainable focus.

3. Territorial connectivity (CT): areas that allow the functional connection of protected areas (Natura 2000 network), both inside the Territorial Spatial Plan boundaries as well as across its transregional boundaries and peripherals. The aim of this land protection type is to contribute to the development of a balanced system of protected areas with adaptation capabilities.

4. River system - River zones (SCR): area that carries out essential functions such as water transportation, water cleansing, keep related biodiversity, and natural connector of the whole territory.

The protection of land from urban development (SNU) is derived from the Territorial Development Model (MDT) adopted by each Territorial Spatial Plan (POT). The MDT takes in different objectives depending on the geographic area, thus making the sub-categories identified among them not necessarily homogeneous.

Delimitation of sub-categories has been derived from diverse thematic layers such as crops and uses, flood areas, rivers, points of geological interest, routes of historical and cultural interest, etc.

The areas of special protection identified in the POT have an informative purpose and is represented at a scale of 1:100,000 in the map "3.1. Patrimonio Natural. Áreas de Especial Protección". The precise delimitation of this protected areas should be derived from the spatial plans at municipal level and, if applicable, from the sectorial plans, and should be carried out according to the criteria established in the document "ANEXO PN3 - ÁREAS DE ESPECIAL PROTECCIÓN".
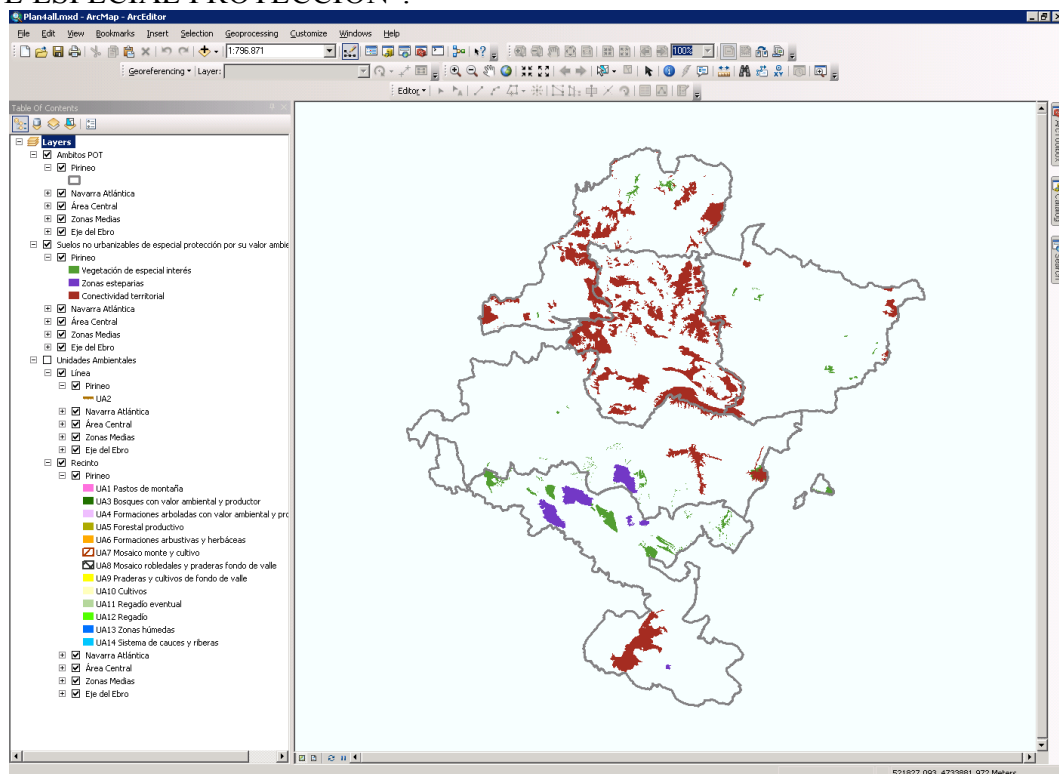
These four datasets cover the following Plan4all themes:

- Delimitation of territorial spatial plans: land use.
- Environmental Units (cliffs): land cover.
- Environmental Units (except cliffs): land cover.
- Land with special protection from urban development due to environmental qualities: land use.

At this stage of deployment, only environmental units (land cover) are transformed and ready for deployment, so this dataset will be further described in following paragraphs. In the following stage of deployment, all 4 datasets will be transformed and published.

4.9.2. Detail Description of Source Data

Source data is stored in an ArcSDE geodatabase and is managed using ArcGIS Desktop (ArcEditor). While Land Use is without transformation until decision about data specification is made, Land Cover is already prepared for deployment. Any case, the 4 source datasets are splitted into 20 target datasets (one dataset per theme and POT). The reference system of the source data is European Datum 1950, UTM30N (EPSG 23030), thus making projection necessary.
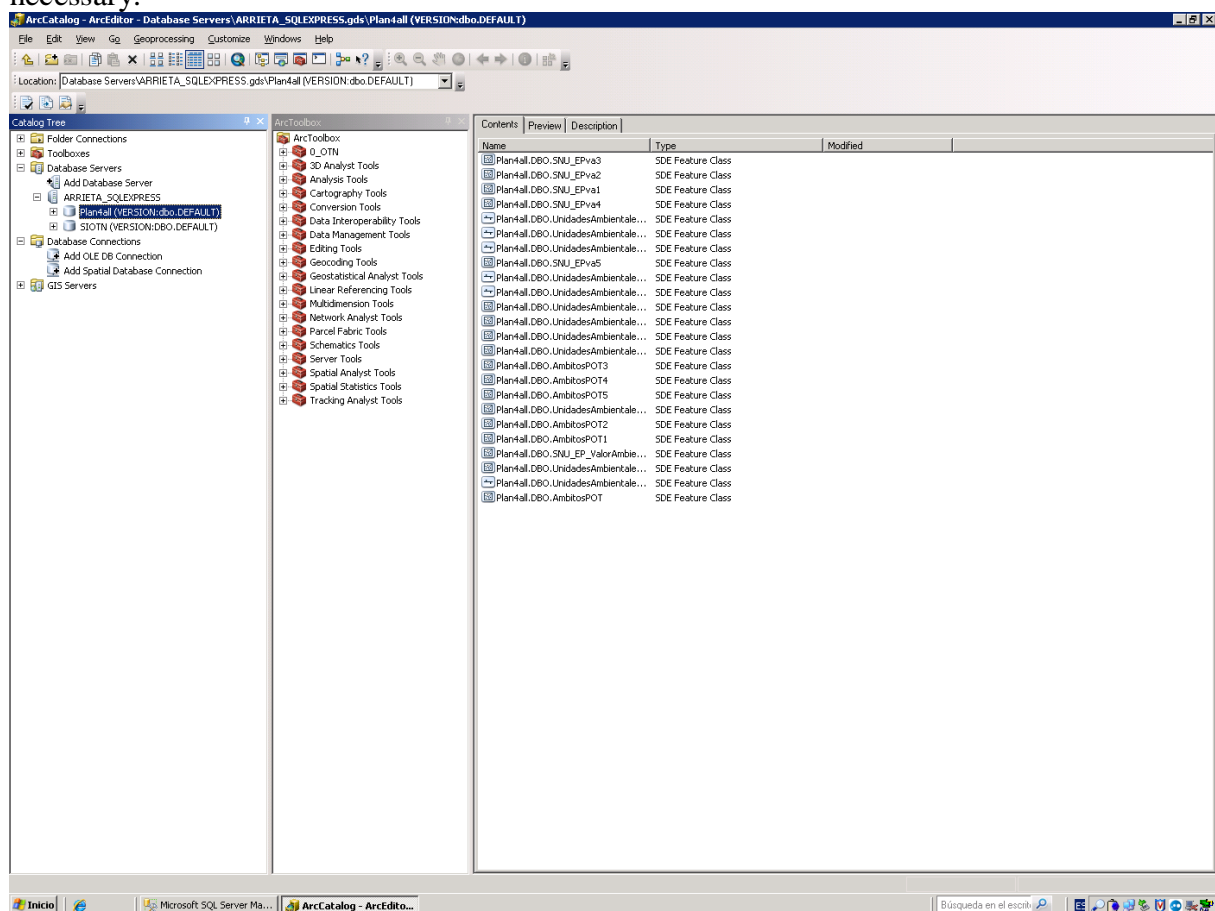
4.9.2.1. Scheme

The base structure of Land Cover (cliff and except cliffs) source data is presented in the following table, where originally the fields are described in Spanish language. For purposes of

the Plan4all project, it is also joined a description in English as well as an example of field values.

FIELD	DESCRIPTION	EXAMPLE
OBJECTID	Unique ID	16
MUNICIPIO	Name of municipality	Cascante
COD_MUN	Municipality code	68
CODIGO	Land cover code	UA7
CATEGORIA	Land cover description	Mosaico monte y cultivo
SHAPE_area	Surface of land cover polygon (m2)	9532489,988
SHAPE_len	Length of land cover polygon (m)	24634,18662

4.9.2.2. Features and Code Lists

The following table describes Land cover (except cliffs) source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: OBJECTID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: MUNICIPIO	
Value type:	string
Definition:	Name of municipality
Code List:	(Municipalities)
Attribute: COD_MUN	
Value type:	number
Definition:	Municipality code
Code List:	(Municipalities)
Attribute: CODIGO	
Value type:	string
Definition:	Land cover code
Code List:	UA1
	UA3
	UA4
	UA5
	UA6
	UA7
	UA8
	UA9
	UA10
	UA11
	UA12
	UA13
	UA14
Attribute: CATEGORIA	

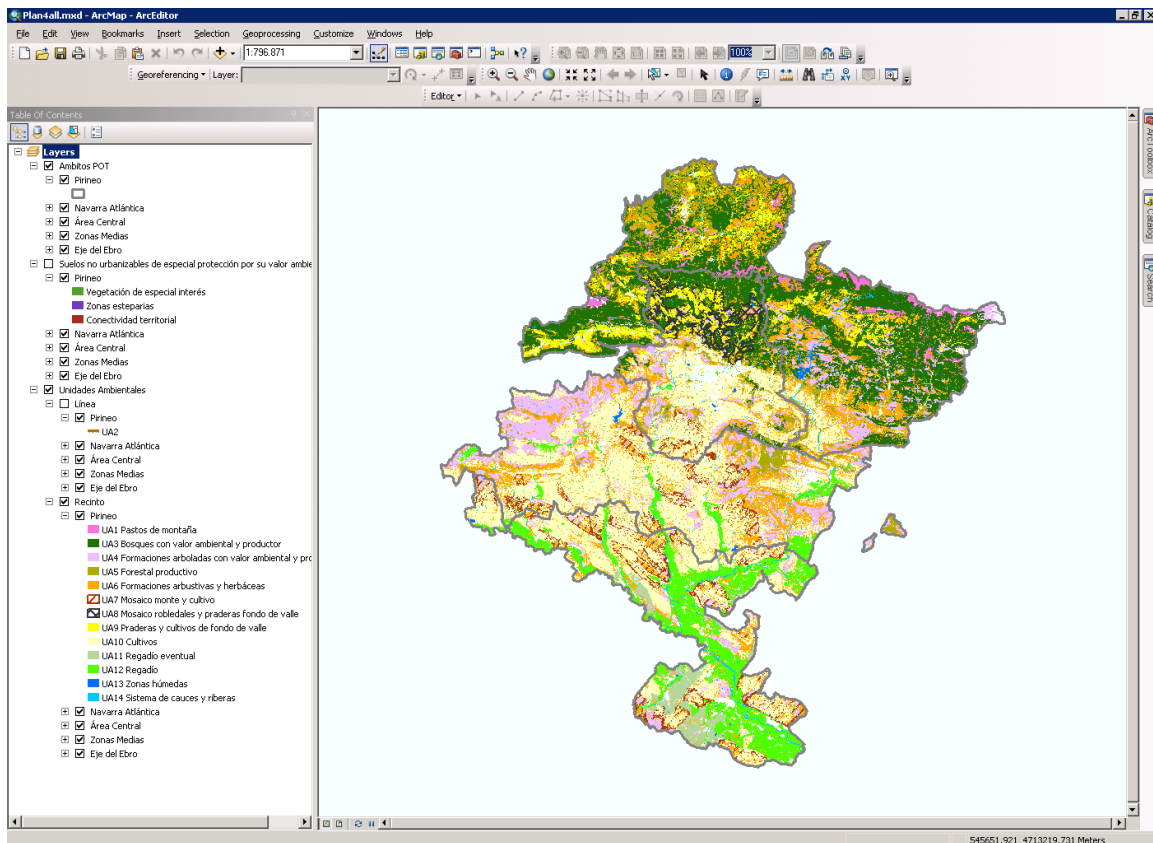|	
Value type:	string
Definition:	Land cover description
Code List	UA1 - Mountain pasture
	UA3 - Forests with environmental and productive values
	UA4 - Wooded formations with environmental and productive value
	UA5 - Productive woods,
	UA6 - Bush and herbaceous formations
	UA7 - Mosaic of mountain and crops
	UA8 - Mosaic of oak woods and grassland, bottom of valleys
	UA9 - Grassland and crops, bottom of valleys,
	UA10 – Crops
	UA11 - Seasonal irrigation
	UA12 – Irrigation
	UA13 – Wetlands
	UA14 - River system

The following table describes Land cover (cliffs) source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: OBJECTID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: MUNICIPIO	
Value type:	string
Definition:	Name of municipality
Code List:	(Municipalities)
Attribute: COD_MUN	
Value type:	number
Definition:	Municipality code
Code List:	(Municipalities)
Attribute: CODIGO	
Value type:	string
Definition:	Land cover code
Code List:	UA2
Attribute: CATEGORIA	
Value type:	string
Definition:	Land cover description
Code List	UA2 - Cliffs

4.9.3. Transformation

4.9.3.1. Transformation method

Source data is transformed using Model Builder, a geoprocessing modelling tool within ArcGIS Desktop (ArcEditor). First a transformation of fields is carried out, to later on project to EPSG 3035 and then split the 4 themes in 20 datasets (1 dataset per theme and POT).
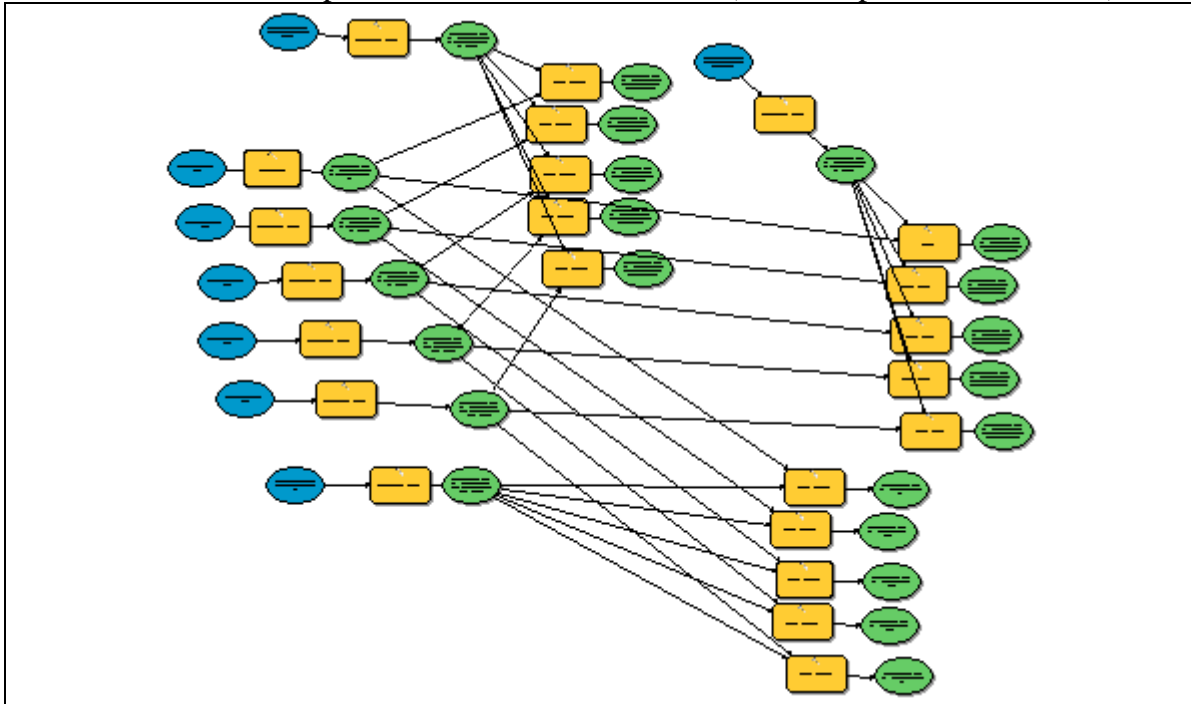
4.9.3.2. Transformation scheme

The scheme shows the relationship between target and source data:
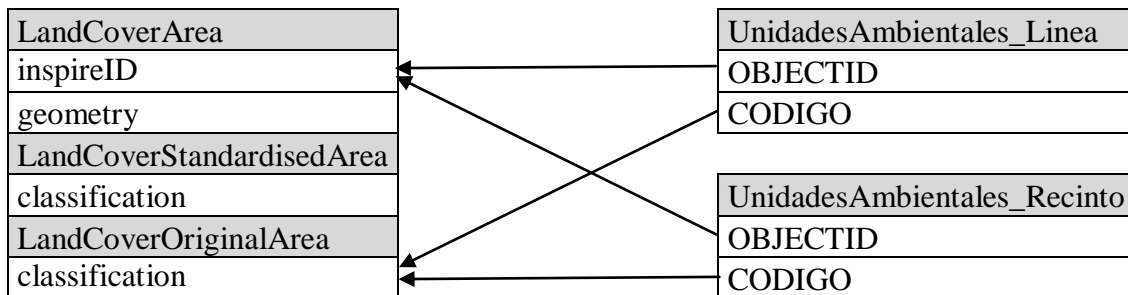
Transformation scheme of enumerations:

UA1 - Mountain pasture	2_Agricultural_Areas
UA3 - Forests with environmental and productive values	231_Pastures
UA4 - Wooded formations with environmental and productive value	24_Heterogeneous_Agricultural_Areas
UA5 - Productive woods,	244_Agro_Forestry_Areas
UA6 - Bush and herbaceous formations	31_Forests
UA7 - Mosaic of mountain and crops	313_Mixed_Forests
UA8 - Mosaic of oak woods and grassland, bottom of valleys	32_Scrub_AndOr_Herbaceous_Vegetation_Associations
UA9 - Grassland and crops, bottom of valleys	41_Inland_Wetlands
UA10 – Crops	5_Water_Bodies
UA11 - Seasonal irrigation	332_Bare_Rocks
UA12 – Irrigation	
UA13 – Wetlands	
UA14 - River system	
UA2 - Cortados	

In other words:

UA1 - Mountain pasture	231_Pastures
UA3 - Forests with environmental and productive values	31_Forests
UA4 - Wooded formations with environmental and productive value	31_Forests
UA5 - Productive woods,	244_Agro_Forestry_Areas
UA6 - Bush and herbaceous formations	32_Scrub_AndOr_Herbaceous_Vegetation_Associations
UA7 - Mosaic of mountain and crops	24_Heterogeneous_Agricultural_Areas
UA8 - Mosaic of oak woods and grassland, bottom of valleys	31_Forests
UA9 - Grassland and crops, bottom of valleys,	231_Pastures
UA10 – Crops	211_Non_Irrigated_Arable_Land
UA11 - Seasonal irrigation	212_Permanently_Irrigated_Arable_Land
UA12 – Irrigation	212_Permanently_Irrigated_Arable_Land
UA13 – Wetlands	512_Water_Bodies
UA14 - River system	511_Water_Courses
UA2 – Cortados	332_Bare_Rocks

4.9.4. Publication

All data is published without field transformations until decision is made about data specifications.

4.9.4.1. Web Map Client

For Plan4all purposes, only WMS service will be provided to access selected datasets.

4.9.4.2. Web Services

All datasets are accessible through a WMS service published using ArcGIS Server 9.3.1. This WMS service is accessible at http://gisportal.tracasa.es/plan4all/wms/ and has the following capabilities:

- GetCapabilities: http://gisportal.tracasa.es/plan4all/wms/?request=getcapabilities
- GetMap:
  - Delimitation of territorial spatial plans
    http://gisportal.tracasa.es/plan4all/wms/?SERVICE=WMS&VERSION=1.3.0&REQUEST=Getmap&BBOX=540900.939476,4639822.263908,687204.192222,4797834.633921&CRS=EPSG:23030&WIDTH=732&HEIGHT=790&LAYERS=24,20,22,21,23&STYLES=&SRS&FORMAT=image/jpeg
  - Environmental Units
    http://gisportal.tracasa.es/plan4all/wms/?SERVICE=WMS&VERSION=1.3.0&REQUEST=Getmap&BBOX=540900.939476,4639822.263908,687204.192222,4797834.633921&CRS=EPSG:23030&WIDTH=732&HEIGHT=790&LAYERS=2,3,4,5,6,8,9,10,11,12&STYLES=&SRS&FORMAT=image/jpeg
  - Land with special protection from urban development due to environmental qualities
    http://gisportal.tracasa.es/plan4all/wms/?SERVICE=WMS&VERSION=1.3.0&REQUEST=Getmap&BBOX=540900.939476,4639822.263908,687204.192222,4797834.633921&CRS=EPSG:23030&WIDTH=732&HEIGHT=790&LAYERS=14,15,16,17,18&STYLES=&SRS&FORMAT=image/jpeg

4.9.5. Results

The results of data transformation will be reported in the next reporting period.

4.10. GIJON – Land Cover

4.10.1. General description of source data

For the project WP7 plan4all, obviously Gijon City council is going to use original data from Gijón owned by the municipality. In this first phase will begin with data relate to Land Cover. Physical and biological cover of the earth's surface including artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies according to the theme 2 of the Annex II of Inspire.
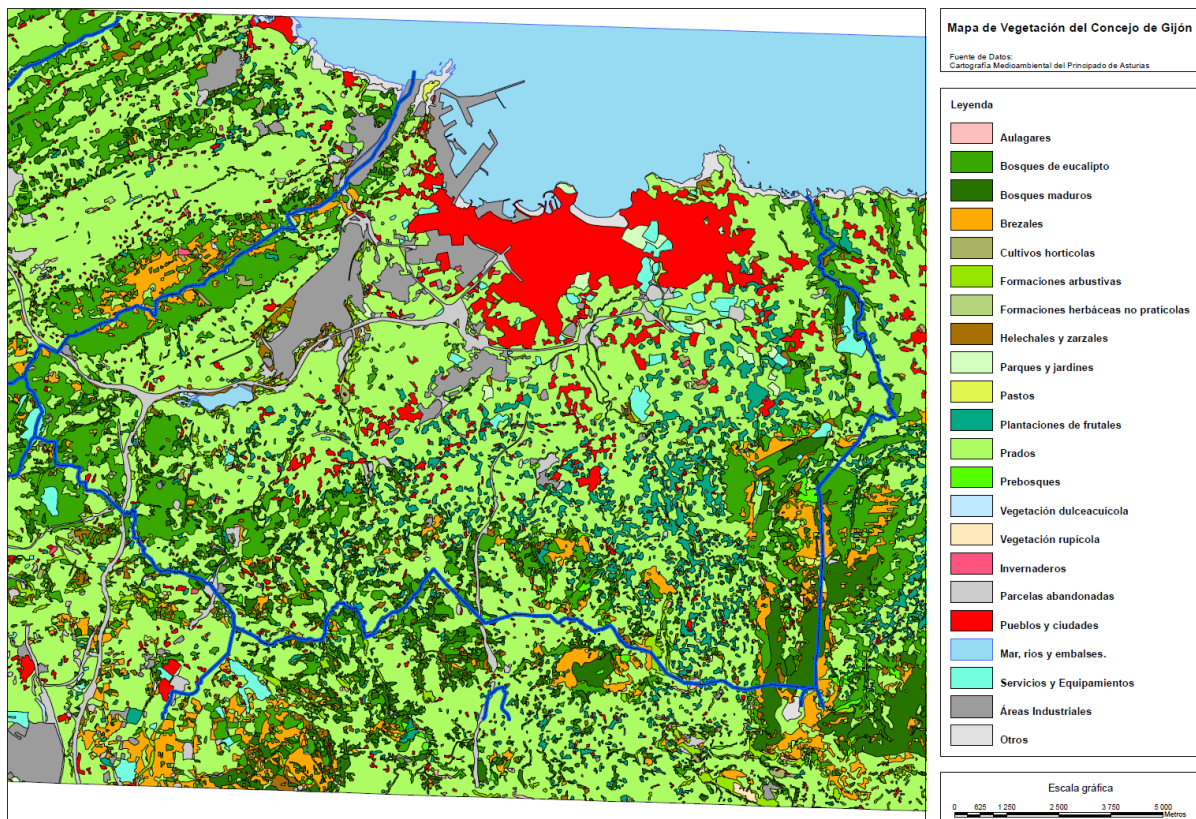
4.10.2. Detail Description of Source Data

The source data is available in DGN (graphical data) and PDF formats. We converted them to transform into shapefiles.

The reference system of the source data is ED 50.

4.10.2.1. Scheme

The base structure of Land Cover source data is presented in the following table, where originally the fields are described in Spanish language. For purposes of the Plan4all project, it is also joined a description in English as well as an example of field values.

CAMPO	DESCRIPCIÓN	EJEMPLO
CODIGO	Identificador único	425
GRUPO	Grupo de Vegetación	Pastizal
TIPO	Clase de vegetación	Prados
DEFINICIÓN	Características	Formaciones herbáceas
SUPERFICIE	Área	10236.68

4.10.2.2. Features and Code Lists

The following tables describe Land cover source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: Código

Value type:	number
Definition:	ID of the feature
Code List:	

Attribute: Grupo

Value type: string

Definition: Grupo de Vegatación

Code List
  ARBUSTOS
  CULTIVOS
  EUCALIPTAL
  FORESTAL
  FRUTALES
  IMPRODUCTIVO
  INVERNADEROS
  LAMINA DE AGUA
  PASTIZAL
  PREBOSQUE
  URBANO
  VEGETACION DE RIBERA
  VERDE URBANO

Attribute: Tipo

Value type: String

Definition:	Types of Vegetation
Code List:	Áreas Industriales Aulagares Bosques de eucalipto Bosques maduros Brezales Cultivos hortícolas Formaciones arbustivas Formaciones herbáceas Helechales y zarzales Invernaderos Mar, rios y embalses. Parcelas abandonadas Parques y jardines Pastos Plantaciones de frutales Prados Prebosques Pueblos y ciudades Servicios y Equipamientos Vegetación dulceacuícola Vegetación rupícola

Attribute: Definicion

Value type:	string
Definition:	Description
Code List	Value

Attribute: Superficie

Value type:	number
Definition:	Surface of the element
Code List	Value

4.10.3. Publication

The Server software uses to publish data is GeoServer 2.0.2.

The spatial planning data are published through web map application which is based on the HSLayers client. The data has been published in the ETR projection (EPSG:25830)

All data is published without field transformations until decision is made about data specifications.

4.10.3.1. Web Map Client

The web map application is available on this address: http://ide.gijon.es
It's in Spanish and English and the direct address of the client is http://ide.gijon.es/visor/index.html in Spanish and http://ide.gijon.es/visor/en_index.html in English.

4.10.3.2. Web Services

The harmonised data has been published also as Web Map Service (WMS) and Web Feature Service (WFS)
Links for the services:
WMS: http://ide.gijon.es:8080/geoserver/wms

Getcabilities:
   http://ide.gijon.es:8080/geoserver/wms/?request=getcapabilities

GetMap:

   Land Cover:
http://ide.gijon.es:8080/geoserver/wms?service=WMS&version=1.1.0&request=GetMap
&layers=Gijon:Mapa_de_vegetacion&styles=&bbox=271934.423,4813164.271,292772.9
43,4829463.186&width=512&height=400&srs=EPSG:25830&format=image/png

   Delimitations:
   http://ide.gijon.es:8080/geoserver/wms?service=WMS&version=1.1.0&request=GetM
ap&layers=Gijon:Distritos_Municipales&styles=&bbox=271934.278,4813164.767,292773.0
36,4829478.14&width=512&height=400&srs=EPSG:25830&format=image/jpeg

   Bondaries
   http://ide.gijon.es:8080/geoserver/wms?service=WMS&version=1.1.0&request=GetM
ap&layers=Gijon:Limite_Concejos&styles=&bbox=271157.271,4812587.327,292773.127,48
28787.386&width=512&height=383&srs=EPSG:25830&format=image/jpeg

WFS: http://ide.gijon.es:8080/geoserver/wfs

Getcapabilities:
   http://ide.gijon.es:8080/geoserver/wms?service=WFS&version=1.1.0&request=GetCa
pabilities

4.10.4.   Results

4.10.4.1. Comments on Conceptual Models
No special remarks.

4.10.4.2. Recommended changes
The results of data transformation will be reported in the next reporting period.

4.11.   MAC – Land Use

4.11.1.   General description of source data

MAC has partnered with Limerick County Council to pilot the theme of 'land use' through the councils iPlan database. iPlan registers all planning applications in the region. It then tracks the application through the planning process and ends when a decision has been made i.e. the application has been approved (with possible alterations) or denied. iPlan is used nationally throughout the Irish Republic with each local authority maintaining their own database.

4.11.2.   Detail Description of Source Data

4.11.2.1. Scheme

The PAPPLIC table is probably the main table in the database. It stores all relevant information pertaining to a new planning application. The following table contains some of the more important fields

Field	Type	Description
authority_code	Varchar(3)	Planning Authority code
file_year	Varchar(2)	Year of application
file_num	Int	File number
file_number	Varchar(8)	File number
application_status	SmallInt	State of application
application_type	Varchar(1)	Type of application
received_date	Datetime	Date of receipt
one_off_house	Varchar(1)	One-off house
sig_applic_indic	Varchar(1)	Significant application indicator
Decision_date	Datetime	Date decision is due
Ext_decision_count	SmallInt	'Decision to extend' count
Ext_agree_date	Datetime	Date of agreed extension
Architect_name	Varchar(35)	Name of architect
Development_descri	Varchar(2500)	Description of proposed development
Nat_grid_ref	Varchar(16)	National Grid Reference No.
Rec_commence_date	Datetime	Date Commencement Recd
Dev_commence_number	Varchar(7)	Commencement Notice

4.11.2.2. Features and Code Lists

Application_status

status_code	status_desc
0	Incomplete Application
1	New Application
2	Further Information
3	Decision Made
5	Appealed
8	Withdrawn
9	Application Finalised
10	Pre-Validation

Application_type

ApplicationTypeID	ApplicationTypeCode	ApplicationTypeDescription
1	A	Approval
2	C	Permission Consequent
3	O	Outline Permission
4	P	Permission
5	R	Retention
6	T	Temporary Permission

4.11.3. Transformation

The data transformation is scheduled to happen in the near future. The local authority are in the process of upgrading their version of Autodesk MapGuide storage from SQL Server 2000 to SQL Server 2008.

4.11.3.1. Transformation method

Once the MapGuide upgrade has been completed, we can begin the extraction/transformation to a PostGIS database. This postGIS database will serve as the datasource for future WMS services.

4.11.4. Publication

The relevant services are published through GeoServer. This is an open source technology written in JAVA and hosted through the Apache Tomcat Application Server. We use Apache2 Http Server to provide the service through port 80. These services are provided through a mixture of intel based servers running Ubuntu Linux and Microsoft Windows 2003.

4.11.4.1. Web Map Client

The mapping element of this system is delivered using AutoDesk MapGuide 6.5, a Web GIS (Geographical Information System) technology. The interface will allow you to interact with the map, using pan and zoom tools to view a wide range of mapping for your area of interest.

The System also includes a "Where is" tool that allows you to search for and locate particular areas of interest on the map For this functionality to be available, you will need to download and install the Free Viewer that is supplied by Autodesk. Either click on the link below to go to the Autodesk site and download the viewer or let the Planning Enquiry system automatically download and install it for you. This process will only need to be done once.

http://137.191.230.245/PELite/LAResources/info.aspx
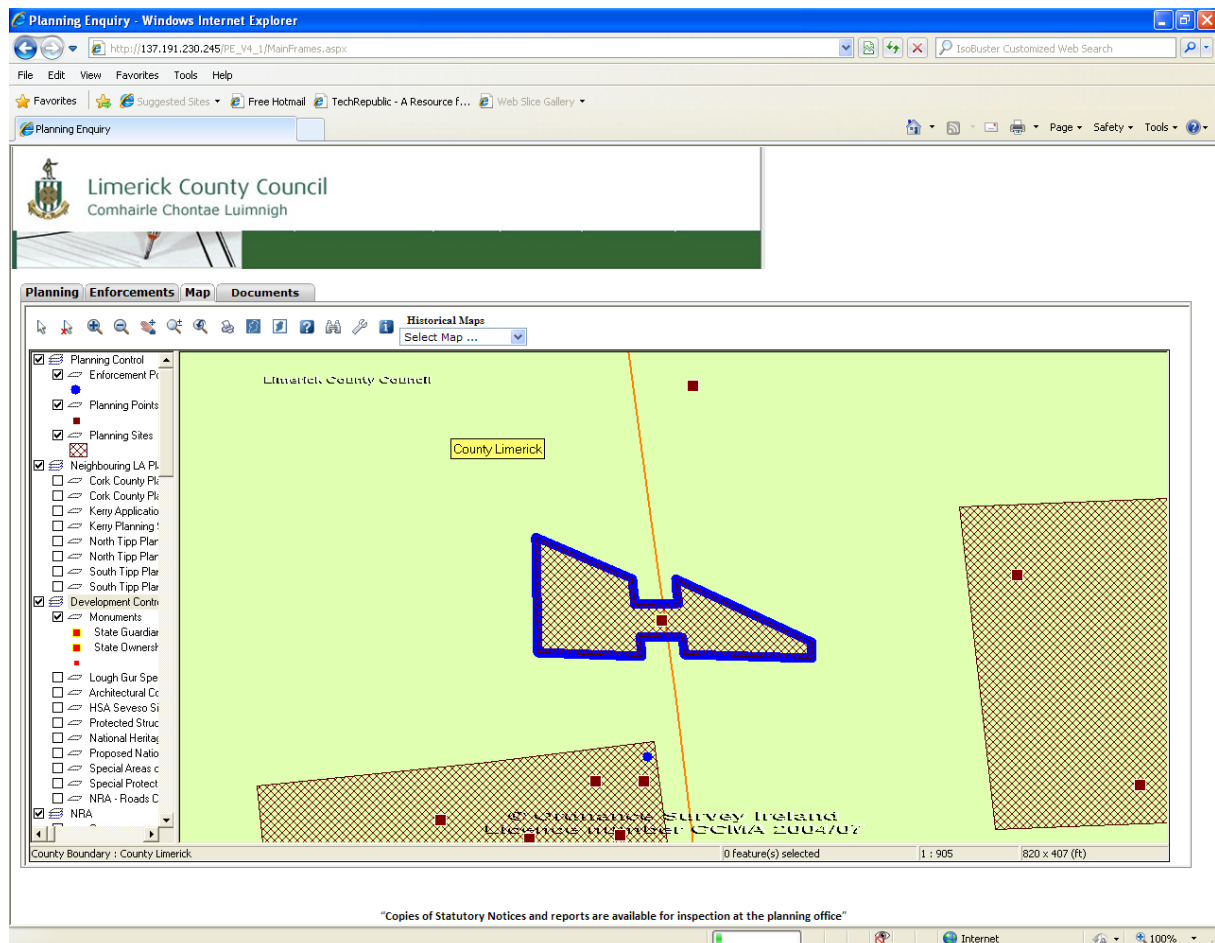
4.11.4.2. Web Services

At present, we have some relevant information published through gis.mac.ie. The two most relevant are 'Special Areas of Conservation 2007-' and Limerick County Council's iPlan

application planning points. Any information published to date uses shapefiles as a datasource but this will change to a PostGIS database shortly.

http://gis.mac.ie/geoserver/wfs?request=GetCapabilities
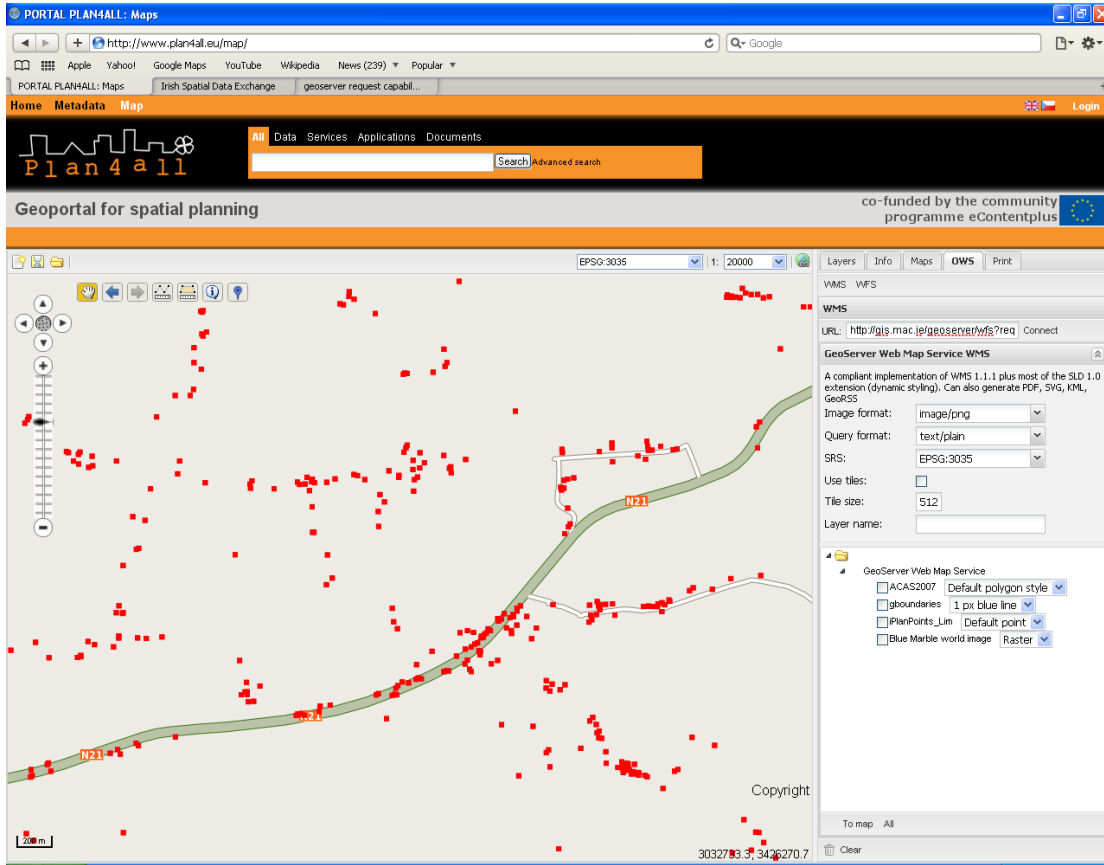
4.12. AVINET

AVINET is not a content provider in the Plan4all project but due to our role as a significant provider of hosted and non-hosted web map solutions for planning authorities throughout Norway the company still takes part in the content deployment and validation activities of the project.

4.12.1. General description of source data

AVINET mediates data from Arendal Municipality as part of work package 7 of Plan4all. The theme used for the content deployment activity is land-use data.

Norwegian planning data are structured according to a national standard called SOSI, an abbreviation which roughly translates as "joint system for spatial information". Code lists for land-use categories are included and well-defined in this standard something which makes the transformation/mapping task easier, as the definitions in the standard help disambiguate the interpretation of which source fields maps to which target fields.

SOSI is both a data model and a text based format for storing spatial vector data. The format is a notation designed for loss-less *exchange* of data rather than *use*. For this reason, most Norwegian planning authorities implement the data model in a variety of tools and export data to SOSI format for the purpose of exchange.

Arendal Municipality creates and maintain data in a Norwegian proprietary GIS software format called Quadri, embedded into an Oracle Spatial database. Local planning data in large scales are often using a spatial reference system based on an ageing national grid called NGO 1948 which has Gauss-Kruger projection with a horizontal Y axis and a vertical X-axis. However, in recent years, a massive country-wide effort has been made to switch to a new national grid based on UTM zones 32 – 34 and WGS84. Arendal Municipality provided data in UTM Zone 33N, WGS84.

The municipality is using AVINET's map application Adaptive as their platform for publishing web map services, web feature services, web catalog services and viewer clients. Arendal already publishes their land-use data on the Internet through their online GIS viewer application. For the purpose of Plan4all, AVINET has received their data, performed a series of manual and semi-automated transformation steps and made the data available on AVINET's Plan4all test site.

4.12.2. Detail Description of Source Data

This chapter describes the data in relation to the SOSI data model. A national strategy exists to transform the SOSI spatial data format to an application profile of GML/XML but this work has yet to be realized. As the latter primarily is of interest only to Norwegian institutions, the transformation of the data took as a starting point an articulation of the SOSI data model in the widely used ESRI Shapefile format.

4.12.2.1. Scheme

While the data are sourced from a single municipality, the conceptual approach is identical for all Norwegian municipalities, as they are all implementing the same data model. We therefore first have to revisit the standards

The SOSI data model defines three different levels of plans:
- County plans (small scale, sometimes non-spatial, for 19 counties)
- Municipal plans (intermediate scale, always spatial, for 434 municipalities)
- Development plans (large scale, always spatial, for individual developments on municipal level, many per municipality)

Additionally the standard defines five other planning related objects:
- Planning illustrations
- Expropriation areas
- General restrictions
- Prohibition of building (i.e. constructions)
- Projects

In the validation activity, AVINET have been working with land-use data from the detailed level – development plans. The features and code-lists described are all related to this specific section of the overall SOSI schema. The actual plan at hand is a development plan for "Skarvedalen, Hisøy" in Arendal Municipality in southern Norway.

4.12.2.2. Features and Code Lists

The SOSI standard defines no less than 17 different feature classes which together constitute a development plan as defined in the Norwegian planning system. Providing a complete walkthrough of these 17 features will exhaust the purpose of the content deployment exercise and only the parts relevant for comparison across European planning systems are described in great detail here. A more comprehensive version of this report is available as an internal whitepaper prepared by AVINET.

The complete list of feature classes includes:
- ZbdPreservationArea
- ZbdPreservationBoundary
- ZbdHazardBoundary
- ZbdHazardArea
- ZbdOrderBoundary
- ZbdOrderArea
- ZbdRestrictionBoundary
- ZbdRestrictionArea
- ZbdArea
- ZbdBoundary
- ZbdPurposeBoundary
- ZbdPurposeArea
- ZbdRenewalBoundary
- ZbdRenewalArea
- ZbdLegalLine
- ZbdLegalPoint
- ZbdAnnotation

Out of these the one most closely associated with land-use, as defined in Plan4all is ZbdRestrictionArea, for this reason, this feature class and all its attributes are described below. The data model preserves data for both GIS and traditional cartographic purposes.

<<Feature>> ZbdPurposeArea

No	Name/ Role name	Description	Obligation/ Condition	Maximum Occurrence	Type	Constraint
12	Class ZbdPurposeArea	area for zoning purposes in zoning and building development plan (PBA § 25, subsection 1)				
12.1	Extent	area over which an object extends	0	1	SurfaceWithQuality	
12.2	Position	location where the object exists	0	1	PointWithQuality	
12.3	landUseCategory	type of land use category (PBA § 25, subsection 1)	1	1	ZoningCatUsagePurpose	
12.4	zoningCategoryElaboration	elaboration of zoning categories (PBA § 25, subsection 1)	0	1	CharacterString	
12.5	FieldDesignation	name/designation of area use category within zoning and building development plan (PBA § 25 subsection 1)	0	1	CharacterString	
12.6	Utilization	degree of utilization (PBA § 20-4, subsection 2, letter b and § 26, subsection 1 and TEK regulations, Chapter III)	0	1	RbUtilisation	
12.7	OutdoorPlayArea	minimum outdoor play area (PBA § 26, subsection 2 and TEK regulations, Chapter III)	0	1	Integer	
12.8	constructionProvision	provision in plan for the location and design, etc. of buildings (PBA §20-4, subsection 2, letter a, §26, subsection 1, § 28-2) Note: Used where the plan indicates heights, roof ridge orientation, etc.	0	1	constructionProvision	
12.9	AccessProvision	provision for access road in plan (PBA §§ 25 and 26,	0	1	accessProvision	

		subsection 1) Note: States whether or not access road to land use category area is allowed, or whether the plan / provisions allow access via a category other than road (via pedestrian path, trail, et				
12.10	VerticalLevel	the location of the plan or its contents in relation to the Earth's surface (PBA § 19-1, subsection 6, § 20-1, subsections 2 and 5, §§ 22 and 28-2)	1	1	VerticalLevel	
12.11	Role boundaryPurpose		0	N	ZbdPurposeBoundary	Aggregration
12.12	Role (unnamed) ZbdArea		1	1	ZbdArea	

In similar detail as for the features, the SOSI standard defines 14 comprehensive code lists for each development plan. For the purpose of not exhausting this document, we have emphasized the codelist which is most relevant for the Plan4all definition, namely the SOSI Plan 4.3 land use classification which defines 138 distinct land-use categories as shown below.

<<Codelist>> ZoningCatUsagePurpose

Nr	Code name	Definition/Description	Code
4	CodeList ZoningCatUsagePurpose	type of land use category (PBA § 25, subsection 1)	
4.1	Building construction area	Construction area, PBA § 20-4, subsection 1, item 1 (for generalization)	100
4.2	Residential area	Residential area (detached, concentrated, blocks of flats)	110
4.3	Detached individual houses		111
4.4	Concentrated individual houses		112
4.5	Multi-story housing		113
4.6	Garage	Garages in residential areas	115
4.7	Business	Areas for business	120
4.8	Office	Areas for offices	130
4.9	Industry	Areas for industry	140
4.10	Leisure buildings	Areas for leisure buildings	150
4.11	Public buildings	Area for public buildings (state, county, municipality) (for generalization)	160
4.12	Public building - kindergarten		162
4.13	Public building -		163

	education		
4.14	Public buildings - institution		164
4.15	Public building – church		166
4.16	Public building - assembly rooms		167
4.17	Public building - administrative building		169
4.18	General public usage	Area for specially designated general public usage. (the owner is indicated where possible) (for generalization)	170
4.19	General public usage – kindergarten		172
4.20	General public usage - education		173
4.21	General public usage - institution		174
4.22	General public usage - church		176
4.23	General public usage - assembly rooms		177
4.24	General public usage - administrative building		179
4.25	Hostel and public house	Area for hostels and public houses (for generalization)	180
4.26	Hotel	Hotel with associated facilities	181
4.27	Catering		182
4.28	Garage facility and petrol station	Area for garage facilities / petrol stations (for generalization)	190
4.29	Garage facility		191
4.30	Petrol station	Area for garage facilities and petrol stations (for generalization)	192
4.31	Other construction area	Other construction area. The use must be specified in the provisions and must be within the framework of PBA § 25, subsection 1, item 1. (Note: detailing must be indicated as land use elaboration	199
4.32	Agricultural area	Agricultural area (PBA § 25, subsection 1, item 2), (for generalization)	200
4.33	Agriculture and forestry	Area for agriculture and forestry	210
4.34	Agricultural area reindeer husbandry	Reindeer farming area	220
4.35	Garden centre / Nursery	Area for garden centre / nursery	230
4.36	Allotment	Area for allotments	240
4.37	Other agricultural area	Other agricultural area. The use must be specified in the provisions and must be within the framework of PBA § 25. Note: detailing must be indicated as land use elaboration	299
4.38	Public traffic area	Public traffic areas (PBA § 25, subsection 1, item 3), (for generalization)	300
4.39	Road		310
4.40	Street with sidewalk		311
4.41	Other road area		319
4.42	Pedestrian/bicycle path		320
4.43	Bicycle path		321
4.44	Walkway		322
4.45	Streetside courtyard		330
4.46	Square		331
4.47	Roadside rest area		332
4.48	Parking lot		333

| 4.49	Public transport facility		340
4.50	Bus terminal		341
4.51	Bus stop		342
4.52	Taxi stand		343
4.53	Railway		350
4.54	Tram line / suburban rail		360
4.55	Airport with administration building	Airport with administration buildings	370
4.56	Airport / taxiway		371
4.57	Hangars, workshops, admin. Buildings	Hangars, workshop, administration buildings	372
4.58	Harbour area (land portion)	Harbour area (facilities on shore)	380
4.59	Jetty		381
4.60	Facility for small boats (land portion)	Facility for small boats (facilities on shore)	382
4.61	Traffic area at sea and in watercourses		390
4.62	Shipping lane		391
4.63	Harbour area at sea		392
4.64	Other traffic area in sea/watercourse	Other traffic area in sea/watercourse. The use must be specified in the provisions and must be within the framework of PBA § 25, subsection 1, item 3. Note: detailing must be indicated as land use elaboration	398
4.65	Other traffic area	Other traffic area (on land) The use must be specified in the provisions and must be within the framework of PBA § 25, subsection 1, item 3. Note: detailing must be indicated as land use elaboration	399
4.66	Public outdoor recreation area	Public outdoor recreation area (PBA § 25, subsection 1, item 4), (for generalization)	400
4.67	Park		410
4.68	Walking Trail		420
4.69	Ski trail		421
4.70	Play facility		430
4.71	Athletics and sports facility		440
4.72	Campgrounds		450
4.73	Other public outdoor recreation area	Other public outdoor recreation area. The use must be specified in the provisions and must be within the framework of PBA § 25, subsection 1, item 4. Note: detailing must be indicated as land use elaboration	459
4.74	Public outdoor recreation area in sea and watercourse	Public outdoor recreation area in sea and watercourse	460
4.75	Swimming area		461
4.76	Marina for small boats		462
4.77	Regatta course		463
4.78	Other public outdoor recreation area in sea/watercourse	Must be within the framework of PBA § 25, subsection 1, item 4	469
4.79	Special area	Special area (PBA § 25, subsection 1, item 6), (for generalization)	600
4.80	Private road		601
4.81	Green belt in an industrial area		611
4.82	Camping site		612

4.83	Area for open-air recreation (on land)	Area for open-air recreation on land (also hiking trail / ski trail)	613
4.84	Area for open-air recreation at sea/in watercourse	Area for open-air recreation at sea/in watercourse	614
4.85	Sports fac., not available to the public	Sports facility which is not available to the public	615
4.86	Golf course		616
4.87	Cemetery		617
4.88	Private facility for small boats (land portion)	Private facility for small boats (facilities on shore)	618
4.89	Private marina for small boats (sea portion)	Private marina for small boats (facilities on water)	619
4.90	Facility in the ground	Area for facility in the ground	620
4.91	Municipal engineering operations	Area for municipal engineering facilities and operations	621
4.92	Drinking water reservoir		622
4.93	Water- and sewerage installation		623
4.94	District heating plant	Area for construction and operation of district heating plant	624
4.95	Telecommunication facility		625
4.96	Armed forces facility	Training area with associated facilities for armed forces / civil defense	626
4.97	Radio navigation installation	Area and installation for operation of radio navigation aids outside airport	627
4.98	Fishing settlement		630
4.99	Other facilities in watercourse / at sea	Other area for facilities in watercourse or in the sea. Must be within the framework of PBA § 25, subsection 1, item 6 (Note: detailing must be indicated as land use elaboration)	631
4.100	Nature conservation area on land		650
4.101	Nature conservation area at sea / in watercourse		651
4.102	Climate conservation zone		652
4.103	Stone quarry and soil extraction site	Areas for stone quarry and soil extraction	670
4.104	Substantial terrain intervention	Other areas for substantial terrain intervention	671
4.105	special area reindeer husbandry		680
4.106	Fur farming facility		681
4.107	Market gardening center		685
4.108	Special facility	Area for special facilities (for generalization)	690
4.109	Cableway		691
4.110	Amusement park		692
4.111	Wind power	Area for wind power	693
4.112	Other special area	Other special area. The use must be specified in the provisions and must be within the framework of PBA § 25, subsection 1, item 6. Note: detailing must be indicated as land use elaboration	699
4.113	Common area	Common area (PBA § 25, subsection 1, item 7) (for generalization)	700
4.114	Common exit road		710
4.115	Common pedestrian		720

	area		
4.116	Common parking area		730
4.117	Common playground	Common playground for children	750
4.118	Common courtyard		760
4.119	Common garage facility	Common area for garages	770
4.120	Common green area		780
4.121	Other common area	Other common area for more than one property	790
4.122	Combined use	Combined use (PBA § 25, subsection 2) (for generalization). Must be within the framework of PBA § 25, subsection 2	900
4.123	Dwelling/Business	Combined use (PBA § 25, subsection 2) (for generalization). Must be within the framework of PBA § 25, subsection 2	910
4.124	Dwelling/Business/Office	Combined use: Dwelling/Business/Office	911
4.125	Dwelling/Office	Combined use: Dwelling/Office	912
4.126	Dwelling/Public	Combined use: Dwelling/Public	913
4.127	Business/Office	Combined use: Business/Office	920
4.128	Business/Office/Industry	Combined use: Business/Office/Industry	921
4.129	Business/Industry	Combined use: Business/Industry	922
4.130	Business/Office/Public	Combined use: Business/Office/Public	923
4.131	Business/Public	Combined use: Business/Public	924
4.132	Office/Industry	Combined use: Office/Industry	930
4.133	Office/Public	Combined use: Office/Public	931
4.134	Office/Petrol station	Combined use: Office/Petrol station	939
4.135	Public/For the public benefit	Combined use: Public/For the public benefit	960
4.136	Catering/Petrol station	Combined use: Roadside service facility (Catering/Petrol station)	980
4.137	Other combined use	Other combined use. Must be within the framework of PBA § 25, subsection 2. Note: detailing must be indicated as land use elaboration	990
4.138	Uniform purpose	Uniform purpose (only for old plans) Note: detailing must be indicated as land use elaboration Merknad: detaljering må angis som reguleringsfomålsutdyping	999

4.12.3. Transformation

4.12.3.1. Transformation method

The transformation method consists of a complex series of as outlined in the BPMN diagram below:
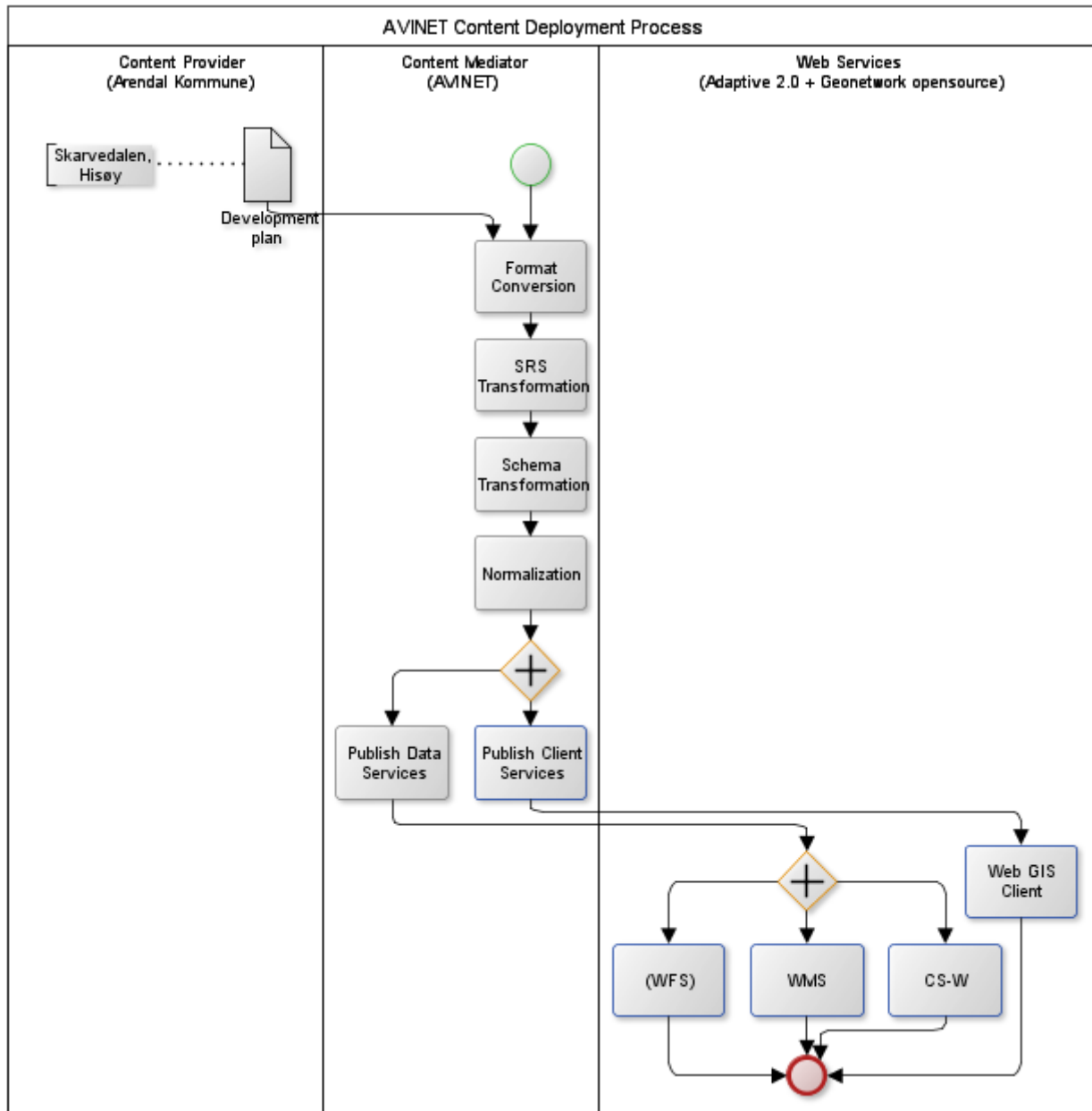
The process may be explained as follows:

1) Planning data for the development plan "Skarvedalen, Hisøy" are received from Arendal Municipality in QUADRI format.
2) The data are translated to ESRI Shapeformat using FME and a dedicated plugin to handle the proprietary format mentioned in step 1.
3) The coordinate system is verified and converted to the ETRS89 reference frame (EPSG:3035). As is demonstrated later, the publishing of the services enables transformation on the fly to a wide range of data formats.

4) The schema of the data is remapped to the Plan4all data model for land-use using ArcGIS 9.3.1 Model Builder, Spatial E-T-L

5) The content values of the code lists identifying planning status and land use category are normalized (generalized) towards the joint Plan4all code-lists.

6) At this stage, data are published as services to be consumed by OGC aware applications on the Internet or through a web map client.

   a) Web services include WMS, WFS and CS-W

   b) Web client is AVINET's Adaptive 2.0

4.12.3.2. Transformation scheme

The table below shows the transformation between the source schema, SOSI Plan 4.3 and the target schema, Plan4all Land-Use:

Source schema (SOSI Plan 4.3)		Match	Target schema (Plan4all)	
Feature	*Attribute*		*Feature*	*Attribute*
Multiple			**PlanObject**	
ZbdArea+	"Norway" + municipalityNumber + planIdentification	Added static context + Merge		inspireId
ZbdArea	planName	Exact match		title
ZbdArea	Extent	Exact match		geometry
ZbdArea	legalReference	Exact match		legislation
	"Norway"	Added static context		country
Multiple			**PlanFeature**	
ZbdPurposeArea	fieldDesignation	Exact match		inspireId
ZbdArea	planStatus	Normalized		status
		n/a		regulationNature
ZbdArea	planProvision			regulationReference
		n/a		isOverlayArea
ZbdPurposeArea	extent	Exact match		geometry
Multiple			**Function indications**	
		n/a		property
		n/a		LUCAS_Code
		n/a		macroClassificationOfLand
ZbdPurposeArea	landUseCategory	Normalized		generalLandUseType
ZbdPurposeArea	landUseCategory	Exact match		specificLandUseType
		n/a		otherTerritorialClassification
				interventionType
		n/a		indirectExecution
Multiple			**Indirect execution**	
		n/a		title
		n/a		processStepGeneral
Multiple			**Dimensioning indications**	
		n/a		indexes
ZbdPurposeArea		n/a		volumeIndication
ZbdPurposeArea	utilization	Exact match		surfaceIndication
ZbdPurposeArea		n/a		heightIndication
ZbdPurposeArea		n/a		unitIndication
ZbdPurposeArea	outdoorPlayArea, acccessProvisions	Broad match		otherIndication
Multiple			**ConstructionIndications**	
	constructionProvision	Narrow match		typeOfBuilding
ZbdPurposeArea	constructionProvision	Narrow match		roofShape
ZbdPurposeArea	constructionProvision	Broad match		otherConstructionIndication
Multiple			**Conditions and Constraints**	
ZbdArea	Role preservation			protectedSites
ZbdArea	Role hazard			naturalRiskSafetyArea
ZbdArea	Role restriction			restrictionZone
		n/a		easementType
Multiple			**TextualRegulation**	
		n/a		inspireId
		n/a		title

A comprehensive mapping for the complete SOSI Plan 4.3 schema is underway and will be conducted over the next month. It might be more beneficial for post-use to perform the

mapping towards the final INSPIRE TWG schemas rather than the more inspirational and free-form Plan4all schemas – though the latter have been an important input to the work in the INSPIRE technical working groups.

The table below shows the normalization of land-use classification values as defined in SOSI Plan 4.3 towards general land-use classification values as defined in Plan4all:

Source term (SOSI 4.3) ZoningCatUsagePurpose	Match	Target term (Plan4all) GeneralLandUseType
Road	broader term	TransportInfrastructure
Other road area	broader term	TransportInfrastructure
Traffic area at sea and in watercourse	broader term	TransportInfrastructure
Other traffic area (on land)	broader term	TransportInfrastructure
Private road	broader term	TransportInfrastructure
Private marina for small boats	related term	TransportInfrastructure
Municipal engineering operations	broader term	TechnicalInfrastructure
Other special area	exact match	Other
Common exit road	broader term	TransportInfrastructure
Common playground for children	related term	Parks
Common green-area	related term	Parks
Dwelling/business/office	broader term (combined)	Commercial + Residential
Business/office	broader term	Commercial

The combined land-use category commercial + residential was resolved through duplicating the polygon and visualizing it as a line-fill on top of a solid color base – using the color schemes from Olomuc.

4.12.4.   Publication

4.12.4.1. Web Map Client

AVINET has published the harmonized land-use data through Arendal Municipality's web map solution Adaptive 2.0 which consists of a client application with three different user interfaces (1) simple, (2) advanced and (3) administrative.

The client is based on built on UMN MapServer, OpenLayers, PostGIS and PostgreSQL. The metadata catalogue client is based on Geonetwork Opensource.

The client application currently provides access to map layers illustrating the general land use and planning feature status. The normalized land-use layer has been symbolized using recommended colors from Olomuc.
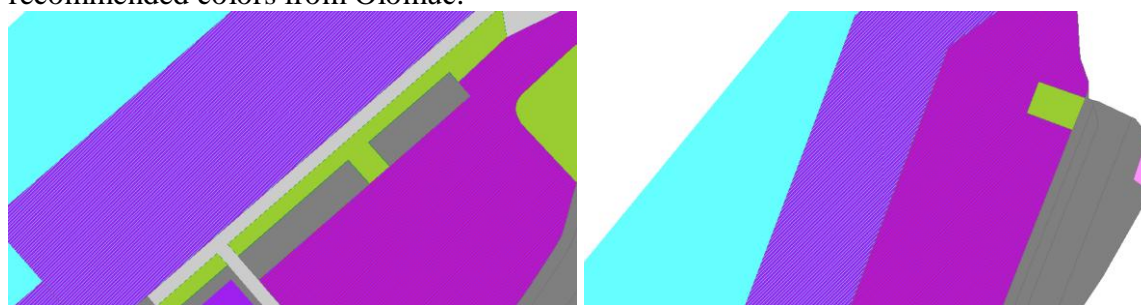
The above images are examples of maps which are returned when issuing a request to the WMS service, requesting the land-use layer.

4.12.4.2. Web Services

The following OGC spatial related web services have been enabled and contain the planning data from Arendal Municipality:

- CS-W (Catalog Web Service)
- WMS (Web Map Server)
- WFS (Web Feature Server)

4.12.5.   Results

Only preliminary results are available so far and have not been synthesized into a coherent set of recommendations for improvements – but for the purpose of conveying initial experiences, a number of observations are included below.

4.12.5.1. Comments on Conceptual Models

The Conceptual models, while very comprehensive, are so detailed that it might be difficult to generalize from a highly specialized national model to another highly specialized pan-European model.

Schema transformation is possible when taking highly specialized data and generalizing them. It is not possible during an automated transformation process to specialize a generalized dataset.

The work involved in mapping from the national standard in Norway to the Plan4all schema is parallel to the effort that will have to be done by the National Mapping Authorities towards the output from the INSPIRE TWG's work on data models for INSPIRE annex III themes.

It might be a good idea to converge the Plan4all specifications towards the output of the INSPIRE TWGs as part of the project in order to be able to benefit from the mapping work in a sustainability context.

4.12.5.2. Recommended changes

Actual recommendations for changes will be elaborated as the content deployment verification proceeds over the next months.

4.13. DIPSU – Land Cover

The pilot chosen by DipSU regards the Plan4all themes "Land use", "Land cover" and "Natural risk zones". The related data has been elaborated in support of the process of Strategic Environmental Assessment of a municipal spatial plan for the town of Montalto Uffugo in Southern Italy. The process of elaborating a spatial plan and the related Strategic Environmental Assessment needs, as a first step, a collection of all information needed for the planning task: on the one hand, the basic cartography such as administrative boundaries, topography, cadastre, land cover and existing constraints, on the other the actual planning information, i.e. the municipal general plan and the sub-municipal executive plans in force at the moment of the elaboration of the new general plan.

The following data are available as far as the Plan4all themes are concerned:
- land cover;
- natural risk areas: landslide and flood risks, as defined by a specific risk plan;
- land use constraints defined by regional and national decrees/laws: woods, buffers along watercourses, archaeological areas;
- the actual land use data (i.e. the spatial plans at municipal and sub-municipal level).

4.13.1. Detail Description of Source Data

4.13.1.1. Scheme

The tables with the attributes that will be transformed are shown below. The description of the attribute, an example of attribute values and a translation in English (when needed) are provided for each field.

Source field	Description	Attribute example	Translation of attribute
FID	ID number	17	
Shape	Geometry of the object	Polygon	
LAYER	Description of land cover	Insediamento residenziale continuo	Continuous urban fabric
CODICE	CORINE code	1.1.1	

4.13.1.2. Features, attributes and Code Lists

The tables describe source data features, attributes and code lists important for data transformation and harmonisation.

Feature: carta_uso_del_suolo	
Definition:	Land cover
INSPIRE theme:	Land Cover
Attribute: LAYER	
Value type:	*see code list*
Definition:	Description of land cover
Code List	The descriptions refer to the CORINE standard
Attribute: CODICE	
Value type:	*see code list*
Definition:	Land cover code
Code List	CORINE codes, extended to fourth level

4.13.2. Transformation

Data transformation will be carried out in the next reporting period.

4.13.3. Publication

This section contains some information about the technologies through which the source data is published.

The fundamental services, provided by Geoserver, are based on Java technology and supported by a database managing system. The tool used for executing Java applications is Tomcat 6.

All these applications run on a Linux operating system.

4.13.3.1. Web Map Client

The WebGIS allows disseminating the basic datasets (cadastral maps and administrative borders, land cover, land use and natural risk zones information) that have been used for designing the municipal spatial master plan and for carrying out its Strategic Environmental Assessment. Up to now, the following data are published through the WebGIS (a snapshot of which can be seen in the figure below):

- cadastral and administrative data (land and building cadastre, municipal borders);
- infrastructure networks (streets and railroads);
- land cover;
- watercourses;
- land use constraints defined by regional and national decrees/laws: woods, buffers along watercourses, archaeological areas;
- natural risk areas: landslide and flood risks, as defined by a specific risk plan.

The actual land use data (i.e. the spatial plans at municipal and sub-municipal level) is not yet published on the WebGIS but is available on DipSU's server.

The web map application is available at the address:
http://193.204.163.228:8000/map_montalto/map.phtml?winsize=large&language=en&config=default

4.13.3.2. Web Services

Data from different layers are registered in a PostgreSQL database (using its PotsGIS module). This database also provides the necessary support for the Geoserver application.

The data downloading services are provided through the direct download of files from the appropriate section in the web (HTTP protocol), using the standard Geoserver user interface over registered layers and allowing direct download in different formats through WMS service (http://www.dipsuwebgis.uniroma3.it:8081/geoserver_dipsu/wms?VERSION=1.1.1&REQUEST=GetCapabilities&SERVICE=WMS).

4.13.4.   Results

The results of data transformation will be reported in the next reporting period.

4.14. DIPSU – Natural Risk Zones

4.14.1. Detail Description of Source Data

4.14.1.1. Scheme

The tables with the attributes that will be transformed are shown below. The description of the attribute, an example of attribute values and a translation in English (when needed) are provided for each field.

Landslide risk:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	101	
Shape	Geometry of the object	Polygon	
LEGENDA	Description of risk	Area di rischio frana R3	R3 landslide risk class

Flood risk:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	6	
Shape	Geometry of the object	Polygon	
LEGENDA	Description of risk	Area di attenzione a rischio idraulico	Flood risk area

4.14.1.2. Features, attributes and Code Lists

The tables describe source data features, attributes and code lists important for data transformation and harmonisation.

Feature: pai		
Definition:	Natural risk zones, as defined by a specific risk plan: landslides	
INSPIRE theme:	Natural Risk Zones	
Attribute: LEGENDA		
Value type:	*see code list*	
Definition:	Description of risk	
Code List	area di rischio frana R1	R1 landslide risk area
	area di rischio frana R2	R2 landslide risk area
	area di rischio frana R3	R3 landslide risk area
	area di rischio frana R4	R4 landslide risk area
	area di rispetto R1	R1 respect area
	area di rispetto R2	R2 respect area
	area di rispetto R3	R3 respect area
	area di rispetto R4	R4 respect area
	perimetro frane	delimitation of landslides

Feature: aree_rischio_idr

Definition:	Natural risk zones, as defined by a specific risk plan: floods
INSPIRE theme:	Natural Risk Zones

Attribute: LEGENDA

Value type:	*see code list*	
Definition:	Description of risk	
Code List	area di attenzione a rischio idraulico	flood risk area
	punti di attenzione a rischio idraulico	flood risk spot

4.14.2. Transformation

Data transformation will be carried out in the next reporting period.

4.14.3. Publication

This section contains some information about the technologies through which the source data is published.
The fundamental services, provided by Geoserver, are based on Java technology and supported by a database managing system. The tool used for executing Java applications is Tomcat 6.
All these applications run on a Linux operating system.

4.14.3.1. Web Map Client

The WebGIS allows disseminating the basic datasets (cadastral maps and administrative borders, land cover, land use and natural risk zones information) that have been used for designing the municipal spatial master plan and for carrying out its Strategic Environmental Assessment. Up to now, the following data are published through the WebGIS (a snapshot of which can be seen in the figure below):
- cadastral and administrative data (land and building cadastre, municipal borders);
- infrastructure networks (streets and railroads);
- land cover;
- watercourses;
- land use constraints defined by regional and national decrees/laws: woods, buffers along watercourses, archaeological areas;
- natural risk areas: landslide and flood risks, as defined by a specific risk plan.

The actual land use data (i.e. the spatial plans at municipal and sub-municipal level) is not yet published on the WebGIS but is available on DipSU's server.

The web map application is available at the address:
http://193.204.163.228:8000/map_montalto/map.phtml?winsize=large&language=en&config=default

4.14.3.2. Web Services

Data from different layers are registered in a PostgreSQL database (using its PotsGIS module). This database also provides the necessary support for the Geoserver application.

The data downloading services are provided through the direct download of files from the appropriate section in the web (HTTP protocol), using the standard Geoserver user interface over registered layers and allowing direct download in different formats through WMS service
(http://www.dipsuwebgis.uniroma3.it:8081/geoserver_dipsu/wms?VERSION=1.1.1&REQUEST=GetCapabilities&SERVICE=WMS).

4.14.4. Results

The results of data transformation will be reported in the next reporting period.

4.15. DIPSU – Land Use

4.15.1. Detail Description of Source Data

4.15.1.1. Scheme

The tables with the attributes that will be transformed are shown below. The description of the attribute, an example of attribute values and a translation in English (when needed) are provided for each field.

Constraints on woods:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	24	
Shape	Geometry of the object	Polygon	
LAYER	Type of wood	pl_boschi castagno	Chestnut woods

Constraints on watercourses:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	24	
Shape	Geometry of the object	Polygon	
LEGENDA	Description of law establishing the constraint	ex articolo 1 lettera c legge 431/1985	art. 1, letter c, law 431/1985
FONTE	Source of information	Piano pluriennale di sviluppo socio economico: tav. 14 – carta vincoli ambientali e paesaggistici	Economic development programme: map of environmental and landscape constraints

Constraints on archaeological areas:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	1	
Shape	Geometry of the object	Polygon	

Note: this layer is incomplete, it contains only the geometry.

Municipal general plan: general zoning:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	31	
Shape	Geometry of the object	Polygon	
ZONE	Code of land use zone	C2	
LEGENDA	Description of land use zone	Zona di espansione residenziale	Residential development zone
IFT	Index expressing the maximum volume that can be built for each gross surface unit (the gross surface comprises	1,5	

	the area for services such as streets and sewage)		
IFF	Index expressing the maximum volume that can be built for each net surface unit (the net surface doesn't comprise the area for services such as streets and sewage)		

Municipal general plan: public services:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	10	
Shape	Geometry of the object	Polygon	
ZONE	Code of land use zone	FQ1	
LEGENDA	Description of type of service	Zona pubblica per attrezzature di quartiere	Public zone for neighbourhood services
PREVISTI	Indicates that the service is planned	sì	Yes
ESISTENTI	Indicates that the service is existing	sì	Yes

Sub-municipal executive plans:

Source field	Description	Attribute example	Translation of attribute
FID	ID number	34	
Shape	Geometry of the object	Polygon	
ZONE	Code of land use zone	D1	
LEGENDA	Description of land use zone	Zona industriale	Industrial zone
NOME	Description of plan	PdL in zona D1, località "Curetto", committente Garrafa	Development plan in zone D1, locality "Curetto", customer Garrafa
IFT	Index expressing the maximum volume that can be built for each gross surface unit (the gross surface comprises the area for services such as streets and sewage)	1,5	
IFF	Index expressing the maximum volume that can be built for each net surface unit (the net surface doesn't comprise the area for services such as streets and sewage)		

4.15.1.2. Features, attributes and Code Lists

The tables describe source data features, attributes and code lists important for data transformation and harmonisation.

Feature: boschi		
Definition:	Land use constraints defined by regional and national decrees/laws: woods	
INSPIRE theme:	Land Use	
Attribute: LAYER		
Value type:	*see code list*	
Definition:	Type of wood	
Code List	pl_boschi castagno	Chestnut woods
	pl_boschi faggio	Beech woods
	pl_boschi latifoglie	Broad-leaved woods

Feature: vincolo_paesaggistico_corsiacqua		
Definition:	Land use constraints defined by regional and national decrees/laws: watercourses	
INSPIRE theme:	Land Use	
Attribute: LEGENDA		
Value type:	string	
Definition:	Description of law/decree establishing the constraint	
Attribute: FONTE		
Value type:	string	
Definition:	Source of information	

Feature: prg		
Definition:	Zoning of the municipal general plan in force	
INSPIRE theme:	Land Use	
Attribute: ZONE		
Value type:	*see code list*	
Definition:	Code of land use zone	
Code List	A	Historic centre
	B1	Completion and refurbishment
	B2	Completion and urban renewal
	B3	Completion and renewal
	B4	Completion
	C1	Residential development
	C2	Residential development
	C3	Residential development
	C4	Residential development (for tourism)
	D1	Industrial
	D2	Industrial (completion)
	D3	Handicraft
	D4	Handicraft (completion)
	D5	Handicraft

D6	Commerciale
D7	Commerciale (completion)
E1	Agriculture (forestry)
FA	Environmental green
FI	Public municipal and inter-municipal services
FQ1	Public neighbourhood services
FQ2	Public municipal services
FU	Public university services
G1	Not suitable for development
G2	Protection of watercourses
G3	Buffer zone around cemeteries
I	Transport interchange

Attribute: LEGENDA

Value type:	*see code list*	
Definition:	Description of land use zone	
Code List	Centro storico	Historic centre
	Zona di completamento e ristrutturazione	Completion and refurbishment
	Zona di completamento e rinnovo urbano	Completion and urban renewal
	Zona di completamento e rinnovo	Completion and renewal
	Zona di completamento	Completion
	Zona di espansione residenziale	Residential development
	Zona di espansione residenziale	Residential development
	Zona di espansione residenziale	Residential development
	Zona di espansione residenziale turistica	Residential development (for tourism)
	Zona industriale	Industrial
	Zona industriale di completamento	Industrial (completion)
	Zona artigianale	Handicraft
	Zona artigianale di completamento	Handicraft (completion)
	Zona artigianale	Handicraft
	Zona commerciale	Commerciale
	Zona commerciale di completamento	Commerciale (completion)
	Zona agricola boschiva	Agriculture (forestry)
	Zona verde ambientale	Environmental green
	Zona pubblica per attrezzature comunali e intercomunali	Public municipal and inter-municipal services
	Zona pubblica per attrezzature di quartiere	Public neighbourhood services
	Zona pubblica per attrezzature comunali	Public municipal services
	Zona pubblica per attrezzature universitarie	Public university services
	Area non idonea all'edificazione	Not suitable for development
	Area di salvaguardia dei corsi d'acqua	Protection of watercourses
	Area di rispetto cimiteriale	Buffer zone around cemeteries
	Area di interscambio (autoparco)	Transport interchange

Attribute: IFT

Value type:	float
Definition:	Index expressing the maximum volume that can be built for each gross surface unit (the gross surface comprises the area for services such as streets and sewage)

Attribute: IFF

Value type:	float
Definition:	Index expressing the maximum volume that can be built for each net surface unit (the net surface doesn't comprise the area for services such as streets and sewage)

Feature: servizi_pubblici	
Definition:	Description of type of service, both planned and existing
INSPIRE theme:	Land Use

Attribute: ZONE

Value type:	*see code list*	
Definition:	Code of land use zone	
Code List	F	General public services
	F-A	Community facilities
	F-Am	Environmental green
	F-I	Education
	F-P	Public parking lots
	FQ1	Public neighbourhood facilities
	FQ2	Public municipal facilities
	FU	Public university facilities
	F-V	Parks

Attribute: LEGENDA

Value type:	*see code list*	
Definition:	Description of type of service	
Code List	Servizi pubblici generali	General public services
	Attrezzature collettive	Community facilities
	Zona verde ambientale	Environmental green
	Istruzione	Education
	Parcheggi pubblici	Public parking lots
	Zona pubblica per attrezzature di quartiere	Public neighbourhood facilities
	Zona pubblica per attrezzature comunali	Public municipal facilities
	Zona pubblica per attrezzature universitarie	Public university facilities
	Verde pubblico attrezzato	Parks

Attribute: PREVISTI

Value type:	Boolean
Definition:	Indicates that the service is planned

Attribute: ESISTENTI

Value type:	Boolean
Definition:	Indicates that the service is existing

Feature: piani_attuativi		
Definition:	Description of sub-municipal executive plans	
INSPIRE theme:	Land Use	
Attribute: ZONE		
Value type:	*see code list*	
Definition:	Code of land use zone	
Code List	Altro	Other
	C1	Residential development
	C2	Residential development
	D1	Industrial
	D2	Industrial (completion)
	D6	Commercial
	F	General public services
	F-A	Community facilities
	F-I	Education
	F-P	Public parking lots
	F-V	Parks
Attribute: NOME		
Value type:	string	
Definition:	Description of plan	
Attribute: IFT		
Value type:	float	
Definition:	Index expressing the maximum volume that can be built for each gross surface unit (the gross surface comprises the area for services such as streets and sewage)	
Attribute: IFF		
Value type:	float	
Definition:	Index expressing the maximum volume that can be built for each net surface unit (the net surface doesn't comprise the area for services such as streets and sewage)	

4.15.2. Transformation

Data transformation will be carried out in the next reporting period.

4.15.3. Publication

This section contains some information about the technologies through which the source data is published.

The fundamental services, provided by Geoserver, are based on Java technology and supported by a database managing system. The tool used for executing Java applications is Tomcat 6.

All these applications run on a Linux operating system.

4.15.3.1. Web Map Client

The WebGIS allows disseminating the basic datasets (cadastral maps and administrative borders, land cover, land use and natural risk zones information) that have been used for

designing the municipal spatial master plan and for carrying out its Strategic Environmental Assessment. Up to now, the following data are published through the WebGIS (a snapshot of which can be seen in the figure below):

- cadastral and administrative data (land and building cadastre, municipal borders);
- infrastructure networks (streets and railroads);
- land cover;
- watercourses;
- land use constraints defined by regional and national decrees/laws: woods, buffers along watercourses, archaeological areas;
- natural risk areas: landslide and flood risks, as defined by a specific risk plan.

The actual land use data (i.e. the spatial plans at municipal and sub-municipal level) is not yet published on the WebGIS but is available on DipSU's server.

The web map application is available at the address:
http://193.204.163.228:8000/map_montalto/map.phtml?winsize=large&language=en&config=default

4.15.3.2. Web Services

Data from different layers are registered in a PostgreSQL database (using its PotsGIS module). This database also provides the necessary support for the Geoserver application.

The data downloading services are provided through the direct download of files from the appropriate section in the web (HTTP protocol), using the standard Geoserver user interface over registered layers and allowing direct download in different formats through WMS service
(http://www.dipsuwebgis.uniroma3.it:8081/geoserver_dipsu/wms?VERSION=1.1.1&REQUEST=GetCapabilities&SERVICE=WMS).

4.15.4.   Results

The results of data transformation will be reported in the next reporting period.

4.16.   EPF

4.16.1.   General description of source data

Within the WP7 of the Plan4all project, EPF tests a pilot for LandUse data of Municipality of Yambol, located in Southewest part of Bulgaria. The municipality currently is developing its Master Plan and the consultant is the company ProArch Ltd (Sofia). The original data for the Master Plan was developed by TPO-Varna company under the project "Building of Integrated GIS of Yambol Municipality", funded by EEA grants. The data is available in ESRI geodatabase format (File geodatabase- gdb).
EPF has transformed the visualization of original data into predifinayed layers with specific colours, according to the requirements of Bulgarian Ministry of regional development and Public Works for the visualization of the "Master plans"" and published it at www.geoporatl-bg.com.

The process of common publication of spatial planning data is presented at the figure:
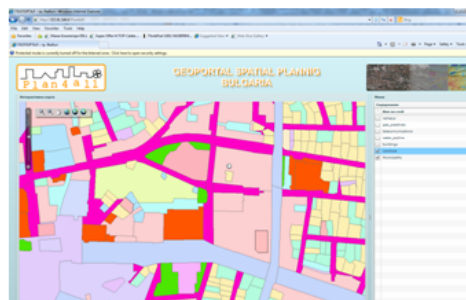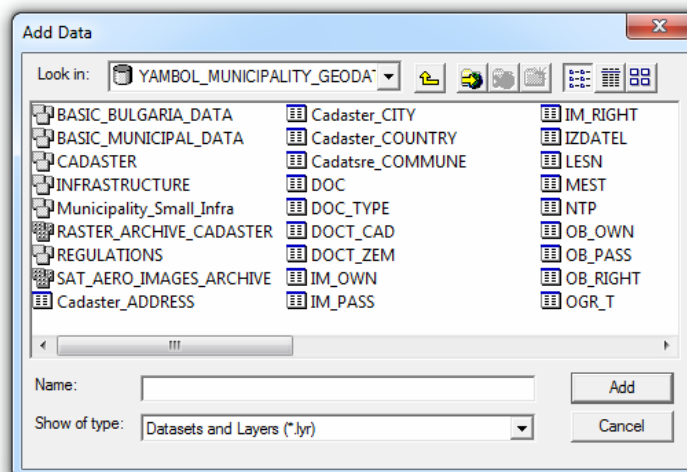
The spatial planning data is published through web map application based on ArcGIS API for Flex and ArcGIS server technology behind. The ArcGIS API for Flex enables to build dynamic rich Internet applications (RIAs) on top of ArcGIS Server. Create interactive and expressive Web applications leveraging ArcGIS Server resources-such as maps, locators, feature services and geoprocessing models-and Flex components-such as grids, trees and charts.

The ArcGIS API for Flex allows easy to use maps and tasks from ArcGIS Server in various Web applications, including such for spatial planning purposes.. For instance:

- Display an interactive map containing your own data.

- Execute a GIS model on the server and display the results.

- Display your data on an ArcGIS Online basemap.

- Search for features or attributes in your GIS data and display the results.

- Locate addresses and display the results.

- Edit your data (if published as a feature service)

- Create mashups (information combined from multiple Web sources).

Bu using the technology described above, the un-harmonised (source) data is published. This data (GDB) presents input into transformation and harmonisation process. The output data in a structure based on conceptual models can be published the same way the source data – in web map client and also through web services WMS or WFS.

4.16.2. Detail Description of Source Data

In the case of Yambol municipality spatial planning data, the harmonisation process is built up on the source data in the GDB format. This file contains all important data regarding land use specification.

4.16.2.1. Scheme

The base structure of the source data is presented in the table. Originally the field are described in Bulgarian Language, for purpose of the Plan4all project is joined also description in English and example of values.

Source_structure	Description	Attribute_example
EKATTE	ID of the Settlement	87374
IMOT	Feature ID	7601
IDENT	Cadastral ID	55.354
N_USETYPE	Landuse Code	
DESCRIPTIO	Landuse Description (full)	Ниско застрояване (до 10м)
UPI	Full Cadastral ID	87374.55.354
SHAPE_LENGH	Perimeter	125340
SHAPE_AREA	Area	2234560

4.16.2.2. Important Features, Attributes and Code Lists

The table describe source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: EKATTE		
Value type:	text	
Definition:	ID of the Settlement	
Code List:		

Attribute: IMOT		
Value type:	double	
Definition:	ID of the Parcel	

Attribute: N_USETYPE		
Value type:	string	
Definition:	Landuse type code	
Code List		

CODE	DESCRIPTION_BG	DESCRIPTION_EN

1000	Ниско застрояване (до 10 м)	Low build up (10 m)
1010	Средно застрояване (от 10 до 15 м)	Average build up(10-15m)
1020	Високо застрояване (над 15 м)	High build up (more than 15m)
1030	Комплексно застрояване	Complex build up
1040	Незастроен имот за жилищни нужди	Not_build up area for homes (reserve)
1050	За друг вид застрояване	Other
1100	За обект, комплекс за здравеопазване	For heltcare
1110	За обект, комплекс за образование	For education
1120	За обект, комплекс за култура и изкуство	Culture ane art object
1130	За обект, комплекс за социални грижи	Social care
1140	За административна сграда, комплекс	Administrative center
1150	За обект за детско заведение	Kindergarden
1160	За търговски обект, комплекс	Market (trade) object (use)
1170	За обект, комплекс за битово обслужване	Comunal and public services
1180	За обект комплекс за научна и проектантска дейност	Science and design
1190	За култова сграда, комплекс	Religious object (church, mosk etc)
1200	Незастроен имот за обществена сграда, комплекс	Not build area for future public building or complex
1210	За друг обществен обект, комплекс	For other public building or Complex
1300	Обществен селищен парк, градина	Public park within urbanized area
1310	Обществен извънселищен парк, горски парк	Public park outside urbanized area
1320	Дендрариум	Dendarium
1330	Ботаническа градина	botanic garden
1340	Зоологическа градина	ZOO
1350	Гробищен парк	Graveyard
1360	За защитно и изолационно озеленяване	Green areas for protection
1370	За друг вид озеленени площи	Other green areas
1400	Стадион	Stadion
1410	За спортна зала	Sport hall
1420	Спортно игрище	Sport pitch
1430	За трасета за вело- и мотоспорт	Bicycle path
1490	Незастроен имот за спортен обект	Not build area for future sports building or complex
1500	За други видове спорт	For other sports
1600	За вилна сграда	For second home (vilas)
1620	За почивен лагер	Camping
1630	За туристическа база, хижа	Toursit hut
1640	За санаториум, балнеосанаториум, профилакториум	Sanatorium
1650	За курортен хотел, почивен дом	Hotel
1660	За къмпинг, мотел	motel and campng area
1670	Незастроен имот за курортно-рекреационен обект	Not build are for toursim purposes
1700	За електроенергийното производство	Industry (energy)
1720	За друго производство на продукти от нефт, въглища, газ, шисти	Industry (mining)
1730	За черната и цветната металургия	Industry (metalurgy)
1740	За машиностроителната н машиннообработващата промишленост	Industry (mashinary)
1750	За химическата и каучуковата промишленост	Industry (cehmical)
1760	За дърводобивната и дървообработващата промишленост	Industry (wood processing)
1770	За целулозно-хартиената промишленост	industry (paper)
1780	За производството на строителни материали, конструкции и изделия	Industry (construction materials)
1790	За производството на стъкло	Industry (glass)

1800	За текстилната промишленост	Industry (textile)
1810	За шивашката промишленост	Industry (apparalel)
1830	За хранително-вкусовата промишленост	Industry (food)
1900	За животновъдна ферма	Farm
1910	Незастроен имот за производствен, складов обект	Wharehouse
2000	За археологически паметник на културата	Archological site
2010	За архитектурен паметник на културата	Architecture monument
2100	За първостепенна улица	First class street
2110	За второстепенна улица	Second class street
2120	За алея	aley
2130	За кръстовище	crossroad
2140	За площад	square
2150	За паркинг	parking
2170	За линии на релсов транспорт	railway
2500	Нива	Field
2510	Зеленчукова градина	Vegatable garden
2530	Оранжерия с трайна конструкция	Greenhouse
2550	Неизползвана нива (угар, орница)	Non used agricultural field
2560	Изоставена орна земя	Abandoned agricultural land
2570	Друг вид нива	Other agricultural land
2600	Овощна градина	Fruit tree garden
2610	Лозе	vineyard
2700	Ливада	meadow
2710	Неизползвана ливада	Non-used meadow
2720	Изоставена ливада	Abandoned meadow
2730	Друг вид ливада	Other kind of meadow
2800	Пасище	Pasture
2840	Гори и храсти в земеделска земя	Forests within agricultural land
2900	Иглолистна гора	Coniferos forests
2910	Широколистна гора	Broad-leaf forests
2920	Смесена гора	Mixed forests
3630	Депо за индустриални отпадъци	Dump site-industrial
3650	Депо за битови отпадъци (сметище)	Dump-site

4.16.3.   Transformation

4.16.3.1. Transformation method

It is possible to use several different tools for data transformation from the source data structure into the target data model. The target conceptual LandUse data model developed in WP4 is quite complicated. Therefore in the first stage of data deployment, EPF solved the transformation and harmonisation process directly by editing of target data structure.

Transformation and harmonisation steps:
- The target structure has been established on the basis of LandUse conceptual data model defined in WP4. Because this conceptual data model is not fully corresponding to the source data structure, some modifications have been proposed and only some of the fields have been used. The target database is ArcGIS GEODATABASE.
- The transformation (harmonisation) scheme have been defined in two steps
  - The scheme for attributes transformation
  - The scheme for values transformation – comparison of enumerations of the source and target data
- The target GEODATABSE tables have been filled on the basis of transformation (harmonisation) schemes

4.16.3.2. Transformation scheme

The first step in the harmonisation process is definition of the source and target features and attributes

The scheme below shows relations between target data and source data

In the case of EPF data, the blue fields is filled in one-time because each of these fields has the same value for all record. These types of fields have much more metadata then data character, but it could be important to have this type of information stored together with other data within the Plan4all project.

Red field means a field the most important for harmonisation process in Land Use Theme. The target field GeneralLandUseType will be the main field mandatory for every project

partner's region. The GeneralLandUseType is filled in by field N_USETYPE (Land Use Code) in the source data. The same source field (N_USETYPE) is used also for filling in the fields MacroClassificationOfLand and SpecificLandUseType. The differences consist in the diverse transformation of attribute's values (see attributes transformation)

The target field PlanFeature:InspireID is filled in by IMOT (Feature Number). There are also one field of indications that can be filled in the target data –HeightIndication – relevant field is again N_USETYPE, which identifies the height of the buildings (the codes 1000,1010 and 1020). The same situation is with the status field- the information must be extracted from the N-USETYPE filed (codes 1040, 1200, 1490,1670, 1910 indicate that those territories are still not build, but it is planned to be build for specific purposes)

4.16.4.   Publication

The data from the target ArcGIS Geodatabase database can be published in a web map application or through web services WMS and/or WFS. The data has been published in the UTM 35N WGS 84 projection. The colour presentation is based on the agreed colour scheme.

4.16.4.1. Web Map Client

EPF has published the harmonised data in the developed for the pland4all web map application that is based on Flex for ArcGIS server API. The displayed map layers:

- Plan Feature Status
- Land Use
- Height Indications
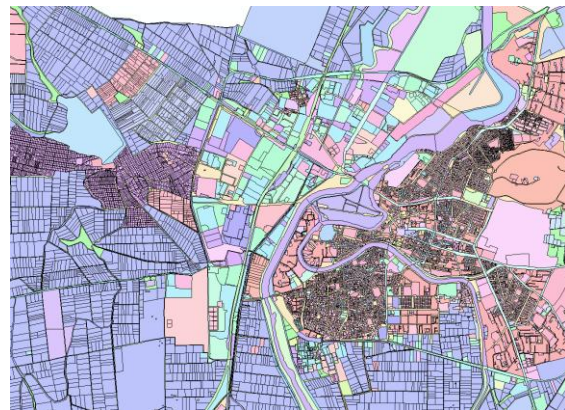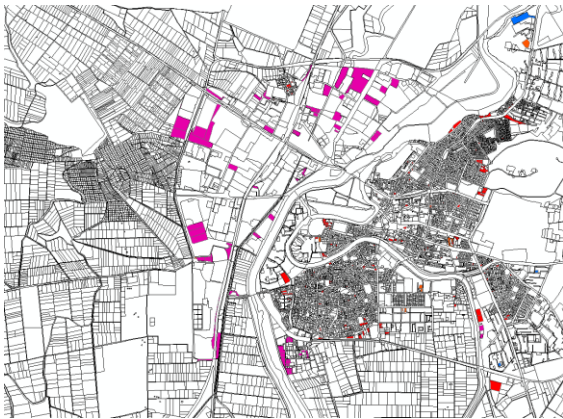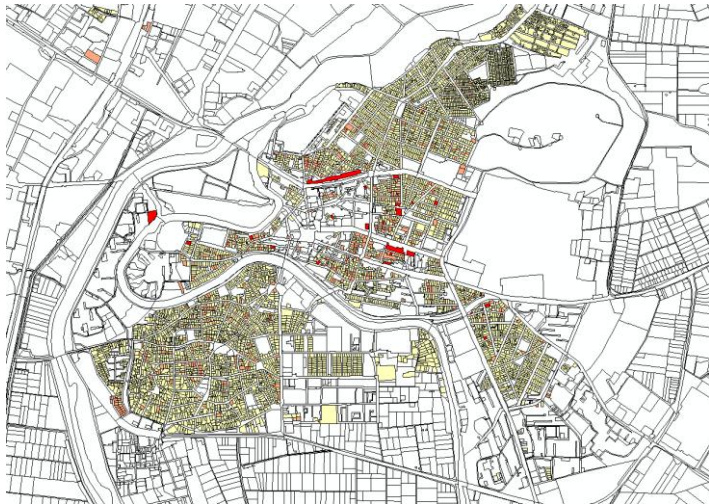
The web map application is available on the address: www.geoprtal-bg.com

4.16.4.2. Web Services

The harmonised data has been published also as Web Map Service (WMS) and Web Feature Service (WFS)
Links for the services:
WMS: http://213.91.166.6/arcgis/services/Plan4All_final/MapServer/WMSServer
WFS: http://213.91.166.6/arcgis/services/Plan4All_final/MapServer/WFSServer

4.16.5.   Results

4.16.5.1. Comments on Conceptual Models

The conceptual model Land Use proposed by WP4 is very complex and in the fact it covers the whole area of Territorial Planning, not only specific Land Use. From the other hand it is very difficult to propose an unified and standardized model for Landuse planning (or spatial planning), where almost all files and formats are unique and unstandartized even within a given country or district.
EPF has tested spatial planning data from Ymabol municipality using the simplified target data structure, EPFHF has created 3 harmonised data layers. The data should have got the same presentation as harmonised data from other regions.

4.16.5.2. Recommended changes

The initial problems with identification of relations between source and target structures have been mostly solved by simplification of the target data model.

4.17. ADR Nord Vest – LandCover

4.17.1. General description of source data

The source data selected by ADR Nord-Vest to be used for Land Cover transformation tests within the WP7 of the Plan4all project is the *vector map* of Cluj-Napoca administrative territorial unit, published by the European Environment Agency as GMES Urban Atlas (http://www.eea.europa.eu/data-and-maps/data/urban-atlas). The map is available in .SHP format, at scale 1:10.000, geographical projection ETRS_1989_UTM_Zone_34N. The source data was composed of the following files:

    ro002l_cluj_napoca.shp,
    ro002l_cluj_napoca.shx.
    ro002l_cluj_napoca.prj,
    ro002l_cluj_napoca.dbf.

The data was initially transformed into the Romanian geographic coordinate system Stereographic 70, but further published in WGS84, using an ArcGIS server and the web client application ArcGIS Viewer for Flex, launched from the regional geoportal http://geoportal.nord-vest.ro:8080/geoportal .

The un-harmonised source data was further processed to obtain the structure based on the Land Cover conceptual model. The agreed geographic coordinate system for the target data is WGS84. The target data can be further published the same way as the source data – in web map client and also through web services WMS or WFS using the regional Nord-Vest geoportal for spatial planning or the Plan4all geoportal.

4.17.2. Detail Description of Source Data

The source data for the harmonisation process is the original LandCover Urban Atlas file for Cluj-Napoca administrative territorial unit, in ETRS_1989_UTM_Zone_34N geographical projection. This file contains all important data regarding land cover specification. Following figure shows the source data.
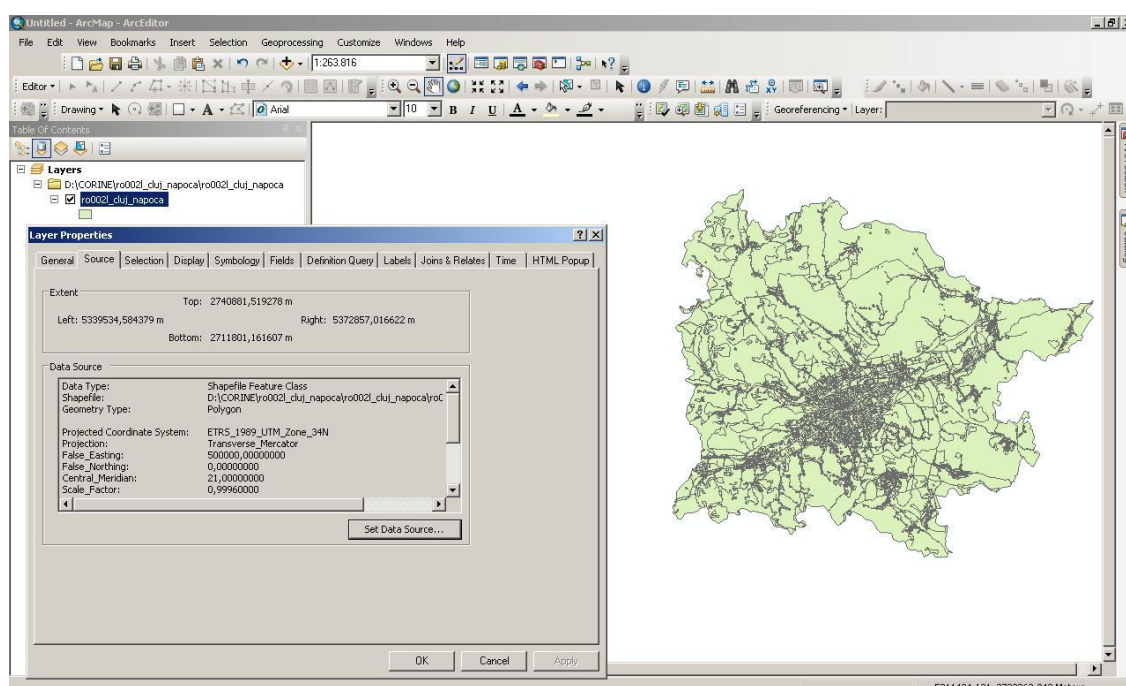
4.17.2.1. Scheme

The base structure of the source data is presented in table below. The fields are described in English and some examples of values are listed as well.

FID	Feature number (ID)	4133
Shape	Geometry	Polygon
CITIES	Town name	Cluj-Napoca
LUZ_OR_CIT	Intern code	RO002L
CODE	Land Cover type code according to Urban Atlas	2000
ITEM	Land Cover type name according to Urban Atlas	Agricultural+Semi-natural areas+Wetlands
PROD_DATE	Date	2009
SHAPE_LEN	Feature length	15001305,4096
SHAPE_AREA	Feature area	24984,797622

4.17.2.2. Important Features, Attributes and Code Lists

Following table describes source data features attributes and code lists important for the data transformation and harmonisation.

Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: CODE	
Value type:	number
Definition:	Land Cover Code for different types of areas – corresponds 1:1 to ITEM list
Enumeration	11100
	11210
	11220
	11230
	12100
	12220
	12230
	12400
	13100
	13300
	14100
	14200
	20000
	30000
	50000
	13400
	11300

Attribute: ITEM	
Value type:	text
Definition:	Category of the Land Cover area - corresponds 1:1 to CODE list
Enumeration	Continuous Urban Fabric (S.L. > 80%)
	Discontinuous Dense Urban Fabric (S.L. : 50% - 80%)
	Discontinuous Medium Density Urban Fabric (S.L. : 30% - 50%)
	Discontinuous Low Density Urban Fabric (S.L. : 10% - 30%)
	Discontinuous Low Density Urban Fabric (S.L. : <10%)
	Industrial, commercial, public, military and private units
	Other roads and associated land
	Railways and associated land
	Airports
	Mineral extraction and dump sites
	Construction sites
	Green urban areas
	Sport and leisure facilities
	Agricultural + Semi-natural areas + Wetlands
	Forests
	Water bodies
	Land without current use
	Isolated Structures

Attribute: PROD_DATE	
Value type:	Date time
Definition:	Date of production of map
Code List	Value

Attribute: SHAPE_AREA	
Value type:	double
Definition:	Area indication
Code List	Value

Attribute: SHAPE_LEN	
Value type:	double
Definition:	Length indication
Code List	Value

4.17.3. Transformation

4.17.3.1. Transformation method

In order to transform the source data geometry and attributes to match the target scheme, it is possible to use several different tools for data transformation from the source data structure into the target data model. The target conceptual LandCover data model developed in WP4 can be achieved using the proposed tools suggested by WP4 team (such as Model Builder), but for the first stage of data deployment, ADR Nord-Vest solved the transformation and harmonisation process directly by editing the target data structure; the LandCoverOriginalArea feature will be created in second stage.

a/ Understanding the source and target data:

   - description of source feature:

Source Data
Cluj-Napoca Urban Atlas

Name	Data type	Length	AllowNull	Precision	Scale
FIELD					
FID	Object ID		No		
Shape	Geometry		No		
CITIES	Text	254	No		
LUZ_OR_CIT	Text	254	No		
CODE	Text	7	No		
ITEM	Text	150	No		
PROD_DATE	Text	4	No		
SHAPE_LEN	Double			18	10
SHAPE_AREA	Double			18	10

- description of target feature LandCoverStandardisedArea (feature LandCoverOriginalArea still to be created)

LandCoverStandardiseArea

Name	Data type	Length	AllowNull	Precision	Scale
FIELD					
OBJECTID	Object ID				
Shape	Geometry		Yes		
InspireID	String	15	Yes		
Source	String	50	Yes		
Classification	String	21	Yes		
beginLifespanVersion	Date	8	Yes	0	0
endLifespanVersion	Date	8	Yes	0	0
SHAPE_Length	Double			0	0
SHAPE_Area	Double			0	0

b/ Transform source data to WGS84 geographic coordinate system
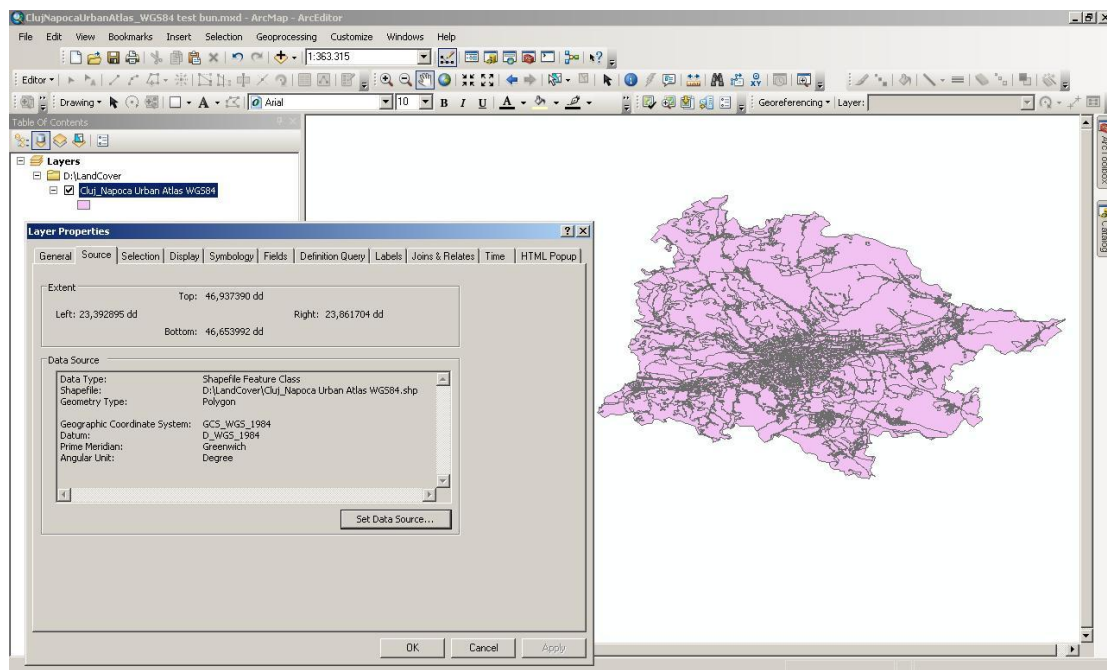
c/ Transform the source data geometry and attributes to match the target scheme

4.17.3.2. Transformation scheme

The scheme for attributes transformation, showing relations between target data (LandCoverStandardisedArea) and source data (Cluj-Napoca Urban Atlas) is presented in table below.

| *Source Data*	*LandCoverStandardiseArea*
Name	Name
FID	OBJECTID
Shape	Shape
	InspireID
	Source
CITIES	
LUZ_OR_CIT	
CODE	Classification
ITEM	
PROD_DATE	beginLifespanVersion
	endLifespanVersion
SHAPE_LEN	SHAPE_Length
SHAPE_AREA	SHAPE_Area

The scheme for values transformation – comparison of enumerations of the source and target data, is presented in table below. CorineLandCover nomenclature is used for the target data.

Source data ITEM	Source data CODE	CLC CODE	CLC LABEL
Continuous Urban Fabric (S.L. > 80%)	11100	111	Continuous urban fabric
Discontinuous Dense Urban Fabric (S.L. : 50% - 80%)	11210	112	Discontinuous urban fabric
Discontinuous Low Density Urban Fabric (S.L. : 10% - 30%)	11230		
Discontinuous Medium Density Urban Fabric (S.L. : 30% - 50%)	11220		
Discontinuous Low Density Urban Fabric (S.L. : <10%)	11240		
Industrial, commercial, public, military and private units	12100	1	Artificial surfaces
Other roads and associated land	12220	122	Road and rail networks and associated land
Railways and associated land	12230		
Airports	12400	124	Airports
Mineral extraction and dump sites	13100	13	Mine, dump and construction sites
Construction sites	13300	133	Construction sites
Green urban areas	14100	141	Green urban areas
Sport and leisure facilities	14200	142	Sport and leisure facilities
Agricultural + Semi-natural areas + Wetlands	20000	24	Heterogeneous agricultural areas
Forests	30000	31	Forests
Water bodies	50000	512	Water bodies
Land without current use	13400	990	Unclassified Land Surface
Isolated Structures	11300	990	Unclassified

The target structure has been established on the basis of LandCover conceptual data model defined in WP4. The target data was saved in .SHP format.
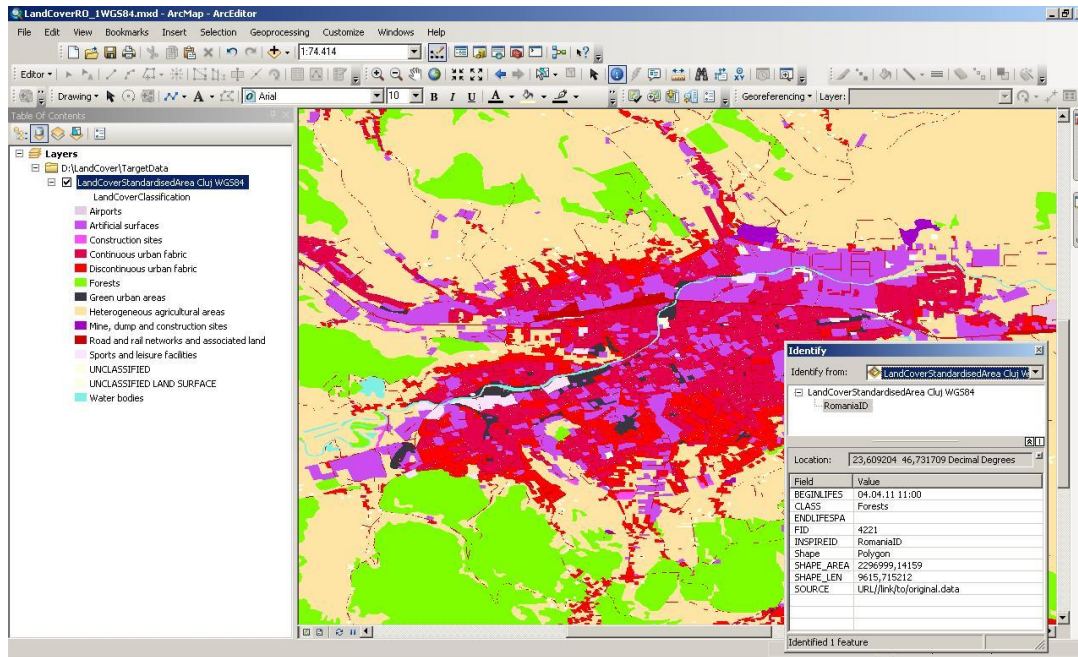
4.17.4.   Publication

The data from the target database can be published in a web map application or through web services WMS and/or WFS. The data has been published in the WGS84 projection. The colour presentation is based on the CLC colour scheme.

4.17.4.1. Web Map Client

The harmonised data has been uploaded for test reasons both on Plan4all server (using DataMan and MapMan applications) and on the regional server of ADR Nord-Vest (using ArcGIS Server). It was published in a simple web HSLayers client map viewer (see figure below), as well as in an ArcGIS Viewer for Flex client application.
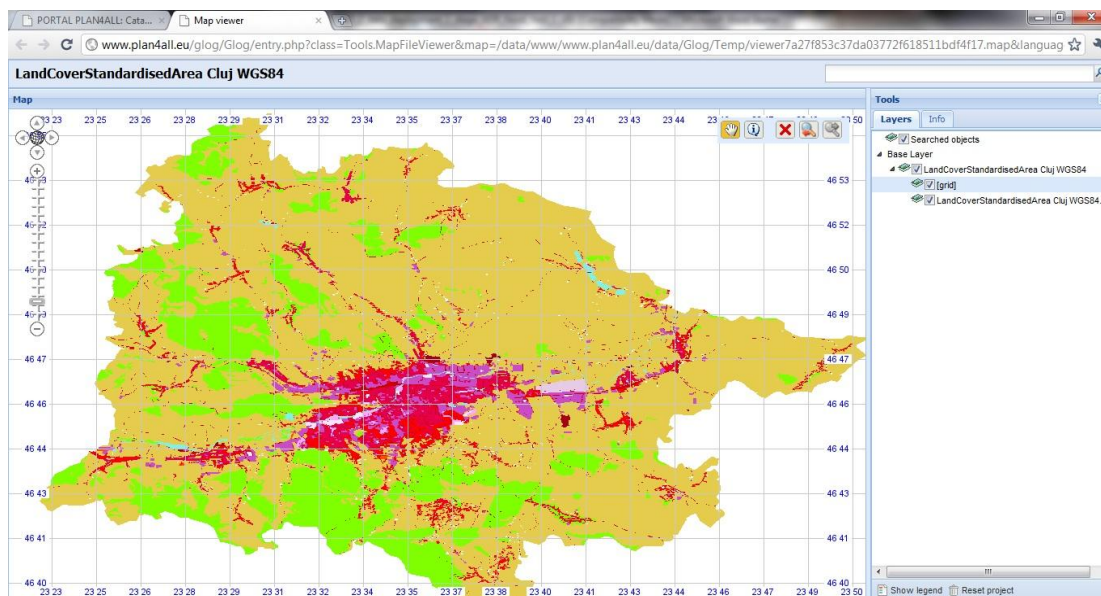
The web map viewer example can be accessed on :

http://www.plan4all.eu/glog/Glog/entry.php?class=Mapman.MapmanShowMap&mapProject
=mapproject16&instance=&language=en

4.17.4.2. Web Services

Services were published as Web Map Service (WMS) and Web Feature Service (WFS) on
pan-European Plan4all geoportal and on the regional geoportal Nord-Vest for spatial
planning. Examples are given below.

URLs for harmonised data services:

WMS: http://www.plan4all.eu/glog/Glog/entry.php?class=Mapman.MapmanWms&mapProje
ct=mapproject16&instance=&SERVICE=WMS&REQUEST=GetCapabilities

WMS service viewed on regional geoportal Nord-Vest for spatial planning:
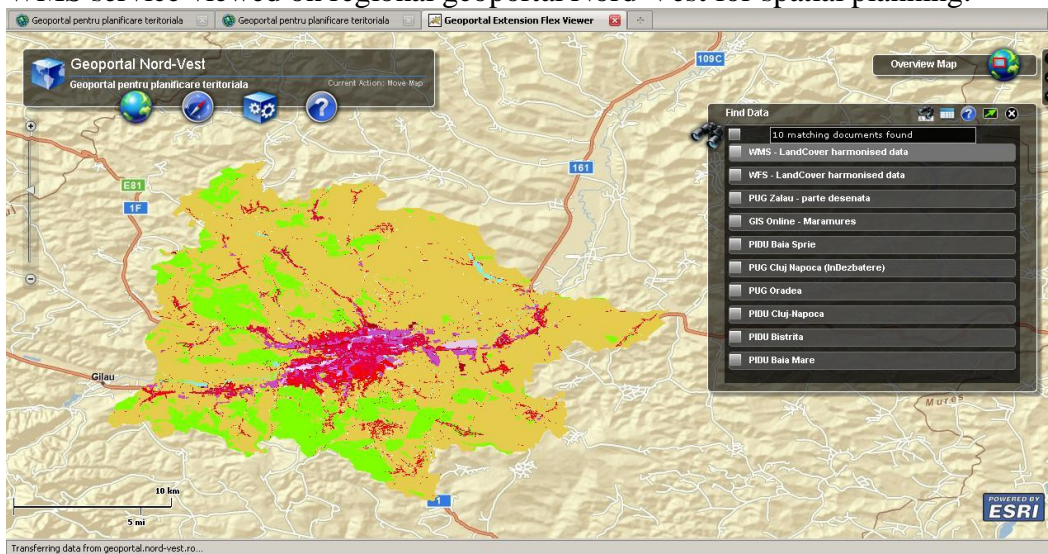
WFS: http://www.plan4all.eu/glog/Glog/entry.php?class=Mapman.MapmanWfs&VERSION
=1.0.0&mapProject=mapproject16&instance=&SERVICE=WFS&REQUEST=GetCapabiliti
es

WFS service viewed on Plan4all geoportal (one feature selected, color settings lost):
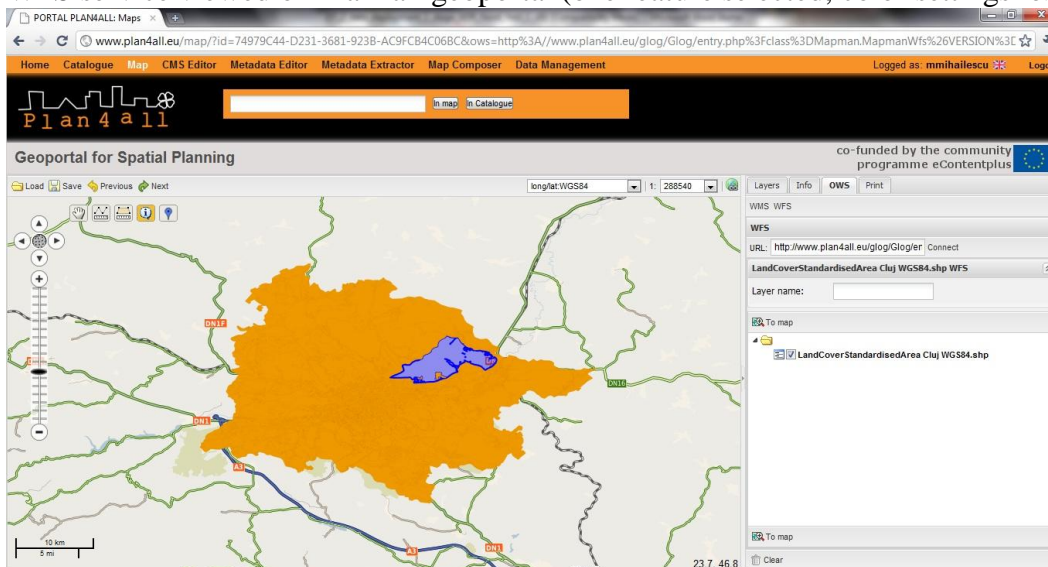
4.17.5. Results

4.17.5.1. Comments on Conceptual Models

No special remarks on the data model.

4.17.5.2. Recommended changes

The color scheme of CLC applies to LEBEL 3, but sometimes the transformation requires the use of a LEBEL 2 or even LEBEL 1 categories. There is no agreement on what color to use in these cases (see target "Heterogeneous agricultural areas" used as correspondent for source "Agricultural + Semi-natural areas + Wetlands").

4.18. ADR Nord Vest – LandUse

4.18.1. General description of source data

The source data selected by ADR Nord-Vest for Land Use transformation tests within the WP7 of the Plan4all project is an extract from the vector map of the General Urban Plan (PUG) of a commune from Cluj county. The plan covers all the villages of Baciu commune, including the area of Radaia village where the new ADR Nord-Vest office building was recently opened. The urban plan and its original data have been prepared by Informnet architecture company for the commune administration and the data is available in SHP formats at scale 1:5.000, geographical projection Stereographic 70 (the Romanian national geographical coordinate system).

PUG is composed of a graphical part (plans) and textual descriptions. For the present stage, no textual data was available. According to the national methodology in force since 1999, PUG plans cover the 5 mandatory thematic sections: 1. spatial location; 2. present situation – disfunctions; 3. urban regulations – zoning; 4. public utilities regulations; 5. land property. The source data used for the Land Use transformation tests is a small area extracted from section 2 of PUG Baciu.

The un-harmonised source data was processed to obtain the structure based on the Land Use conceptual model. The target data can be published in web map client and also through web services WMS or WFS using the regional Nord-Vest geoportal for spatial planning (http://geoportal.nord-verst.ro:8080/geoportal) or the Plan4all geoportal (www.plan4all.eu).

4.18.2. Detail Description of Source Data

The source data for the harmonisation process is composed from a number of SHP files representing an extract of 7.5 sqkm from section 2 of the General Urban Plan (PUG) of Baciu commune, in Stereographic 70 geographical projection. There are a number of files containing existent and planned general data regarding land use specification. Figure below shows the source data.
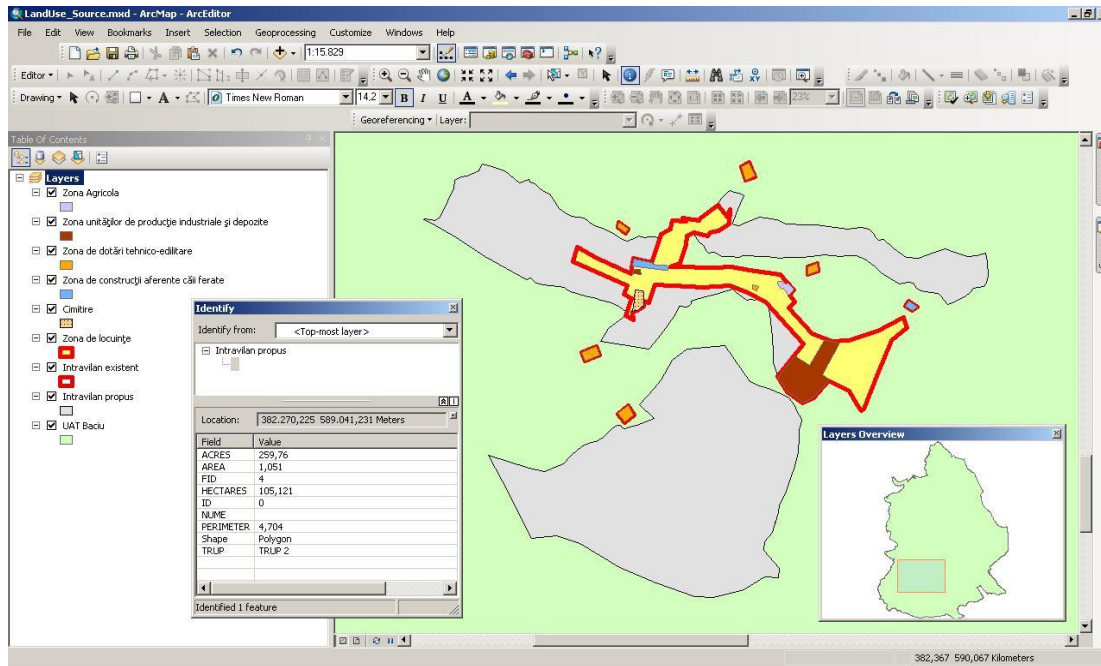
Only polygon geometry features were selected. An overview window shows the boundaries of the actual PUG Baciu, while a red marked rectangular area delimits the simple extract from PUG Baciu used for the test source data.

4.18.2.1. Scheme

The base structure of the source data is presented in table below. As expected, PUG is more a CAD than a GIS, even though the source data is in .SHP format. There are more feature types composing the urban plan, but only the common usual FID, Shape and ID fields are present in the data base, thus it is not relevant to describe the fields, but the feature classes of the source data.

Source data structure	Description
IntravilanExistent	Existent urban area
IntravilanPropus	Planned urban area
Zona unităţilor de producţie industriale şi depozite	Area with industrial production units and storehouses
Zona de dotări tehnico-edilitare	Area with utilities equipment
Zona de construcţii aferente căii ferate	Area related to railway constructions
Cimitire	Cemeteries
Zona de locuinţe	Residential area
Zona agricola	Area with agriculture destination
Zona de construcţii aferente căii ferate	Area related to railway stations
UAT Baciu	Borders of the territorial administrative unit of Baciu commune (includes the rectangular limits of the simple extract source data)

Note: Additional line or point type feature classes were excluded from the present test.

4.18.2.2. Important Features, Attributes and Code Lists

Table below describes source data features, attributes and code lists important for the data transformation and harmonisation.

IntravilanExistent	
Definition:	Existent delimited urban area
Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
IntravilanPropus	
Definition:	Proposed delimited urban area – additional or modified areas of existent urban area
Attribute: FID	
Value type:	double
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
Attribute: Area	
Value type:	number
Definition:	Area indication
Code List:	
Attribute: Perimeter	
Value type:	number
Definition:	Perimeter indication
Code List:	
Attribute: Trup	
Value type:	text
Definition:	Component part indication of the proposed urban area (independent geometries)
Code List:	
Zona unităţilor de producţie industriale şi depozite	
Definition:	Area with industrial production units and storehouses
Attribute: FID	
Value type:	number

Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
Zona agricola	
Definition:	Area with agricol units
Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
Zona de dotări tehnico-edilitare	
Definition:	Area with utilities equipment
Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
Cimitire	
Definition:	Cemetries
Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
Zona de locuinţe	
Definition:	Residential area
Attribute: FID	
Value type:	number
Definition:	ID of the feature

Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
Zona de construcţii aferente căii ferate	
Definition:	Area related to railway stations
Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
UAT Baciu	
Definition:	Administrative limits of Baciu commune
Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	

4.18.3. Transformation

4.18.3.1. Transformation method

The target conceptual LandUse data model developed in WP4 is quite complicated and does not have a simple direct correspondence with the source data urban plan. Therefore in the first stage of data deployment ADR Nord-Vest solved the transformation and harmonisation process directly by editing the target data structure.

a/ Understanding the source and target data:

- The source data (general urban plan) is a CAD representation, not a GIS, except for feature class IntravlanPropus. It is a multi-layer structure, features often overlaying one over another. Consequently, an intermediary processed source data was conceived, gathering all the source polygon type features, except the UAT Baciu (see previous description of source data). The original feature type names were transformed into attributes.

- The target structure has been established on the basis of LandUse conceptual data model defined in WP4. In this first stage, only mandatory (necessary) fields of the conceptual model have been used (see chapter 2.1 on Conceptual Model LandUse). Two main geometry feature classes have been created: PlanObject and FeatureObject. All the mandatory fields for this stage of transformation (agreed upon in WP7.2) were edited as attribute tables of these two features.

b/ Transform the source data geometry and attributes to match the target scheme.

c/ Transform target data to ETRS89_LAEA (EPSG:3035) projected coordinate system
The target data in original Stereographic 70 coordinate system has been transformed to _LAEA (EPSG:3035) .

4.18.3.2. Transformation scheme

The scheme for attributes transformation, showing relations between target data (PlanObject and PlanFeature, with mandatory attributes for this first stage) and source data (PUG Baciu features) is presented in the followings.
The attributes transformation is simple between the source UAT Baciu feature and target PlanObject (see table below)

Source Data	Target Data
UAT Baciu	**PlanObject**
FID	
	InspireID
	Title
Shape	*Geometry*
	LegislationReference
	CountryCode

The transformation from the other source features to target PlanFeature passes an intermediary stage of gathering all objects into one source feature class, with a new attribute Source feature:

Source feature	
Definition:	Data from all source files, except UAT Baciu
Attribute: FID	
Value type:	number
Definition:	ID of the feature
Code List:	
Attribute: Shape	
Value type:	polygon
Definition:	Type of the geometry of the land use indication
Code List:	
Attribute: Type	
Value type:	text
Definition:	Type of the land use indication

| Enumeration	IntravilanExistent
	IntravilanPropus
	Zona unităţilor de producţie industriale şi depozite
	Zona de dotări tehnico-edilitare
	Zona Agricola
	Cimitire
	Zona de locuinţe
	Zona de construcţii aferente căii ferate

The scheme for values transformation – comparison of enumerations of the source and target data, is presented in table below.

Source feature	GeneralLandUseType
Zona de locuinţe	Residental
Zona unităţilor de producţie industriale şi depozite	Industrial
	Commercial
Cimitire	Services
	Green
	Natural
Zona agricola	Agriculture
	Water
Zona de construcţii aferente căii ferate	TransportInfrastructure
	MiningQuarrying
Zona de dotări tehnico-edilitare	TechnicalInfrastructure
	Other

Source feature	MacroclassificationOfLand
IntravilanExistent	Urbanised
IntravilanPropus	ToBeUrbanised
	Rural
	Natural
	Other

Source feature	Status
IntravilanExistent	Planned
IntravilanPropus	Existing

The target structure has been established on the basis of LandUse conceptual data model defined in WP4. The target data was saved in .SHP format. The color code was selected according to WP7:T7.2 indication on behalf of Olomouc.
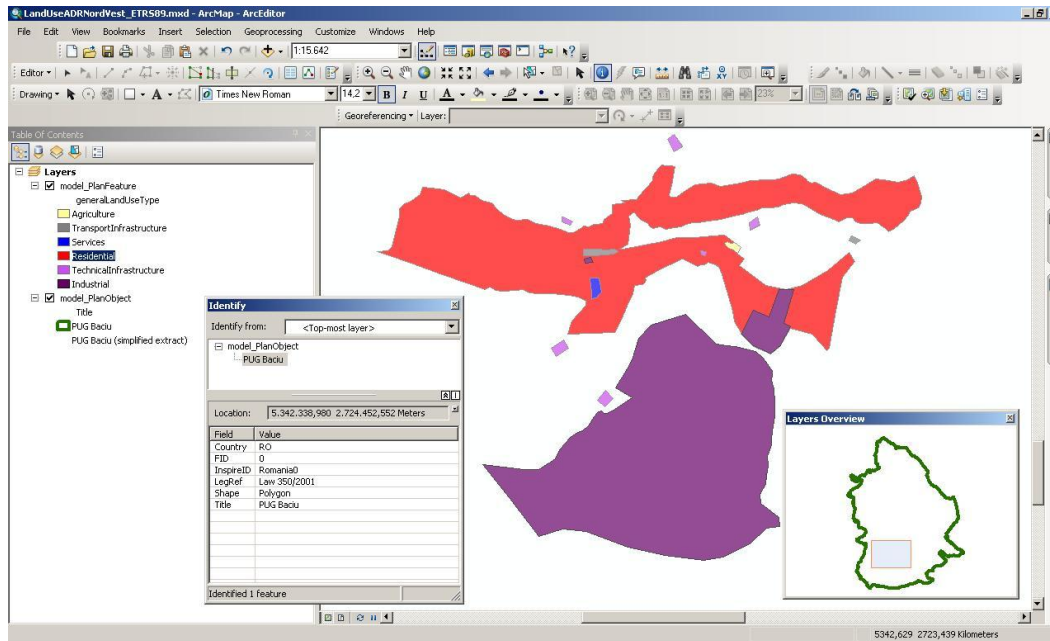
4.18.4.   Publication

The data from the target database can be published in a web map application or through web services WMS and/or WFS. The data has been published in the ETRS1989_LAEA projected coordinate system (EPSG:3035), as required for target data. The colour presentation is based on a particular scheme, to be modified and agreed later during the second stage of deployment.

4.18.4.1. Web Map Client

The harmonised data is published in a simple web map application that is based on Flex Viewer client.
The web map application is available on the regional geoportal address:
http://geoportal.nord-vest.ro/ArcGIS/rest/services/ADRNordVest/LandUse_test/MapServer

4.18.4.2. Web Services

The harmonised data are published also as Web Map Service (WMS) and Web Feature Service (WFS) on the regional geoportal after the final agreement on color codification.

URLs for harmonised data services:
WMS: http://geoportal.nord-vest.ro/ArcGIS/services/ADRNordVest/LandUse_test/MapServer/WMSServer?request=GetCapabilities&service=WMS
WFS: http://geoportal.nord-vest.ro/ArcGIS/services/ADRNordVest/LandUse_test/MapServer/WFSServer?request=GetCapabilities&service=WFS

4.18.5. Results

4.18.5.1. Comments on Conceptual Models

Usually, the digital urban plans are CAD representations, not GIS. They are conceived on layers of information (either DWG, DXF or SHP formats), with no data base connected, even if they are edited on a GIS platform. Consequently, it is difficult to establish a direct correspondence between the target data with only two main geometry feature classes (PlanObject and FeatureObject) and the source data, with many overlaying different features, standing for each type of classification in the frame of an urban plan.

4.18.5.2. Recommended changes

The data model transposed into actual geometry is presently interpreted as described in the above mentioned target data. There is no direct correspondence between usual urban plans structure and the proposed target data structure. Using the same data model, but interpreted as more features overlaying one another, each one representing a class with specific attributes, might represent at least a possible approach to be studied.

4.19. Lazio

4.19.1. General description of source data

The pilot chosen by Lazio Region regards the theme Land Cover. The Land Cover Map of Lazio Region has been developed within the EU CORINE Land Cover project. The entire territory of the Region (1,720,300 hectares) has been mapped down to the fourth level of detail, obtaining 72 land cover classes, with a minimum mapped area of one hectare. The current Land Cover Map of the Region is therefore an in-depth study which follows the original survey carried out by the EU, and has been implemented within the works regarding the drafting of the Regional Territorial Landscape Plan.

The map has been developed through visual interpretation of "Terraitaly" digital ortophotos, dating to the 1998-1999 flights, and of the 2001-2001 Landsat 7 ETM+ images.

4.19.2. Detail Description of Source Data

4.19.2.1. Scheme

The tables with the attributes that will be transformed are shown below. The description of the attribute, an example of attribute value and a translation in English (when needed) are provided for each field.

Source field	Description	Attribute example	Translation of attribute
CODICE	Land cover class code	141	
CLASSE	Land cover class name	Aree verdi urbane	Green urban areas
CODICE ISTAT	ISTAT (Italian Statistical Institute) code	12058091	
PERIMETRO	Perimeter length (metres)	613,975	
AREA	Area (hectares)	2,216	

4.19.2.2. Features and Code Lists

The following table describes source data features, attributes and code lists important for data transformation and harmonisation.

Feature: carta_uso_del_suolo	
Definition:	Land cover
INSPIRE theme:	Land Cover
Attribute: CODICE	
Value type:	String
Definition:	Land cover class code
Code List	1111
	1112
	1121
	1122
	1123
	1211
	1212

1213
1214
1215
1221
1222
1223
1224
1225
1226
123
124
131
1321
1322
1331
1332
141
1421
1422
1423
1424
143
2111
2112
2113
2121
2122
2123
221
222
223
22411
22412
2242
2243
231
241
242
243
311
312
313
321
322
323
3241
3242
331
332
333
3341

	3342
	3343
	411
	421
	422
	5111
	5112
	5121
	5122
	5123
	5124
	522
	523

Attribute: CLASSE

Value type:	String
Definition:	Land cover class name
Code List	Tessuto residenziale continuo e denso
	Tessuto residenziale continuo e mediamente denso
	Tessuto residenziale discontinuo
	Tessuto residenziale rado
	Tessuto residenziale sparso
	Insediamento industriale o artigianale
	Insediamento commerciale
	Insediamento dei grandi impianti di servizi pubblici e privati
	Insediamenti ospedalieri
	Insediamenti degli impianti tecnologici
	Reti stradali territoriali con zone di pertinenza
	Reti ferroviarie comprese le superfici annesse
	Grandi impianti di concentramento e smistamento merci
	Aree per impianti delle telecomunicazioni
	Reti per la distribuzione, la produzione e il trasporto di energia
	Reti ed aree per la distribuzione idrica compresi gli impianti di captazione, serbatoi e stazioni di pompaggio
	Aree portuali
	Aree portuali ed eliporti
	Aree estrattive
	Discariche e depositi
	Depositi di rottami a cielo aperto
	Cantieri e spazi in costruzione e scavi
	Suoli rimaneggiati ed artefatti
	Are urbane verdi
	Campeggi e bungalow
	Strutture di sport e tempo libero
	Parchi di divertimento
	Aree archeologiche
	Cimiteri
	Seminativi In Aree Non Irrigue
	Vivai in aree non irrigue
	Colture orticole in pieno campo, in serra e sotto plastica in aree non irrigue
	Seminativi in aree irrigue

Vivai in aree irrigue
Colture orticole in pieno campo, in serra e sotto plastica in aree irrigue
Vigneti
Frutteti e frutti minori
Oliveti
Pioppeti, saliceti e altre latifoglie
Conifere a rapido accrescimento
Castagneti da frutto
Altre colture (eucalipti)
Superfici a copertura erbacea densa (graminacee)
Colture temporanee associate a colture permanenti
Sistemi colturali e particellari complessi
Aree prevalentemente occupate da coltura agraria con presenza di spazi naturali importanti
Boschi di latifoglie
Boschi di conifere
Boschi misti di conifere e latifoglie
Aree a pascolo naturale e praterie d'alta quota
Cespuglieti ed arbusteti
Aree a vegetazione sclerofilla
Aree a ricolonizzazione naturale
Aree a ricolonizzazione artificiale
Spiagge, dune e sabbie
Rocce nude, falesie, affioramenti
Aree con vegetazione rada
Boschi percorsi da incendi
Altre aree della classe 3 percorse da incendi
Aree degradate per altri eventi
Paludi interne
Paludi salmastre
Saline
Fiumi, torrenti e fossi
Canali e idrovie
Bacini senza manifeste utilizzazioni produttive
Bacini con prevalente utilizzazione per scopi irrigui
Bacini con prevalente altra destinazione produttiva
Acquicolture
Lagune, laghi e stagni costieri
Estuari
Aree al di là del limite delle maree più basse

4.19.3.   Transformation

Data transformation will be carried out in the next reporting period.
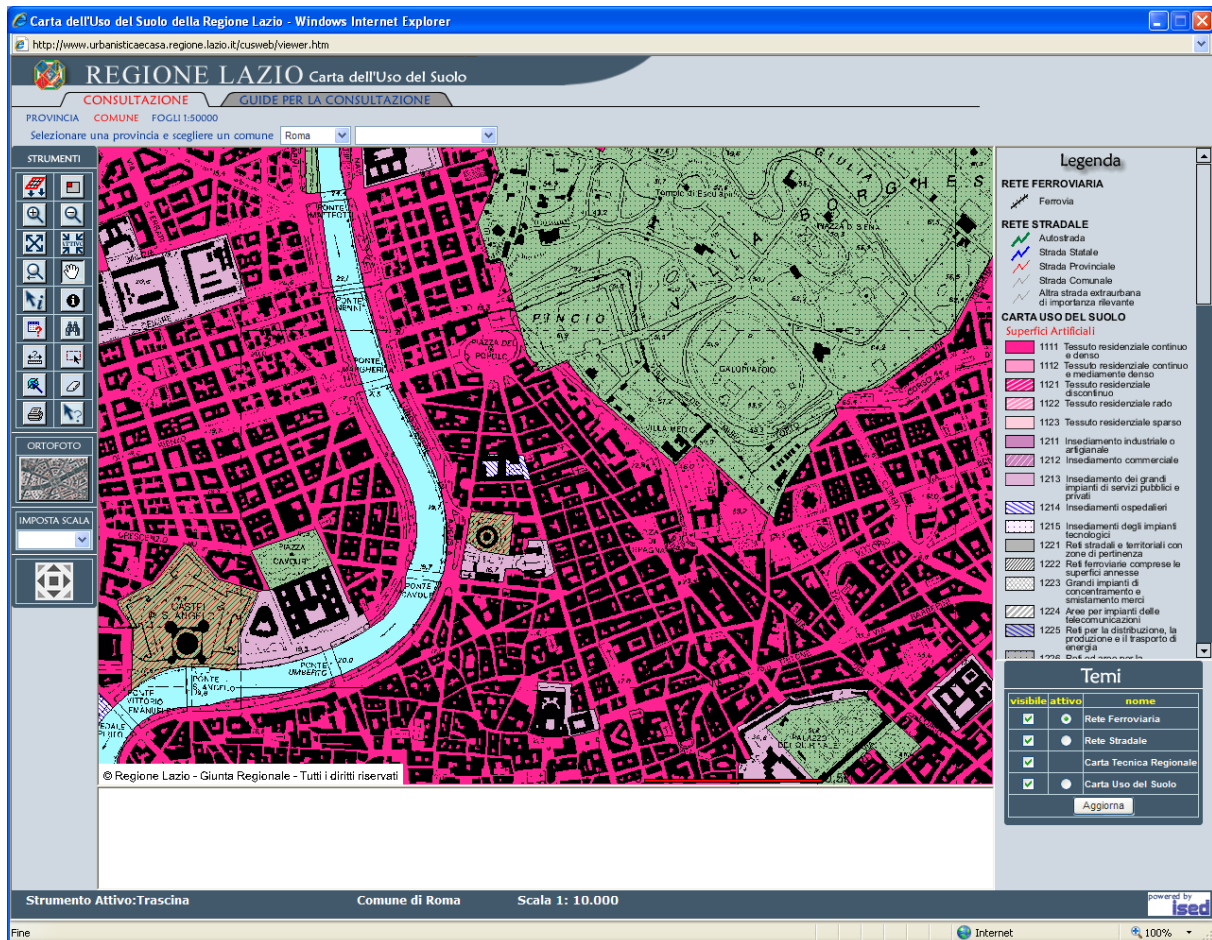
4.19.4.   Publication

This section contains some information about the technologies through which the source data is published.

4.19.4.1. Web Map Client

The site http://www.urbanisticaecasa.regione.lazio.it/cusweb/viewer.htm allows to access a WebGIS service for consulting the Land Cover Map. By clicking on each polygon, it is possible to obtain, besides a description of the data attributes, a detailed description of the characteristics of each land cover class and the rules for the interpretation of the related images.

Other layers of this WebGIS regard transport infrastructure, orthophotographs, and the regional topographic map.

A screenshot of the Land Cover Map WebGIS

The detailed description of the land cover classes

4.19.5.   Results

The results of data transformation will be reported in the next reporting period.

4.20. MEDDTL (ex MEDDAT) – LandUse – Area Management

4.20.1. General description of source data

The general principle MEDDTL (see Figure 4.18-1) is following takes benefit of the investment made by local administration to digitize spatial plans (PLU - plan local d'urbanisme) according to the recommendation that the National council for geographic information (CNIG) has been producing for several years. These investments are done either through sub-national spatial data infrastructures such as in the Region Pays de la Loire (GéoPAL) or by MEDDTL local offices through the ministerial SDI.

The second source of information taken into consideration are the easements for public interest (SUP servitudes d'utilité publiques) that are produced by the MEDDTL local offices in order to make them available to local governments (Porté à connaissance). They will conform to a standard under finalisation (public hearing) under the CNIG auspices[1].

All these datasets will be catalogued on the national geoportal[2] and can be co-visualised through WxS services.
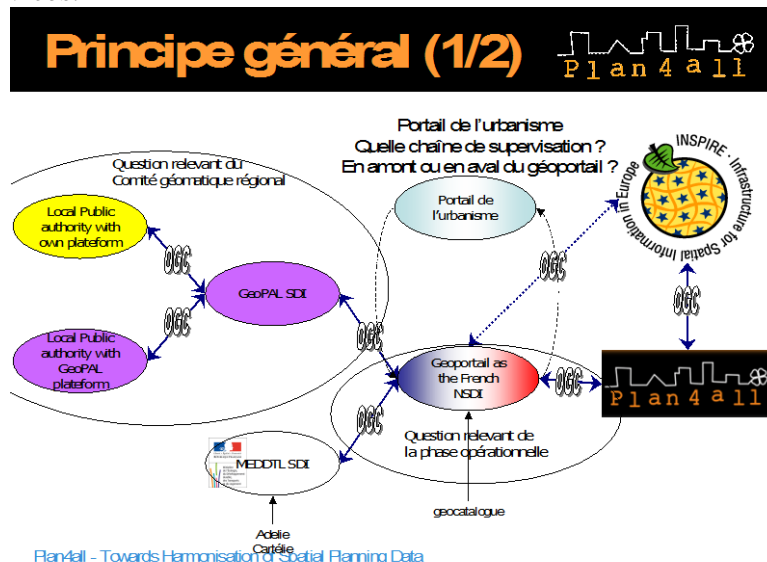

Figure 4.18-1 general principle of the experimentation in MEDDTL

Within the WP7 of the Plan4all project, MEDDTL tests a pilot for spatial plan (LU[3] theme) and easements for public interest (AM[4] theme) data in use for the Land law enforcement (land right implementation – application du droit des sols) that the ministry is in charge of on behalf of local governments. The Spatial plan data are several municipality urban plans (PLU) in the CNIG standard. The original data have been prepared by local governments and then digitised according the CNIG structure by MEDDTL local units. The easement (SUP) data come from data digitised by the MEDDTL local units according to the CNIG structure.

The objective of the experimentation is given by Figure 4.18-2.

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1 http://www.cnig.gouv.fr/Front/index.php?RID=142

2 http://www.geoportail.fr/

3 Annex III theme 4: Land Use

4 Annex III theme 11: Area Management/Restriction/Regulation Zones and Reporting Units
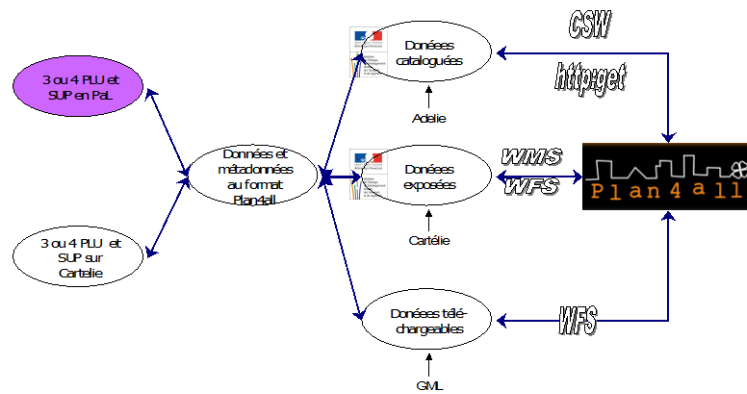
Figure 4.18-2: practical principle

For the experimentation data are the test data already available for the pilot of the GeoADS software stored as MapInfo tables in the COVADIS structure which is the internal schema implementing the CNIG standard. Through the get feature and the get capabilities of the WFS server that make the spatial plan accessible, GML data are created. Knowing the Plan4all standard, a transformation mechanism transform the data into GML consistent with Plan4all land use standard. Figure 4.18-3 provides a view of the mechanism.

Figure 4.18-3 transforming spatial plan into Plan4all data model

4.20.2. Detail Description of Source Data

4.20.2.1. Scheme
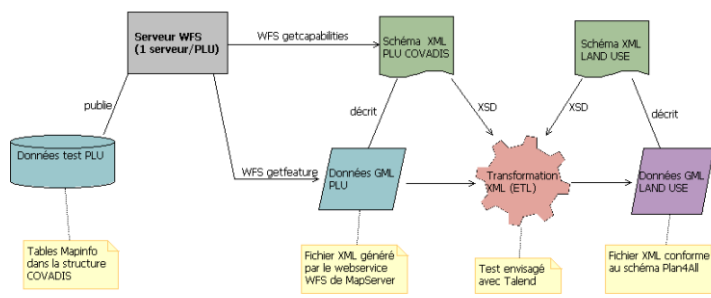
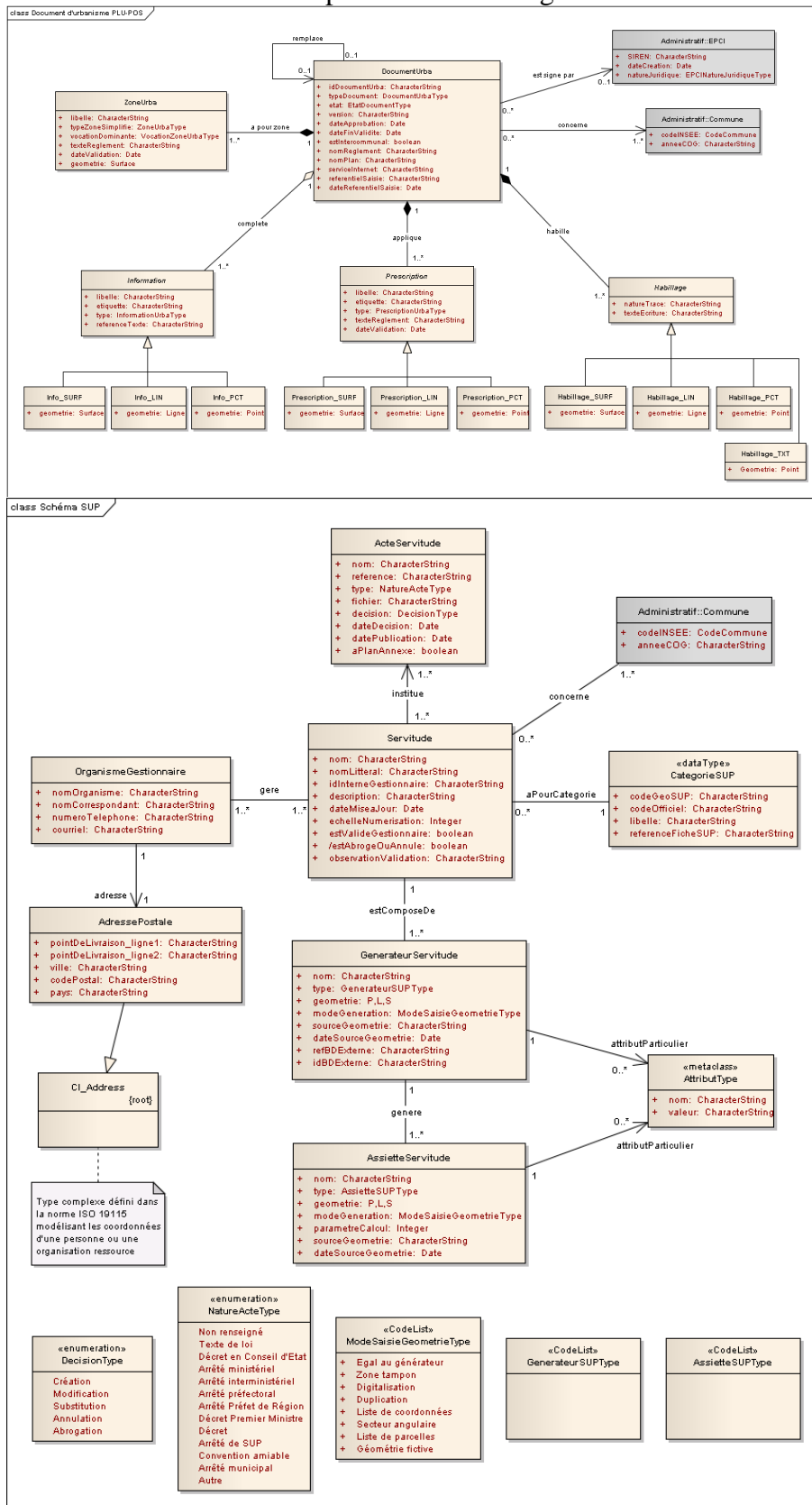The base structure of the source data is presented in the Figure 4.18-4.

Figure 4.18-4: UML diagram of the CNIG standard for spatial plans and easements

The complete specification of the CNIG standard[1] as well as the COVADIS implementation[2] for PLU are available from the Internet.

The models has four main geographic feature types: the spatial plan (DocumentUrba), the zoning (ZoneUrba) and the supplementary regulations (Information, Prescription) for the PLU model and the easements (Servitude) for the SUP model.

The analysis provided a mapping of the Plan4all concepts of the Land Use and Area Management models with the CNIG ones. Figure 4.18-5 illustrate the Mapping.
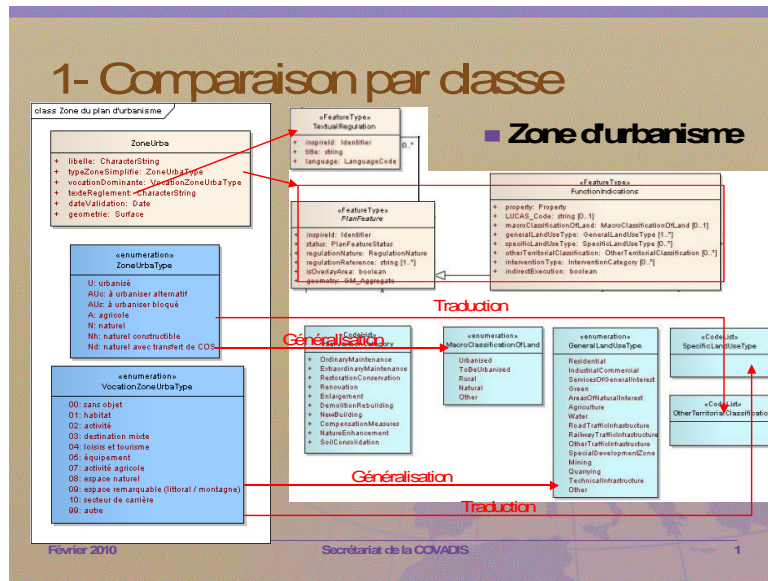
Figure 4.18-5: Mapping CNIG and Plan4all models

4.20.2.2. Important Features, Attributes and Code Lists

Figure 4.18-6 describes source features types important for data transformation and harmonisation.

Informations administratives sur les processus de planification Étapes de procédure + état administratif des plans + autorités responsables	*Classes COVADIS concernées* std PLU : <DocumentUrba> std Zonages : <ProcedureUrba>
Information géographique de planification Zone de construction réglementée + contraintes ou conditions affectant l'usage du sol + informations non contraignantes	*Classes COVADIS concernées* std PLU : <ZoneUrba>, <Prescription>, <Information> std SUP : <SUP> & <Assiette>
Documents Documents textuels précisant les objectifs du plan ou les règles s'y appliquant	*Classes COVADIS concernées* std PLU : Ø, mais lien d'accès au règlement général du PLU
Information graphique Information graphique utile à l'édition du plan	*Classes COVADIS concernées* std PLU : <Habillage>

Figure 4.18-6: correspondence between Plan4all model sand CNIG models

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4.20.3. Transformation

4.20.3.1. Transformation method

4.20.3.2. Transformation scheme

The first step in the harmonisation process is definition of the source and target features and attributes
Figure 4.18-7 to Figure 4.18-9 show relations between target data and source data. Selected parts of CNIG model appear on the left side of each figures in a UML-like form, Plan4all corresponding elements on the right side. Coloured arrows illustrate the mapping. Sometimes the mapping is one to one, sometimes it requires translating (traduction) or generalisation (généralisation)
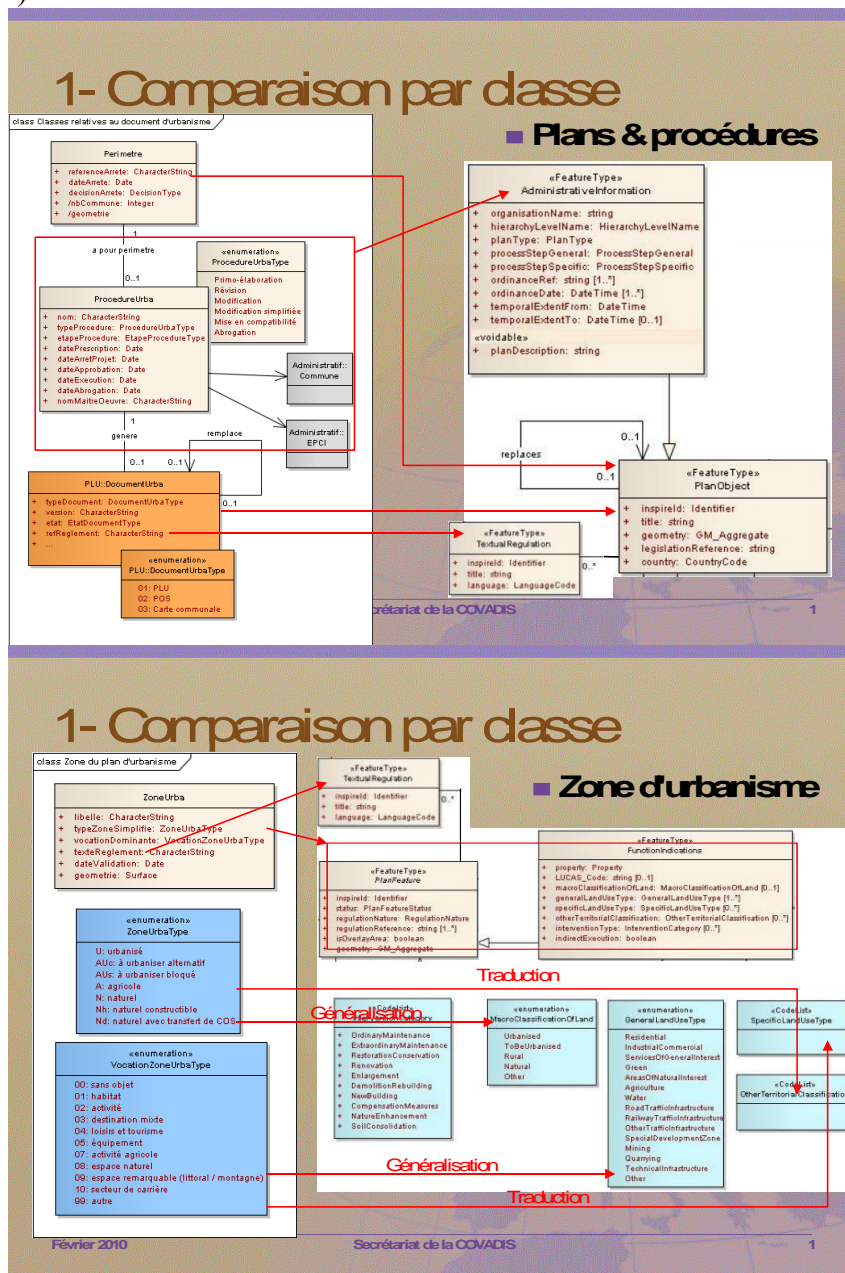
Figure 4.18-7: Correspondence for spatial plans, procedures and zoning
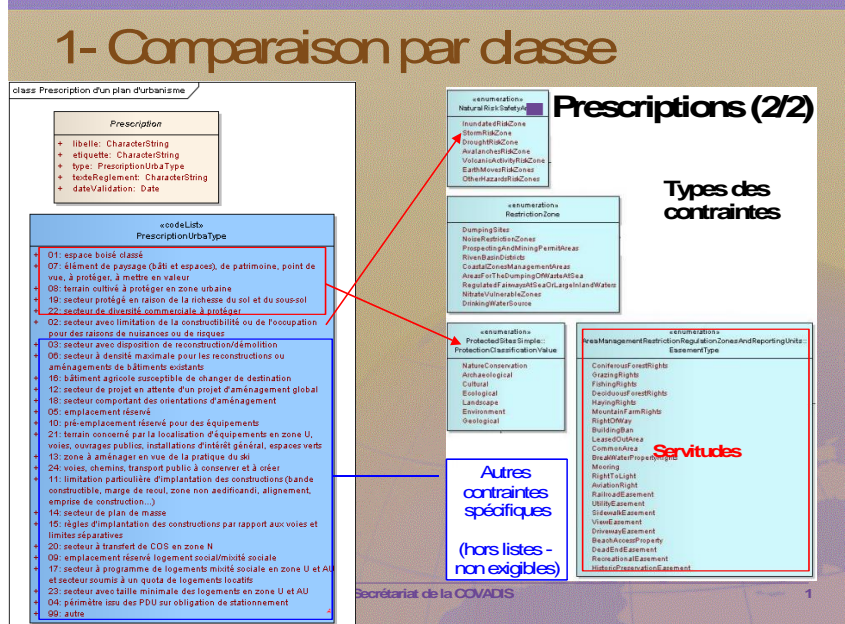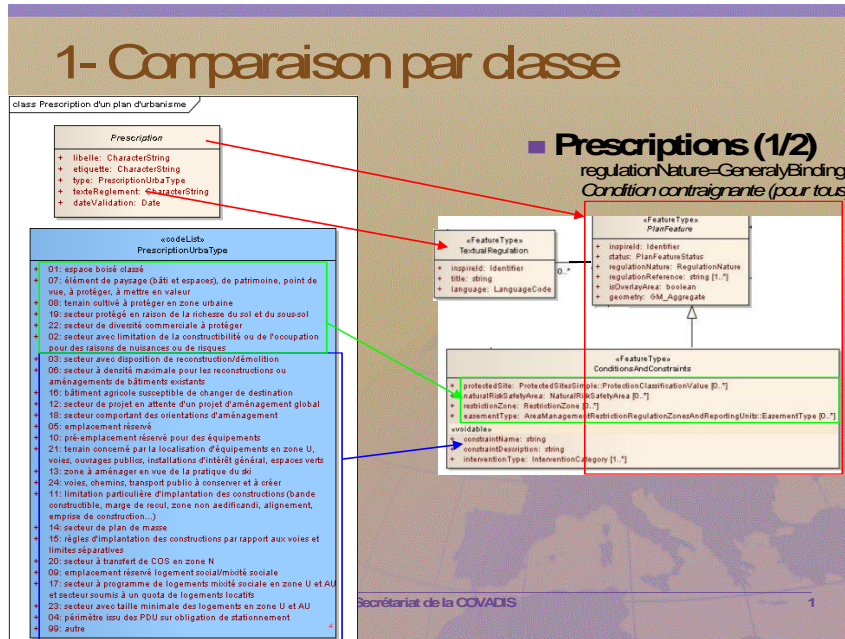
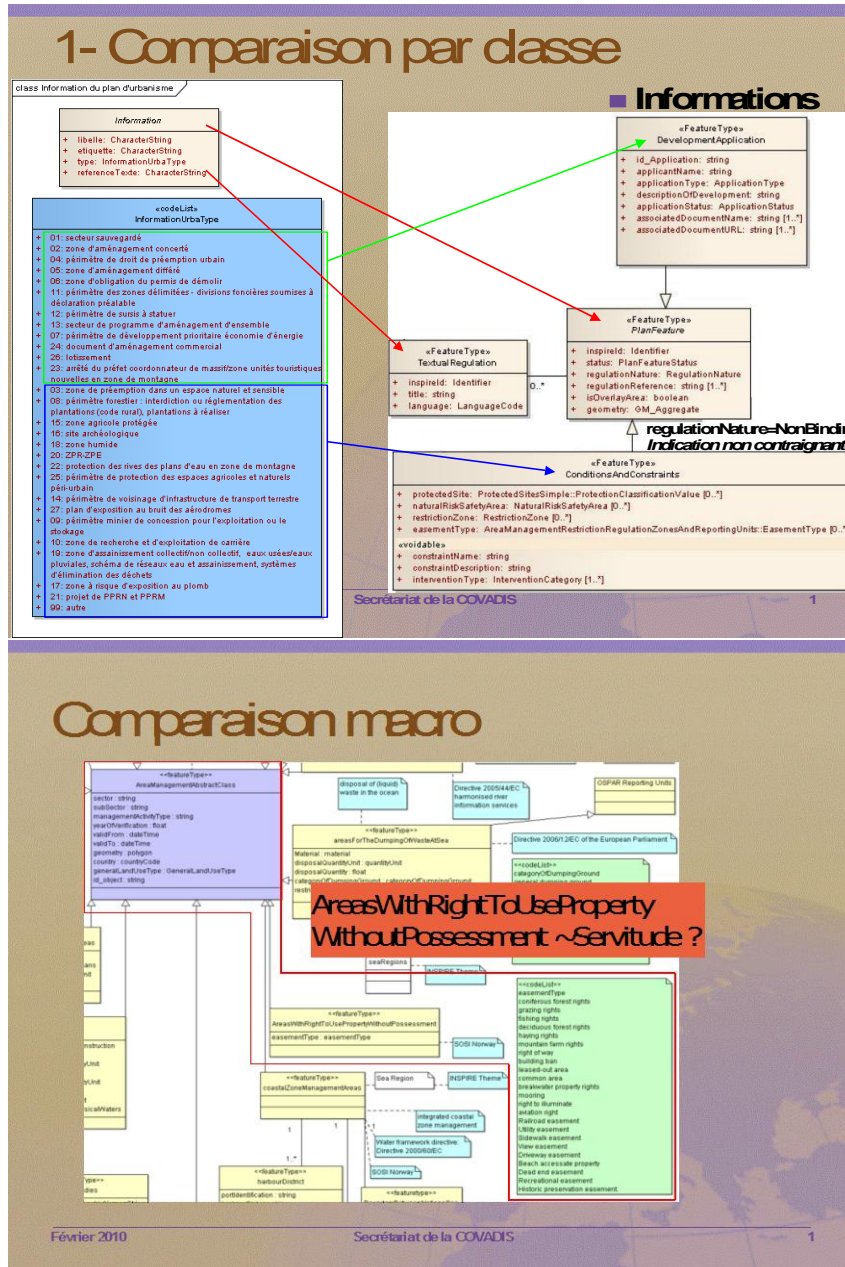Figure 4.18-8: correspondence for prescriptions

Figure 4.18-9: correspondence for non binding regulation and easements

4.20.4. Publication

The data from the target database can be published in a web map application or through web services WMS and/or WFS. The data will be published in the French projection (EPSG:xxx). The colour presentation is based on the agreed colour scheme.

4.20.5. Results

4.20.5.1. Comments on Conceptual Models

The conceptual model proposed by WP4 for Land Use is very complex and requires semantic interpretation and careful scrutiny or enumerations by planning experts. Definitions are sometimes loose and require interpretation. The comparison has been done one way (from CNIG model to Plan4all model). It means that no investigation has been made to identify datasets that could populate all Plan4all models elements. It also means that from the spatial plans that are available it is not possible to populate all the attributes and feature types of Plan4all model. For example, some plan4all attributes are only in the textual part of the regulations and not in the model. Missing data includes the tools and projects as well as the building permits.

The conceptual model proposed by WP4 for Area Management/Restriction/Regulation Zones and Reporting Units is even more complex. The easement for general interest (SUP : servitudes d'utilité publique) is only a small part of the model as they seams to correspond to the concept of « AreasWithRightToUsePropertyWithoutPossessment ». But on the other hand the buffer around some of the easements might be seen as « NaturalRiskSafetyArea » or « RestrictionZone »or « ProtectedSitesSimple ». It has been difficult to map the type of SUP into the enumeration EasementType as the French approach is based on the nature of the geographical object that generates and easement (historical monument, utilities) and the Plan4all approach relates to the type of consequence the easement has on the land use (e.g. BuildingBan, SideWalkEasement). And some of the Plan4all definitions are really sufficiently explicit! Few Plan4all feature types have been taken into consideration:

- <RestrictedAreaAroundDrinkingWaterSources> = servitudes de protection des points de captage
- <AreasWithRightToUsePropertyWithoutPossessment> the term 'right' has been considered as right to use a piece of land even-though not being the land lord (e.g. right of way) as well as restriction on the possible use of a piece of land that is imposed to the land lord by a third party (e.g. hight limit to buildings due to airport proximity). This feature type could be renamed <AreasWithConstraintsToUseProperty>
- <OtherManagementRegulationRestrictionAreas

As the overall aim of the experimentation is to get prepared to the annex III specification, it has been decided not to take into account elements of Plan4all models that are likely excluded from the draft INSPIRE data specification

4.20.5.2. Recommended changes

For the next step of the process it should be possible to get closer to the INSPIRE data specification that will be made for SDIC and LMO comments on June the 20th for a four months testing period ending on October the 21st of 2011. It might be necessary to ask for a 3 months extension of the Plan4all project to ensure finalising the lessons learnt from the INSPIRE testing period.

For the testing period two approaches need to be taken into account (see Figure 4.18-10).

The pragmatic approach will be to test a Web Processing Service that would be able transforming Plan4all compliant datasets into INSPIRE compliant datasets. The consortium should investigate how to perform such a transformation from Plan4all to INSPIRE.

But in the future all local governments having spatial planning data in digital form will have to conform to INSPIRE data specification from mid 2014 onwards for any **new** dataset and from mid 2019 onwards **all** dataset. It is likely that at national level Web Processing Services will be developed to transform datasets compliant to national standards into datasets compliant to INSPIRE. That will automatically enable any local governments to be INSPIRE compliant as soon as they are national standard compliant. The consortium should also investigate the possibility to transform INSPIRE datasets into Plan4all datasets. That will be a paper study as no INSPIRE compliant datasets will exist during the time allocated to the project.
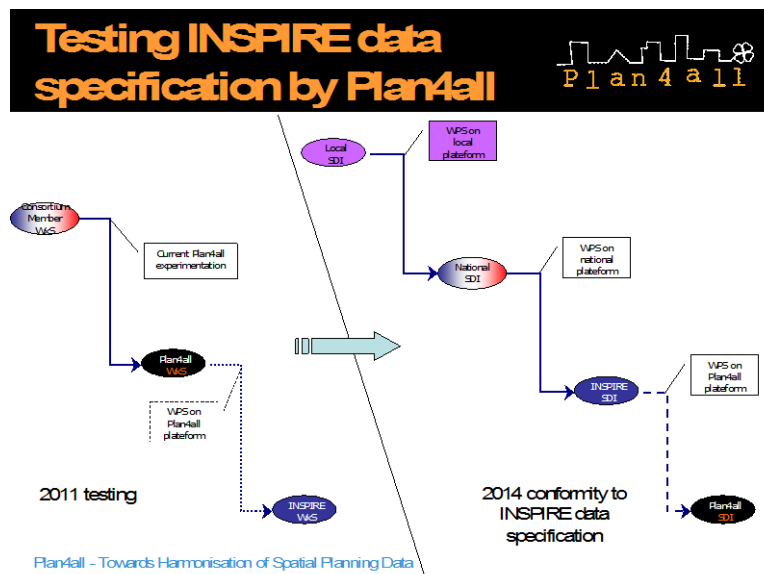
Figure 4.18-10

5. Results Summary

In the first stage of Task 7.2, the effort of the T7.2 team has been focused mainly on testing conceptual models and data deployment of Land Use and Land Cover. The testing and deployment covered several steps from description of the original (source) data structure, through proposals for a transformation table to target data structures that represent harmonised data. To create these target structures, the conceptual models elaborated in WP4 have been used.
The harmonised data has been published in web map clients and/or through standardised OGC web services WMS and WFS.

The following is an overview of data harmonisation steps according to Plan4all in the regions:

	3 Olomouc	4 TDF	6 LGV Hamburg	8 ZPR	9 PROVROMA	10 FTZ	11 GEORAMA	12 NASURSA	14 Gijon	MAC	17 AVINET	18 DIPSU	19 EPF	20 ADR Nord Vest	21 Lazio	22 HF	24 MEDDTL
1.General description of source data	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x
2.Detail description of the source data	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x
3.Transformation (scheme, text, methods)	x	x	x	x	x	x		x	x		x		x	x		x	
4.a Publication in a Web Map Client	x	x	x	x	x	x			x	x	x	x	x	x		x	
4.b Publication as a Web Service	x	x		x	x	x		x	x	x		x	x	x		x	

During the first stage, the harmonisation process has been tested on the Land Use and Land Cover INSPIRE themes. The table below indicates INSPIRE themes planned to be tested by project partners in the first and second stages of the data deployment

	[green]	The both, first and second period - will be reported already in D7.2 and also in
	[orange]	Only second period - will be reported in the D7.4 at the end of the project

INSPIRE themes per partner	3 Olomouc	4 TDF	6 LGV Hamburg	8 ZPR	9 PROVROMA	10 FTZ	11 GEORAMA	12 NASURSA	14 Gijon	MAC	17 AVINET	18 DIPSU	19 EPF	20 ADR Nord Vest	21 Lazio	22 HF	24 MEDDTL
LandCover					[green]		[green]		[green]					[green]			
LandUse	[green]	[green]	[green]	[green]	[orange]	[green]	[green]	[orange]	[green]		[green]	[green]	[green]	[green]		[green]	[green]
Agriculture and Aquaculture Facilities																	
Area Management/Restriction/Regulation Zones																	
Production and Industrial Facilities																	
Utility and Governmental Services																	
Natural Risk Zones	[orange]												[green]	[orange]			

Land Cover

The Land Cover data model proposed by WP4 is quite simple and transparent. Thus the harmonisation process is straighforward. The data sources usually have a similar structure, so the harmonisation is provided mainly on enumeration.

Harmonised data publication in the web map client:

9	PROVROMA	http://plan4all.hyperborea.com/geoexplorer
18	DIPSU	http://193.204.163.228:8000/map_montalto/map.phtml?winsize=large&language=en&config=default
20	ADR Nord Vest	http://www.plan4all.eu/glog/Glog/entry.php?class=Mapman.MapmanShowMap&mapProject=mapproject16&instance=&language=en

Harmonised data publication through WMS:

9	PROVROMA	http://plan4all.hyperborea.com/geoserver/ows?service=wms&version=1.1.1&request=GetCapabilities
10	FTZ	http://ftzgeo.org:8080/geoserver/wms?service=WMS&version=1.1.0&request=GetMap&layers=CorineLandcover:LandUse_MALTA_WGS84_region&styles=&bbox=426502.308,3962580.738,461759.848,3993367.302&width=512&height=447&srs=EPSG:32633&format=application/openlayers
12	NASURSA	http://gisportal.tracasa.es/plan4all/wms/?request=getcapabilities
14	Gijon	http://ide.gijon.es:8080/geoserver/wms
18	DIPSU	http://www.dipsuwebgis.uniroma3.it:8081/geoserver_dipsu/wms?VERSION=1.1.1&REQUEST=GetCapabilities&SERVICE=WMS
20	ADR Nord Vest	http://www.plan4all.eu/glog/Glog/entry.php?class=Mapman.MapmanWms&mapProject=mapproject16&instance=&SERVICE=WMS&REQUEST=GetCapabilities

Harmonised data publication through WFS:

9	PROVROMA	http://plan4all.hyperborea.com/geoserver/ows?service=wfs&version=1.1.0&request=GetCapabilities
20	ADR Nord Vest	http://www.plan4all.eu/glog/Glog/entry.php?class=Mapman.MapmanWfs&VERSION=1.0.0&mapProject=mapproject16&instance=&SERVICE=WFS&REQUEST=GetCapabilities

Land Use

The conceptual model for Land Use proposed by WP4 is very complex and in fact covers the whole area of Spatial Planning, not just specifically Land Use. The WP7 team modified the model and agreed a shorter and simpler version of the conceptual model. This simplified structure is more understandable and better for definition of harmonisation relations.

The team also defined a key harmonisation attribute – GeneralLandUseType. This attribute is the main item for comparison of data from different countries and regions. An enumeration related to this attribute has been modified. In addition, several other attributes and values have been re-defined (see chapter 2.1).

On the basis of the knowledge of regional/local data, the project partners individually specified transformation tables and provided data transformation into the target (harmonised) structure. The data from the target structure has been published in web map clients on the partner's sites or through web services WMS and WFS. The spatial reference has been agreed as the projection EPSG:3035.

Harmonised data publication in the web map client:

3	Olomouc	http://vm-glog.wirelessinfo.cz/demo/mapviewer/index_en.html?project=Plan4AllOlomouc
4	TDF	http://geoportal.tdf.lv
8	ZPR	http://giz.zpr.gov.lv/glog/Glog/entry.php?class=Tools.MapFileViewer&map=/data/www/giz.zpr.gov.lv/data/Glog/Temp/viewercb4dcf8dd64c5060b7f255cd8fc7b899.map&language=lav&useToolsPanel=true&useLayerSwitcher=true&showTopPanel=true&showMapTitle=true&useDataObjects=true
10	FTZ	http://ftzgeo.org:8080/geoserver/web
18	DIPSU	http://193.204.163.228:8000/map_montalto/map.phtml?winsize=large&language=en&config=default
19	EPF	www.geoprtal-bg.com
20	ADR Nord Vest	http://geoportal.nord-vest.ro/ArcGIS/rest/services/ADRNordVest/LandUse_test/MapServer
22	HF	http://vm-glog.wirelessinfo.cz/demo/mapviewer/index_en.html?project=Plan4AllSumperk

Harmonised data publication through WMS:

3	Olomouc	http://vm-glog.wirelessinfo.cz/cgi-bin/mapserv.exe?SERVICE=WMS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\olomouc.map
8	ZPR	http://giz.zpr.gov.lv/glog/Glog/entry.php?class=Mapman.MapmanWms&mapProject=mapproject7&instance=&SERVICE=WMS&REQUEST=GetCapabilities
10	FTZ	http://ftzgeo.org:8080/geoserver/wms?service=WMS&version=1.1.0&request=GetMap&layers=CorineLandcover:CLC2006_UTM_region&styles=&bbox=426573.732,3962764.804,461831.604,3993551.661&width=512&height=447&srs=EPSG:32633&format=application/openlayers
14	Gijon	http://ide.gijon.es:8080/geoserver/wms
18	DIPSU	http://www.dipsuwebgis.uniroma3.it:8081/geoserver_dipsu/wms?VERSION=1.1.1&REQUEST=GetCapabilities&SERVICE=WMS
19	EPF	http://213.91.166.6/arcgis/services/Plan4All_final/MapServer/WMSServer
20	ADR Nord Vest	http://geoportal.nord-vest.ro/ArcGIS/services/ADRNordVest/LandUse_test/MapServer/WMSServer?request=GetCapabilities&service=WMS
22	HF	http://vm-glog.wirelessinfo.cz/cgi-bin/mapserv.exe?SERVICE=WMS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\sumperk.map

Harmonised data publication through WFS:

3	Olomouc	http://vm-glog.wirelessinfo.cz/cgi-bin/mapserv.exe?SERVICE=WFS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\olomouc.map
8	ZPR	http://giz.zpr.gov.lv/glog/Glog/entry.php?class=Mapman.MapmanWfs&VERSION=1.0.0&mapProject=mapproject7&instance=&SERVICE=WFS&REQUEST=GetCapabilities
14	Gijon	http://ide.gijon.es:8080/geoserver/wfs
19	EPF	http://213.91.166.6/arcgis/services/Plan4All_final/MapServer/WFSServer
20	ADR Nord Vest	http://geoportal.nord-vest.ro/ArcGIS/services/ADRNordVest/LandUse_test/MapServer/WFSServer?request=GetCapabilities&service=WFS
22	HF	http://vm-glog.wirelessinfo.cz/cgi-bin/mapserv.exe?SERVICE=WFS&map=c:\ms4w\apps\glog\data\DataFiles\Plan4All\sumperk.map

6. Conclusion

The Land Cover conceptual model can be used for harmonisation of data from different countries without significant changes. The structures of the source regional data are very close to the proposed model, and the publication is straightforward.

The conceptual model proposed by WP4 for Land Use is very complex and requires semantic interpretation and careful scrutiny or enumerations by planning experts. Definitions are sometimes loose and require interpretation. This complicates the data harmonisation process based on this conceptual model.

The modification proposed by the WP7 team leads to a simpler data structure. This means that the full range of spatial planning data cannot be harmonised, but on the other hand the key information can be readily harmonised. The first tests indicated simple harmonisation of data from nearly all project partners.

On the basis of our experiences with the harmonisation of LandUse and LandCover data, we have several recommendations for the next period:

- To better understand source-target relations a precise definition of the source data should be created and described. There does not exist any fixed standard for planning data in many countries and the definition should help to harmonise the different data in the same way.
- Define precise specific code lists and enumerations with explanation of terms. The same values may imply different meaning to people from different countries and consequently harmonised datasets may be technically correct, but are not in reality. This is not problem of the data model, but a consequence of differences in spatial planning in European countries.
- Redefine the multiplicity of selected attributes
- Define names of the source and target elements of the association connectors. Otherwise it is very difficult to identity these associations in schema mapping tools.
- Propose changes of the models in some cases to make them simpler.
- Specify precise metadata fields and leave them out of the data as much as possible – of course, where it is useful !
- Define symbols and colour presentation for harmonised data.
- Include an information sheet explaining the difficulties experienced in aligning and aggregating the data across the local and regional areas and then up to the national and super-national levels. The different professions, software and methodologies used in the countries are too great to compile into one document, however drafting such a sheet allows policy and decision makers to understand the hurdles yet facing spatial information.
- Solve problems with overlaying features.

At the end of the first stage of the WP7 data deployment, the project team was asked to participate in the testing of the INSPIRE Annex II and III data specifications that will be made available by the end of June 2011. In the case of realisation it does mean an exchange of the Plan4all of conceptual models for the INSPIRE data specification. Considering the need to modify the Plan4all conceptual data models (as mentioned above), it seems to be better to put effort into testing the INSPIRE data specification which will be the most important for spatial data harmonisation in future.

Of course, it brings many problems; as huge effort has been spent on the conceptual models development, on their testing and modification. On the other hand, these experiences could be capitalized also in the work on the INSPIRE data specification.

The final agreement will be made at the project meeting in Hamburg, nevertheless all recommendations mentioned above should be taken into account in any case.

7. References

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- W3C Working Group (2004), *Web Services Architecture*

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Plan4all

Data Deployment Stage 1
Annex I – Georama extension

*e*Content*plus*

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[1] OJ L 79, 24.3.2005, p. 1.

1.1. *Georama*

1.1.1. General description of source data

Source data used for tests is Corine Land Cover 2000 for the whole Greece, which have been finalized and updated constantly since 2004 by the Greek organization for cadastre and chartography (www.okxe.gr). Data are produced according Corine Land Cover mapping requirements.

Source data come from geodata.org.gr and reproduced through Georamas map services in ESRI Shapefile format within the Greek Grid GCS_GGRS_1987 projection.

1.1.2. Detail Description of Source Data

In the case of the CLC2000 of the Georama test, the harmonisation process is built up on the source data in the ESRI Shapefile format. This file contains all important data regarding land cover specification.

1.1.2.1. Scheme

The base structure of the source data is presented in the table. Originally the field are described according CLC standard.

Source_structure	Description	Attribute_example
C00_GR_ID	Unique id (identifier)	9
CODE_00	Corine land cover encoding	231
NOMOS	Region of Greece unique id	71
DESCRIPTIO	Corine land cover text description in GREEK	Δάσος Πλατύφυλλων
DESCRIPT_1	Corine land cover text description in ENGLISH	Broadleaved forest

1.1.2.2. Features and Code Lists

The table describe source data features, attributes and code lists important for data transformation and harmonisation.

Attribute: C00_GR_ID
  Value type: Integer
  Definition: Unique numeric id (identifier)
  Code List:
Attribute: CODE_00
  Value type: Integer
  Definition: Corine land cover classes
  Code List   111 Continuous urban fabric
                   112 Discontinuous urban fabric
                   121 commercial and transport units
                   122 commercial and transport units
                   123 commercial and transport units
                   124 commercial and transport units
                   131 dump and construction sites
                   132 dump and construction sites
                   133 dump and construction sites
                   141 non-agricultural vegetated areas

142 non-agricultural vegetated areas
211 Non-irrigated arable land
212 Permanently irrigated land
213 Rice fields
221 Vineyards
222 Fruit trees and berry plantations
223 Olive groves
231 Pastures
41 Annual crops associated with permanent crops
242 Complex cultivation patterns
243 Land principally occupied by agriculture
244 Agro-forestry areas
311 Broad-leaved forest
312 Coniferous forest
313 Mixed forest
321 Natural grasslands
322 Moors and heathland
323 Sclerophyllous vegetation
324 Transitional woodland-shrub
331 Beaches
332 Bare rocks
333 Sparsely vegetated areas
334 Burnt areas
335 Glaciers and perpetual snow
411 Inland marshes
412 Peat bogs
421 Salt marshes
422 Salines
423 Intertidal flats
511 Water courses
512 Water bodies
521 Coastal lagoons
522 Estuaries
523 Sea and ocean

1.1.3. Transformation

1.1.3.1. Transformation method

Main tasks in transformation are simple manipulations with attribute data and geometries. Actions are performed using ArcMap GIS software (of course they can be performed using any other GIS application completely or some parts from described process steps).

Steps using ArcMap SW toolbox scripts:
1. Dissolve neighbour geometries with equal Corine Land Cover codes (action is performed just for security reasons, such cases in dataset should not be); During the transformation this fact is verified.

Steps using desktop, depending from used application some of steps are easier for end users but some are non optimal due application functionality limitations:

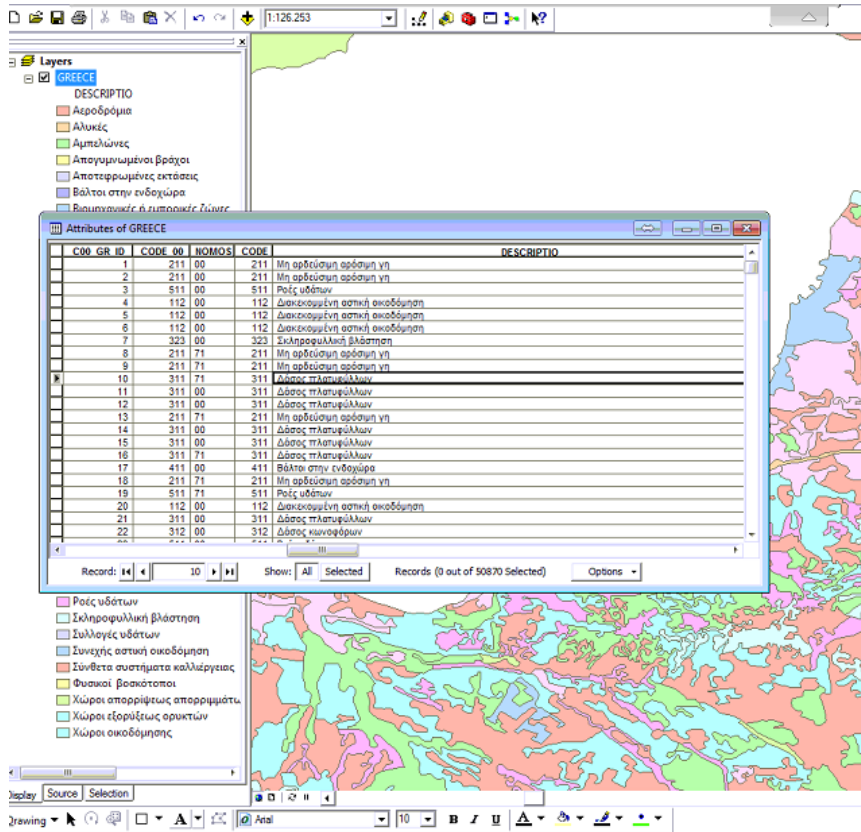1)ArcMap GIS desktop is possible to perform Dissolve function.

Figure: ArcMap SW showing clc properties including corine Greek text description for categories
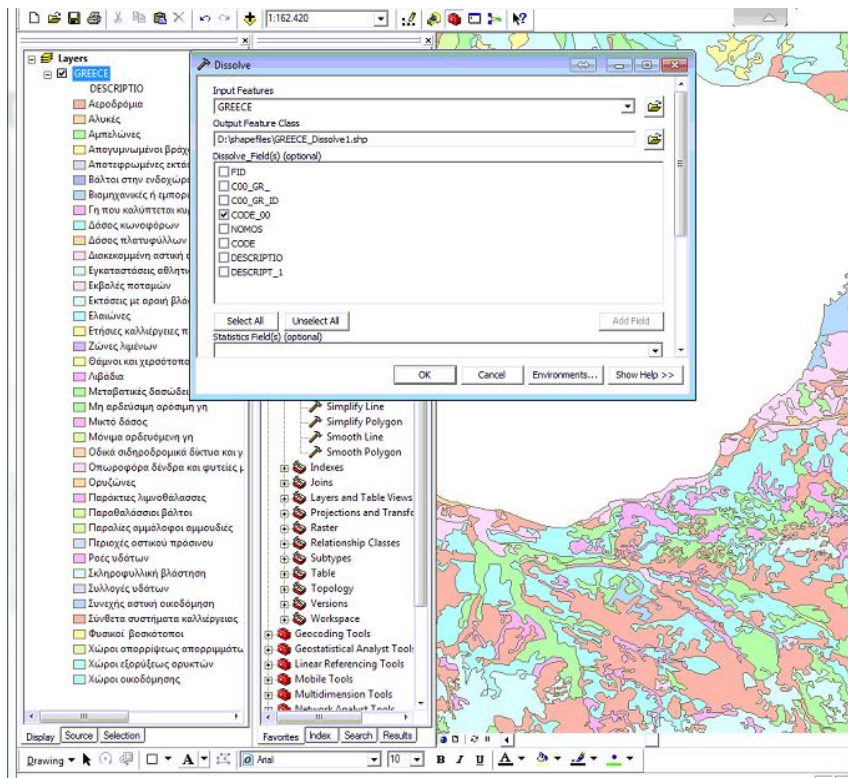

Figure: Verifying that all polygons are dissolved according to corine area codes

Spatial transformation process

The spatial transformation are also needed due to the fact that Greece holds all its data in a projected Greek Grid format (GCS_GGRS_1987) which required the following steps in order to be converted to the final required projection:

> i) Reprojecting to WGS84: EPSG: 36233;
> ii) Colour schemes are lost in the transition and need to be recreated in the geoserver.

1.1.3.2. Transformation scheme

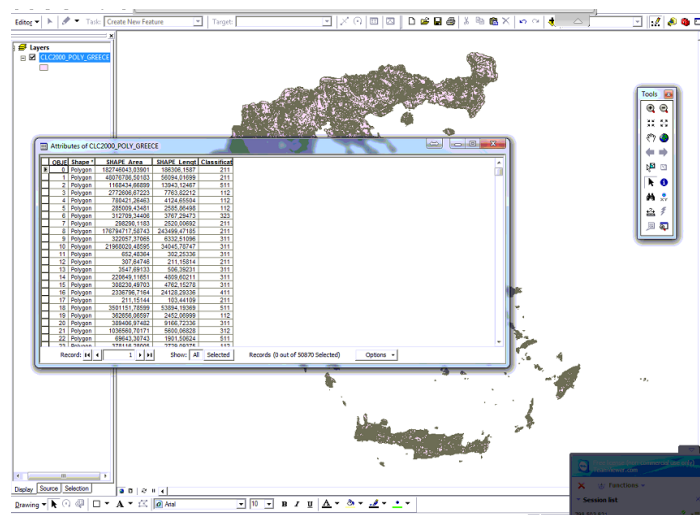| Source Data	LandCoverStandardiseArea
Name	Name
FID	OBJECTID
Shape	Shape
	InspireID
	Source
NOMOS	
CODE DESCRIPTION GREEK	
CODE DESCRIPTION ENGLISH	
CODE_00	Classification
PERIMETER	SHAPE_Length
AREA	SHAPE_Area

Figure: Transformed shape file for corine Greece

1.1.4. Publication

The data publication is performed using CCSS & HSRS developed Geoportal using OGC compliant services. System provided functionality:

- Search: search of data and metadata using Micka metadata solution
- OGC services: CWS, WMS, WFS, WCS.
- Downloads: data file download, via HTTP, to use with local applications.

The data has been published in the WGS84 system.

As desktop client can be used any application able to use OGC WMS, WFS or CSW services like ArcMap SW, gvSIG, QuantumGIS, Open JUMP, uDig and other.

1.1.4.1. Web Map Client

The harmonised data is published in a simple web map application at plan4all.georama.org.gr

1.1.4.2. Web Services

All web services are available in plan4all.georama.org.gr/geoserver

```
WMS link
http://plan4all.georama.org.gr/geoserver/ows?service=wms&version=1.1.1&request=GetCapabilities
WFS link
```
http://plan4all.georama.org.gr/geoserver/ows?service=wfs&version=1.1.0&request=GetCapabilities

Example of WMS (General land Use layer) service connection using Plan4all portal map client:
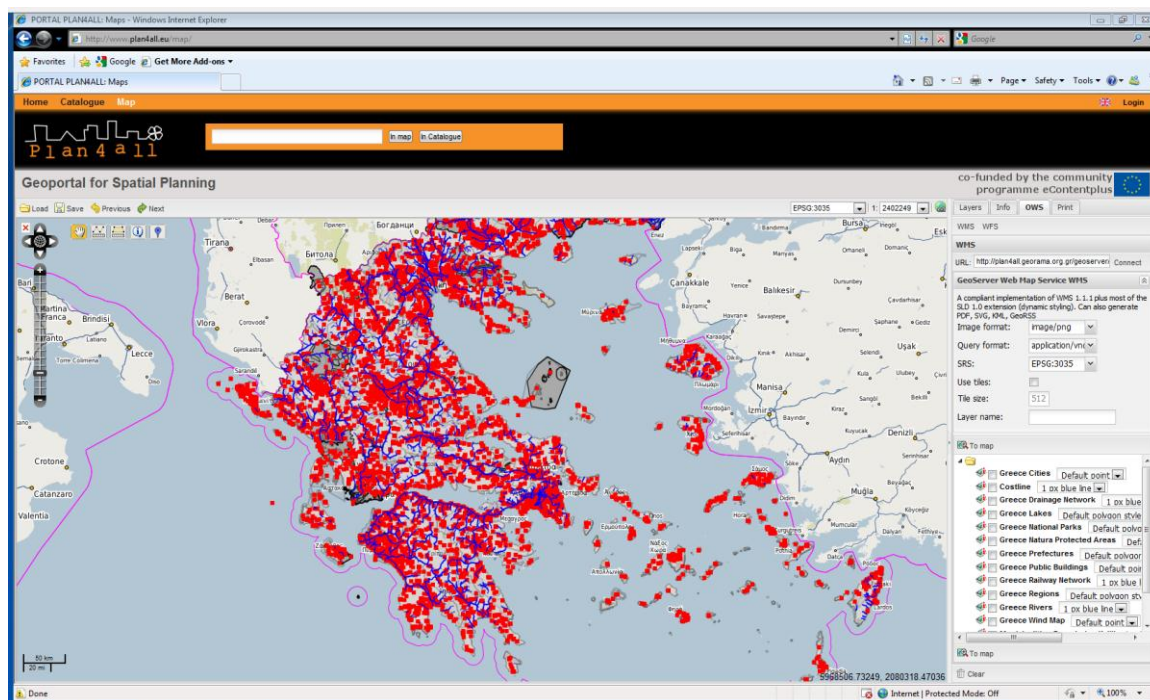
1.1.5. Results

1.1.5.1. Comments on Conceptual Models

Model is well understandable because is similar to Corine Land Cover that is well known and accessible for reference.

1.1.5.2. Recommended changes

Multilingual code translation of corine areas has to be further investigated