ECP-2008-GEO-318007

Plan4all

Analysis of Innovative Challenges

Deliverable number	*D2.2*
Dissemination level	*Public*
Delivery date	*16th November 2009*
Status	*Final*
Authors	*Clemens Beyer (CEIT Alanova)* *Wolfgang W. Wasserburger (CEIT Alanova)* *Runar Bergheim (AviNet), Pēteris Brūns (TDF), Karel Charvat (HSRS), Miroslav Dvorak (Olomouc), Petr Horak (HF), Julia Neuschmid (CEIT Alanova), Dimitrov Stelian (EPF), Norma Zanetti (Hyperborea)*

e*Content*plus

This project is funded under the eContentplus programme1,
a multiannual Community programme to make digital content in Europe more accessible, usable and exploitable.

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

1 Abstract

Plan4all is a European project dealing with spatial planning data interoperability, harmonisation and Spatial Data Infrastructure building. The project is organised in nine work packages (WP), which are further structured into several tasks. This deliverable presents the results of task 2.2 which is part of WP2 – the state of the art analysis – and has the objective to analyse latest developments and innovative challenges in SDI building for spatial planning in Europe. The objective of this deliverable is to assist to pilot partners deploy their infrastructure in WP6.1, to prepare recommendation for possible platforms. The deliverable use results of other two deliverables D 2.1 “Identification of leading regional and local administration in building SDI for spatial planning” describing the detailed situation in single European countries (the report provides a general survey on SDI and spatial planning data in each partner country) and D 2.3 “INSPIRE Requirements Analysis”, which analyses requirements coming from INSPIRE directive. The results are based on an analysis of information about relevant software classified according a framework for software classification based on INSPIRE architecture, spataial planning needs and a collection of best practice projects.

2 Contents

3 Introduction

3.1 Objectives

Plan4all focuses on the interoperability and harmonisation of spatial planning data based on the existing best practises in European regions and municipalities and the results of current research projects. The project involves a detailed description and summary of the current situation and standards, proposal, testing and implementation of spatial planning metadata profile, common data model and harmonisation procedures. The important parts of Plan4all are networking standards of spatial planning data, based on previously collected and analysed experiences. Furthermore, common procedures and methods for spatial data sharing will be defined as well as the use of new pan-European standards for spatial planning data within the EU. Expected results from Plan4all are European forums for SDI (Spatial Data Infrastructure) in spatial planning, a database and analysis in terms of organisation, sharing and harmonisation as well as SDI recommendations for spatial planning. Plan4all also focuses on implementing the INSPIRE Directive into the spatial planning process, mainly based on building spatial planning data models and metadata profiles.

The project is structured into nine work packages. The aim of Work Package 2 (WP2) is to analyse the current state of the art in spatial planning, the used technologies, INSPIRE requirements and also to identify the requirements that affect the implementation of spatial planning SDI. Into more detail, the objective of the present Task 2.2 out of WP2 is to analyze latest developments and innovative challenges of SDI for spatial planning in Europe.

3.2 Structure

This deliverable presents the results of WP2 Task 2.2 and aims to identify innovative challenges in data harmonisation. The first step is to establish a framework for classifying technologies and services with focus on technology convergence and the emergence of applications. To test that framework a selection of known software packages was described (page 9). The detailed software descriptions are part of Annex A (page 119). The two following chapters deal with the chances, potentials, risks of data infrastructure applications (page 39) as well as data evaluation and quality criteria (page 45). In addition there is a detailed examination of existing related EU projects and a comparison of Best Practise Projects with Plan4all, identifying strengths and weaknesses of spatial planning SDI implementation (page 51). For the assessment of national and regional policies we refer to Deliverable 2.1. On this basis we try to find a conclusion that defines the most innovative challenges on SDI for the future (page 112).

3.3 Methodology

The results of Task 2.2 are based on a survey among both, all project partners and the European members of the Paln4all partner ISOCARP. The survey is shared with

Task 2.1. Besides, there is a documentation of well known software and of best practise projects that have been collected providing a template questionnaire.

Into more detail the survey covers a wide range of topics describing the present situation in spatial planning in each partner country and its subsidiaries. It includes basic information like the availability of plans and the legal situation, cross-border initiatives, data availability and data management, metadata collection, web mapping activities, spatial data infrastructures, national geodatabases and data license models. The survey was also forwarded to the large number of international members of the project partner ISOCARP so that valuable information could be also retrieved from outside the Plan4all consortium, too. The results of this survey are used in task 2.1 and 2.2 to find out about correlations between the legal situation, the availability of plans and the accessibility of data, in terms of harmonising activities and efforts in building a national SDI.

The classification and description of software was done according to a developed framework containing information about the product version, manufacturer, developping period, type, approach, interactivity, technology, metadata management, usage in planning and challenges. A table with the collected software information provides an overview of existing spatial planning related software and classifies suitable software for Plan4all.

The documentation of the best practise projects contains detailed information about the project type, dimension, start, end, partners, goals and content, used technology, strengths and weaknesses, accessibility, user interface and challenges. All together more than 40 best practise projects in Europe could be identified, described and analysed.

The complete list of best practise projects and the software classifications can be found in the Annex A (page 119) and also on the internal project wiki. The wiki serves as an online platform that gives access to all project partners and contains all papers, documents, surveys that have been produced so far. In addition to communication via web seminars and workshops are organised, especially the meeting in Schwechat on September 14th and 15th, 2009 and the external Expert Workshop hosted by the University of Rome on October, 5th 2009. The purpose on the one hand was to share information and results on WP2 among the partners on the other hand to get feedback by an external consultation of experts to avoid blindness by routine. Experts especially invited to review this deliverable were Michele Campagna (I), Pawel Decewicz (PL) and Gabor Remetey-Fülöpp (H).

4 From Geographic Information Systems to Spatial Data Infrastructure building

A spatial data infrastructure (SDI) is a framework of spatial data, metadata, users and tools that are interactively connected in order to use spatial data. Current Spatial Data Infrastructure (SDI) development is combination of data, technologies and standards and legislation and also by implementation initiatives. On the technological side current SDI is mainly based on Web Mapping and Service Oriented Architecture (SOA) and currently also by newly coming Web 2.0 approach. Some of the main principles are that data and metadata should not be managed centrally, but by the data originator respectively owner, and that tools and services connect via computer networks to the various sources. A GIS is often the platform for deploying an individual node within an SDI. To achieve these objectives, good coordination between all the actors is necessary and the definition of standards is very important.

Spatial data infrastructure (SDI) is a kind of a service oriented architecture (SOA) and covers a variety of services: discovery services, view services, download services, transformation services and services allowing spatial data services to be invoked. Spatial Data Infrastructure is service based combination of Web Mapping, but also standalone GIS and eventually CAD applications. So there is a short introduction about the development and history of such systems.

From the point of view of standardisation the most adequate are effort of Open Geospatial Consortium, ISO, W3C and OASIS. Legislation is defined by INSPIRE directive and implementation of SDI is supported by different European and World wide initiatives as GMES, UNSDI and GEOSS.

4.1 History and state of the art

Since web mapping is very much based on ideas used by CAD and GIS there is a short introduction about the development and history of such systems.

4.1.1 Computer Aided Design (CAD)

First Computer Aided Design systems came up in the 1970s. In its first days it only served as an equivalent for manual drawing and construction desks. Whereas in the late 1980s with the change to Personal Computers and the addition of 3d Functions CAD Systems got more and more the function of integrated construction systems not only as a graphical representation of already constructed parts.

Beginning with the late 1980s in some places still in use, CAD systems were also used to store geographical data. As the needs to represent the earth surface (e. g. different projections) differ a little bit from mechanical parts and geographic users also wanted to store database entries with their features and use some basic geographic functions. Consequently new, so called Geographic Information Systems were developed based upon CAD and database principles.

CAD systems typically follow the motto that every feature is drawn in its final representation (‘What you see is what you get’ – ‘Wysiwyg’) whereas the upcoming

Geographic systems store features without a special graphical representation and produce that upon database items.

In the time being some complex CAD systems integrated also GIS functions or put hybrid systems into market. A typical system that follows this approach is Autodesk Map which combines the fully featured 3d AutoCAD with 2d GIS functions.

4.1.2 Geographic Information Systems (GIS)

It is difficult to be defined when exactly the contemporary GIS technology was established, because GIS technology evolved through multiple parallel but separate applications across numerous disciplines and researchers. One of the most important facts of the GIS history was the development of the GBF-DIME files by the U.S. Census Bureau in the 1960s which is one of the first examples of governmental initiative, using digital mapping and digital spatial data. Later that initiative led to the development of the Census TIGER files, which are in use today. In the 1970s the further development of the GIS technology continued mainly within the universities, where the first approaches and prototypes for the later so called Geographic Information Systems were developed. Such prototype is the program SYMAP, developed at the Laboratory for Computer Graphics and Spatial Analysis at the Harvard Graduate School of Design in 1966, which was widely distributed and served as a model for later systems. One of the most important pioneering projects from that period is the so called Canada Geographic Information System (CGIS). It was developed in the 1960s and 1970s to assist in regulatory procedures of land-use management and resource monitoring. This simple automated computer processes designed to store and process large amounts of spatial data enabled Canada to begin a national land-use management program and become a foremost promoter of geographic information systems (GIS).

With the upcoming graphical user interfaces these systems were first used outside of universities and programming companies in the late 1980s. Opposite to CAD systems their advantage was that features could be printed (to screen or paper) in different variations depending from database entries. Besides, these new geographic functions allowed the overlay of different datasets and the automatic creation of combined datasets. Later on also map projections of the earth were fully integrated and graphical retrieving data became more and more easy.

Whereas these systems followed the CAD approach to store explicitly borders between features (Vector GIS), alternatives were developed in Raster GIS which stored all values for every single cell. At first this approach was mainly used because of memory and CPU restrictions. However, nowadays such systems are mainly used for remote sensing data or to represent continuous changing data.

Today nearly all systems allow the use of both approaches.

4.1.3 Web Mapping

With the upcoming of the World Wide Web (WWW), first ideas came up how to represent maps in the Web. As a first approach pictures were placed in HTML pages originating from scans of paper material or electronic drawings.

Shortly after the web gathered momentum, first applications were developed which generated HTML pages on the fly based upon database entries. Shortly afterwards people also began to think about dynamically generated maps for the web.

First approaches used manually tiled maps and combined them e. g. dynamically with points of interest. While this was based upon manual work it was rarely used for more than one city.

Because of very complex developments it took some years before the first commercially programmed web map servers were introduced to the public in the late 1990s. Most of them follow the approach to tile pre produced huge bitmaps on the fly or produce small tiles out of vector data dynamically (e. g. ArcView IMS). Only few other products tried to serve vector data to dedicated HTML clients (e. g. Arc-Explorer) or browser extensions (Java Applets, Netscape PlugIns or Microsoft Internet Explorer ActiveX; e. g. Autodesk MapGuide). Whereas the first approach was restricted by serverside CPUs and the size because of small bandwidths, the second approach had the disadvantage of downloading (or getting on disks) and installing extensions.

Based on today's bandwidths these problems no longer exist in many countries and developers got the chance to decide which approach to use upon user and application requirements.

As another indirect change in the information business open source technologies became more important. Nowadays open source products are market leader in web mapping.

Web mapping is understood as implementation of automatically generated maps through internet infrastructure. The term web GIS is often used simultaneously but the meaning of web GIS is much wider as it also includes analysis and geoprocessing functions whereas web mapping just deals with map generation, display and navigation within the map. As web mapping tools become more and more powerful, the border between web mapping and web GIS is, however, not always clear. Further on, only the term "web mapping" (or "web map") will be used.

Web maps are mainly dissemination media, i. e. they serve as visualisation tool for geodata which are queried from one or more (also distributed) servers. One of the huge advantages of this technology is the fact that data updates are very simple: As the source data on a map server is altered, all web mapping clients will instantly also receive the updated datasets, having no need to update every single client on its own.

Beside that modern upcoming web services are enabled to use disperse stored data.

A short overview:

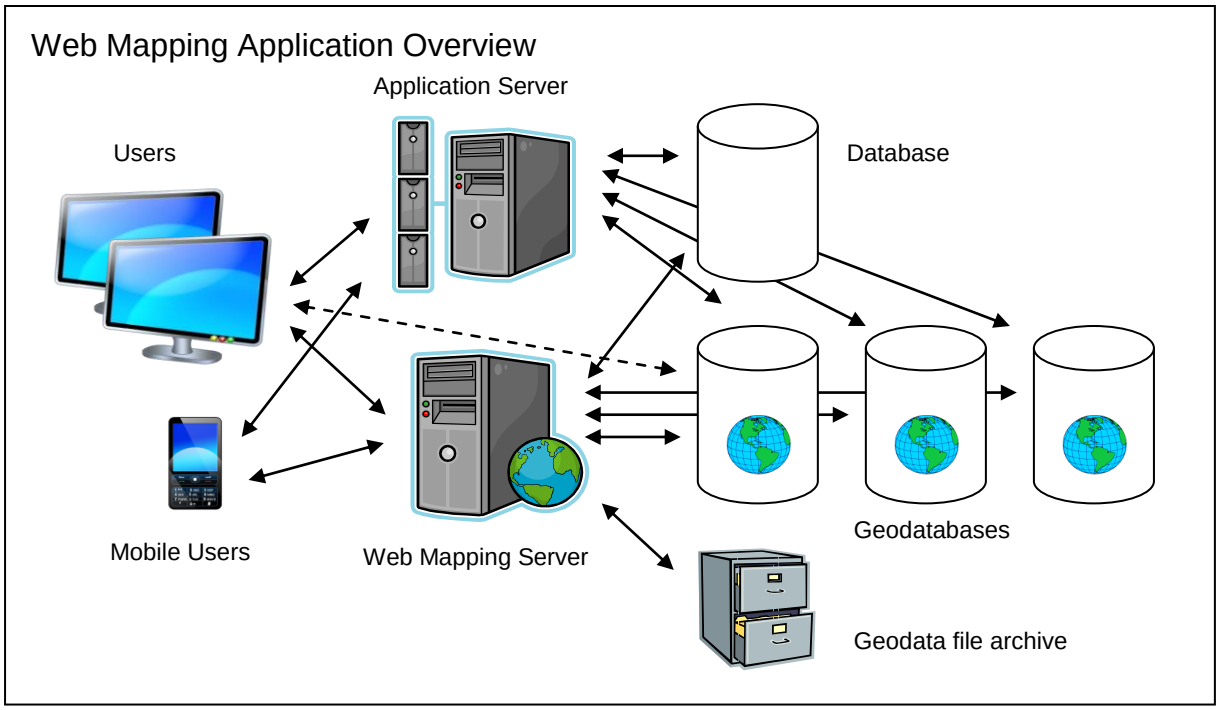


Fig. 1: Web Mapping Application Overview

A spatial data infrastructure (SDI) is a framework of spatial data, metadata, users and tools that are interactively connected in order to use spatial data.

Some of the main principles are that data and metadata should not be managed centrally, but by the data originator respectively owner, and that tools and services connect via computer networks to the various sources. A GIS is often the platform for deploying an individual node within an SDI. To achieve these objectives, good coordination between all the actors is necessary and the definition of standards is very important.

Spatial data infrastructure (SDI) is a kind of a service oriented architecture (SOA) and covers a variety of services: discovery services, view services, download services, transformation services and services allowing spatial data services to be invoked.

4.1.4 Service-Oriented Architecture

In computing, service-oriented architecture (SOA) provides a set of principles of governing concepts used during phases of system development and integration. Such an architecture will package functionality as interoperable services: software modules provided as a service can be integrated or used by several organisations, even if their respective client systems are substantially different.

Web services can implement a service-oriented architecture. Web services make functional building-blocks accessible over standard Internet protocols independent of

platforms and programming languages. These services can be new applications or just wrapped around existing legacy systems to make them network-enabled.

Each SOA building block can play one or both of two roles:

a) server;

b) server and client;

c) client.

The current development of SOA is mainly defined by consortiums W3C, OASIS and in SDI by Open Geospatial Consortium.

4.1.5 Web 2.0

Web 2.0 is commonly associated with web applications which facilitate interactive information sharing, interoperability, user-centered design and collaboration on the World Wide Web. Examples of Web 2.0 include web-based communities, hosted services, web applications, social-networking sites, video-sharing sites, wikis, blogs, mashups and folksonomies. A Web 2.0 site allows its users to interact with other users or to change website content, in contrast to non-interactive websites where users are limited to the passive viewing of information that is provided to them. As example of Web 2.0 application could be mentioned GoogleMaps or OpenStreetMap.

Google Maps also offer full interactivity as users can draw their own content directly into the map. In contrast to WFS-T, Google has a strict distinction between user generated content and original content provided by the company itself which is also a form of a digital rights management. However, Google Maps are not fully OGC compliant: WMS can be shown in Google applications but Google data cannot be accessed via WMS requests.

OpenStreetMap: Beside the Google Applications OpenStreetMap offers its own standards as an open alternative; since more than 100,000 contributors work on the maps it is emerging like Wikipedia and cannot be ignored in some situations where planning data is rare.

4.2 Standards

4.2.1 W3C

The World Wide Web Consortium (W3C) is an international community based on member participation, which defines the standard for World Wide Web. Currently, the most relevant standards for SDI building are XML, SOAP and WSDL.

4.2.1.1Extensible Markup Language (XML)

XML (Extensible Markup Language) is a set of rules for encoding documents electronically. It is a textual data format, with strong support via Unicode for the languages of the world. XML is used as common interface for many applications, there also exist several schema systems designed to aid in the definition of XML-based languages.

A XML document is a string of characters. The characters could be markup or content. They are distinguished by the application of simple syntactic rules. Markup either begin with the character "<" and end with a ">", or begin with the character "&" (ampersand) and end with a ";" (semicolon). Strings of characters which are not markup are content. Tags are a markup beginning with "<" and ending with ">". Elements are a logical component of a document which either begins with a start-tag and ends with a matching end-tag, or consists only of an empty-element tag. The characters between the start- and end-tags are content. Attribute are a markup construct consisting of a name/value pair that exists within a start-tag or empty-element tag.

Software which processes an XML document are called processor. It works in the service of an application. The processor is often referred to colloquially as an XML parser.

4.2.1.2Simple Object Access Protocol (SOAP)

SOAP is a basic protocol supporting exchange of structured information for Web Services. It is based on Extensible Markup Language (XML) as its message format. SOAP provides a basic messaging framework for Web service.

SOAP is composed from several layers:

- message exchange patterns (MEP),
- underlying transport protocol bindings,
- message processing models,
- protocol extensibility.

Both SMTP and HTTP are valid application layer protocols used as transport for SOAP, but HTTP has gained wider acceptance as it works well with today's Internet infrastructure; specifically, HTTP works well with network firewalls. SOAP may also be used over HTTPS.

XML is used as the standard message format because of its widespread use by major corporations and open source development efforts.

4.2.1.3Web Service Description Language (WSDL)

WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information. The operations and messages are described abstractly, and then bound to a concrete network protocol and message format to define an endpoint. Related concrete endpoints are combined into abstract endpoints (services). WSDL is extensible to allow description of endpoints and their messages regardless of what message formats or network protocols are used to communicate, however, the only bindings described in this document describe how to use WSDL in conjunction with SOAP 1.1, HTTP GET/POST, and MIME.

WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented

information. The operations and messages are described abstractly, and then bound to a concrete network protocol and message format to define an endpoint. Related concrete endpoints are combined into abstract endpoints (services). WSDL is extensible to allow description of endpoints and their messages regardless of what message formats or network protocols are used to communicate, however, the only bindings described in this document describe how to use WSDL in conjunction with SOAP 1.1, HTTP GET/POST, and MIME.

4.2.2 OASIS

OASIS (Organisation for the Advancement of Structured Information Standards) is a non-profit consortium that drives the development, convergence and adoption of open standards for the global information society. The consortium produces more Web service standards than any other organisation along with standards for security, eBusiness, and standardisation efforts in the public sector and for application-specific markets. Two main relevant standards of OASIS are ebXML and UDDI.

4.2.2.1ebXML

Electronic Business using eXtensible Markup Language, commonly known as e-business XML a family of XML based standards sponsored by OASIS and UN/CEFACT. There exist 6 specifications, 5 parts of the work were submitted to ISO TC 154 for approval. The International Organization for Standardization (ISO) has approved the following five ebXML specifications as the ISO 15000 standard, under the general title, Electronic business eXtensible markup language:

- ISO 15000-1: ebXML Collaborative Partner Profile Agreement
- ISO 15000-2: ebXML Messaging Service Specification
- ISO 15000-3: ebXML Registry Information Model
- ISO 15000-4: ebXML Registry Services Specification
- ISO 15000-5: ebXML Core Components Technical Specification

4.2.2.2UDDI

Universal Description, Discovery and Integration (UDDI) is a platform-independent, Extensible Markup Language (XML)-based registry for businesses worldwide to list themselves on the Internet. The UDDI was integrated into the Web Services Intero-perability (WS-I) standard as a central pillar of web services infrastructure. The UDDI specifications supported a publicly accessible Universal Business Registry in which a naming system was built around the UDDI-driven service broker.

4.2.3 OGC

The Open Geospatial Consortium, Inc (OGC) is an international industry consortium of companies, government agencies and universities participating in a consensus process to develop publicly available interface standards. OpenGIS® Standards support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT. The standards empower technology developers

to make complex spatial information and services accessible and useful with all kinds of applications. The OGC adopted sets of standards, which are important for Plan4all implementation.

4.2.3.1Geography Markup Language (GML)

The Geography Markup Language (GML) is an XML grammar for expressing geographical features. It serves as a modelling language for geographic systems as well as an open interchange format for geographic transactions on the internet. As with most XML based grammars, there are two parts to the grammar – the schema that describes the document and the instance document that contains the actual data, i. e. the spatial and non-spatial properties of geographic features. The encoding is done in compliance with ISO 19118 for the transport and storage of geographic information modeled according to the conceptual modeling framework used in the ISO 19100 series of International Standards and including both the spatial and non-spatial properties of geographic features. GML serves as a modelling language for geographic systems as well as an open interchange format for geographic transactions on the Internet. The concept of features in GML is a very general one and includes not only conventional “vector" or discrete objects, but also coverage and sensor data. The ability to integrate all forms of geographic information is a key element for the use of GML.

Since 2007 GML is published as ISO standard ISO 19136:2007.

The previous version (2.1.2) of GML was concerned with what the OGC calls simple features: features whose geometric properties are restricted to “simple” geometries. For example, a city could be represented as a feature collection where the individual features represent such things as rivers, roads and colleges. Each of these feature types would have named and typed properties.

The 3.0 version of GML addresses needs that were not addressed or adequately met in previous versions, and in particular:

- simple 2D linear features come with enhanced features including temporal properties, coverages, dynamic features, complex, non-linear, 3D geometry features, 2D topology;
- representation of spatial and temporal reference systems, units of measure and standards information;
- use reference system, units and standards information in the representation of geospatial phenomena, observations and values;
- representation of default styles for feature and coverage visualisation;

GML 3.0 specification defines the XML Schema syntax, mechanisms, and conventions that:

- Provide an open, vendor-neutral framework for the definition of geospatial application schemas and objects;
- Allow profiles that support proper subsets of GML framework descriptive capabilities;

- Support the description of geospatial application schemas for specialised domains and information communities;
- Enable the creation and maintenance of linked geographic application schemas and datasets;
- Support the storage and transport of application schemas and data sets;
- Increase the ability of organisations to share geographic application schemas and the information they describe.

Last versions of GML (3.1.1 and 3.2.1) add new geometries, are more compliant with the ISO/TC 211 family of specifications and contain some items for increased efficiency and simplicity. The last versions maintain backward compatibility for GML version 3.0.0 and 2.1.2 instance documents by preserving, but deprecating, some schema components that have been replaced by different constructs in the current version.

Last enhancements, include:

- The Temporal Reference Systems schema for GML 3.1 provides constructs for handling various styles of temporal reference system. This schema reflects a partial implementation of the model described in ISO 19108:2002.
- Temporal topology schema for ISO19136 provides constructs for handling topological complexes and temporal feature relationships. Temporal geometric characteristics of features are represented as instants and periods. While, temporal context of features that does not relate to the position of time is described as connectivity relationships among instants and periods. These relationships are called temporal topology, as they do not change in time, as long as the direction of time does not change. It is used effectively in the case of describing a family tree expressing evolution of species, an ecological cycle, a lineage of lands or buildings, or a history of separation and merger of administrative boundaries. This schema reflects a partial yet consistent implementation of the model described in ISO 19108:2002.
- Support for Void (ISO/IEC 11404)
- Symbols for units of measurements. In addition to using names of commonly accepted units (e. g. ISO 31) references to application domain specific unit definitions are required. To support commonly used unit symbols like “s” for seconds, unit references now are a union of:
    - a reference to an application defined units dictionary (like in GML 3.1.1)
    - a string that follows the UCUM rules for naming units using the case sensitive symbol labels.
- By value and by reference encoding and ownership of a property value. By-value or by-reference in a GML property and “ownership” (deep-copy, deep-delete) are different concepts. This was clarified.
- Element substitutability vs type derivation. In GML 3.1, requirements were often focused on content model definitions (e. g. “feature-type types must be

ultimately derived from gml:AbstractFeatureType") which are an artefact of the W3C XML Schema language and are thus normally invisible. The requirements did not focus on components that can appear in instance documents, i. e. elements representing features whose name is the feature type and which are substitutable for gml:AbstractFeature. This has been changed.

- Collection types. All existing collection types in GML including the feature collection types have been deprecated.

4.2.3.2KML

KML is an XML language focused on geographic visualisation, including annotation of maps and images. Geographic visualisation includes not only the presentation of graphical data on the globe, but also the control of the user's navigation in the sense of where to go and where to look.

Google submitted KML (formerly Keyhole Markup Language) to the Open Geospatial Consortium (OGC) to be evolved within the OGC consensus process with the following goal: KML Version 2.2 has been adopted as an OGC implementation standard.

4.2.3.3Web mapping services (WMS)

A Web Map Service (WMS) is a standard protocol for serving map images over the internet that are generated by a map server using data from a geographic data resource or raster images. The specification was developed and first published by the OGC in 1999.

The classic web map service (WMS) today is the most important technology in this group for planning purposes. It passes the user's requests to the map server and receives an image file which is generated by the map server on the fly upon request. The map which is displayed to the user consists of one or more images depending on the clients requests.

An OGC Web Map Service (WMS) produces maps of spatially referenced data dynamically from geographic information. This international standard defines a "map" to be a portrayal of geographic information as a digital image file suitable for display on a computer screen. A map is not the data itself. WMS-produced maps are generally rendered in a pictorial format such as PNG, GIF or JPEG, or occasionally as vector-based graphical elements in Scalable Vector Graphics (SVG) or Web Computer Graphics Metafile (WebCGM) formats. This is in contrast to a Web Feature Service (WFS) – which returns actual vector data – and a Web Coverage Service (WCS) – which returns actual raster data.

4.2.3.4Web Map Tile Server (WMTS)

The candidate WMTS Interface Standard is much like the OGC's popular Web Map Server (WMS) Interface Standard, but it enables better server performance in applications that involve many simultaneous requests. To improve performance, instead of creating a new image for each request, it returns small pre-generated

images (e. g., PNG or JPEG) or reuses identical previous requests that follow a discrete set of tile matrices. This proposed standard provides support for multiple architectural patterns - KVP, REST and SOAP.

4.2.3.5Web feature services (WFS)

The Open Geospatial Consortium Web Feature Service Interface Standard (WFS) provides an interface allowing requests for geographical features across the web using platform-independent calls. WFS is oriented for vector data exchange on the Internet. It uses GML format for data transfer. Both geometric and attribute information are transferred with GML. Also OGC Web gazetteer Service profile is derived from this service. An extended capability of the service enables transactional operations like insert/update/delete features on remote servers. WFS uses also Filter Encoding for querying.

The 1.0 version of the Web Feature Service Interface Specification (WFS) was published by the Open Geospatial Consortium on September 2002. This specification purpose is to describe data manipulation operation on OpenGIS Simple Features (feature instances) allowing servers and clients to “communicate” on the feature level. A WFS-compliant service provides client applications with real spatial data (i. e. OGC geospatial Features), typically expressed as an XML-encoded file.

The **WFS Transaction (WFS-T)** operation is used to describe data transformation operations that are to be applied to web accessible feature instances. A web feature service may process a Transaction operation directly or possibly translate it into the language of a target datastore to which it is connected and then have the datastore execute the transaction. When the transaction has been completed, a web feature service will generate an XML response document indicating the completion status of the transaction.

The Transaction operation is optional and a WFS implementation does not need to support it to conform to this specification. If the Transaction operation is supported then this fact must be advertised in GetCapabilities results.

4.2.3.6Web coverage services (WCS)

The WCS may be compared to the OGC Web Map Service (WMS) and the Web Feature Service (WFS); like them it allows clients to choose portions of a server's information holdings based on spatial constraints and other criteria, but the WCS deals with raster data instead of vector data (WFS). WCS supports electronic retrieval of geospatial data as "coverages" – which is digital geospatial information representing space-varying phenomena. This service enables data transfer in native format together with metadata needed for data interpretation. Only raster data are currently supported, vector data are planed to be incorporated in the future. This service plays important role for satellite data transfer in the system.

The Web Coverage Service provides three operations: GetCapabilities (typical to all OGC WxS standards), GetCoverage, and DescribeCoverage.

4.2.3.7Styled Layer Descriptor (SLD)

A **Styled Layer Descriptor** (SLD) is an XML schema specified by the Open Geospatial Consortium (OGC) for describing the appearance of map layers. It is capable of describing the rendering of vector and raster data. A typical use of SLDs is to instruct a Web Map Service (WMS) of how to render a specific layer.

Since 2007 the SLD specification has been split up into two new OGC specifications:

- Symbology Encoding Implementation Specification (SE)
- Styled Layer Descriptor

Styled Layer Descriptor Specification now only contains the protocol for communicating with a WMS about how to style a layer. The actual description of the styling is now exclusively described in the Symbology Encoding Implementation Specification.

4.2.3.8Web Map Context

WMS 1.1.1 specifies how individual map servers describe and provide their map content. The Context specification states how a specific grouping of one or more maps from one or more map servers can be described in a portable, platform-independent format for storage in a repository or for transmission between clients. This description is known as a "Web Map Context Document", or simply a "Context". Presently, context documents are primarily designed for WMS bindings. However, extensibility is envisioned for binding to other services.

A Context document includes information about the server(s) providing layer(s) in the overall map, the bounding box and map projection shared by all the maps, sufficient operational metadata for Client software to reproduce the map, and ancillary metadata used to annotate or describe the maps and their provenance for the benefit of human viewers.

4.2.3.9Catalogue Service (CSW)

Catalogue services support the ability to publish and search collections of descriptive information (metadata) for data, services, and related information objects. Metadata in catalogues represent resource characteristics that can be queried and presented for evaluation and further processing by both humans and software. Catalogue services are required to support the discovery and binding to registered information resources within an information community. Metadata act as generalised properties that can be queried and returned through catalogue services for resource evaluation and, in many cases, invocation or retrieval of the referenced resource. Catalogue services support the use of one of several identified query languages to find and return results using well-known content models (metadata schemas) and encodings.

Catalogue services are the key technology for locating, managing and maintaining distributed geo-resources (i. e. geospatial data, applications and services). With OGC catalogue services, client applications are capable of searching for geo-resources in a standardised way (i. e. through standardised interfaces and operations) and, ideally, they are based on a well-known information model, which includes spatial

references and further descriptive (thematic) information that enables client applications to search for geo-resources in very efficient ways.

Whereas interfaces and operations of OGC catalogue services are well defined, it is left up to the developer of the system to define a specific information model which a catalogue service instance provides. This includes, but is not limited to, the information which can be inserted in the catalogue, supported query languages, available search terms, response/result sets, etc. This point is of major importance with respect to interoperability between different catalogue service instances.

The CSW information model is based on the international standard for metadata description ISO 19115:2003/Cor.1:20066. In addition, the catalogue uses a metadata description for service metadata based on the ISO 19119:2005/PDAM 17 standard [ISO 19119] to facilitate the management of service metadata. The encoding of any information object in this profile is based on ISO/TS19139. The main purpose of the information model is to provide a formal structure for the description of information resources that can be managed by a catalogue service that complies with the application profile.

The current standard is CSW 2.0.2, which is supported by metadata system “Micka” and also an implementation in “GeoNetwork opensource” is expected.

4.2.3.10 Web Processing Services (WPS)

The OpenGIS Web Processing Service (WPS) Interface Standard from Open Geospatial Consortium defines a standardised interface that facilitates the publishing of geospatial processes on the web and the discovery of and binding to those processes by clients. “Processes” include any algorithm, calculation or model that operates on spatially referenced data. “Publishing” means making available machine-readable binding information as well as human-readable metadata that allows service discovery and use. A WPS can be configured to offer any sort of GIS functionality to clients across a network, including access to pre-programmed calculations respectivly computation models that operate on spatially referenced data. The data required by the WPS can be delivered across a network, or is available on a server. This interface specification provides mechanisms to identify the spatially referenced data required by the calculation, initiate the calculation and manage the output so that the client can access it. This Web Processing Service is targeted at processing both vector and raster data. The WPS specification is designed to allow a service provider to expose a web accessible process, such as polygon intersection, in a way that allows clients to input data and execute the process with no specialised knowledge of the underlying physical process interface or API. The WPS interface standardises the way processes and their inputs/outputs are described, how a client can request the execution of a process, and how the output from a process is handled. Because WPS offers a generic interface, it can be used to wrap other existing and planned OGC services that focus on providing geospatial processing services. For instance Python Web Processing Service is an implementation of the Web processing Service standard.

The specified Web Processing Service (WPS) provides client access to pre-programmed calculations and/or computation models that operate on spatially referenced data. The data required by the service can be delivered across a network, or available at the server. This data can use image data formats or data exchange standards such as Geography Markup Language (GML) or Geolinked Data Access Service (GDAS). The calculation can be as simple as subtracting one set of spatially referenced numbers from another (e.g. determining the difference in influenza cases between two different seasons), or as complicated as a global climate change model.

The WPS interface specifies three operations that can be requested by a client and performed by a WPS server, all mandatory implementation by all servers. Those operations are:

4.2.4 ISO (International Standardisation Organisation) Metadata standards

ISO 19115:2003 defines the schema required for describing geographic information and services. It provides information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data.

ISO 19115:2003 is applicable to:

- the cataloguing of datasets, clearinghouse activities, and the full description of datasets;
- geographic datasets, dataset series, and individual geographic features and feature properties.

ISO 19115:2003 defines:

- mandatory and conditional metadata sections, metadata entities, and metadata elements;
- the minimum set of metadata required to serve the full range of metadata applications (data discovery, determining data fitness for use, data access, data transfer, and use of digital data);
- optional metadata elements - to allow for a more extensive standard description of geographic data, if required;
- a method for extending metadata to fit specialised needs.

Though ISO 19115:2003 is applicable to digital data, its principles can be extended to many other forms of geographic data such as maps, charts, and textual documents as well as non-geographic data.

ISO 19119:2005 identifies and defines the architecture patterns for service interfaces used for geographic information, defines its relationship to the Open Systems Environment model, presents a geographic services taxonomy and a list of example geographic services placed in the services taxonomy. It also prescribes how to create a platform-neutral service specification, how to derive conformant platform-specific

service specifications, and provides guidelines for the selection and specification of geographic services from both platform-neutral and platform-specific perspectives.

ISO/TS 19139:2007 defines Geographic MetaData XML (gmd) encoding, an XML Schema implementation derived from ISO 19115.

4.2.5 De Facto Standards

- GeoRSS
- GeoJSON

4.3 Policy

4.3.1 INSPIRE

INSPIRE (Infrastructure for Spatial Information in Europe) is the name of an EU directive for the development of an European Spatial Data Infrastructure. INSPIRE Directive 2007/2/EC of the European Parliament and of the Council of 14th March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) entered into force on the 15th May 2007. Member States have until 15th May 2009 to transpose the Directive into their legislative systems. INSPIRE lays down general rules to establish an infrastructure for spatial information in Europe for the purposes of Community environmental policies, and policies or activities which may have an impact on the environment. The goal of the infrastructure is to support the European Environmental policy and decision-making. The directive is legally binding for EU member states and includes explicit deadlines for its implementation. The detail description of INSPIRE rules is in D 2.3 INSPIRE Requirements Analysis

The implementing rules will be of major relevance for the implementation of the INSPIRE directive. They are currently developed and specified by five drafting teams. The drafting teams cover the following topics:

- Metadata
- Data specifications
- Network services
- Data and service sharing
- Monitoring and reporting

INSPIRE Network Services Architecture is based on the description provided in the INSPIRE Technical Architecture Overview document. At the core of the architecture are the INSPIRE Service Types:

- Discovery
- View
- Download
- Transform
- Invoke[2]

[2] See D2.3 INSPIRE Requirements Analysis

4.4 Initiatives

4.4.1 UNSDI

Formed in 2000, UNGIWG (United Nations Geospatial Information Working Group) comprises a network of UN professionals and others, working in the fields of cartography and *geospatial information* management science to address common geospatial issues - maps, boundaries, data exchange, standards, naming conventions, and location. It also works directly with nongovernmental organisations, research institutions and industry to develop and maintain common geographic databases and geospatial technologies to enhance guidance and operational capabilities. Since its inception, UNGIWG has been laying the foundations for a UNSDI (United Nations Spatial Data Infrastructure). The accomplishments of its Task Groups in particular indicated that refinement and refocusing of current activities and UNGIWG organisation could deliver the components for such a system. During the 7th UNGIWG Plenary meeting held in Santiago in November 2006, it has been recognised that the development of a common vision and understanding on UNSDI was a priority. In order to build on common interests, the UNGIWG Secretariat consulted the UN agencies on the activities carried out within the agency that could benefit from the UNSDI. Four primary UN business cases drive the need for a UNSDI:

1. Provision of spatial data and information
2. Development of common data services
3. Capacity building
4. Promotion of partnerships and cooperation

The UNSDI Vision is for a comprehensive, decentralised geospatial information framework that facilitates decision-making at various levels by enabling access, retrieval and dissemination of geospatial data and information in a rapid and secure way. Achieving this vision in the milieu of UN reform, delivering on the MDGs (Millennium Development Goals) and attending to the remits of evolving global governance requires a mechanism to establish system coherence for the applications and exchange of geospatial data for UN activities.

The UNSDI is such a mechanism. It enables interoperability between spatial data infrastructures developed for specific purposes that operate within UN agencies, among groups of UN agencies sharing common interests, and between the UN, Member States and their regional and thematic groupings, and partners. To achieve this the UNSDI provides a base collection of technologies, datasets, human resources, policies, institutional arrangements, and partnerships that facilitate the availability, exchange of, access to and use of geographically-related information using standard practices, protocols, and specifications. Where SDI's do not yet exist - within or beyond the bounds of the UN - it is in the UN's interest to foster their development as a means of encouraging improved ease of access and re-use of spatial data to support the MDGs, the UN reform agenda and the tenets of the UN Charter.

At its core, the UNSDI will contribute substantively to the million of the United Nations by engaging member states, regional organisations and partners in building consen-

sus, policy and governance mechanisms to ensure that geospatial data and information sharing practices are used widely in social, economic and environmental development.

Access, retrieval, and dissemination of geospatial data and services will be enabled in an easy and secure way by the UNSDI, avoiding duplication in data collection and management within the United Nations, and with and between its member states and partners.

By facilitating efficient global and local access, exchange and utilisation of geospatial information to both developed and developing countries, the UNSDI will enhance decision-making on a global basis and at all levels of societies and thus contribute substantively to the achievement of the Millennium Development Goals (MDGs).The UNSDI will also provide opportunities to increase UN efficiencies and effectiveness in the context of the recent UN reform agenda and by facilitating the demands of increasing global governance.

4.4.2 GMES

The objective of GMES is to provide, on a sustained basis, reliable and timely services related to environmental and security issues in support of public policy makers' needs. GMES is an EU-led initiative, in which ESA implements the space component and the Commission manages actions for identifying and developing services relying both on in-situ and space-borne remote sensing data. GMES will use, to the maximum extent possible, existing capacities, weather they are national or European. This entails cooperation between the European Community, ESA and their Member States.

4.4.3 GEOSS

The Global Earth Observation System of Systems will provide decision-support tools to a wide variety of users. As with the Internet, GEOSS will be a global and flexible network of content providers allowing decision makers to access an extraordinary range of information at their desk.

This 'system of systems' will proactively link together existing and planned observing systems around the world and support the development of new systems where gaps currently exist. It will promote common technical standards so that data from the thousands of different instruments can be combined into coherent data sets. The 'GEOPortal' offers a single Internet access point for users seeking data, imagery and analytical software packages relevant to all parts of the globe. It connects users to existing data bases and portals and provides reliable, up-to-date and user friendly information – vital for the work of decision makers, planners and emergency managers. For users with limited or no access to the Internet, similar information is available via the 'GEONETCast' network of telecommunication

5 Framework for classifying technologies and services

An important part of the state of the art analysis is to identify relevant GIS technologies and services. To make them more structured, we described a framework to classify software products, which was tested by classifying a couple of existing products. The framework includes minimum requirements for software and services in SDI and several classifications (classification by technology, by interactivity, by approach). First of all we need this framework to test it and to see if it is useful in SDI context (or will be within the project time). Second, we need detailed software description to decide which software could be used for the development of Plan4all prototype.

5.1 Classification given by Plan4all extension of INSPIRE Networking Architecture

The INSPIRE networking Architecture define next five types of basic services:

- Discovery
- View
- Downloading
- Transformation
- Invoke

The definition of this services is described detail in D 2.3 INSPIRE Requirements Analysis. This services are defined mainly for sharing data and services across Europe. INSPIRE services doesn't include such functionality like digitalisation, data collection, data analysis, routing, design and planning. So for classification of software we will use next additional type of services:

- Digitalisation
- Data collection
- Digital cartography
- Data analysis
- Routing
- Design and planning activity

5.2 Classification by standards

Classification by standards is given by OGC and ISO standards described in the previous chapter.

5.3 Classification by technology

There are various types of web mapping applications which have different goals, use different technologies and are addressing different target groups. Therefore, we set up a number of groups to classify web mapping and online geo data manipulation by used technology.

5.3.1 Client-Side (User Interface)

5.3.1.1File transfer technology

The simpliest form of map acquisition through the web is a download-only map where you can view and/or download any static map (image file or pdf). There is no interactivity and no direct connection to a map server or geodatabase. The download can only be updated by replacing the downloadable file. Because files may be very large in size someone should mention that this download may use the more robust FTP protocol too. In such a case all intelligence of the application must be provided server side. Such systems are outdated in the SDI context.

5.3.1.2Thin Client Web Maps

In a time when it was quite unsafe that browsers could interpret JavaScript typical web mapping clients consisted of a serverside calculated map picture surrounded by many hyperlinks (e. g. for zoom, pan, switch layers, query attribute data), and probably also reacting on clicks within the image as they were embedded in a HTML form. On click the whole HTML page as well as the embedded image was reloaded from the server where it also was regenerated just in the client requested size. Such systems are working with nearly any graphical browser, even very outdated versions. First versions of web mapping servers from the commercial GIS companies worked in that way in the late 1990s just like the mapserver from the University of Minnesota (In the time being this server component has also grown at a similar pace as its commercial counterparts and offer all the OGC interfaces to a similar or higher degree of conformance.), where this behaviour is still in use nowadays. Since first mobile devices, especially mobile phones, had low technical possibilities this technology was also reused for the first mobile applications, e. g. with WAP. Such systems will be used in the SDI context only within special circumstances.

5.3.1.3Thick Client Web Maps

Since the comfort of thin client web maps is undesirable, developers created new interfaces which allow more comfortable usability. Typically these clients request either vector data from the server and interpret it client side or raster tiles (e. g. images with 256 * 256 pixels, mostly fractions of 1024). On zoom events these data are recalculated in a first step (even if the pixels get huge) and reloaded in a second step. In pan events the vectors or rasters are moved and the missing parts requested in another step. This technology ensures that maps can be displayed quickly as well as more comfortably than with simple one image applications.

Since the scripting technology of browsers in the mid 1990s was in its infancy, first attempts of creating better interfaces were setup upon browser add-ons or http using standalone applications. Later on scripting languages especially JavaScript were impressively extended and so newer interfaces use this technology. Specific technologies of that type are:

5.3.1.4Standalone Web Map Applications

Since browsers bring a lot of functionality which is not needed for geographical applications, it may be a good concept to provide special web map client applications. On the other hand restrictions caused by applets and all applications capable of residing within browsers made it reasonable to create standalone applications. The standalone applications also allowed re-use of code for the creation of simple clients based on their mainstream commercial products. In the time being new standalone applications were developed for mobile devices as these give the possibility to override restrictions of mobile browsers.

5.3.1.5GIS with ability to use online data

Beside other standalone applications some GIS (and even CAD) systems are enabled also to use web maps in the meantime.

5.3.1.6Browser Extensions

Typically geographic applications used the following way to extend the browser's possibilities. A huge common disadvantage of nearly all these technologies is that the user has to install something, which is problematic especially in company networks with restricted rights. Some of these extensions only work as an extended user interface to load images more comfortable, others bring real vector data to the user and interpret it there. Nevertheless also public viewable maps were published with such systems in former days.

Proprietary ActiveX

This technology had a very comfortable download but was limited to Microsoft Internet Explorer and therefore lost importance by the time. Some applications which used that way of extension are:

Java Applets

Java applets are very comfortable because the user does not have to download anything. But on the other hand in times of (respectively on systems with) small bandwidth it needs a long time to start the application. In some cases, developers also created installable applets, whereby one disadvantage was solved by getting another one. Another disadvantage was the poor graphical interface of early Java applets. Some applicationsthat used this approach are:

Netscape PlugIns/Firefox AddOns

Whereas the fist PlugIns for Netscape were used for overriding built-in technical restrictions of the early versions, in the time being, modern extensions for Firefox are offered mainly to improve the usability.

Flash, Silverlight and OpenLazlo Applications

To avoid downloading of proprietary extensions some developers used the widely installed Flash PlugIn (or its uncommon used counterparts Silverlight and OpenLazlo) which are nowadays often installed with one's browser standard installation. Since

Flash applications with many elements have a poor performance and the server side development is not quite easy, this technology was used only rarely and for smaller projects in a geographical context.

SVG Applications

While SVG (Scalable Vector Graphics) is a W3C standard since 2001 some developers tried to use it for geographic applications too. But SVG never became really accepted. On one hand it is implemented in Firefox natively, but with poor functionality for zooming and panning, on the other hand Microsoft invented its own standard (ovl?) and a SVG-PlugIn was needed. At last Adobe ended the support of its market leading PlugIn. In the meantime most of the features of SVG are also possible with HTML and JavaScript directly. A huge advantage of SVG is the full implementation of the DOM (document object model).

5.3.1.7Web-based 3D graphics

X3D (Extensible 3D) is an open standard XML-based language successor to the popular VRML (Virtual Reality Modelling Language) the original ISO standard for web-based 3D graphics (ISO/IEC 14772). In particular, the XML encoding enables 3D to be incorporated into web services architectures and distributed environments allowing 3D data moving between applications. X3D has been officially incorporated within MPEG-4 multimedia standard and it is compatible with SVG.

X3D has a rich set of features to support applications such as engineering and scientific visualisation, multimedia presentations, entertainment and educational titles, web pages, and shared virtual worlds.

In particular X3D feature set includes:

- 3D graphics: Polygonal geometry, parametric geometry, hierarchical transformations, lighting, materials and multi-pass/multi-stage texture mapping
- 2D graphics: Text, 2D vector and planar shapes displayed within the 3D transformation hierarchy
- Animation: Timers and interpolators to drive continuous animations
- Spatial audio and video: Audiovisual sources mapped onto geometry in the scene
- User interaction: Mouse-based picking and dragging; keyboard input
- Navigation: Cameras; user movement within the 3D scene; collision, proximity and visibility detection
- User-defined objects: Ability to extend built-in browser functionality by creating user-defined data types
- Scripting: Ability to dynamically change the scene via programming and scripting languages

- Networking: Ability to compose a single X3D scene out of assets located on a network; hyperlinking of objects to other scenes or assets located on the World Wide Web
- Physical simulation: Humanoid animation; geospatial datasets; integration with Distributed Interactive Simulation (DIS) protocols

5.3.1.8Web Browser with scripting extensions

With the further development of browsers and the extended scripting languages, application developers were enabled to construct user interfaces directly within the browser using that scripting technologies and avoiding extensions, which have to be installed. Some of them – like OpenLayers – are even enabled to interpret vector layers directly.

Others – like Mapbender which also includes a backend application– have a rich interface which reminds of desktop mapping applications.

There is no need to install any additional software on the client's (i. e. the user's) PC. The scripts are embedded in the HTML pages or separate files and loaded on demand without user interaction.

5.3.2 Serverside

5.3.2.1Application server

There is a certain number of powerful web mapping clients available; they are predominantly open source software and they all work through the user's web browser. Although called client, the web mapping client software is installed on a server and loaded to the client.

Whereas server modules which deliver maps to clients, derive from a handful products on market, surrounding applications are often individually programmed. Most of these applications are written in PHP, sometimes also in Python, Perl or Java. Beside that, there are some products on the market which even include a backend for special purposes, e. g. Mapbender.

While most of the application servers allow only the interpretation of zoom and pan requests or even feature information requests, some applications are able to react to further GIS functions starting with drawing requests and lasting to real GIS functions like polygon overlays.

5.3.2.2Tile server and "cookie cutter"

While the first products on market mainly served tiles or created them out of huge bitmaps on the fly, this rather simple solution is still used for mass user applications.

5.3.2.3File interpreting

The first more sophisticated attempt used vector files (mainly ESRI shape files) and created bitmaps on the fly. Really early applications even used desktop applications running on the server and sent screenshots to the user.

First products in the market like the mapserver of the university of Minnesota or ArcIMS used their proprietary set of request parameters nowadays most services work OGC compliant so that client applications have no need to know the server side product in detail.

5.3.2.4Mapserver with database backend

With the upcoming geodatabases products were enabled to interpret data from these databases directly. In the time being these products were also enhanced to produce maps upon requirements with user driven design.

5.3.2.5Mapserver with more intelligent functions

Driven by the Open Source Community with the latest products it is also possible to use some GIS functions like manipulating data or retrieving data to use it with intelligent clients so that mapservers act like a middle tier to the geodatabase.

5.3.2.6Middleware

Middleware products with special geographic functions may be for example servers which request data or images from another map server and reproject these on the fly to send it to clients.

5.3.2.7Geodatabases

Geodatabases are commonly SQL extensions which allow the request of geographical data from SQL databases based on geographical items. Some of them are also able to achieve GIS functions. In early days of development some of them used also proprietary protocols.

5.4 Classification by Service

5.4.1 State of the art

State of the art is on the one side defined by technology development, which is currently mainly predicted by service oriented architecture and currently also Web 2.0 development. On the other side current state of the art is defined by European legislation given by the INSPIRE directive. Parallel to the INSPIRE initiative the initiatives GMES and GEOSS could be mentioned and word wide also the UNSDI initiative.

5.4.1.1Proprietary mapping services

First products on market used their own proprietary request protocols which are even in use nowadays by many map distributors. Most mapping clients are able to request maps from the most established mapservers in their specific proprietary protocol.

5.4.1.2Direct SQL Requests to Geodatabases

Geodatabases usually can be requested following the Simple Feature Specification for SQL defined by the Open GIS Consortium (OGC).

5.5 Products

5.5.1 Template with answering suggestions

Plan4all Product/Service description #...		
Productname/Version		Full name (short name, actual/last Version)
Manufacturer		
Developed from/to		
Contact		Name (email)
Short Description		
Type		• commercial • OpenSource • Standard (OGC, W3C, …) • Commercial, but free of cost (for …)
Approach		• Graphic Display • Web Mapping • Web Mapping (Globe) • Web Cartography • Web GIS • Geodatabase • Location-based services • Routing
Interactivity		• Only Viewing • Semi interactive • Fully interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Database Access • WebGIS functions
	Client side	• standalone • ActiveX • PlugIn/AddOn • Applet • Scripts • HTML only
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • SLD/… (OGC conform) • Simple Feature Specification for SQL (OGC) • GeoRSS • KML • GML • SVG • Others (specify …)
Operating System	Server side	
	Client side	
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	• Server side • Client side

Metadata management	
Known usage in planning	
Challenges	
Collected by	
Additions by	
Remarks	
Manufacturers remarks	

5.6 Selected Product overview

This table provides classification of selected products, which was recognised as most relevant for Plan4all pilot implementations. The full list of products and detailed information about all software is provided in Annex A.

Products			Classification		Comments
Type	Manufacturer	Product	Plan4all classification	Standards	
Commercial Software	AbacoGroup	DbMap2D	View Downloading Transformation Digitalisation Data collection Digital cartography Data analysis Routing	WMS (OGC conform) Simple Feature Specification for SQL (OGC) GeoRSS KML	
	Autodesk Inc.	Autodesk Map	Digitalisation Data collection Data analysis Design and planning activity	WMS?	
		Autodesk MapGuide	View	WMS?, WFS?	Until 2005; Client-Server-Application; still in use;
	Bentley Systems	Bentley Cadastre	Design and planning activity	KML	
		Bentley Map	Digitalisation Data collection Design and planning activity	KML WMS	
		GeoWebPublisher	View Downloading	WMS	**
		MicroStation	Digitalisation Data collection Design and planning activity	KML WMS	proprietary projections
	Conterra	terraCatalog	Discovery	CSW ISO19115/19119)	Connectivity to ArcGIS

Products			Classification		Comments
Type	Manufacturer	Product	Plan4all classification	Standards	
	ERDAS	Apollo Image Manager	Discovery View Downloading Digital cartography Data analysis	WSDL/SOAP/UDDI, WRS 0.0.2 WMS-WSDL, WMS POS, WMS, WMC, WCS-WSDL, WCS, URN, SOAP, SLD, OWS common, Filter, CAT2 AP, ebRIM, CAT CS/W Metadata ISO 19115/ 19119/ 19139	Included Metadata-Management
		Apollo Server	Discovery View Downloading Digital cartography Data analysis	WSDL/SOAP/UDDI, WRS 0.0.2 WMS-WSDL, WMS POS, WMS, WMC, WCS-WSDL, WCS, URN, SOAP, SLD, OWS common, Filter, CAT2 AP, ebRIM, CAT CS/W Metadata ISO 19115/ 19119/ 19139	
		ERDAS Catalog	Discovery View Downloading Digital cartography Data analysis Routing	WSDL/SOAP/UDDI, WRS 0.0.2 WMS-WSDL, WMS POS, WMS, WMC, WCS-WSDL, WCS, URN, SOAP, SLD, OWS common, Filter, CAT2 AP, ebRIM, CAT CS/W Metadata ISO 19115/ 19119/ 19139	
	ESRI	ArcCatalog	Discovery	19115/19119/19139, CSW?	Meta Data Editor
		ArcGIS Explorer	View	WMS	Free of cost
		ArcIMS / ArcGIS Server	View Downloading Digital cartography Data analysis	WMS, WFS	Various Applications

Products			Classification		Comments
Type	Manufacturer	Product	Plan4all classification	Standards	
		ArcSDE (Spatial Data Engine)	View Downloading Digital cartography Data analysis	WMS, WFS	
	HSRS	Micka	Discovery	CSW, ISO 19115/ 19119/ 19139	
		URM Geoportal	Discovery View Downloading Transformation Digitalisation Data collection Digital cartography Data analysis	WMS, WFS, WCS, WPS, CSW, ISO 19115/ 19119/ 19139	
	Intergraph	GeoMedia WebMap	View Downloading Transformation Digitalisation Data collection Digital cartography Data analysis	WMS, WFS, WFS-T, GM, SVG, CSW	
	MapInfo	Mapinfo Professional	Digitalisation Data collection Digital cartography Data analysis	WMS, WFS, WFS-T, KML	
		MapXtreme	View Routing	WMS, GML	
	Oracle	Oracle Spatial & Locator	View Routing	WMS, LBS	
	Topol s.r.o	Topol xT 9.0	View Transformation Digitalisation Data collection Digital cartography Data analysis	WMS	
		Topol xT Internet server	View Transformation	WMS, WPS	
OpenSource Software or freeware	Advanced Information Systems Group of the University of Zaragoza and GeoSpatium-Lab	CATMDEdit	Discovery	ISO 19115/ 19119/ 19139	
	Camptocamp SA	CartoWeb	View Routing	WMS, WFS	
	Cenia	Janitor	View Digitalisation Data collection Digital cartography Data analysis	WMS, CSW	
	DM Solutions Group	Chameleon	View	WMS, WMC	
		Ka-map	View	WMS, WFS	

Products			Classification		Comments
Type	Manufacturer	Product	Plan4all classification	Standards	
	Fraunhofer Institute for Computer Graphics Research (IGD)	HALE – HUMBOLDT Alignment Editor	Transformation	GML, WFS	
	Gigateway - AGI	MetaGenie	Discovery	ISO 19115/ 19119/ 19139	
	Help Forest, Wirelessinfo	DataMan	Downloading Discovery	ISO 19115/ 19119/ 19139, GML	
	Help Forest, Wirelessinfo HSRS	MapMan	View Discovery Digital cartography	WMS, WFS, ISO 19115/ 19119/ 19139, GML	
		Teredit System	View Discovery Digitalisation Data collection	WMS, WFS, WCS, CSW	
		Gemet Client	thesaurus	SOAP	**
	HSRS IDEC Spain	HSLayers	View	WMS, WFS	OpenLayers based
		PyWPS	Transformation	WPS	
		MetaD	Discovery	ISO 19115/ 19119/ 19139	
	Immanuel Scholz, Dirk Stöcker	JOSM	Digital cartography	No standard?	
	Intelec Geomatique	M³CAT	Discovery	ISO 19115/ 19119/ 19139	MetaDataEditor**
	Intevation GmbH and TechniData AG	Thuban	View Digitalisation Data collection Digital cartography Data analysis	WMS SWG	
	IVER Technologias	gvSIG	View Digitalisation Data collection Digital cartography Data analysis	WMS, WFS WCS SLD/… GeoRSS, KML GML SVG	
	lat/lon	degree	View Digitalisation Data collection Digital cartography Data analysis	WMS, WFS,WFS-T, WCS, pre-standards of Sensor Observation Service (SOS), Web Terrain Service/ Web Perspective and View Service, (WTS/ WPVS), WPS, SLD, SFS for SQL, KML, GML (3.1 with a complex Feature Model and 3D-geometries), SVG	

Products			Classification		Comments
Type	Manufacturer	Product	Plan4all classification	Standards	
	Ministerio de Fomento, Admon Públicas, Industria y Turismo, Economía y Hacienda	GeoPista	Municipality GIS	WMS, WFS, SLD/… ,GML, SVG	
	OSGeo Foundation	GDAL/OGR	Transformation	WMSTS?	Additional commandline tools
		GeoNetwork	Discovery	CSW	Inkl. Meta Data Editor
		Grass Gis	Analysis Digitalisation	SWG ?	
		MapBender	View	WMS, WFS, WFS, SLD/…	
		MapServer	View	WMS, WFS client/server, WMC, WCS, Filter Encoding SLD, GML, SOS, OM, SFS for SQL, GeoRSS, KML, SVG	May be combined with other client software; former: Map-Server Foundation, former: University of Minnesota
		OpenLayers	View	WMS, WFS	Client side projections
	PortalU	InGrid Editor	View Discovery	ISO 19115 / ISO 19119, OGC-CSW-2-0, WMS	Meta Data Editor**
	QGIS Project Steering Comitee	QGIS (QuantumGIS)	View Digitalisation Data collection Digital cartography Data analysis	WMS, WFS, SFS for SQL, GML	
	Refractions Inc.	GeoServer	View Downloading	WMS, WFS, WFS-T, WCS	
		PostGIS	Geodatabase,	WMS, WFS, WFS-T, WCS, GML, WKT, SVG, SFS for SQL	
		uDig	View Digitalisation Data collection Digital cartography Data analysis	WMS, WFS, SLD/…, GeoRSS, KML, GML, SVG	
	SAIG	KOSMO GIS	View Digitalisation Data collection Digital cartography Data analysis	WMS, WFS, SLD/…, GML, SVG	
	T-Systems España, SAU	MonoGIS	View Digital Cartography Routing	GML	

Products			Classification		Comments
Type	Manufacturer	Product	Plan4all classification	Standards	
	Vivid Solutions	JUMP	View Digitalisation Data collection Digital cartography Data analysis	WMS, SLD/…, GML, SVG	

6 Chances, potentials, risks of data infrastructure applications

Based on the framework of technologies and services we give a theoretic view on their chances, potentials and risks concerning data storage, data display, legislation, insufficient data use, derived datasets and the quality of metadata.

6.1 Data Storage

6.1.1 Any time access and combined access

Any time and any where access is one of the main advantages of online data infrastructures. The user is not dependent on certain office hours nor does he or she have to collect datasets on offline devices to have an every time access. The problem of having offline datasets which are out of date because an update has been missed does not exist in this case because there is always access to the latest version of all data.

Any time and any where access does not necessarily mean that the datasets are shared via internet or similar, potentially insecure channels. A connection can also be made through a secured or private network and can even be encrypted so that only privileged users can access the data. Therefore, confidential datasets can be accessed this way, too.

Combined access means that datasets from different sources can be accessed in the same way because everything is part of the spatial data infrastructure (SDI).This is a huge advantage opposite to datasets which are kept without an SDI (see also “incorrect data use” and the figure below). Since this ambition may be overruled by browser security features, using more than one source with browser extensions may work only via reverse proxy servers or middleware.

6.1.2 Redundancy

A huge problem of distributed data management is redundancy. This term refers to double storage of identical datasets as well as multiple storage of similar datasets due to erroneous or negligent survey or a lack of coordination. There may be several reasons for redundancy:

- ***quicker access:*** If all relevant datasets are stored at the same place, disregarding the fact that they are also available elsewhere, the user does not have to think of different sources but can always rely on the same data source.
- ***independency:*** One data store is not dependent on another data store if it keeps all relevant datasets in its own place.
- ***ignorance:*** The datasets are kept in multiple places because one data manager simply does not know that another data manager maintains the same datasets. This is a common effect in tangled and outdated infrastructure networks of big administrational clusters. Technical ignorance may also be a

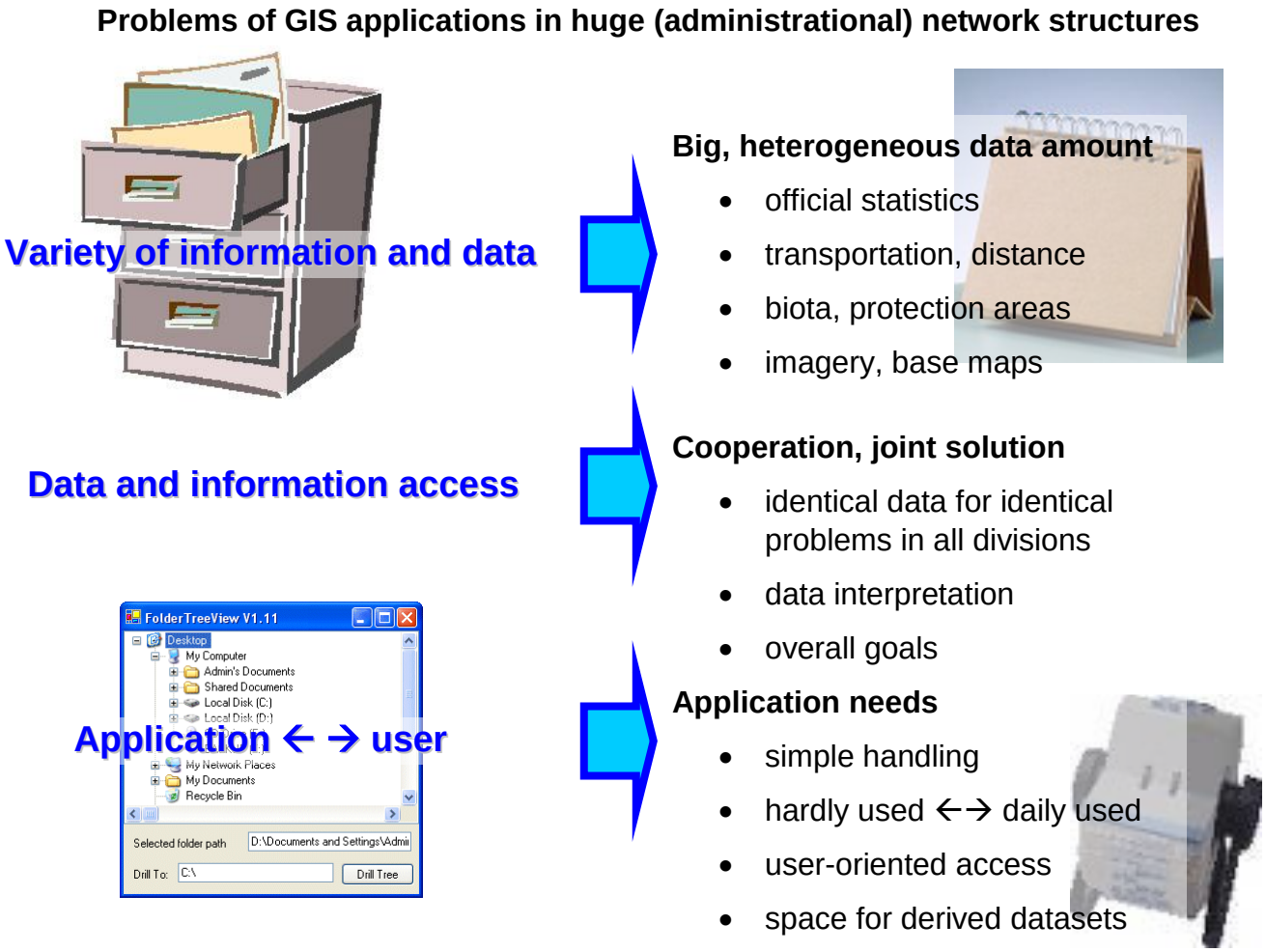
consequence of legal ignorance, which is often followed by redundant datasets.

Apart from safety issues which see redundancy as a matter of purpose for security reasons (backup), classic redundancy often leads to problems: More than one instance of a dataset is available, and each claims to be the latest – but the user does not really know which one is the one he or she should choose to work with. Central data storage or an up-to-date data infrastructure network helps to solve redundancy problems which are not only a matter of work efficiency but also a matter of wasted disk space.

6.2 Data Display

6.2.1 Generalisation

Cartographic generalisation is the process of selecting and representing information of a map in a way that adapts to the scale of the display medium of the map. Printed maps are always provided in fixed scales whereas digital maps are scalable. This can lead to presentation problems because geodata are always stored in a resolution which is proper for a certain scale range. Zooming out of this range may result in inaccurate, wrong, or at least strange data display. An alternative could be to store geodata only at their best available resolution and apply automatic generalisation dependent on the requested map scale. However, generalisation is a balancing process. Automatic generalisation still leads to problems as different researchers invented conceptual models for automated generalisation, but still there is no clear classification of operators available, It is doubtful if a comprehensive classification will



evolve in future. This leads directly to the next point:

Fig. 2: Problems of GIS applications in huge (administrational) network structures

6.2.2 Web mapping vs. cartography

Cartography is understood as the study and practise of designing geographical maps combining science, aesthetics, and technique, and building on the premise that reality may be modelled in ways that communicate spatial information effectively, whereas web mapping is a much simpler technique of visualisation of digital data.

	Cartography (printed maps)	Web mapping (digital maps)
Scale	fixed scale	variable scale, but are data suitable for all scales?
Generalisation	manual generalisation	a few automatic generalisation rules, or no generalisation at all
Layer structure	fixed layer structure (in most cases)	variable layers
Resolution	high resolution	maximum resolution is screen resolution what about printouts?
Generation time	map generation once respectively periodically	map generation on the fly through map server applications respectively pre generated in short intervals or simply cached
Update cycles	high up-to-dateness is expensive because of manually intervention	In most cases easily and automatically updateable
User know how?	user needs to know how to read a map – really?	user needs to know how to read a map, user also needs to know how to navigate within a map, for edits additional know-how or experience is necessary, or, at least, advisable
Readability	map should be designed to be readable	some layer combinations may result in illegibility
Flexibility	no flexibility, map is as it is	sometimes too much flexibility especially when web mapping is mixed up with web GIS
User contributions	nearly no user contributions, no interactivity	user contributions and interactivity are possible
Plausibility	datasets are checked for plausibility	in simple systems there is usually no guarantee for correct data; however, geodatabases can handle digital data signature so that correctness can also be trusted with electronic maps
Legally binding	may be legally binding	(currently) difficulties with legal commitment

Tab. 1: Web Mapping vs. Cartography

Remark: Although there are no useable web systems which deliver really good cartography further development could change the perspective to the above points.

6.3 Legal obligation

Dealing with datasets is often not subject to legislation as far as datasets are not understood as content building items but as core digital mass. Laws often state which data has to be used for which purpose but in most cases they do not say anything about the way data should be used. There are no statements regarding data storage, file formats, data documentation (metadata) and similar issues which are essential for a working SDI. Therefore, it is also critical to rely on the legal commitment of online datasets because such commitment cannot be derived from the legal situation in most countries.

Spatial data infrastructures should therefore be made a part of the legislative framework. This step also simplifies the situation administrative offices often see themselves in: They want to build an SDI and have to spend working time on that issue, but the time cannot be booked correctly because in their legally defined business a booking slot for such things simply does not exist and even more time is wasted making loop constructs to by-pass this lack of legal coverage.

6.4 Incorrect data use

Often, data access is physically not ensured or de facto impossible due to technical hurdles. This may cause the following risks:

- Datasets are not used because hardly anyone knows of their existence.
- Datasets are not correctly used according to their actual purpose because data documentation (metadata) is poor.
- Identical work and identical results (but with different interpretation and different graphic expression) are done more than once in different divisions of the company or administration which makes the results incomprehensible.

6.5 Derived datasets

A spatial data infrastructure also allows to store derived datasets, i. e. the amount of new data which evolves through calculation and analysis of existing data. An SDI helps to avoid multiple calculations of the same facts because once an analysis result is generated, it can be made part of the SDI and, therefore, immediately accessible to all other network partners and/or institutions. Since derived datasets usually not reuse the geographic primitives, geometric changes are not automatically mirrored to derived datasets. In such cases the derived datasets should be recalculated, which is often forgotten because it is not automated.

6.6 Metadata

6.6.1 Metadata quality

Metadata quality is as important as the actual data quality. If you want to work with geodata, you need to know where these data come from, for which scale they are suited, how the data have been processed, and much more. As the overall quality of a product is always dependent on the weakest link, a dataset is only as good as its metadata documentation which should not be done according to own standards, but following existing guidelines like the INSPIRE directive or the rules of ISO 19115 (“Geographic Information – Metadata”). Once a dataset lacks metadata, all derived datasets will suffer from the same deficit. The data cannot be traced back to its roots; uncertainty and insecurity arise and finally prevent the dataset from being used without doubts about its origin.

Some survey results may be found in Annex B (page 208)

7 Data evaluation and quality criteria

So far the importance of correct data use and high quality of metadata was outlined in the previous chapter, but we still did not answer the questions about the aspects of data quality and how high quality data can be achieved? Constitutive this chapter emphasizes on identifying criteria for data quality, because the best technologies and services alone are useless without the right data – and the other way around.

7.1 Why Data Quality?

Data quality is an increasingly important issue which must not be neglected. Consequences of poor data quality can be felt often in everyday life without being aware of the causes. A simple example is the mistaken or duplicate delivery of a letter which is mainly caused by errors in an address database.

The Office of Management and Budget of the United States of America defines data quality as "an encompassing term comprising utility, objectivity, and integrity."

- Objectivity means that information is accurate, clear, complete, and was unbiasedly collected.
- Utility means that the information is useful for its anticipated purpose.
- Integrity means the security of information, i. e. protection from unintended or unauthorised changes.

In comparison to this United States definition the Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information highlights the aspect of data quality mainly regarding the accessibility of public data and its availability in a format which is platform independent. This directive states that it is necessary for public data the re-use guarantee the data quality in terms of accuracy and up-to-dateness through data cleaning campaigns, which would make datasets attractive to potential users.

Scientific discussions of data quality began in the late 1960s, and it took three more decades until computer sciences started considering the problem of data quality definition, measurement, and improvement.

7.2 Aspects of Data Quality

In terms of the Plan4all project, the data quality discussion should concentrate on these criteria:

- accuracy (in both geometric and attributive terms)
- completeness
- consistency
- currency – this term has nothing to do with money but means system currency, the time duration from the time the real world changes to the time when the information system state is updated. (Source: Wang, Richard Y., et al.: Information quality. Armonk, NY, 2005.)
- timeliness

- volatility
- accessibility
- interpretability

Data quality is a multi-faceted concept, and all factors have to be considered at the same time:

- In some cases quality dimensions can easily be detected (e. g. apparent misspellings); in other cases, however, measurement of data quality can be somewhat difficult (e. g. when admissible but nevertheless incorrect values are provided).
- As with accuracy, completeness can be hard to evaluate, especially if the expected total number of datasets is unknown. In case of polygons it is easier to state completeness, if the topic is covering the whole area, like for example land use whereas completeness is tricky to measure if polygons may overlap.
- Consistency detection can show that there are errors, but the errors can often not be exactly localised.

7.2.1 Accuracy

Accuracy is defined as the closeness between a real life value and the (database) value which represents the real life value. It can be divided into

- syntactic accuracy, which applies to the check whether the value can anyway be true, e. g. if a value is within the allowed range of values. In syntactic accuracy it does not matter if the value is representing its correspondent real life value.
- semantic accuracy, which applies to the difference between the database value and its real life correspondent value.

Here is an example for accuracy: In a street network database, the name “King Street” has been erroneously attached to a street section which is not part of the street called “King Street” in real life. Thus, semantic accuracy is not given. However, “King Street” is a valid street name anyway, so syntactic accuracy is given.

Semantic accuracy is typically more complex than syntactic accuracy, as the object has to be uniquely identified to apply a semantic accuracy check.

7.2.2 Completeness

Completeness of data states whether data have sufficient breadth, depth, and scope for their intended purpose. It can be understood as the extend to which datasets in a table describe the real world. The more real world values are missing among the datasets, the worse the completeness of data. Completeness problems often arise in connection with null values in tables. Is the value really null, is it existing but unknown, or is it unknown if it is existing? So, to characterise the completeness of data, it must be investigated why values are missing: The following cases can be distinguished:

- A dataset is missing because its real world existence is unknown to the date of data collection (e. g. an unknown ground water stream).
- A dataset is missing although it exists in real world, but was forgotten, misplaced or not surveyed for any reason (e. g. a ground water stream close to the border of the survey region).

- A dataset is missing because it did not exist in real life when data collection took place (e. g. a new groundwater stream caused by construction works). This is not a completeness problem, but a currency problem – see below.

Handling polygon vector data, completeness can easily be checked – the data should be covering the whole area without without any gap. Line and point vector data cannot be verified that easily because the structure of the whole set is not taked corrupted when parts are missing. Raster datasets are always complete at first glance, but, on second glance, there can also be cells showing a “no data” value.

7.2.3 Consistency

Datasets in a table, or relations in a database, must follow certain rules which define the consistency of these data. In other words, consistency expresses whether data are logically correct. Data are checked for dependencies which must be met to make data consistent. The followig types of dependencies can be distinguished:

- **Key dependencies:** Given key dependency allows the installation of primary keys in a table. A value in a primary key field may occur only once, e. g. a parcel number in a municipality. Having data from more than one municipality, the primary key must be extended also to the field of the municipality code. Having a primary key enclosing more fields, the value in each single columns is allowed to occur more often, but each combination of all primary key fields may exist only once.
- **Inclusion dependencies:** These restraints manage the relations between tables in a database. For instance, if a land table has information about the parcels and their respective owners, the owner can be defined through his or her social security number (as each such number exists only once forever).
- **Functional dependencies:** Other dependencies which can put into constraints or formulas are called functional dependencies. In abstract words, there can be a constraint that for certain values x and y in a table row the column z must have a certain value or be in a certain range. For instance, a road section in a peripheral area of a municipality (x) which was opened after 1950 (y) must not have an overall width less than 4 metres (z). If this constraint is violated, the dataset is not consistent – there must be an error, but it cannot be said from the dataset where the error is located as it can have its origin either in the x, y, or z field.

7.2.4 Currency

The change of data in time is highly important concerning electronic (online) data structures. There is a significant difference between data on paper-based and electronic media. Printed data are published once and for all whereas electronic data are published continuously on the web. Currency is defined through the time spread between a real world gain, e. g. the designation of new building land parcels, and the corresponding database update. It describes how promptly data are updated, giving renewed datasets a high currency.

Currency underlines the importance of metadata management as “Last Update” fields are usually a mandatory element of a metadataset. Knowing the average update period (or volatility, see below) for certain themes, it can easily be estimated whether datasets are likely to be up to date. E. g., land use data with a last update in 1999 are out of date for almost sure, whereas data of inland waters from 1999 are likely to be still up to date because the inland waters network will usually not have changed during the past few years.

Also data synchronisation is a matter of currency. Especially data models which deal which many different data sources – like Plan4all – will have to deal with datasets of different sources having different time stamps. However, regarding planning relevant data, the question is not only how to synchronise datasets (e. g. interpolation of population values), but also whether it is basically allowed to synchronise data as an interpolation may neglect spatial impacts having occurred in the meantime, or simply falsifies analysis results.

7.2.5 Timeliness

Timeliness expresses how current data are for the task at hand. It is possible to have data of high currency which nevertheless can be useless because they are late for their actual purpose. For instance, data of a digital zoning plan may be current referring to the latest changes – but they are rather useless for reclamations if they are published after the reclamation deadline, giving the data a bad timeliness.

7.2.6 Volatility

Volatility is a factor which describes how frequent data changes occur; it can be understood as the usual length data remain valid. Parcel data near the centre of a municipality may have a low volatility as these parcels are covered with buildings or other city structures which today are usually not subject to changes. Or, these datasets are changed once, perhaps twice, when new building land at the outskirts is opened up. On the contrary, road traffic data may have high volatility as the traffic system is behaving very dynamically and always self-adapting to the current situation.

7.2.7 Accessibility

To make data accessible, it is not enough simply to put the data onto a web site or make them somehow downloadable from a server. Accessibility means that the user can successfully access data. There must be access to the network including availability of the necessary hardware, software, interface, and tools. The user must understand the navigation procedure and/or the navigation language. And, just as important, the user must be able to perceive the information given, which means accessibility also includes measures for individuals with disabilities.

7.2.8 Interpretability

Interpretability states whether or how good data are documented, and if metadata are available so that meaning and properties of data sources can be interpreted correctly. The documentation of European data has to be done according to the INSPIRE

directive; sticking to the guidelines given by INSPIRE data interpretability can be taken for granted.

7.3 How to Achieve Data Quality

To receive data of high quality, there must be an eye on quality measurement right from the birth of data, which date lies even before data collection because only if the proper issues are surveyed, the data receive sufficient informative value. Data quality activities can be classified as follows:

(1) **New data acquisition:** Set up a new database or refresh an existing database with new quality data.

(2) **Standardisation:** modify data according to standards (e. g. spelling checks, comply with style sheets).

(3) **Object identification:** make sure that the connection between the real world object and its database counterpart is correct.

(4) **Data integration:** produce a unified view out of data from heterogeneous sources – this step will be one of the main tasks of Plan4all.

(5) **Source trustworthiness:** rate data sources on the basis of the quality of data they provide.

(6) **Quality composition:** compute the actual data quality dimension values.

(7) **Error detection**, and, if possible, error localisation: apply rules to find out if there are errors in the data.

(8) **Error correction:** try to eliminate as many errors as possible.

(9) **Cost optimisation:** achieving data quality produces costs. An optimal cost/quality ratio has to be found so that data have a good quality which is affordable though.

7.4 Summary

Data quality consists of a wide variety of dimensions which characterise the goodness of data. The framework presented on the previous pages should work as a reference for those working on the data and metadata model in the forthcoming work packages of Plan4all so that all user groups coming into contact with data on the one hand can rely on the quality of the Plan4all data, but on the other hand also can characterise, or, to some extent, measure data quality.

As a consequence, data quality should be constantly on the rise, and, furthermore, on a comparable level through all groups and institutions contributing to the Plan4all data collection. Data concepts are evolving rapidly due to the increased apply of information and communication technologies, so also the concept of data quality will continuously be changed and extended. The diversity of real world phenomena that can put into databases and tables is too large to set up general rules for “the” data quality. There is no chance for an overall data quality approach, thus Plan4all can

develop a milestone regarding quality of administrational data and/or planning related data and metadata.

Within the achievement of data quality, it will often be impossible to receive data with an overall 100 % quality. The higher data quality is, the higher the costs are, and, perhaps, also the longer the waiting period is. The right cost/quality ratio for high data quality at an affordable price level is also an important factor that should be taken into consideration.

8 Detailed examination of existing related EU initiatives and projects

In addition to the so far more theoretical parts, this chapter takes a look on existing European best practise projects dealing with spatial data harmonisation and SDI building. This is done according to the objective of evaluating applied technologies, developments as well as strengths and weaknesses in data harmonisation to finally identify challenges for Plan4all.

8.1 Initiatives, Projects and Best Practises in detail

On the base of the Rome event, an additional Dutch best practice project was analysed. The Dutch example represents one of the most complex strategy form Spatial Planning SDI building in Europe. It demonstrates process starting with ad hoc digitalisation to complex harmonised planning solution.

8.1.1 Overview

Nr	Best practise name	Countries	Collector
1	Ami4for	CZ et al	Sarka Horakova / HF
2	C@R (Collaboration@Rural)	ES et al	Sarka Horakova / HF
3	CentropeMAP	AT CZ HU SK	Clemens Beyer / CEIT ALANOVA
4	Cross-SIS	EU	Clemens Beyer / CEIT ALANOVA
5	Data model for municipality structural plan of Bologna Province	IT	Beniamino Murgante/AMFM
6	Dutch spatial planning SDI	NL	Julia Neuschmid / CEIT Alanova
7	EarthLookCZ	CZ	Sarka Horakova / HF
8	EnviroGRIDS	CZ CH UA	Sarka Horakova / HF
9	eSDI-NET+	EU	Clemens Beyer / CEIT ALANOVA
10	EURADIN	ES et al.	Clemens Beyer / CEIT ALANOVA, María Cabello / TRACASA
11	EuroGeoNames (EGN)	EU	Clemens Beyer / CEIT ALANOVA
12	EuroGEOSS	EU	Clemens Beyer / CEIT ALANOVA
13	eWater	EU	Clemens Beyer / CEIT ALANOVA
14	Geoland	AT	Clemens Beyer / CEIT ALANOVA
15	GEOMIND	EU	Clemens Beyer / CEIT ALANOVA
16	GéoPal	FR	Francois Salge / MEEDDAT
17	Geoportal of Lombardy	IT	Julia Neuschmid / CEIT Alanova
18	GIGAS	EU	Clemens Beyer / CEIT ALANOVA

Nr	Best practise name	Countries	Collector
19	GIS4EU	EU	Clemens Beyer / CEIT ALANOVA
20	GMES	EU	Clemens Beyer / CEIT ALANOVA
21	HUMBOLDT	EU	Clemens Beyer / CEIT ALANOVA
22	ISAMAP	AT, IT, SI	Clemens Beyer / CEIT ALANOVA
23	ISDA (Irish Spatial Data Exchange)	IE	MAC
24	Mapsharing	IT, SI	Beniamino Murgante/AMFM
25	Med-Isolae 3D	EU	Clemens Beyer / CEIT ALANOVA
26	Metaschool	CZ DE GR	Sarka Horakova / HF
27	MonPlanGML (Municipal land management)	ME	Kai-Uwe Krause / LGV
28	NatureSDIplus - Best Practice Network for SDI in Nature Conservation	EU	Clemens Beyer / CEIT ALANOVA
29	NATURNET-REDIME (NNR)	CZ et al	Sarka Horakova / HF
30	NESIS	EU	Clemens Beyer / CEIT ALANOVA
31	OneGeologyEurope	EU	Clemens Beyer / CEIT ALANOVA
32	OpenYambol	BG	Stelian Dimitrov / EPF
33	Orchestra	EU	Clemens Beyer / CEIT Alanova
34	ÖROK-Atlas	AT	Julia Neuschmid / CEIT ALANOVA
35	SDI-MRH (spatial data infrastructure Hamburg Metropolitan Region)	DE	Kai-Uwe Krause / LGV
36	SIRA	IT	Guido Parchi, Norma Zanetti/ Hyper
37	SITNA (Territorial Information System of Navarra)	ES	María Cabello/TRACASA
38	SITR	IT	Guido Parchi, Norma Zanetti / Hyper
39	Territorial Information System of Pilsen Region and Bavaria	CZ, DE	Karel Jedlicka / UWB
40	TRANSLAND	IT, SI	Beniamino Murgante/AMFM
41	VESTA-GIS	EU	Clemens Beyer / CEIT ALANOVA
42	Web SIG Agape	FR	Francois Salge / MEEDDAT
43	X-border-GDI	EU	Clemens Beyer / CEIT ALANOVA
44	XPlanung	DE	Kai-Uwe Krause / LGV

8.1.2 Collection

Best Practise # 1	
Project Name	*Ami4for*
Type of project	○ EU project
Dimension of project	○ international
Project start	*2005*
Project end	*2007*
URL	*http://www.ami4for.org/*
Leader, Project Partners	*Lead Partner: Wirelessinfo (WIN), Czech republic* *Project Partners:* *European Space Agency/European Space Research INstitute (ESA/ESRIN)* *Lesprojekt Sluzby s.r.o. (LPS)* *Help Service Remote Sensing s.r.o. (HSRS)* *MJM (MJM)* *Forest Management Institute (FMI)* *ARS Logica (ARS LOGICA)*
Content (keywords)	*Open Service Architecture, Ambient mobile intelligence, Open GIS WEB services, Metadata*
Content (description)	*The main objective was to establish a new concept of Ambient Mobile Intelligence (AMI) for forest, winery and agriculture management integrated mobile communication, new methods of navigation (GPS, EGNOS, GALILEO) and integration of spatial information including satellite imaging (SPOT, IKONOS, EROS, PROBA).*
Used technology/software	*UMN Mapserver, Geoserver, PostgreSQL, MAP Project MANager (MAPMAN), Teredit System, ArcPad*
Strengths or chances of this project	*Development of MAPMAN and Teredit System web technology for management and publication of spatial data, applications for data collection in the field and their storage directly on the server*
Weaknesses or risks of this project	*Tests have been carried out only on the limited number of the testbeds*
Accessibility, Information	*Information about the project available on the project website.* *Project reports are accessible upon request at the project coordinator.*
User Interface, Software	*MAPMAN - Map Project Manager is a software tool for users who want to publish or create new map projects and compositions.* *Teredit Systems - Teredit is a special tool for data collection in the field, data transfer from a mobile device (PDA, notebook) to a server and for generating a project for data collection.*
Challenges	*Possibility to re-implement the developed technologies for spatial data management on the Web, support for geospatial web services*
This project deals with planning relevant datasets	*no*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*WIRELESSINFO, Petr Horak, horak@wirelessinfo.cz*
Collected by	*Sarka Horakova, WRLS*
Additional remarks	-

Best Practise # 2	
Project Name	*C@R (Collaboration@Rural: a collaborative platform for working and living in rural areas)*
Type of project	○ EU integrated project
Dimension of project	○ international
Project start	*2006*
Project end	*Still running – the fixed end is 2009*
URL	*http://www.c-rural.eu/*
Leader, Project Partners	*Project Leader: TRAGSA, Spain + 34 Project Partners*
Content (keywords)	*Rural Living Labs, Collaborative Working Environments, Open Collaborative Architecture, Software Collaborative Tools, Collaborative Core Services*
Content (description)	*C@R project aims to boost the introduction of Collaborative Working Environments (CWE) as key enablers catalyzing rural development. According to this strategic goal, the C@R Integrated Project proposes a complete set of research activities and tasks which will identify, develop and validate technological responses to actual barriers jeopardizing the sustainable development in rural areas.*
Used technology/software	*Open Service Oriented Architecture (OSOA) including BUS & AXIS 2, Core Collaborative Service (CCS) and SCT; implementation of OGC standards; Metadata & catalogue system Micka, Geohosting components including Map Project MANager – Mapman, Data Manager (DataMan) and web map visualization client HSLAyers;*
Strengths or chances of this project	*C@R is a project that aims to enable people in remote and rural Europe to fully participate in the knowledge society as citizens and as professionals. User involvement – support for Living lab methodology - users are invited to participate in the whole development process, can test products, bring innovative ideas. OSOA implementation – Open Service Oriented Architecture has been implemented and tested in several user applications in 7 European living labs. Some of the applications have been focused on implementation of technology for spatial planning*
Weaknesses or risks of this project	*Implementation of OSOA requires the specialized IT– knowledge. Principle of the collaboration with users can meet an insufficient interest in involvement from their side.*
Accessibility, Information	*All project data are freely accessible over the internet: see project website...; Project data of the Czech partner WIRELESSINFO are freely accessible over the internet: see project website http://www.livinglab.cz/ – all datasets are available as web map services*
User Interface, Software	*In Wirelessinfo applications: web map visualization client HSLayers, MapMan, DataMan, metadata catalogue Micka, How is the project's user interface built? Which software is used?*
Challenges	*Style of work typical for living labs (user involvement, developer collaboration) can bring benefits in the application development in spatial planning area.* *OSOA implementation in SDI*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*WIRELESSINFO, Petr Horak, horak@wirelessinfo.cz*
Collected by	*Sarka Horakova, WRLS*

Best Practise # 3	
Project Name	*CentropeMAP*
Type of project	*public project*
Dimension of project	○ international
Project start	*2003*
Project end	*open end*
URL	*http://www.centropemap.org/*
Leader, Project Partners	*PGO – East Austrian Planning Association* *CEIT ALANOVA gemeinnützige GmbH* *Administrative Authorities of Burgenland, Lower Austria, Vienna, South Moravia, Bratislavsky kraj, Trnavsky kraj, Györ-Moson-Sopron*
Content (keywords)	*Centrope region, cross-border data harmonisation, map client, cross-border statistics database*
Content (description)	*CentropeMAP brings datasets from the four countries Austria, Czech Republic, Hungary and Slovak Republic together in one map client. The project mainly focuses on planning related datasets. A cross-border statistics database has been launched 2009: CentropeSTATISTICS allows the user to query statistic data from the whole region and generate thematic maps on the fly.*
Used technology/software	*UMN Mapserver, Geoserver, Mapbender, PostgreSQL, (ArcGIS Server by some of the administrative offices)*
Strengths or chances of this project	○ datasets from different servers are shown together in one map ○ next goal is the harmonisation of data layout and classification so that datasets become comparable ○ all interfaces are built on open source software
Weaknesses or risks of this project	○ slow progress due to lack of time and financial resources at state administrations ○ official documents needed to get state administrations to work
Accessibility, Information	*All project data are freely accessible over the internet: see project website http://www.centropemap.org – all datasets are available as web map services. There is no restriction at all.*
User Interface, Software	*Web mapping client (web browser interface): Mapbender 2.4.2. Web map server: UMN Map Server 4.8*
Challenges	*SLD integration, future web mapping standards (XML/GML/WCS), fully interactive WFS-T. Direct access to partners' statistics databases?*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*CEIT ALANOVA gemeinnützige GmbH* *Manfred Schrenk (Managing Director), m.schrenk@ceit.at*
Collected by	*Clemens Beyer, ALANOVA*
Additional remarks	-

Best Practise # 4	
Project Name	Cross-SIS
Type of project	EU project
Dimension of project	international
Project start	2005
Project end	2007
URL	http://www.cross-sis.com (discontinued)
Leader, Project Partners	data and technoloy providers from Lower Austria (Austria), Gelderland and Overijssel (The Netherlands), Navarra (Spain) and North-Rhine Westphalia (Germany)
Content (keywords)	web mapping, statistics, cross-border GDI, interactive, thematic maps, INTERREG IIIc
Content (description)	Planning pilot: a web GIS client that presents comparable regional planning data as interactive maps at a European level, not only presenting planning data in a cross-border context, but also following a service-oriented architecture with OGC-compliant technologies. Statistics: With CROSS-SIS it was demonstrated that with distributed interoperable web service technologies it is possible to discover, retrieve, visualize and analyze spatial data regardless of the factual physical location.
Used technology/software	UMN and other map server applications, SOAP, ArcSDE, Oracle, SLD
Strengths or chances of this project	Cross-SIS was one of the very first projects to jointly display both geographic and thematic maps in cross-border style.
Weaknesses or risks of this project	The partner regions were quite far away so that apart from pure feasibility the project did not deliver any useful map with interpretable content.
Accessibility, Information	The project's website is not online any more, though information can be found over the internet, e. g. http://www.it.nrw.de/informationstechnik/IT_Veroeffentlichungen/Ausgabenarchiv/ausgabe1_2008/schwerpunkte/z091200851_s9.pdf
User Interface, Software	web browser interface, Javascript map viewer
Challenges	One of the main results of Cross-SIS was that many technical questions regarding a European SDI are solveable but not trivial. Bigger efforts are necessary in data content and structure harmonisation of the EU regions' (geo)data stock to enable meaningful cross-border use.
This project deals with planning relevant datasets	no
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Oliver Karusseit, Düsseldorf, Germany +49 211 9449-6302, oliver.karusseit@lds.nrw.de
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 5	
Project Name	*Modello dati di base del Piano Strutturale Comunale per il territorio provinciale bolognese* *Data model for municipality structural plan of Bologna Province*
Type of project	○ Regional project
Dimension of project	○ Regional
Project start	*2004*
Project end	*2008*
URL	*http://cst.provincia.bologna.it/ptcp/psc.htm*
Leader, Project Partners	*Italian Lead Partner: Bologna Province* *Municipalities of Bologna Province*
Content (keywords)	*Shared data model, Municipal Structural Plan, Data Interoperability,*
Content (description)	*The project has as its primary objective the definition of a shared data model, a sort of lowest common divisor in which small local features have been considered. For instance municipalities could modify the model according to their Municipal Structural Plan features, while the Province considers only the main information. A flexible models have been adopted with the possibility to adding entities, data model is also scalable depending on the different platforms technology of local authorities.*
Used technology/software	*ORACLE, ArcSDE9, Arcgis 9*
Strengths or chances of this project	*The definition of a shared data model strictly related to content features of Municipal Structural Plan allows the monitoring of phenomena and an adequate digital representation.*
Weaknesses or risks of this project	*Harmonization does not consider issues concerning semantic matching, OGC standards etc..*
Accessibility, Information	*All documents and data are freely accessible, unfortunately documents are only in Italian. Documents link http://cst.provincia.bologna.it/ptcp/psc.htm*
User Interface, Software	*No particular* user Interface *has been used*
Challenges	*none (project has been finished)*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*no*
This project is a cross-border initiative	*no*
Contact	*Riccardo Sabbadini – Provincia di Bologna – via Benedetto XIV, Bologna (BO) – Tel 051 6598838 Fax 0516959025 e-mail: riccardo.sabbadini@provincia.bologna.it*
Collected by	*Beniamino Murgante, AM/FM Italia*

Best Practise # 6	
Project Name	*Dutch Spatial Planning SDI*
Type of project	*public*
Dimension of project	*national*
Project start	*The current Spatial Planning Act (Wet op de ruimtelijke ordening, new Wro) took effect on 1 July 2008; the relevant part for digital spatial planning and SDI is the Spatial Planning Standards Regulation that will take effect on 1 January 2010.*
Project end	*ongoing*
URL	*http://international.vrom.nl/pagina.html?id=37427* *http://www.agi.org.uk/SITE/UPLOAD/DOCUMENT/Events/AGI2009/papers/RonBloksma.pdf*
Leader, Project Partners	*Ministry of Housing, Planning and Environment,* *Provincial and municipal authorities*
Content (keywords)	*Digitalisation of spatial planning plans, SDI*
Content (description)	*In the Netherlands a package of spatial planning standards was developed in 2008 saying that spatial plans have to be made available in digital format with the same legal status as the analogue plans. This package is legally established in the Spatial Planning Standards Regulations, which are part of the WRO (Wet op de ruimtelijke ordening – Spatial Planning Act). Because of this SDI building process all plans of public administrations will be exchangable, comparable and accessable for everybody.*
Used technology/software	*The digital plans are publicly available as 'plain' datasets. They are a coherent set of widely recognised files (GML, HTML, PDF, XML and several image files). They are structured in a specific way and their web locations are catalogued in an XML file, which has to be acknowledged at a national index service.*
Strengths or chances of this project	*The act is a further step towards digitalisation of spatial planning data and SDI building, standardised definition of access, storage and distribution of spatial planning data, according to ISO/OGC standards.*
Weaknesses or risks of this project	-
Accessibility, Information	*The Spatial Planning Act stipulated that all governments must make their spatial plans publicly available so that they can be electronically accessed by everyone. Anyone who wants to use digital plans can discover the web locations through the national index service. The integrity, authenticity and completeness of* *the datasets are safeguarded by the digital signature of the authority on the separate files or plan and in the XML file catalogue of all the digital plans of that authority.*
User Interface, Software	
Challenges	
This project deals with planning relevant datasets	
This project is compatible to the standards of the OGC	
This project is a cross-border initiative	
Contact	*Paul Janssen <P.Janssen@geonovum.nl (Geonovum)*
Collected by	*Julia Neuschmid (Ceit Alanova)*

Best Practise # 7	
Project Name	*EarthLookCZ*
Type of project	○ public project
Dimension of project	○ national
Project start	*2007*
Project end	*Still running – the fixed end is 2009*
URL	*http://www.earthlook.cz*
Leader, Project Partners	*WIRELESSINFO, Czech republic*
Content (keywords)	*Spatial data infrastructure, GMES (Global Monitoring for Environment and Security), INSPIRE, web services*
Content (description)	*EarthLookCZ is one of pilot projects developed in the Czech Republic in the ERA-STAR regions framework. The project undertaken by WIRELESSINFO association aims to verify the validity of spatial data infrastructure quality for GMES in the Czech Republic and is supported by the Ministry of Education, Youth and Sports.*
Used technology/software	*UMN MapServer, Geohosting technology – modification and integration of the technological components for geo-spatial data management – MapMan, DataMan, visualization client HSLayers, metadata and catalogue system Geohosting*
Strengths or chances of this project	*Implementation of ISO and OGC standards for data sharing and exchange, distribution system that ensures the access to distributed data and metadata of the GMES,*
Weaknesses or risks of this project	*Slow progress due to financial resources at state administrations*
Accessibility, Information	*Information about the project available only in Czech language on the project website.* *Project reports are accessible upon request at the project coordinator.*
User Interface, Software	*EarthLookCZ portal with Geohosting applications MapMAn and DataMan, HSlayers client*
Challenges	*Integration of main datasets of GMES Core Services, publication of the local GMES datasets on the web*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*WIRELESSINFO, Petr Horak, horak@wirelessinfo.cz*
Collected by	*Sarka Horakova, WRLS*
Additional remarks	-

Best Practise # 8	
Project Name	*EnviroGRIDS*
Type of project	○ EU project
Dimension of project	○ international
Project start	*2009*
Project end	*2013*
URL	*http://www.envirogrids.net/*
Leader, Project Partners	*The EnviroGRIDS Project Team includes 27 partners from 15 countries University of Geneva, Climatic Changes and Climate Impacts & Spatial Analyses and Predictions,CCSS, European Organization for Nuclear research, Switzerland (CERN), Swiss Federal Institute of Aquatic Science and Technology (EAWAG), Geographic GIS&RS Consulting Center (Geographic), UNESCO: Institute for Water Education (UNESCO/IHE), European Topic Centre Land Use and Spatial Information supported by the European Environment Agency (EEA) (UAB), Ukrainian Scientific and Research Institute of Ecological Problems (USRIEP) etc.*
Content (keywords)	*GEOS, monitoring, INSPIRE, GRID, SDI*
Content (description)	*EnviroGRIDS aims at building the capacity of scientist to assemble such a system in the Black Sea Catchment, the capacity of decision-makers to use it, and the capacity of the general public to understand the important environmental, social and economic issues at stake. EnviroGRIDS will particularly target the needs of the Black Sea Commission (BSC) and the International Commission for the Protection of the Danube River (ICPDR) in order to help bridging the gap between science and policy.*
Used technology/software	*GRID, metadata. SWE, WPS,*
Strengths or chances of this project	*Focus on application domain*
Weaknesses or risks of this project	*Very different technologies integration*
Accessibility, Information	*Not defined yet, but part of data will be publicly available*
User Interface, Software	*OGS services, GRIS services*
Challenges	*To use GRID technology inside of SDI*
This project deals with planning relevant datasets	*partly*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*Czech Centre for Science and Society, Karel Charvat, charvat@ccss.cz*
Collected by	*Karel Charvat, CCSS*
Additional remarks	-

Best Practise # 9	
Project Name	eSDI-NET+
Type of project	EU project
Dimension of project	international
Project start	2007
Project end	2010
URL	http://www.esdinetplus.eu/
Leader, Project Partners	German lead partner + partners from 14 EU countries: data providers and GI umbrella organisations
Content (keywords)	SDI, networking, INSPIRE, GMES, GALILEO, interoperability, best practises
Content (description)	Objective of eSDI-Net+ is to bring together existing SDI key players and target users in a Thematic Network to be established as a platform for communication and exchange between different stakeholders involved in the creation and use of SDI's.
Used technology/software	best practise collection – no special software needed
Strengths or chances of this project	increase awareness for importance of SDIs, best practise award, establishing a thematic network. All kinds of European GI Agencies will benefit from a uniform normative context which will promote the creation of a shared base cartography. The GI Research community, thanks to a better definition of specifications, will be able to carry out the research and training projects throughout Europe. All users can benefit from the interoperable and accessible base cartography.
Weaknesses or risks of this project	best practise collection – no actual risks
Accessibility, Information	Press releases, public deliverables, presentations, workshop information, and dissemination material is available through the project website. International Conference in Turin, Italy, 26-27 November 2009
User Interface, Software	best practise collection – no special software or user interface needed
Challenges	By mobilising such expertise, eSDI-NET+ offers the means to catalyse new initiatives, actions and services, maximising the potential of both GI and the communities it supports.
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Joachim RIX, Darmstadt, Germany Tel: +49 (0) 6151/155-596 E-mail: joachim.rix@inigraphics.net; co-ordination@esdinetplus.eu
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 10	
Project Name	EURADIN
Type of project	EU project
Dimension of project	international
Project start	June 2008
Project end	May 2010
URL	https://www.euradin.eu/
Leader, Project Partners	The EURADIN consortium, coordinated by the Government of Navarre (ES), is composed of a variety of experts in the field of Spatial Information, including public authorities, research centres, service providers and dissemination partners. 30 partners from the following European countries participate in the project. Austria: http://www.bev.gv.at/ Czech Republic: http://www.vugtk.cz/e_index.html Denmark: http://www.deaca.dk/, http://www.grontmij-carlbro.com/en/Frontpage.htm Finland: http://www.vaestorekisterikeskus.fi/vrk/home.nsf/pages/index_eng France: http://www.ign.fr/ Germany: http://www.bezreg-koeln.nrw.de/brk_internet/organisation/index.html Hungary: http://www.fomi.hu/honlap/angol/, http://www.geox.hu/ Italy: http://www.regione.piemonte.it/, http://www.regione.lombardia.it/, http://www.csipiemonte.it/en/home.shtml, http://www.regione.toscana.it/ Latvia: http://www.vzd.gov.lv/?lang=ENG Lithuania: http://www.registrucentras.lt/index_en.php The Netherlands: http://www.kadaster.nl/english/, http://www.navteq.com/index.html Norway: http://www.statkart.no/ Portugal: http://www.igeo.pt/, http://www.eurogi.org/, http://www.fct.unl.pt/ Spain: http://www.navarra.es/home_en/Gobierno+de+Navarra/, http://www.tracasa.es/es/, http://www.cnig.es/, http://www.icv.gva.es/, http://www.intergraph.com/, http://www.telefonica.es/acercadetelefonica/telefonica/informe_rc/acerca/portada-2.html, http://www.catastro.meh.es/eng/default_eng.asp Sweden: http://www.lantmateriet.se/epidefault.aspx?id=55&lang=EN United Kingdom: http://www.intelligent-addressing.co.uk/iaweb/welcome.htm
Content (keywords)	address data harmonisation, address infrastructure, INSPIRE
Content (description)	EURADIN is creating a best practise network to promote European address harmonisation establishing a common definition, registration and access to European address data. The consortium works on analysing the current situation, building the necessary consensus, delivering a proposal for data harmonisation, implementation of the INSPIRE specifications and creating a toolbox to assist data flow.
Used technology/software	Different partners are working with different technologies for developing gazetteer services across Europe for accessing address data: Open source – Deegree with Postgres ESRI technology Open LS and Intergraph technology
Strengths or chances of this project	The project is working to demonstrate the validity of data model and metadata profile proposed based on INSPIRE data model through the implementation of several gazetteer services providing access to

	harmonised address information in EUROPE The strength of the project is a very strong consortium with partners from private and public sector working to support and reinforce INSPIRE implementation. The work they are performing within the project is providing them an important advantage in the implementation of the INSPIRE requirements regarding addresses, which includes contributions coming from EURADIN testing core. In this sense, EURADIN is actually acting as the laboratory in which INSPIRE implementation requirements are being checked, using real data from the different partners. The services implemented in the framework of EURADIN will be very probably kept by the partners, as they will comply with the INSPIRE requirements regarding addresses (compulsory for all EU members) which will share at least some common requirements with the EURADIN results. But the sustainability of the project is also based on the European Address Forum creation The mission of the EAF is to support the European information society and knowledge economy through maximizing the availability and efficient use of good Address systems and quality address data for the benefit of the citizens, good governance, and business. As a result of the EURADIN project the first steps for the creation of the EAF have been done, and the objective of the creation of this forum is more than never available.
Weaknesses or risks of this project	The potential risk is not to be able to achieve a significant impact in each of the 27 member states of the European Union. The lack of time for gazetteer implementation and validation is also crucial
Accessibility, Information	The results of the project are freely available at the project website: http://www.euradin.eu
User Interface, Software	The gazetteer is still under discussion and the final solution is not decided. The consortium is working in different platforms and solutions: WFS (open software and proprietary software), WS based on SOA, OPEN LS This information will be updated as soon as the decision made
Challenges	The major challenge is to be able to access harmonised address information through Europe and achieve the sustainability of the European address forum as a collaborative space for all stakeholders involved in address creation, management, use and dissemination
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Leadership: Government of Navarra: euradin@navarra.es; Technical coordination: mcabello@tracasa.es
Collected by	Review by María Cabello
Additional remarks	The project is still running and working on the Gazetteer services and in the European Address Forum and dissemination until May 2010

Best Practise # 11	
Project Name	EuroGeoNames (EGN)
Type of project	○ EU project
Dimension of project	○ international
Project start	2006
Project end	2009
URL	http://www.eurogeographics.org/eurogeonames
Leader, Project Partners	Federal Agency for Cartography and Geodesy (BKG, Germany) + 8 partners from 6 member states
Content (keywords)	multilingual, geographical names, Web GIS, INSPIRE
Content (description)	The EuroGeoNames (EGN) project to develop a European geographical names infrastructure and services successfully completed the eContentplus funded phase at the end of February 2009. EGN is a core project under EuroSpec. EGN has implemented an interoperable internet service that links to and provides access to the official, multilingual geographical names data held at the national level across Europe. EGN is a major contribution to opening up public sector information within a wider European spatial (geographic) information infrastructure, and relates more specifically to the INSPIRE implementation rules. The target is to aggregate data for all EU Member States, Candidate countries as well as EFTA countries – by connecting their national databases in the EGN infrastructure. The user – primarily 'value added service' providers - will have access to this information through a Web GIS application which will enable searching using all official European languages, including minority languages.
Used technology/software	open source databases (MySQL, PostgreSQL), non-transactional WFS 1.0, gazetteer services, Deegree, Geoserver
Strengths or chances of this project	Correct display of diacritic signs and transliteration are well-known problems. It is the main strength of this project to overcome these "digital language barriers".
Weaknesses or risks of this project	The services seem not to be available via internet – an ArcGIS installation is necessary to use EGN.
Accessibility, Information	The extension is available for free from http://arcscripts.esri.com (requires ArcGIS 9.2 or higher)
User Interface, Software	EGN's interface has been realised as an extension for ESRI ArcGIS.
Challenges	-
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Pier-Giorgio Zaccheddu, pier.zaccheddu@bkg.bund.de
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

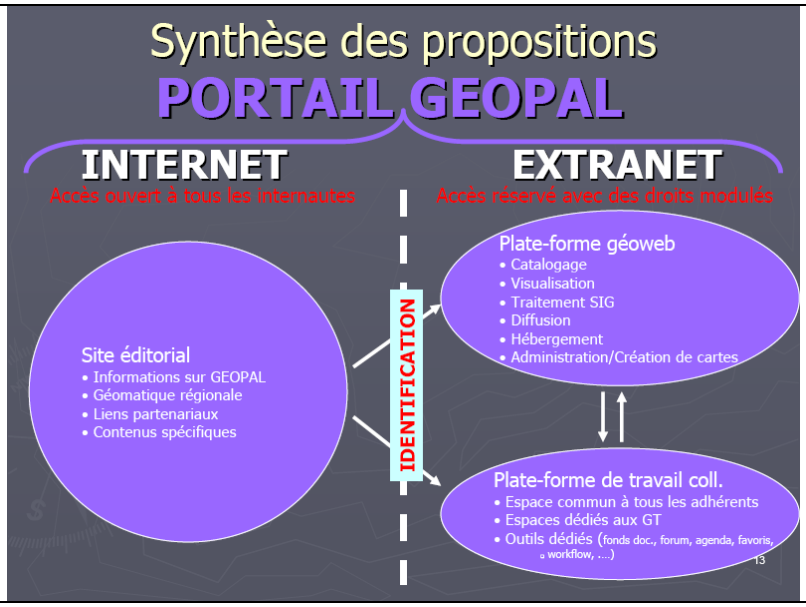
Best Practise # 12	
Project Name	EuroGEOSS
Type of project	EU project (GEOSS is a world-wide project)
Dimension of project	international
Project start	2009
Project end	no information available
URL	http://www.eurogeoss.eu/
Leader, Project Partners	22 partners from 10 countries including USA
Content (keywords)	GEOSS, INSPIRE, monitoring
Content (description)	EuroGEOSS demonstrates the added value to the scientific community and society of making existing systems and applications interoperable and used within the GEOSS and INSPIRE frameworks. The project will build an initial operating capacity for a European Environment Earth Observation System in the three strategic areas of Drought, Forestry and Biodiversity. It will then undertake the research necessary to develop this further into an advanced operating capacity that provides access not just to data but also to analytical models made understandable and useable by scientists from different disciplinary domains. EuroGEOSS builds on three strategic application areas that the Joint Research Centre (JRC) has institutional responsibilities: forestry, biodiversity and drought.
Used technology/software	the project has just started, thus no information available
Strengths or chances of this project	facilitate member states in contributing to GEOSS with their existing national monitoring capacities; share European experiences with devleoping countries, e. g. in Africa
Weaknesses or risks of this project	-
Accessibility, Information	the project has just started, thus no information available
User Interface, Software	the project has just started, thus no information available
Challenges	The aspect of multi-disciplinary interoperability remains to date a fundamental challenge that informs the GEOSS initiative and other related efforts such as the development of e-science
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	http://www.eurogeoss.eu/contact/default.aspx
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 13	
Project Name	*eWater* *Multilingual cross-border access to ground water databases*
Type of project	○ EU project
Dimension of project	○ international
Project start	*2006*
Project end	*2008*
URL	*http://www.ewater.eu/*
Leader, Project Partners	*NETHERLANDS ORGANISATION FOR APPLIED SCIENTIFIC RESEARCH – TNO + 14 partners from 13 member states*
Content (keywords)	*cross-border, sub-surface water, interoperability, web portal, groundwater monitoring, INSPIRE*
Content (description)	*eWater is a multilingual Internet system, providing access to hydrogeological measurement data as well as ground water maps in EU countries. The hydrogeological data are usually acquired from wells or springs. Hydrogeological maps and models are produced based on on interpolation of the point measurement data and interpretation of geological structures. Since eWater architecture complies with INSPIRE policy, new data suppliers are also able to distribute their data via the system. Moreover, the spatial hydrogeological data infrastructure, developed within eWater project, can be used by other international applications.*
Used technology/software	*WSDL, XSD, WFS, PostgreSQL, MapBuilder (Javascript)*
Strengths or chances of this project	*As ground water does not care much about administrative borders, such data are excellent examples for the importance of cross-border data infrastructures.*
Weaknesses or risks of this project	*-*
Accessibility, Information	*There are a web mapping application, a metadatabase, and a thesaurus (online dictionary).*
User Interface, Software	*Web browser interface*
Challenges	*-*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*Dr Alexei TCHISTIAKOV, Netherlands Institute of Applied Geoscience TNO, a.tchistiakov@nitg.tno.nl*
Collected by	*Clemens Beyer, CEIT ALANOVA*
Additional remarks	*-*

Best Practise # 14	
Project Name	Geoland
Type of project	public project
Dimension of project	national
Project start	2003
Project end	open-ended
URL	http://www.geoland.at/
Leader, Project Partners	GIS offices of all 9 Austrian federal states
Content (keywords)	national geodatabase, INSPIRE, WMS, SDI
Content (description)	With the realisation of the Geodata Network with all Austrian Federal states through geoland.at, the first concrete step of the conversion of aims, defined by Austrian Geodata politics, is made. This Geodata Network should offer a free and Austrian wide access to Geodata and Services of the federal states of Austria for many purposes. The planned openness of the Geodata network – with decentralised data-management following the subsidiarity principle on the basis of international standards (OGC, ISO, CEN, WMS, WFS, etc.) and national Standards (ISO EN ON) offers moreover the possibility to include and link further Geodata.
Used technology/software	Map servers: different software depending on the 9 federal states operating the map servers; map client: own construction
Strengths or chances of this project	fist project to visualise web map services from different Austrian administrational web map servers in one client via internet
Weaknesses or risks of this project	sometimes poor map server performance, this needs to be strongly improved to guarantee full Austria-wide data display
Accessibility, Information	free access
User Interface, Software	web browser
Challenges	not only national joint view, but also international data (e. g. like CentropeMAP)
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	no
Contact	Amt der Oberösterreichischen Landesregierung thomas.ebert@ooe.gv.at
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 15	
Project Name	GEOMIND Geophysical Multilingual Internet-Driven Information Service
Type of project	○ EU project
Dimension of project	○ international
Project start	2006
Project end	2008
URL	http://www.geomind.eu/portal/, http://thes.igme.gr/geomind/
Leader, Project Partners	Lead Partner: Polish Geological Institute + 11 partners from 8 other EU countries
Content (keywords)	SDI, eContentPlus, INSPIRE, multilingual, metadata
Content (description)	GEOMIND is a web-based information portal to search, display and order geophysical data on international level. It provides a multilingual platform as well as metadata on various geophysical topics. The metadata profile os compliant to ISO 19115 and ISO 19139. The system demonstrates research capabilities of the partners and will increase public awareness of the usefulness of geophysical research methods for various needs of the society.
Used technology/software	Java, XML for metadatabase, metadata editor, overview map and thesaurus
Strengths or chances of this project	The system concentrates on metadata only because once there is a comprehensive and complete metadataset, the access procedure to real geodata is almost done.
Weaknesses or risks of this project	Metadata must be uploaded to a central database before being provided through GEOMIND. There is no way to simply link metadata from existing databases.
Accessibility, Information	The metadata portal is freely accessible – registration is only needed for metadata providers and translation contributors.
User Interface, Software	web browser interface
Challenges	In a further step, real geodata could be integrated into such a system through web mapping so that there is at least a preview.
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Geomind, RAKOWIECKA 4, 00957 WARSZAWA, POLAND
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 16	
Project Name	GéoPal
Type of project	Local-government – national-government – private partnership
Dimension of project	Sub national for the Région “Pays de la Loire”
Project start	2006
Project end	
URL	http://www.geopal.org
Leader, Project Partners	The Regional council (elected administration for the region) The préfecture de region (state adminstration for the region The general council ((elected administration for the département) of the 5 départements (NUTS III), GéoVendée, the inter-municipality structures of the agglomeration that are capital for the department, GIP Loire estuaire (public interest grouping for the Loire estuary), IGN (French mapping agency), BRGM (French geological survey), IFREMER (research institute for Sea), the regional state administrations, …
Content (keywords)	SDI, discovery, search, visualisation, download, metadata
Content (description)	Implement a common framework for consistency and interoperability for all initiatives connected to geomatic and GI : ○ Increase the efficiency off all entities that produce and or use GI in the Pays de la Loire region, ○ Develop mutual use and sharing of existing GI by these entities ○ Stimulate the GI development in the Pays de la Loire region and participate to any actions as many initiatives exist but many inconsistencies and heterogeneity exist.
Used technology/software	Based on the PRODIGE platform, which use open source software, developed by the préfecture de la région Rhône-Alpes. Evolutions are on their way taking account of the CARMEN platform developed by MEEDDAT
Strengths or chances of this project	It is an example of a efficient and conistent project within its local context that goes in close cooperation between the state and local government : ○ Acquisition of geographical reference data and thematic data elaborated at the departement level ○ Host a data catalogue interoperable with the national géocatalogue (www.geocatalogue.fr) part of the French geoportal (www.geoportail.fr) ○ Co-production of data such as the land and city planning documents using a common set of specification
Weaknesses or risks of this project	The Elected people at the Region level (regional council members) have difficulties to appropriate the project and have a low level support to the initiative. They therefore allocate insufficient human resources for the user-oriented application.
Accessibility, Information	○ Host a data catalogue interoperable with the national geoportal ○ Harmonize and standardise data ○ Develop a patrimony of available data ○ Create a mutual platform of services
User Interface, Software	The software solution includes ○ A WEB browser for identifying the available datasets based on the ISO 19115 standard ○ A WEB viewer based on WMS ○ An upload download service The organisationnal sxchema of the regional SDI (see diagram) includes ○ An Internet bloc open to the general public ○ An Extranet bloc open to the GEOPAL members. The Extranet includes a geoWeb service platform and a collaborative platform. Passing from one bloc to the other is transparent to the user.

	
Challenges	The GéoPAL service is currently hosted by the regional sate administration and requires complementary funding.
This project deals with planning relevant datasets	Yes, the state administrations in the region in co-operation with the main local governments have developed a common set of specification for turning digital the local planning materials (PLU, cartes communales et POS) derived from the document established nationally by the national council for GI (Conseil national de l'information géographique). A digitisation programme is on its way through calls for tender, the local state administration being in charge of quality controls. Agreements with the municipalities ensure that any changes to the planning documents are transmitted tothe platform as soon as adopted by the municipal council in order to ensure that the bureaus in charge of delivering the building permits use the digital version of the planning documents as quickly as possible.
This project is compatible to the standards of the OGC	Yes
This project is a cross-border initiative	No as Pays de la Loire has no terrestrial borders with other country, but the initiative serve as reference to other area of France including those having borders shared with other countries.
Contact	Christophe NICOLLE - Région des Pays-de-la-Loire christophe.nicolle@paysdelaloire.fr Catherine Charmard-Bois - DREAL Pays-de-la-Loire Catherine.Chamard-Bois@developpement-durable.gouv.fr
Collected by	François Salgé Chargé de mission auprès du Directeur général Direction générale de l'aménagement, du logement et de la nature Ministère de l'écologie, de l'énergie, du développement durable et de la mer Arche de la Défense Paroi Sud FR-92055 La Défense Cedex ligne directe : + 33 1 40 81 15 47 mobile: +33 6 75 42 83 54 courriel : francois.salge@developpement-durable.gouv.fr http://www.geomatique-aln.fr/
Additional remarks	A partner charter has been signed by the GéoPAL members A working group has been established for implementing standards in conformance INSPIRE rules.

Best Practise # 17	
Project Name	Geoportale della Lombardia (Geoportal of Lombardy)
Type of project	Public-private
Dimension of project	Regional
Project start	2007
Project end	2009
URL	http://www.cartografia.regione.lombardia.it/geoportale
Leader, Project Partners	Project between local public authorities and private subjects in the Lombardy region that deal with spatial planning data
Content (keywords)	Regional SDI, INSPIRE, regional law on SDI
Content (description)	The geoportal of Lombardy is a collection of GIS data of local authorities, with the aim to build a regional SDI. Regional Law 12/2005 requires all plans at local, provincial, and regional levels to be prepared in digital format and to contribute to the regional SDI, coordinated by the Regional Authority (spatial governance, spatial planning, natural and cultural heritage, risk prevention etc.). Pilot for Inspire
Used technology/software	ESRI GIS Portal Toolkit, international metadata standards ISO19115 and ISO19139, The GeoPortal is built on top of REGIS, the Regional Enterprise platform for Geographic Information Services, which consists of an technological infrastructure (based on ESRI Enterprise components) and basic services used as "LEGO bricks" to build up geographic solutions
Strengths or chances of this project	Data harmonisation, exchange of spatial planning data for local authorities, Inspire standards
Weaknesses or risks of this project	-
Accessibility, Information	Accessible for local authorities vie web services
User Interface, Software	ESRI products
Challenges	-
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	no
Contact	Marco Panebianco Lombardia Informatica Via Don Minzoni, 24 Milan , Milan 20158, Italy Phone: +39.02.39331.636 E-mail: marco.panebianco@lispa.it
Collected by	Julia Neuschmid, CEIT ALANOVA
Additional remarks	-

Best Practise # 18	
Project Name	GIGAS (GEOSS, INSPIRE and GMES – an Action in Support)
Type of project	EU project
Dimension of project	international
Project start	2008
Project end	2010, platform persisting thereafter
URL	http://www.thegigasforum.eu/
Leader, Project Partners	Fraunhofer Institute (Germany) + 18 partners from 7 countries
Content (keywords)	INSPIRE, GMES, FP7, Consensus building, Harmonisation of SDI initiatives
Content (description)	The three initiatives GEOSS, INSPIRE and GMES share commonalities, including their thematic focus, their reliance on international standards and the advanced Spatial Data Infrastructures that are needed for their implementation. At the same time however, each initiative follows its own timeline and approach for technical development, thereby risking to evolve into separate, incompatible services. GIGAS is a consensus process that facilitates communication between INSPIRE, GEOSS, GMES and the standardisation bodies.
Used technology/software	The consensus-driven approach of GIGAS does not require any special technology or software.
Strengths or chances of this project	coordinate actions between SDI projects which are primarily independent from each other
Weaknesses or risks of this project	Are there too many separate SDI initiatives? Is it too late to bring them all in line?
Accessibility, Information	The GIGAS discussion board is not available to the public. The website features public deliverables, a conference paper on GIGAS, dissemination material, and the Report of the 1st GIGAS Stakeholder Workshop (Brussels, Jan 2009).
User Interface, Software	The consensus-driven approach of GIGAS does not require any special technology or software.
Challenges	bringing THE European SDI to life
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	GIGAS Project Office +49-6151-155-637 E-Mail: po@thegigasforum.eu
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	This project does not deal with SDI itself, it deals with harmonisation of SDI initiatives.

Best Practise # 19	
Project Name	GIS4EU
Type of project	EU project
Dimension of project	international
Project start	2007
Project end	2010
URL	http://www.gis4eu.eu/
Leader, Project Partners	Lead partner: CORILA (Italy) + 21 partners from 9 countries
Content (keywords)	INSPIRE, data model, data sharing, base cartography, web mapping
Content (description)	GIS4EU aims at organising a system to share base cartography layer in order to make accessible and generate a common level of sharing information, without building a central database but sharing data through standard services. The project intends to develop a common data model and support tools for assessment of common standards based on INSPIRE Directive.
Used technology/software	project ongoing, thus no information available
Strengths or chances of this project	common data models for administrative units, hydrography, transportation networks and elevation themes → homogenous reference data provided by various cartographic authorities from different countries. During the project an operational validation of INSPIRE standards and implementation rules will be performed.
Weaknesses or risks of this project	assertiveness among various other similar projects
Accessibility, Information	There will be a GIS4EU geoportal featuring base layers for administrative units, hydrography, transportation networks and elevation themes.
User Interface, Software	project ongoing, thus no information available
Challenges	join geographic SDI and planning SDI over INSPIRE
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	CONSORZIO PER LA GESTIONE DEL CENTRO DI COORDINAMENTO DELLE ACTIVITA DI RICERCA INERENTI IL SISTEMA LAGUNARE DI VENEZIA, ITALY DE ZORZI Stefania, +39 041 2402523, dezorzi@corila.it
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 20	
Project Name	GMES – Global Monitoring for Environment and Security
Type of project	EU project
Dimension of project	international
Project start	1998
Project end	2013 at the earliest
URL	http://www.gmes.info/
Leader, Project Partners	
Content (keywords)	ESA, Sentinel, monitoring, INSPIRE
Content (description)	Global Monitoring for Environment and Security (GMES) is a joint initiative of the European Commission and European Space Agency, which aims at achieving an autonomous and operational Earth observation capacity. The objective is to rationalize the use of multiple-sources data to get a timely and quality information, services and knowledge, and to provide autonomous and independent access to information in relation to environment and security. In other words, it will pull together all the information obtained by environmental satellites, air and ground stations to provide a comprehensive picture of the "health" of Earth.
Used technology/software	space satellite missions
Strengths or chances of this project	GMES is one of three related initiatives that are the subject of the GIGAS (GEOSS, INSPIRE and GMES an Action in Support) harmonization project under the auspices of the EU 7th Framework Programme.
Weaknesses or risks of this project	The only risk is a potential failure of the ESA missions.
Accessibility, Information	All sub projects and partners are linked on the central GMES website; from these linked website a large number of data catalogues, contact information and online services are accessible.
User Interface, Software	GMES consists of numerous single projects and therefore does not run specific own software
Challenges	building an own European monitoring satellite network
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	GMES Bureau, Brussels, +32.2.296 21 62, entr-gmes-bureau@ec.europa.eu
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 21	
Project Name	HUMBOLDT
Type of project	EU project
Dimension of project	international
Project start	2006
Project end	2010
URL	http://www.esdi-humboldt.eu/
Leader, Project Partners	Lead Partner: Fraunhofer Institute, Germany. + 27 partners throughout Europe
Content (keywords)	European SDI, open source software, harmonisation, metadata
Content (description)	The Humboldt project aims to facilitate the harmonisation of spatial data and metadata by automating the necessary processes as far as possible. Humboldt will undertake a process analysis which will show the steps necessary to harmonise data and metadata. Finally, a software framework and diverse tools will be developed and integrated into the ESDI to support spatial data and service providers in offering standardized spatial information.
Used technology/software	The HUMBOLDT project is developing an own software branch: http://community.esdi-humboldt.eu/
Strengths or chances of this project	All HUMBOLDT developments will be available as Open Source Software, released under the LGPL 3.0 license.
Weaknesses or risks of this project	-
Accessibility, Information	The whole software branch is well-documented: Detailed documentation for all these services and applications, such as full specifications, will be made available under the same license as the software itself. Furthermore, a forum, wiki and bugtracker are prepared for your information and feedback.
User Interface, Software	own software
Challenges	creating a standalone open source community
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Project Office: zeitform Internet Dienste OHG, Darmstadt, Germany E-mail: po@esdi-humboldt.eu
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 22	
Project Name	ISAMAP – Harmonisation of regional data resources for cross-border planning
Type of project	○ EU project
Dimension of project	○ international
Project start	2003
Project end	2006
URL	http://www.isamap.info/
Leader, Project Partners	Lead Partner: Carinhtia - Office of the Government of Carinthia, Dept. 20, Spatial Planning - KAGIS Project Partners: Friuli Venezia Giulia - Regione Autonoma Friuli-Venezia Giulia, Direzione centrale della pianificazione territoriale, della mobilità e delle infrastrutture di trasporto; Slovenia - Ministry of the Environment, Spatial Planning and Energy, National Office for Spatial Planning
Content (keywords)	spatial information, data harmonisation, INTERREG, cross border planning
Content (description)	Nearly 80% of all decisions of the public administration in general and the planning in particular depend on the availability of geographical information. The project sets the task to build up a cross-border infrastructure for geodata which is able to supply the groundwork of questions as regional planning, interests of disaster protection as well as regional political decisions.
Used technology/software	WMS, Geoland Viewer
Strengths or chances of this project	ISAMAP was one of the very first projects to deal with cross-border planning data using web mapping applications, also following the INSPIRE initiative's guidelines, thus being a pioneer in the field of cross-border harmonised GIS.
Weaknesses or risks of this project	As many other similar projects followed since ISAMAP, there have not been significant weaknesses within this project in retrospect.
Accessibility, Information	The project results are freely accessible through the project website http://www.isamap.info/ – however, the map viewer is currently (Aug. 2009) not working. A short project report brochure can be found at http://www.isamap.info/Final_Broschure_ISAMAP.pdf
User Interface, Software	web browser interface, Geoland Viewer software (in-house development by Carinthian state administration)
Challenges	none (project has ended)
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Amt der Kärntner Landesregierung Abteilung 20/Landesplanung KAGIS Wulfengasse 13 A-9020 Klagenfurt klaus.gruber@ktn.gv.at, mathias.moser@ktn.gv.at
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 23	
Project Name	ISDE – Irish Spatial Data Exchange
Type of project	public-private partnership
Dimension of project	National – within Ireland.
Project start	2006
Project end	Still running: open-ended
URL	www.isde.ie
Leader, Project Partners	Leader: Irish Marine Institute Partners: Department of Communications, Marine and Natural Resources Environmental Protection Agency Department of Environment, Heritage and Local Government Teagasc – the Irish agriculture and food development authority Electricity Supply Board The Coastal and Marine Resources Centre, University College Cork The Hydraulics and Maritime Research Centre, University College Cork The Martin Ryan Marine Institute, National University of Ireland, Galway The Centre for Coastal and Marine Research, University of Ulster
Content (keywords)	ISD discovery, search, metadata, distributed.
Content (description)	ISDE is a discovery service for spatial data to search metadata catalogues operated by each of the partner organisations. The exchange architecture is distributed with a light central mediation service. The exchange is based around OGC and ISO standards, which allows it to be independent of any catalogue implementation technologies.
Used technology/software	The ISDE is a distributed web architecture consisting of Two browser versions, namely that developed by ESRI-Ireland and an open-source browser developed by CMRC at UCC. The Messaging Hub, known as 'Reach Lite'. This is a temporary compo-nent being used while discussions are carried out with the Irish Reach Agency on possible integration with the Irish Public Services Broker. The Broker/mediator. This maintains a record of participating catalogue services.
Strengths or chances of this project	It is an Irish National web-service based distributed discovery service for spatial data belonging to various organisations, searching the meta-data catalogues operated by each of the partner organisations and accessing the databases at source. It is based on open OGC and ISO standards.
Weaknesses or risks of this project	It is not yet fully INSPIRE compliant and is still work in progress as the Irish Reach & Broker Services have not gained wide usage.
Accessibility, Information	ISDEis very easy to use, and allows users to freely search spatial data metadata catalogues operated by each of the partner organisations, at www.marine.ie/isde/isdesearch.htm or by selecting the global option on the individual catalogue search pages from any of the partners' websites.
User Interface, Software	For this ISDE architecture a simplified version of the Reach Public Service Broker protocols (ReachLite) was implemented[3]. This 'lite' implementation of protocols circumvented the more complex requirements for a complete hub-and-spoke Reach implementation. The solution included: Web Browser (Requester) – The user of the service via the host application server Web Server (Application Host) – The Enabler that manages the web

[3] www.fujitsu.com/ie/casestudies/midata.html

	services and accepts HTTP requests and augments and routes the message appropriately ReachLite (Fulfiller) – The provider of the service functionality based on a partial implementation of the Reach Public Service Broker interface standards. The ReachLite Fulfiller was designed with software components to work both in a Microsoft and Open Source environments. The ISDE solution demonstrates the value of data exchange within the public services sector as a whole. It provides immediate practical assistance to those agencies and organisations and individuals that require an Irish nation wide view of the available data. The key focus of the ISDE project was the development of a metadata discovery mechanism that allows metadata catalogues held by the different organisations to become searchable via the Web. In collaboration with ESRI Ireland, Fujitsu developed and deployed an online mechanism whereby publicly funded bodies can provide seamless public access to Metadata relating to GI data sets that they hold. They also identified suitable standards for Metadata exchange in the context of metadata catalogues and indexed data stores, and migration towards INSPIRE compliance. By maximising the reuse of GI data using a federated database integrated using Reach technologies, the key benefits are the improved selection of research locations, topics and questions to be answered about Ireland's resources. The ISDE project has also increased Ireland's ability to manage and benefit from the various data resource that exists within the public services and is demonstrating the potential of web-enabled Geographical Information Systems (GIS) and related technologies at a national level. It is hoped that the successful sharing of metadata will demonstrate the usefulness of the Irish Spatial Data Exchange and prompt other organisations to make funding available to allow all INSPIRE-related data from various repositories to be exchanged seamlessly, such as a thematic search for temperature variations for pre-selected coastal and offshore locations.
Challenges	The ISDE service is currently hosted by the Irish Marine Institute. ISDE needs funding to allow it to provide fully INSPIRE-compliant access to the partner organisations involved, and enable/encourage further organisations to join in, particularly the Local Authorities, who are directly involved in the Irish Planning system.
This project deals with planning relevant datasets	Yes, but not primarily.
This project is compatible to the standards of the OGC	Yes
This project is a cross-border initiative	No – not yet.
Contact	isde@marine.ie.- no further contact information is provided.
Collected by	Dr. John J O'Flaherty, MAC
Additional remarks	The ISDE partners are currently drafting a Memorandum of Understanding (MOU) to be entered into by participating organizations. Organizations wishing to participate have to adhere to the following ISDE Interoperability Guidelines: ISDE - principal standards are: ISO 19115 for meta data structure OGC CSW 2.0 For catalogue entry exchange UDDI for service identification. And they have issued the following ISDE Interoperability Guidelines (IIGs): Interoperability Guidelines (IIG003) for Data Server (www.marine.ie/isde/IIG-003.pdf) Interoperability Guidelines (IIG002) for ISDE Record (www.marine.ie/isde/IIG-002.pdf) Interoperability Guidelines (IIG001) for ReachLite (www.marine.ie/isde/IIG-001.pdf)

Best Practise # 24	
Project Name	*Mapsharing*
Type of project	○ EU project
Dimension of project	○ international
Project start	*2005*
Project end	*2007*
URL	*http://www.mapsharing.eu/*
Leader, Project Partners	*Lead Partner: Trieste Province* *Project Partners: Pordenone Province, Muggia municipality, Udine municipality; Slovenia Municipality of Koper, Regional Development Agency South Primorska*
Content (keywords)	*Strategic Environmental Assessment, spatial information, INTERREG, cross border planning*
Content (description)	*The main aim of Mapsharing project consists in identifying tools and methodologies for the construction of shared territorial knowledge in order to increase the effectiveness of Strategic Environmental Assessment in cross-border area located between Friuli Venezia Giulia region and Slovenia Republic. In more detailed way a SDI has been realized for storing data used in the project, in order to ensure their use for planning and programming, as well as their diffusion using internet. The project also defines a shared methodology between project partners, for Strategic Environmental Assessment applicable in Italy and Slovenia and for cross-border plans and programs.*
Used technology/software	*WMS, WFS, GML*
Strengths or chances of this project	*This project adopts OGC standards and an huge amount of data have been produced in order to improve the Strategic Environmental Assessment quality. All data are accessible for all citizen.*
Weaknesses or risks of this project	*This initiative of cross-border harmonization does not consider issues concerning semantic matching. In this project miss an ontological approach.*
Accessibility, Information	*All documents and data are freely accessible, unfortunately great part of documents are in Italian language. Documents link (http://www.mapsharing.eu/index.php?id=22&L=0), Webgis link (http://sitp.provincia.pordenone.it/pmap/map.phtml?config=mca&language=it)*
User Interface, Software	*web browser interface, Mapserver*
Challenges	*none (project has been finished)*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*Sergio Bergnach, Provincia di Pordenone, Largo San Giorgio, 12 - 33170 Pordenone, tel. + 390434 342311 fax + 390434 231244 bergnach@provincia.pordenone.it*
Collected by	*Beniamino Murgante, AM/FM Italia*

Best Practise # 25	
Project Name	Med-Isolae 3D
Type of project	EU project
Dimension of project	international
Project start	2007
Project end	2009
URL	http://www.medisolae-3d.eu/, http://www.3d-islands.eu/
Leader, Project Partners	Lead partner: Coordinator: EPSILON INTERNASIONAL ANONYMI ETAIREIA MELETON KAI SYMVOULON + 13 partners from 7 countries
Content (keywords)	eContentPlus, INSPIRE; SDI, 3D-aerial navigation
Content (description)	Based on readily available geodata owned and to be delivered by the project partners, MedIsolae-3D will deliver for 100+ European Mediterranean islands: (1) A spatial data infrastructure (SDI) in the EU-INSPIRE logic, (2) A 3D-aerial webGIS flying-over application, for island navigation as a virtual-visiting, (3) A dissemination, exploitation and sustainability plan for the commercial use of the Portal, (4) A dynamic Portal for islands information, data sales, and 3D aerial navigation, the latter also being linked to the Google Earth™, Virtual Earth™, and ArcGlobe™ SDI/GIS platforms.
Used technology/software	Google Maps, Flash, Virtual Earth, ArcGlobe
Strengths or chances of this project	Provide an aerial flying-over navigation mastered by the users, who can approach island features and points of interest (POI) as road networks, mountains and hacking trails, beaches, archaeological sites and monuments, city facilities, and visitor information centres, attributed to scale up to 1:5.000 of GIS vector data. → a veryinteresting approach also for tourism
Weaknesses or risks of this project	dependency on commercial enterprises and their rules after the project end (which could lead to data developed away from open standards towards proprietary formats)
Accessibility, Information	The project results (web maps, aerial navigation) will be freely accessible to anyone over the internet, platform will be marketed after project end
User Interface, Software	web browser interface http://www.3d-islands.eu/
Challenges	(1) Make the MedIsolae Portal “the Portal” to be used by many EU islands (beyond project partners). (2) Promote the MedIsolae 3D flying-over service world-wide. (3) Link to Google™, Microsoft™, and ESRI™ platforms for future business.
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Marc Bonazountas, +302106898615, bonazountas@epsilon.gr
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 26	
Project Name	*Metaschool*
Type of project	○ EU project
Dimension of project	○ international
Project start	*2008*
Project end	*2010*
URL	*http://www.metaschool.cz/*
Leader, Project Partners	*Project coordinator is Ellinogermaniki Agogi from the Greece* *Czech Centre for Science and Society* *Gymnasium "Nad Kavalirkou" in Prague* *European Schoolnet* *University Bayreuth* *American Colleagues Thessaloniky*
Content (keywords)	*Education, Metadata, Uniform Resource Management (URM)*
Content (description)	*Project Towards Teacher Competence on Metadata and Online Resources - Metaschool is financing from the Lifelong Learning Programme and Comenius Multilateral projects sub-programme.* *The project objective is to propose new methods of information technology and metadata utilization in educational system.*
Used technology/software	*URM technologies as a solution based on WEB 2.0 principles*
Strengths or chances of this project	*Searching for articles, presentations, tutorials, digital maps and their utilization and sharing.*
Weaknesses or risks of this project	*Data availability* *Willingness of teachers to publish their materials*
Accessibility, Information	*Metaschool portal is free of charge for all schools* *Registration makes possible better using of information (sharing, publishing)*
User Interface, Software	*Web base interface, Internet explorer*
Challenges	*Need to solve IPR issue, probably Common Creative Licence*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*Czech Centre for Science and Society, Dr Karel Charvat, charvat@ccss.cz*
Collected by	*Sarka Horakova, CCSS*
Additional remarks	-

Best Practise # 27	
Project Name	Municipal land management - MonPlanGML
Type of project	public project
Dimension of project	○ National
Project start	03/2004
Project end	12/2011
URL	http://www.gtz.de/en/weltweit/europa-kaukasus-zentralasien/6530.htm
Leader, Project Partners	GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit); Client: German Federal Ministry for Economic Cooperation and Development Lead exec. agency: Montenegrin Min. for Spatial Planning & Environment
Content (keywords)	Harmonization of spatial planning data
Content (description)	The project “Municipal Land Management”, Montenegro, started in March 2004. It is designed for a total period of approximately 8 years (March 2004 – December 2011). Its overall objective is that legal certainty as well as spatial and urban planning using land as a resource is improved. The project is targeted to take effect within the municipalities: As local self-governing units, they are the most important users of cadastre and real estate registration information. The municipalities receive advice on urban land use planning, municipal real estate management and land tax collection, the most important (municipal) land management tasks. According to the “Montenegrin Law on Planning and Development”, all new planning documents have to be elaborated and submitted to the municipal / national planning institutions in digital form. As one of the activity fields of the Municipal Land Management Project, the development of the GML-based data model MonPlanGML will form the necessary precondition for a standardized visualization and exchange of digital planning information in Montenegro.
Used technology/software	RationalRose (UML modeling) MonPlanGML Toolbox (converting ESRI shape files to MonPlanGML data format
Strengths or chances of this project	Harmonization of spatial planning data (corresponding to Montenegrin planning law) so that datasets become comparable and interoperable.
Weaknesses or risks of this project	○
Accessibility, Information	see project website or CORP paper http://www.gtz.de/en/weltweit/europa-kaukasus-zentralasien/6530.htm/ http://www.corp.at/corp_relaunch/papers_txt_suche/CORP2008_17.pdf
User Interface, Software	
Challenges	data harmonisation
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Dr. Joachim Benner (Institute for Applied Computer Science Karlsruhe) joachim.benner@iai.fzk.deThomas Eichhorn (LGV Hamburg - Agency for Geo-Information and Surveying) thomas.eichhorn@gv.hamburg.deDr. Kai-Uwe Krause (LGV Hamburg - Agency for Geo-Information and Surveying) kai-uwe.krause@gv.hamburg.deYvonne Müller (GTZ) yvonne.mueller@gtz.de
Collected by	Kai-Uwe Krause, Agency for Geo-Information and Surveying

Best Practise # 28	
Project Name	NatureSDIplus
Type of project	EU project
Dimension of project	international
Project start	2008
Project end	2011
URL	http://www.nature-sdi.eu/
Leader, Project Partners	Lead partner GISIG (Geographical Information Systems International Group, http://www.gisig.it) + 29 partners from 17 countries
Content (keywords)	spatial planning SDI, nature conservation, eContentPlus, INSPIRE
Content (description)	Nature-SDIplus Network aims, through state-of-the-art methodologies and best practice examples, to improve harmonisation of national datasets and make them more accessible and exploitable. Therefore, it contributes to the INSPIRE implementation with specific reference to a cluster of data themes on nature conservation. The main objective of Nature-SDIplus Network is to: involve new stakeholders; share data and best practices; improve and stimulate exploitation and the re-use of information on nature conservation.
Used technology/software	eGroupWare, OGC compliant architecture
Strengths or chances of this project	Existing nature databases are linked throughout the EU to allow international long-term monitoring.
Weaknesses or risks of this project	gap between “INSPIRE dream” and the European reality could be still too large
Accessibility, Information	ongoing project, thus no results available
User Interface, Software	NATURE-SDIplus will analyse the usability and accessibility of data. The results of this analysis will be used to develop a European metadata profile based on ISO 19115/119 standards and data model in CEN/TC 287 Geographic information. Demonstration infrastructure based on an architecture compliant with the INSPIRE principle and supported by web services
Challenges	achieve future awareness for both environment and SDI themes
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Lead partner http://www.gisig.it; e-mail: gisig@gisig.it
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 29		
Project Name	*NATURNET-REDIME (NNR)*	
Type of project	○ EU integrated project	
Dimension of project	○ international	
Project start	*2005*	
Project end	*2007*	
URL	*http://www.naturnet.org/*	
Leader, Project Partners	*Lead Partner: Czech Centre for Science and Society (CCSS), Czech republic* *+ 17 partners from European countries and 1 from Brazil*	
Content (keywords)	*Spatial Data, Sustainable development, Qualitative Reasoning, Mobile Internet Technologies, Web Services*	
Content (description)	*The general objective of NaturNet-Redime is to support sustainable development by improving knowledge about all aspects of sustainability and provide education mainly about social, economic, and environmental tools for the implementation of the EU Strategy on Sustainable Development at both EU and international levels .*	
Used technology/software	*UMN Mapserver, Metadata catalogue Micka, Moodle, Garp3*	
Strengths or chances of this project	*The The NaturNet-Redime Portal is designed to aid awareness raising, training, presentation and sharing of knowledge and tools related to sustainable development and environmental management & protection in Europe.* *Support for web services, Qualitative Reasoning and Modelling*	
Weaknesses or risks of this project	*-*	
Accessibility, Information	*The results are accessible on project website: http://portal.naturnet.org/* *To access the existing TOOLS the Log-in is needed*	
User Interface, Software	*Web Portal, URM (Uniform Resource Management)*	
Challenges	*Web services for spatial data & environmental awareness*	
This project deals with planning relevant datasets		*yes/no/irrelevant*
This project is compatible to the standards of the OGC		*yes*
This project is a cross-border initiative		*yes*
Contact	*Czech Centre for Science and Society, Dr. Karel Charvat, charvat@ccss.cz*	
Collected by	*Sarka Horakova, CCSS*	
Additional remarks	*-*	

Best Practise # 30	
Project Name	NESIS
Type of project	EU project
Dimension of project	international
Project start	2008
Project end	2010
URL	http://www.nesis.eu/
Leader, Project Partners	Lead partner: Coordinator: GISIG GEOGRAPHICAL INFORMATION SYSTEMS INTERNATIONAL GROUP ASSOCIAZIONE, ITALY + 14 partners from 14 countries
Content (keywords)	ICT Policy Support Programme, CIP-ICT-PSP-TN CIP-Thematic Network, environment, monitoring, INSPIRE
Content (description)	The NESIS aim is to promote the uptake of ICT solutions by public authorities in providing information for the monitoring and reporting of environmental impacts and threats. By supporting a shared vision towards an interoperable information infrastructure, the Network fosters the creation of the Shared Environmental Information System (SEIS) and a coherent frame for existing good practices.The Network grounds on the experience of the EIONET Community, a Network of some nine hundreds experts from over three hundreds national environment agencies and other bodies in 38 European Countries.
Used technology/software	project ongoing, thus no information available
Strengths or chances of this project	foster mutual exchange between regional, national and international authorities, opposed to the one-way flow from member state to EU which typifies today's reporting methodologies
Weaknesses or risks of this project	another standalone subject-specific SDI
Accessibility, Information	The results of the project will be: an interoperable geology spatial dataset at 1:1 million scale for all EU; a scientific and informatics specification for the harmonisation of geological data and significant progress towards a harmonised dataset; a view service providing access to best practice high resolution geological spatial data services for 6 Member States.
User Interface, Software	project ongoing, thus no information available
Challenges	bridge the gap between the ICT domain and the authorities
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Milva Carbonaro, +39-010-8355588, m.carbonaro@gisig.it
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 31	
Project Name	OneGeologyEurope
Type of project	EU project
Dimension of project	international
Project start	2008
Project end	2010
URL	http://www.onegeology-europe.org/home
Leader, Project Partners	Lead partner: Natural Environment Research Council (British Geological Survey - BGS) + partners from 29 countries
Content (keywords)	geology, metadata, geological map, web mapping, data search, geoscience SDI, INSPIRE
Content (description)	29 countries and European organizations are committed to create a geological map at 1:1.000.000 scale, which will be available as from September 2011, integrated with metadata initially available in the following languages: English, French, Italian, Spanish, Swedish, Czech and Norwegian. The project strives to facilitate search for geological spatial data which through the web. Web services will enable its usage through different means, such as visualization, downloading and various transformations. The data will be easily discoverable and easy to understand and analyse.
Used technology/software	project ongoing, thus no information available
Strengths or chances of this project	Geological data are essential to the prediction and mitigation of landslides, subsidence, earthquakes, flooding and pollution – but they are difficult to discover and are not interoperable. For those outside the survey or nation they are not easy to obtain, to understand, or use. This project helps to harmonise geological data sources throughout Europe.
Weaknesses or risks of this project	another standalone subject-specific SDI
Accessibility, Information	The results of the project will be: an interoperable geology spatial dataset at 1:1 million scale for all EU; a scientific and informatics specification for the harmonisation of geological data and significant progress towards a harmonised dataset; a view service providing access to best practice high resolution geological spatial data services for 6 Member States.
User Interface, Software	project ongoing, thus no information available
Challenges	bring this SDI together with various other subject-specific SDIs according to INSPIRE guidelines
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Ian JACKSON (ij@bgs.ac.uk)
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 32	
Project Name	Open Yambol- Local initiative for transference in spatial planning of Yambol Municipality, Bulgaria
Type of project	Public/EU project
Dimension of project	local/regional/national/international
Project start	2008
Project end	2009, but the update will be made on every 2 months
URL	http://www.openyambol.org/gis/
Leader, Project Partners	IDEA (local NGO-www.ngoidea.com) and Municipality of Yambol
Content (keywords)	Map client, spatial planning data, transparency in spatial planning
Content (description)	The project is an initiative of non-governmental organization IDEA, supported by the Ymabol municipality administration and funded by Operational Program Administrative capacity (European Social Fund). The basic idea of the project is to publish spatial planning data, regarding the territory of Yambol Municipality, Bulgaria and all decisions in that field. Using UMN Map server, all spatial planning data and all changes era dynamically published and available for the general public.
Used technology/software	UMN Map server
Strengths or chances of this project	Spatial planning datasets from different sources (Cadastre Agency, Yambol municipality etc) are integrated on one online map; all interfaces are built on open source software
Weaknesses or risks of this project	Problems with sustainability- no clear idea how the service will be funded after the funding is gone
Accessibility, Information	The project data is accessible over the internet at http://www.openyambol.org/gis/– all datasets are available as web map services. There is no restriction at all.
User Interface, Software	Web map server: UMN Map Server 4.8
Challenges	Probably upgrading the map server into fully functional GIS server, with developed GIS services
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	no
Contact	Milena Georgieva, NGO IDEA, idea.yambol@gmail.com
Collected by	Stelian Dimitrov, EPF
Additional remarks	-

Best Practise # 33	
Project Name	*ORCHESTRA (Open architecture and spatial data infrastructure for risk management)*
Type of project	○ *EU project*
Dimension of project	○ *international*
Project start	*2004*
Project end	*2008*
URL	*http://www.eu-orchestra.org/*
Leader, Project Partners	*SCIENCE AND TECHNOLOGY CENTER FOR EUROPE AT MADRID (STREAM) + 13 partners from 7 countries*
Content (keywords)	*risk management, INSPIRE, project network, SDI*
Content (description)	*ORCHESTRA is designing and implementing the specifications for a service oriented spatial data infrastructure for improved interoperability among risk management authorities in Europe, which will enable the handling of more effective disaster risk reduction strategies and emergency management operations. ORCHESTRA will not only deliver technical results such as the RM-OA plus developed services and applications, but also aims to bring together and consolidate the risk management community. This is being done by integrating the results and recommendations of previous and current European and National projects and initiatives.* *Some of the results of ORCHESTRA are being used as input to the INSPIRE (through its Drafting Teams) and GMES initiatives.*
Used technology/software	*OGC-compliant web mapping technology (e. g. QGIS Mapserver, GML); the Reference Model for the ORCHESTRA Architecture has even been granted the status of an OGC best practise document.*
Strengths or chances of this project	*- To design an open service-oriented architecture for risk management* *- To develop the software infrastructure for enabling risk management services* *- To deliver an infrastructure integrating spatial and non-spatial services for risk management* *- To validate the ORCHESTRA results in a multi-risk scenario* *- To provide software standards for risk management applications*
Weaknesses or risks of this project	*limitations of web mapping software and standards regarding scenario operation and simulation*
Accessibility, Information	*The project data are accessible via web mapping clients (meanwhile partly abandoned)*
User Interface, Software	*web interface (mapping client)*
Challenges	*bringing scenario tools and more GIS functionality into web mapping*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*Name: Esteban Lauzan, Jose Fernando* *Tel: +34-91-2148613, Fax: +34-91-7543252* *jfernando.esteban@atosorigin.com*
Collected by	*Clemens Beyer, CEIT ALANOVA*
Additional remarks	-

Best Practise # 34	
Project Name	*ÖROK-Atlas*
Type of project	○ public
Dimension of project	○ national
Project start	*2004-2007*
Project end	*annual updates, no project end determined*
URL	*http://www.oerok-atlas.at/*
Leader, Project Partners	*ÖROK* *Statistik Austria, Eurostat (provide statistic data for Austria and all Europe)* *Working group with Austrian experts*
Content (keywords)	*interactive thematic maps, web services, spatial planning*
Content (description)	*ÖROK publishes series of maps as the ÖROK-Atlas. Goal of this cartographic product is the presentation of spatial development in Austria and to apply current technical possibilities to the distribution, presentation and exploration of statistical and geo data of Austria by means of a free online interactive cartographic information system.*
Used technology/software	*web based service, using open source products, compatible with common systems and data formats*
Strengths or chances of this project	*provides information for planners*
Weaknesses or risks of this project	*it takes extremely long to load European map*
Accessibility, Information	*Website, download of the maps/tables/graphs as pdf or graphic format*
User Interface, Software	*Map viewer, navigation function, choice between different thematic themes*
Challenges	-
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*yes*
Contact	*Sergio Bergnach, Provincia di Pordenone, Largo San Giorgio, 12 - 33170 Pordenone, tel. + 390434 342311 fax + 390434 231244 bergnach@provincia.pordenone.it*
Collected by	*Beniamino Murgante, AM/FM Italia*

Best Practise # 35	
Project Name	spatial data infrastructure Hamburg Metropolitan Region (SDI-MRH)
Type of project	public project
Dimension of project	National
Project start	2003
Project end	open end
URL	http://www.geodaten.metropolregion.hamburg.de
Leader, Project Partners	"LGV Hamburg" – Agency for Geo-Information and Surveying Hamburg, "LGN Lower Saxony" - Geodetic Survey of Lower Saxony, Interior Ministry of Schleswig Holstein, six counties of Lower Saxony, six counties of Schleswig Holstein bordering the Free and Hanseatic City of Hamburg
Content (keywords)	Hamburg Metropolitan Region, cross-border data and layout harmonisation, map client, spatial data infrastructure based on OGC web services
Content (description)	SDI-MRH brings datasets from the three federal states Hamburg, Lower Saxony (partly) and Schleswig Holstein (partly) together in one map client. The project mainly focuses on comprehensive regional planning at federal state and county level, urban land-use planning, protected sites, tourism, education and commercial areas related datasets.
Used technology/software	deegree WMS, WFS, WFS-G, WMPS, Mapbender, PostgreSQL / PostGIS, ESRI ArcIMS (used by some of the administrative offices).
Strengths or chances of this project	- Datasets from different servers are shown together in one map - Harmonisation of data layout and classification so that datasets become comparable (realised for geometric boundary of binding land-use plans, protected sites and commercial areas; development of more harmonised object models is planed) - Cascading WMS, OGC services and map applications are built on open source software
Weaknesses or risks of this project	slow progress in data and layout harmonisation
Accessibility, Information	All project data are freely accessible over the internet: see project website http://www.geodaten.metropolregion.hamburg.de There is no restriction at all.
User Interface, Software	Web mapping client (web browser interface): Mapbender 2.5 Web map service (WMS) / web feature service (WFS-G) / web map print service (WMPS) : deegree 2.3
Challenges	SLD integration, cascading access to partners WMS
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	LGV Hamburg – Agency for Geo-Information and SurveyingThomas Eichhorn (head of the Department Geo Data Application and head of the SDI-MRH coordination site) thomas.eichhorn@gv.hamburg.de
Collected by	Kai-Uwe Krause, Agency for Geo-Information and Surveying
Additional remarks	-

Best Practise # 36	
Project Name	*SIRA*
Type of project	○ public project
Dimension of project	○ Regional
Project start	*2008*
Project end	*Still running: expected end in 2010*
URL	*http://intranet.sardegnaambiente.it/sira-webinsediamenti*
Leader, Project Partners	*Sardinia regional government* *Engineering Ingegneria Informatica* *Core Soluzioni Informatiche*
Content (keywords)	*Environmental cadastral, map client, waste facilities,*
Content (description)	*Regional environmental information system. The project mainly focuses on historical collection and integration of data generated by administrative processes and concerning environ related cadastrals, regarding air, water, waste, soil and pollution (e. g. waste facilities, electromagnetic sources, water bodies, IPPC facilities, etc…) along with the geographical description of such objects. Also, this system allows collection of analytical environmental measurements (e. g. water bodies status, air pollution, etc…).*
Used technology/software	*J2EE, WMS, WFS, Oracle Spatial, ArcGIS Server*
Strengths or chances of this project	*The main strength of the project resides in the its ability to provide historical and integrated information about environmental impact from human activities as well as environmental status as geographical dataset, exposed by means of standard and open web services (WMS, WFS), along with alphanumerical web services in most common formats (HTML, CSV, XML).*
Weaknesses or risks of this project	*Lack of completeness or of information due to the amount of data entry needed, which requires the introduction of new operational procedures in regional government concerning the use of the system.*
Accessibility, Information	*Public geographical and alphanumeric data are provided by standard web services*
User Interface, Software	*The user interface is completely web-based. The geographical data are completely integrated into user interface by Javascript API build over standard OpenLayers.*
Challenges	*Adoption of the system from other regions, national integration of regional environmental data*
This project deals with planning relevant datasets	*Yes*
This project is compatible to the standards of the OGC	*Yes*
This project is a cross-border initiative	*No*
Contact	*Regione Autonoma della Sardegna, Ing. Nicoletta Sannio, n.sannio@regione.sardegna.it*
Collected by	*Norma Zanetti Hyperborea*
Additional remarks	-

Best Practise # 37	
Project Name	*SITNA (Territorial Information System of Navarra)*
Type of project	*Public project collaborative*
Dimension of project	*Regional – Region of Navarra (Spain)*
Project start	*2000*
Project end	*It is open-ended*
URL	*http://sitna.navarra.es*
Leader, Project Partners	*The system organization is corporative and horizontal and it get involved all the actors. The main Board: Coordination Commission is chaired by the Vice President of the Government of Navarra.* *All departments of the Government of Navarra are involved.* *Moreover the Government of Navarra, Local Administrations, public companies and recently some private company are also participating in SITNA.* *The SITNA have been implemented wit the technologic support of the company Trabajos Catastrales S.A. (TRACASA).* *More information can be find at SITNA Geoportal*
Content (keywords)	*Spatial Data Infrastructure, Territorial Information System, INSPIRE, Navarra, SITNA (Territorial Information System of Navarra), IDENA (Regional SDI of Navarra), IDEPamplona (Local SDI of Pamplona), Modernization of Administration, Public Service, Information Society.*
Content (description)	*SITNA has been designed to coordinate and update integrated GI resources from multiple units (all the Government Departments are involved in data supply) so that they can be used to support the activities of every unit, allowing every user's category to fulfill specific needs for information. The system integrates incoming informative flows of the different suppliers, and supplies back territorial integrated information. The incoming information flows are subject to quality assurance procedures, and a precise homogeneous reference system is used for spatial data integration. The system also allows for time series data management.* *On top of SITNA, the IDENA has been developed according to ISO and OGC interoperability standards and offers catalogue, map and download services. The Territorial Information System of Navarra (SITNA) has evolved in the last decade into the regional SDI of Navarra (IDENA) improving integration and giving operative support to a wider number of users.*
Used technology/software	*In-house developments*
Strengths or chances of this project	*Three aspects have been focused in SITNA from its beginnings: The Management, essential to consolidate the model and the coordination among the stakeholders; the Information, collecting the biggest number of possible layers and, at the same time, involving the Departments in their management; the Dissemination, making useful the System, the best way to state it and guarantee its growth.* *SITNA aims to contribute to the modernisation of the Public Administrations taking part as infrastructure for regional development*
Weaknesses or risks of this project	*Lacking of collaborative culture regarding spatial information.* *Not be able to evolve as required by the users and the technological advances.*

Accessibility, Information	*SITNA geoportal is the open window for all those users and citizens interested in information related to the territory of Navarra.* *The information is free with legal copyright and is available for discovering, viewing and downloading directly from the SDI of Navarra (IDENA)* *From SITNA Geoportal home, several data and services are offered increasing and evolving continuously.*
User Interface, Software	*SITNA web is based in in-house developments from TRACASA based on SOAP*
Challenges	*Technologically, planned developments include WFS services and openness services such as API-mashups or Iframe, Future developments for SITNA also include the connection to mobile devices; the diffusion of SITNA among schools, private companies, universities, and local administrations;*
This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*yes*
This project is a cross-border initiative	*No, but participates in the National SDI initiative (IDEE)that it's cross-border (all Spanish regions are participating to build IDEE in a collaborative way)*
Contact	*Government of Navarra: sitna@navarra.es* *Tracasa:pechamendi@tracasa.es*
Collected by	*María Cabello, Tracasa (on behalf of partner NASURSA)*
Additional remarks	-

Best Practise # 38	
Project Name	Sistema Informativo Territoriale Regionale (SITR)
Type of project	○ public project
Dimension of project	○ Regional
Project start	2005
Project end	Still running: expected end in 2010
URL	http://www.sardegnaterritorio.it/sistemainformativo/progettositr.html
Leader, Project Partners	Sardinia regional government, Core Soluzioni Informatiche.
Content (keywords)	GIS, INSPIRE, OGC, Standards, WMS, WFS, OLS, ISO19115,CNIPA, SMART WEB MAPPING
Content (description)	Regional territorial information system. The project mainly focuses on collection and integration of geographical data generated by local administrations, along with the publication of standard web services for providing such geographical dataset.
Used technology/software	J2EE, WEB SERVICES, ORACLE, ORACLE SPATIAL, ArcIMS, JAVASCRIPT API, PHP, GEOSERVER, MySQL, TOMCAT, JBOSS, APACHE
Strengths or chances of this project	The main strength of the project resides in the its ability to provide geographical dataset by standard OGC web services (WMS, WFS, OLS,…) and guarantee data interoperability to any client that support OGC Standards and INSPIRE rules.
Weaknesses or risks of this project	Lack of completeness or of information due to the use of different information systems from local administrative offices. Duplication of data with other territorial systems who don't interoperate with standards.
Accessibility, Information	Public geographical data are provided by standard web services based on the INSPIRE rules.
User Interface, Software	The user interface is completely web-based. The geographical data are completely integrated into user interface by Javascript API build over the OpenLayers tool. Clients can access directly to wms, wfs services and build custom interfaces to data.
Challenges	Adoption of the system from other regions, national integration of regional environmental data.
This project deals with planning relevant datasets	*Yes*
This project is compatible to the standards of the OGC	*Yes*
This project is a cross-border initiative	*No*
Contact	Regione Autonoma della Sardegna, Ing. Rita Vinelli, rvinelli@regione.sardegna.it
Collected by	Norma Zanetti Hyperborea
Additional remarks	-

Best Practise # 39	
Project Name	Territorial Information System of Pilsen Region and Bavaria
Type of project	public-private partnership
Dimension of project	regional
Project start	2006
Project end	2006
URL	http://www.tmapy.cz/public/tmapy/en/_first_page/bavor.html
Leader, Project Partners	Regional Development Agency of the Plzen Region, T-MAPY s.r.o,
Content (keywords)	ATKIS, ZABAGED, harmonization
Content (description)	The project was primarily aimed to prepare a uniform, medium scale reference map that covers an area spanning international border with the Plzen Region on the Czech side of the border and the two Bavarian administrative regions, Upper Palatinate and Lower Bavaria, on the German side. The study's yet another goal was to examine the possibility of linking thematic data. We selected the nature protection to be the pilot thematic sphere.
Used technology/software	ArcGIS, ArcObjects,T-MapServer
Strengths or chances of this project	Provides a harmonization schema between ATKIS and ZABAGED. Provides a unique method of spatial matching of vector features based on TPS transformation.
Weaknesses or risks of this project	The Master-Slave attribute data transformation which was finally used is not usable for more than two different data models.
Accessibility, Information	The highlights on project's results are available at: http://www.tmapy.cz/public/tmapy/en/_first_page/bavor.html http://intermap.plzensky-kraj.cz. (in Czech)
User Interface, Software	T-MapServer
Challenges	Optimisation of data visualization, automation of data actualization.
This project deals with planning relevant datasets	Yes, in middle scales
This project is compatible to the standards of the OGC	No
This project is a cross-border initiative	Yes
Contact	milan.kollinger@tmapy.cz
Collected by	Karel Jedlička, UWB
Additional remarks	-

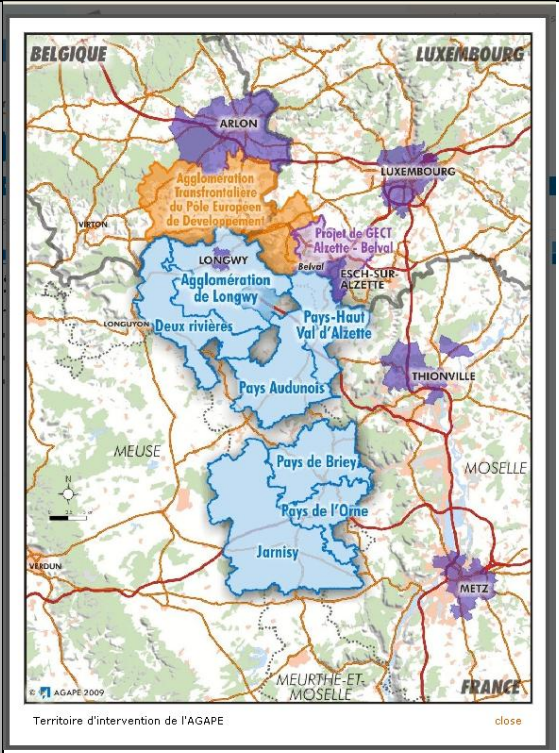
Best Practise # 40	
Project Name	*TRANSLAND, Sustainable spatial planning of the cross-border area Slovenia/Italy*
Type of project	○ EU project
Dimension of project	○ international
Project start	*2005*
Project end	*2007*
URL	*www.transland.it*
Leader, Project Partners	*Italian Lead Partner: Gorizia Province,* *Slovenian Lead Partner: Regional Development Agencies Network of Northern Primorska - Development Agency of Idrija and Cerkno* *Project Partners:* *Consortium of Municipalities in mountain areas Torre, Natisone, Collio* *Consortium of Municipalities in mountain areas Gemonese, Canal del Ferro, Val Canale* *Muncipality of Gorizia, Muncipality of Doberdò del lago, Muncipality of Nova Gorica, Muncipality of Øempeter-Vrtojba, Muncipality of Miren-Konstanjevica* *Muncipality of Tolmin, Muncipality of Idrija, Muncipality of Cerkno, Muncipality of Ajdovøœina, Muncipality of Vipava, Muncipality of Kanal ob Soœi, Muncipality of Kobarid, Muncipality of Brda* *Ministero dell'ambiente, del territorio e dell'energia – Direzione territoriale – Ufficio per lo sviluppo territoriale* *with contribution of Muncipality of Bovec*
Content (keywords)	*Sustainability, Landscape, Development plan, INTERREG, cross border planning, energy, water, territorial planning, cohesion*
Content (description)	*The project pursues the same aims of the previous Interreg "Transplan" which offered an early opportunity to exchange information and knowledge in the context of a shared desire to develop the trans-frontier area. With the aim of consolidating cohesion between the province of Gorizia and the area along the Slovenia border, TRANSLAND carries out an analysis of the salient characteristics of the different sites and identifies the area's potential in terms of the organization of population centres, infrastructure, energy facilities, heritage and the local economy, elaborating a vision of the future for this border area that harnesses cooperation and synergy between Slovenia and Italy.*
Used technology/software	*No particular technology has been used*
Strengths or chances of this project	*It is fundamental to develop cohesion aims among neighbourhood regions of different countries.*
Weaknesses or risks of this project	*This initiative of cross-border harmonization does not consider issues concerning semantic matching, OGC standards etc..*
Accessibility, Information	*All documents and data are freely accessible, documents are both in Italian and in English. Documents link http://www.transland.it/index.php?pag=downloads&cat=14*
User Interface, Software	*No particular user Interface has been used*
Challenges	*none (project has been finished)*

This project deals with planning relevant datasets	*yes*
This project is compatible to the standards of the OGC	*no*
This project is a cross-border initiative	*yes*

Contact	*Marzia Bonetti, Daniel Jjarc Provincia di Gorizia, Corso Italia, 55 – 34170 Gorizia, tel. + 390481547120 daniel.jarc@provincia.gorizia.it, marzia.bonetti@provincia.gorizia.it*
Collected by	*Beniamino Murgante, AM/FM Italia*

Best Practise # 41	
Project Name	VESTA-GIS (Vocational Education and Sectoral Training network on GIS & GI Application domains)
Type of project	EU project
Dimension of project	international
Project start	2007
Project end	2010
URL	http://www.vesta-gis.eu/
Leader, Project Partners	GISIG (Project Co-ordinator, Italy), 6 core partners from other EU countries, numerous associated partners, see http://www.vesta-gis.eu/index.php?option=com_content&task=view&id=16&Itemid=35
Content (keywords)	INSPIRE, GIS, mobility, education, training, LLP – Leonardo da Vinci network
Content (description)	The VESTA-GIS Network intends to set up a favourable context for enhancing professional skills at European level in the changing labour market consequent to the always increasing importance of GI in the new European dimension. VESTA-GIS is committed both to improve the skills existing on the market (offering a comprehensive tool for training people in GIS technology, related sciences, application fields) and to promote mobility of people.
Used technology/software	no special technology, the network combines all available software and techniques
Strengths or chances of this project	fostering the use of GI technology, accumulation of GIS knowledge
Weaknesses or risks of this project	-
Accessibility, Information	Explain the accessibility of project information, project data. Are there any user restrictions? Are the results freely accessible? Is there a project website?
User Interface, Software	Training Catalogue and an e-Learning distributed Platform
Challenges	create a mobility network to dynamically share the gained knowledge
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes – as far as web mapping technoloy is used
This project is a cross-border initiative	yes
Contact	GISIG, +39 010 8355588, gisig@gisig.it
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 42	
Project Name	Web SIG Agape
Type of project	public project
Dimension of project	local (north of département “Meurthe-et-Moselle”, see map)
Project start	2009
Project end	
URL	https://sig.agape-ped.org
Leader, Project Partners	AGAPE Lorraine Nord (Agence d’urbanisme)All the 7 intercommunalités (group of municipalities) that are among the members of AGAPE (agence d'urbanisme)
Content (keywords)	SDI, metadata, visualisation
Content (description)	Implementation of a WEB GIS for all the local governments that are included in the AGAPE area (see map). The platform will meet their requirements: today viewing of cadastral maps, later the system will enable the management of the building permits (autorisation d’urbanisme). It will enable the consultation of geographic information by the general public in conformance with INSPIRE rules.
Used technology/software	The platform is entirely based on open source software. All data are stored in a PostGIS database. Cartoweb is used for cartographic display. Metadata used GéoSource that is a French clone of GeoNetwork.
Strengths or chances of this project	Using open source software enabled to start the project without huge investments. The existence of many corporate data within AGAPE enabled to rapidly fuel the system with data.
Weaknesses or risks of this project	As the project is in its launching phase, there is always the risk that users, both decision maker (elected people) and technical do not appropriate the tool. The consequence will be that no further funding may be available for new user-oriented developments.As no SDI in Lorraine (the region) is proposed and no coordination around GI is on its way, data exchange, sharing and usage are complex to organise. As an example the user conditions that apply to the same reference data defer between the two département (NUTS3 local government).
Accessibility, Information	The system hosts a metadata catalogue that will be interoperable with the national geocatalogue (www.geocatalogue.fr) that is part of the French geoportal (www.geoportail.fr)
User Interface, Software	The system is in fact a thematic geoportal that enable accessing a wide range of maps. The open to public part has limited available functionalities (navigation, print, layer selection and location service).The professional part is only open to identified users. Additional functions are available: data export (both image and vector), portrayal management (sort of cartographic layout), adjunction of annotation and user-oriented data management (adjunction, modification, deletion of geographical data both geometry and semantic).Based on the user ID, cartography enable to access sensitive data over the territory the user is operating on (privacy constraints (CNIL) on personal data)
Challenges	The main goal is to implement a system that enables thematic usage and distribution usage for GI in line with INSPIRE.
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	no
Contact	Christophe BREDEL – AGAPE

	cbredel@agape-ped.org Olivier Durr – AGAPE odurr@agape-ped.org
Collected by	François Salgé, MEEDDAT
Additional remarks	 Territoire d'intervention de l'AGAPE close Of course, AGAPE is progressively turning digital the planning documents of the participating municipalities. A database modelling has been done as close as possible of the CNIG specification for PLU and SUP. Further more, due to the observation mission of the agency, urban sprawl and land use layers are produced and will be made available on the platform. Using Mapserver enabled to guarantee interoperability with WMS and WFS clients and servers. Few functionalities such as data updating or context safeguard are specific to the Cartoweb framework and do not conform to WFS-T or WMC. More or less, the initiative to access cadastral data has no trans-border nature. But AGAPE acting in the context of the European pole of development (www.agglo-ped.org) and the cross-border Esch-Belval area, the system will be use in the related projects

Best Practise # 43	
Project Name	X-border-GDI
Type of project	EU project
Dimension of project	international
Project start	2000
Project end	community funding has ended, project still ongoing
URL	http://www.x-border-gdi.org/
Leader, Project Partners	Innenministerium Nordrhein- Westfalen, Consulaat Generaal van het Koninkrijk der Nederlanden, Bezirksregierung Münster, Provincie Gelderland, Bezirksregierung Düsseldorf, Provincie Overijssel, Bezirksregierung Köln, Provincie Noord-Brabant, Provincie Limburg, Landesvermessungsamt Nordrhein-Westfalen
Content (keywords)	cross border, SDI, border region, INTERREG IIIa
Content (description)	X-border-GDI builds a cross-border SDI in the border regions of North Rhine-Westfalia, the Netherlands, Lower Saxony, and Belgium. Data stores are opened up and made available decentrally. The program aims at optimal data access for all users within thr border region. Existing obstacles are removed by harmonising activities in both short term and long term perspectives.
Used technology/software	Following the website information, geoportal and basic services are currently being realised.
Strengths or chances of this project	X-border-GDI is a huge collection of various single projects. The main advantage is that many different (but also similar!) disciplines dealing with geodata come together through this project (mainly planning, monitoring, administration).
Weaknesses or risks of this project	The project website is partly confusing, there is too much information at once. Some map click events lead to errors. Short basic project information is not available at all.
Accessibility, Information	The sub-projects of X-border-GDI are all well-described and linked through the project website.
User Interface, Software	Following the website information, geoportal and basic services are currently being realised.
Challenges	It is a permanent challenge to keep this big network running and still add new partners and projects. X-border GDI is the largest relevant network that also operates an own GDI overview and own web services.
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Programm Büro X-border-GDI p/a Provincie Gelderland postbus 9090 NL-6800 GX Arnhem Tel: +31 (0)26 359 8312 info@x-border-gdi.org
Collected by	Clemens Beyer, CEIT ALANOVA
Additional remarks	-

Best Practise # 44	
Project Name	XPlanung
Type of project	public project
Dimension of project	National
Project start	2003
Project end	open end
URL	http://www.xplanung.de / http://twitter.com/xplanung
Leader, Project Partners	XPlanung belongs to Germany's national eGovernment strategy pursued by the federal government, federal-state governments and municipal administrations "Deutschland-Online". XPlanung is part of the "Deutschland-Online Project Geographic Data". Lead management for this project has the federal state of North-Rhine Westphalia (GEObasis.nrw).
Content (keywords)	Harmonisation of spatial planning data
Content (description)	Corresponding to German planning law standardised data models and data-exchange format (XPlanGML) for: comprehensive regional planning at federal, federal state and county level (based on framework law "Federal Spatial Planning Act"), preparatory land-use plan, binding land-use plan, project and infrastructure plan (based on "Federal Building Code") landscape programmes, landscape master plans, landscape plans (based on framework law "Federal Nature Conservation Act").
Used technology/software	RationalRose (UML modelling) XPlanGML Toolbox (converting ESRI shape files to XPlanGML data format (freeware), http://www.iai.fzk.de/www-extern/index.php?id=1100)
Strengths or chances of this project	Harmonisation of spatial planning data (corresponding to German planning law) so that datasets become comparable and interoperable.
Weaknesses or risks of this project	Little financial resources. Responsibility for maintenance of the XPlanung data models and data-exchange format (XPlanGML) has not yet been established.
Accessibility, Information	All project data are freely accessible over the internet: see project website http://www.xplanung.de There is no restriction at all.
User Interface, Software	
Challenges	data harmonisation
This project deals with planning relevant datasets	yes
This project is compatible to the standards of the OGC	yes
This project is a cross-border initiative	yes
Contact	Dr. Joachim Benner (Institute for Applied Computer Science Karlsruhe) joachim.benner@iai.fzk.de Erwin Bimüller, (Elbe-Elster county: part of federal state Brandenburg) erwin.bimueller@lkee.de Andreas von Dömmimg (Federal Agency for Cartography and Geodesy) andreas.doemming@bkg.bund.de Dr. Kai-Uwe Krause (LGV Hamburg - Agency for Geo-Information and Surveying) kai-uwe.krause@gv.hamburg.de
Collected by	Kai-Uwe Krause, LGV Hamburg - Agency for Geo-Information and Surveying
Additional remarks	-

8.2 Overview of the European Initiatives, Projects and Best Practise Documentation

8.2.1 Analysis of European Initiatives, Projects and Best Practise Documentation

The analysis of the best practise projects has been done according to the following aspects: type, dimension, content and goals, used technology and software, accessibility, weaknesses and future challenges as well as strengths and key factors for success.

Overall 44 European Initiatives, Projects and best practise projects dealing with Spatial Data Infrastructure (SDI) were analysed, which provides a basis for further recommendations for the Plan4all project. The majority of the analysed best practise projects are European Union projects with an international dimension, 32 out of 44 projects being a cross-border initiative. Into more detail there are 1 Initiative, 25 EU projects, 14 public projects and four public-private projects but no private-only projects. Classified by the dimension 25 projects are on an international level, ten on a national level, seven on a regional level and two on a local level. Moreover, almost all of the projects deal with planning relevant data and are compatible to the standards of the OGC (40 of 44; one is unknown). According to the content and goals of the projects, the projects can be divided into the following six groups:

8.2.1.1Thematic Groups of projects

(1) Regional SDI building and regional data harmonisation (including cross-border mapping):

Regional territorial information systems are either implemented for regions within a country or for cross-border regions, both with the aim to harmonise regional spatial data, to create an infrastructure for geodata and to give access to the data via Web Map Services.

Related to European Union Policy there are a large number of ongoing cross-border spatial data harmonisation and SDI-building initiatives. Mainly during the previous and the current funding periods a lot of new projects were implemented: X-border-GDI, CentropeMAP, ISAMAP, TRANSLAND, etc. The aim is to combine datasets from border countries in one map client. The most common data is spatial planning and nature protection data, in addition in some cases also population data, economical data etc. is available.

More often public administrations (at local, county and national level) start to build up a regional SDI to share spatial planning data with other public institutions and sometimes partly also with the public. WebGIS services are implemented for public administrations which are included in a specific region. This gives access to a wide range of maps and plans, e. g. cadastral maps, land-use plans, developments plans, master plans. It improves the management of building permits and can include vacant space information systems, etc. Best practise projects dealing with regional SDI-building for public administrations are Web SiG Agape, XPlanung, Open Yambol, SITR, SDI-MRH, SIUN and.Geoportal di Lombardia

(2) National SDI building and national data harmonisation

A second group of best practise projects deals with SDI-building on a national level, trying to harmonise spatial data from key players within the country (national/regional/county/local level, etc.). A national SDI-building project in Austria is “Geoland” which can be described as a geodata network that offers a free and Austrian wide access to geodata and services of the federal states of Austria. The spatial data harmonisation is based on international standards (OGC, ISO, CEN, WMS, WFS, etc.) and national standards (ISO, EN, ON). Another example is MonPlanGML that aims to form the necessary precondition for a standardised visualisation and exchange of digital planning information in Montenegro, or the ÖROK-Atlas which is an online information and mapping tool for spatial planning related topics. The Dutch Spatial Planning Standards Regulation will take effect on January 1st 2010 and says that all spatial plans of the public administrations of the municipial and provincial level have to be made available in digital format. They will then have the same legal status as the analogue plans. This national SDI building process will make all plans comparable, exchangable and accessable for everybody.

(3) SDI building for sectoral themes

Thematic networks focus on a specific topic and are situated on different levels, i. e. regional, national, cross-border, European level. A great number of projects deal with environmental issues (data collection, analysing, sharing, monitoring) and providing web-based access to environmental data (hydrogeological measurement data, geological data, data regarding air, waste, soil and pollution, biodiversity, forestry, drought etc.) as well as maps (e. g. ground water maps, geological maps ...). To name some of those projects: eWater, OneGeologyEurope, SiRA, EnviroGRIDS, EuroGEOSS, NESIS, GEOMIND.

The GMES demonstrate European initiative focused on support for global monitoring (Earth Observation and In Situ). GMES is complementary to INSPIRE initative and it include a lot of Europan projects funded from Framework programs or trough ESA.

Besides, there are other thematic best practise projects, for example EuroGeoNames (giving access to the official European, multilingual geographic names via WebGis application) and C@R which is about sustainable development in rural areas.

(4) Best practise networks

A third group of projects is characterised by their approach of creating best practise networks. EURADIN is about promoting European address harmonisation by establishing a common definition, registration and access to European address data. Nature-SDIplus Network aims, through state-of-the-art methodologies and best practise examples, to improve harmonisation of national datasets on nature conversation and make them more accessible and exploitable.

(5) Metadata collection

The importance of metadata has already been described above (page 44), saying that “a dataset is only as good as its metadata collection” and also emphasising on existing and international standards. Once there is a comprehensive and complete metadataset, the access procedure to real geodata is almost done. Therefore some initiatives concentrate especially on metadata: GEOMIND, ISDE, Metaschool, HUMBOLDT.

(6) SDI harmonisation initiatives

The last group of best practise projects does not deal with SDI itself, but with harmonisation of existing SDI initiatives by coordinating actions between SDI projects and key players which are primarily independent from each other. The objective is to establish a platform for communication and exchange between different stakeholders involved in the creation and use of SDI's and also to increase awareness for the importance of an SDI. Projects are GIGAS and eSDI-NET+, which can be described as consensus processes that facilitate communication between different standardisation bodies and directives and initiatives, such as INSPIRE, GEOSS, GMES.

8.2.1.2Used technology/software

The used technologies and software are rather heterogeneous and therefore hard to compare. Roughly summarised many projects use open source software because of financial reasons. Also UMN Map Server and MySQL or PostgreSQL/PostGIS databases are common. The user interface is in most of the cases

- a web browser interface
- discovery based on ISO 19115 standards
- web viewer based on WMS (typically a Javascript map viewer)

In some cases own software and in-house developments are in use (e. g. ISAMAP, Humboldt, SITNA).

8.2.1.3Accessibility

Most projects have in common that the data can be accessed easily via a project website. In general these WebGIS services can be used without restrictions and for free (which applies sometimes only for parts of the data). In some little cases project information/data is accessible only upon request.

8.2.1.4Weaknesses and challenges

This is a summary of the collected weaknesses, threats and risks of the best practise projects which are also challenges for the future.

Insufficient financial resources

The risk of no further funding which negatively effects the project progress. Funding and financial guarantee is a key element for keeping a project running.

Insufficient human resources

Often specialised IT-knowledge is required which cannot always be provided. In some cases there is also a low level support for the members of public administrations.

Complexity

There is a high complexity of data usage, exchange and the integration of different technologies. The question rises, if the gap between the “INSPIRE dream” and the European reality could still be too large?

Distance

Although geographical distance gets more and more irrelevant in today’s globalised world, the factor of overcoming space was still mentioned as a barrier for creating useful maps between distant partner regions.

Insufficient data (quality, quantity, availability, interoperability)

Spatial data (at least in Europe) is expensive and not always available. For future developments bigger efforts are necessary in data collection (quantity and quality) as there are still big disparities between different European Union regions. Harmonisation gets of high importance to enable meaningful cross-border use. Also regional data should be integrated on a national level.

Insufficient sustainability

Most of the best practise projects are based on a fixed term of some months. As a result, the question rises what happens after the project ending? Usually it depends on the funding, if a project survives. The sustainability of a project depends on the one hand on the financial resources and on the other hand on the project itself and if it is able to achieve a significant impact.

Insufficient technology

In some cases a poor map server performance and other weak points in the used software were mentioned. However, the long list of potential software in the GIS sector shows that there is a wide range of options and different solutions.

A future challenge might be to upgrade some map servers to fully functional Web GIS servers, to make use of web mapping standards (gml, WCS), to develop new services and to optimize for example the data visualisation, automation, updating, etc to provide better support for geospatial Web services as well as to make the services and the data public (promotion).

Insufficient cooperation

On the one hand the lack of collaboration and cooperation is a further potential thread for the failure of a SDI building and data harmonisation project. Cooperation can be done according to the Living-Labs-Methodology, which involves not only the developers but also the users in the application development. On the other hand the question is, if there are already too many separate SDI initiatives and if it is too late to bring them all in line?

Insufficient standards and metadata collection

There are still some initiatives of harmonisation that do not consider issues concerning semantic matching, OGC standards etc. In addition metadata is still not always collected at all, or at least not collected to official standards. A challenge for the further development is to work more towards the implementation of the INSPIRE principles.

Strengths & factors for success

This summary of collected strengths of the best practise projects can be seen as key elements for successful spatial planning data harmonisation and SDI building.

Open Source Products

Open Source software and OGC conform Web Services (WMS, WFS) are in common use as they enable the work with GIS data without huge investments.

Standards

ISO and OGC standards and most common formats (html., csv., xml.) make data sharing and data exchange easier.

Metadata

Accurate metadata collection clears the way for data networking and SDI building in a European context. Unfortunately, lots of metadata information is still incomplete and not collected according to certain standards (see survey results, section 4, metadata collection).

Efficiency

Data harmonisation and interoperability of different data catalogues improve the efficiency in spatial planning. Aims are the integration of datasets from different sources into one (online) map, to create common data models for administrative units and homogenous reference data.

Cooperation

Interregional, cross-border and transnational cooperation (horizontally) as well as cooperation between the state and regional or local governments (vertically) are a key factor for successful data harmonisation. In addition cross-border initiatives support the development of cohesion aims between different regions/countries. Also a strong consortium with partners from public and private sectors is necessary to support the INSPIRE implementation in all sectors dealing with spatial information.

Cooperation is also about knowledge transfer and exchange, meaning that the experience should be shared with less experiences or less developed countries within the European Union, but also with players outside of the EU.

Coordination

In addition to cooperation with different partners, coordination of primarily existing and independent projects is of high importance.

Modernisation

The implementation of Web Services and SDI building is a big step towards the modernization of e. g. public administrations.

Monitoring

Especially concerning environmental issues, linked nature databases allow international long-term monitoring.

Living Lab Methodology

Living Lab is a new research paradigm that integrates a user-centric multidisciplinary research approach and user community driven innovation based on real life experiments. Users can participate in the development process by coming up with innovative ideas. The approach intends to increase the understanding of occurring phenomena, to explore and evaluate new ideas and concepts to enable re-usable experiments (i. e. dataset, research protocols and methods,...), to result in more accurate and reliable products and services, to speed-up concepts and to bring science and innovation closer to the citizen.

Accessibility

Data needs to be accessible, most common on the project website via WebGIS Services. Especially in a European context, the importance of multilingualism rises, so that the language is not a barrier for spatial planning data access. For a high use the services need to be promoted and the necessary GIS skills transferred.

8.2.2 Comparison of Best Practise projects with Plan4all

This chapter deals with similarities, differences and links between the presented best practise projects and Plan4all. The first paragraph gives a short description of Plan4all, it’s type, dimension, goals, strengths and weakness.

Plan4all is an EU project with international dimension, starting in 2009 with project duration of three years. The project involves 24 partners within the European Union countries and Norway from public and private institutions. The initial situation is a fragmented legal structure and disjointed planning laws in the different countries, which make it difficult to compare planning regulations across Europe, e. g. for investors and decision makers. Therefore the project will focus on the harmonisation of spatial planning data and metadata as well as on building a networking infrastructure for sharing spatial planning data. It is based on existing best practise projects in the EU and will be done according to the INSPIRE directive. The strengths and

chances of the project are to make planning information more transparent and understandable. Plan4all deals with best practise networks, metadata collection, SDI harmonisation initiatives and European SDI-building for spatial planning data (see page 103). Because spatial planning is interdisciplinary and integrates themes from various sectors, Plan4all concentrates only on a limited number of themes, focusing on land use and land regulation.

Compared to the presented best practise projects above, Plan4all fits in the large group of European Union projects with an international dimension. With 24 partners in different European countries the transnational project is rather wide spread and probably much more linked than most of the other projects (large number of cross-border projects). Plan4all is still at the beginning of a three years period, whereas most of the other projects have already started some years ago or have even been finished by now. Here is a chance for Plan4all as it can learn from previous projects and can make use of their experience with spatial data harmonisation and SDI-building. Some of the key persons of the best practise projects are present in the Plan4all Team and can give experience, knowledge and support concerning the management, used technologies, the handling of accessibility of the data etc. However, potential risks are that not all Plan4all goals can be achieved and that this new approach or attempt of planning data harmonisation and SDI building will be just another project out of many. So, what is it that makes the Plan4all project special and unique compared to other SDI-building projects?

Plan4all is not another standalone subject-specific SDI but has one of its main tasks in harmonising existing SDIs and making them interoperable. It is so far, one of the biggest networks of partners dealing with spatial data harmonisation (according to the number of partners and the number of participating countries). It also emphasizes more than any other project on the INSPIRE directive.

Based on the mentioned strengths and weaknesses of the best practise projects, **factors for success and future challenges** for Plan4all are:

(1) Sustainability

For the success of Plan4all it is essential to have a great sustainable impact which means to keep the process of data harmonisation and SDI building alive, also after the project ending as this is the point on which many previous projects failed. Sustainability depends on different factors, mentioned below.

(2) Funding

Financial resources are a key element for a project and decide its future existence and sustainability. As some previous projects show, as soon as the funding is gone, the project stops.

(3) Communication, cooperation

Plan4all integrates partners from different European countries, who do not have the same experience and level of knowledge in spatial data, spatial data harmonisation, GIS technologies etc. There is a need for knowledge transfer according to GIS technologies/relevant software/services and applied geographical information systems.

Moreover the partners are characterised by different languages, mentalities and cultural background. Even regional cross-border projects of a smaller dimension are often slowed down or even hindered by “borders”, so a challenge for Plan4all will be to overcome those possible barriers.

(4) Strengthening of awareness, promotion

Moreover it is of high importance to strengthen the awareness that SDI and data harmonisation is necessary and to point out the advantages of the Plan4all initiative to keep the network stable and to gain new partners for the future. Besides promoting the idea of Plan4all within the circle of experts and SDI builders, a challenge will be to promote the new services also to the users.

(5) Monitoring

Further monitoring – not only during but also after the project ending – can be a support to ensure sustainability.

8.3 Summary

There are a lot of best practise projects dealing with spatial data infrastructures, each of them combing knowledge from a variety of experts from public authorities, research institutions, service suppliers and technology providers. All of these projects follow the aims of the INSPIRE directive to establish an infrastructure for spatial information throughout the Europe. The collected examples can be divided into the following groups:

(1) Regional SDI building and regional data harmonisation (including cross-border mapping)
(2) National SDI building and national data harmonisation
(3) SDI building for sectoral themes
(4) Best practise networks
(5) Metadata collection
(6) SDI harmonisation initiatives

The key ideas behind these projects are:

(1) To show that cross-border applications are feasible.

Today’s web technologies developed rapidly in the past few years concerning facilities and speed. For example, only little less than half of Germany's internet users had a broadband connection in 2006, whereas the percentage rose to even 65.4 % of all internet users during the year 2008, which is 42.6 % of Germany's whole population. (source: http://www.initiative21.de/presseinformationen/nonliner-atlas-2008-breitbandnutzung-ist-standard). Both the technical standards and the necessary software are available, and most applications are accessible through web browser interfaces so that the end user does not need to install anything.

(2) To foster knowledge regarding cross-border data exchange within the EU

The more spatial data exchange projects are running – regardless if a project is situated only within a country or across borders –, the more knowledge around the

necessary tools and applications will exist; and the bigger the knowledge base, the easier the access. The goal of such SDI projects should not only be data exchange or INSPIRE implementation (see point 4 below) itself, but also building a knowledge database for cross-border data interchange.

(3) To underline the importance of metadata collection

Each data exchange project emphasises the importance of proper metadata. Unfortunately, metadata do not exist in every today's data collection; but the knowledge of the importance of metadata is still growing. Perhaps the lack of metadata has historical reasons in some cases when data networking was no common task and data managers treated their stock like a treasure which has to be hidden and blocked against any access from outside. Thinking in European dimensions has made such attitudes obsolete; and SDI projects will do their best to eliminate these historical leftovers.

(4) To prepare things for the implementation of the INSPIRE directive.

Metadata are part of all SDI projects; and metadata are a mandatory precondition for INSPIRE compliance; so every SDI project and every initiative that fosters the collection of metadata is clearing the way towards INSPIRE. Metadata stocks built during the running period of the collected best practise projects are likely to remain after the end of the projects because otherwise all the efforts spent on metadata collection would be lost. The more metadata exists, the less must be done towards the completion of a European metadata collection.

(5) To be a pioneer and an advisor for Plan4all

Based on the analysis of the best practise projects and their strengths, weaknesses and challenges there are some requirements and challenges for Plan4all. Plan4all integrates multicultural and multilingual partners from different European countries, with diverse backgrounds on knowledge and experience in GIS technologies and spatial data harmonisation. Therefore efficient communication, knowledge transfer and cooperation are additional challenges. Moreover it is of high importance to strengthen the awareness that SDI and data harmonisation is necessary, to point out the advantages of the Plan4all initiative and to promote the services to the users. The aim is to have a great sustainable impact which means to keep the process of data harmonisation and SDI building alive, also after the project ending – can be a support to ensure sustainability, which should be the most important goal and probably is also the biggest challenge for Plan4all.

9 Conclusion – Innovative Challenges

This deliverable is an analysis of the current state of the art in spatial planning. The focus is on GIS technologies and services in use as well as on the latest developments in data harmonisation and SDI building in Europe according to the evaluation of best practise projects. The main objective of this state of the art description and analysis is to define “innovative challenges” for SDI in spatial planning in Europe, i. e. to identify new challenges that may occur for Plan4all. This conclusion presents features that have to be solved for clearing the way for a successful spatial data harmonisation and SDI building:

1 Complexity of the planning process
2 Different legal context
3 Cross-border accuracy
4 Differences in the use of terms
5 Differences between cultures
6 Lack of topology
7 Geodata and time
8 Technology
9 Sustainability
10 Organisational challenges

9.1 Complexity of planning process

Figure 3 tries to describe the planning process which is extremely complex due to

1. the high number of involved stakeholders with different interest and intentions and
2. the need for continuous adaption and updates.

The different players have diverse backgrounds, interest and intentions but are all linked to each other and therefore forced to come to mutual agreement in the planning process without undermining the interests of some weaker players (planning result). Involved are the planners themselves (often situated in public institutions) whose intention is the administrative performance and also to advance their own position and career. In general planners are strongly influenced by politics on different levels (national, regional and local level) that has the power of shaping and structuring space. Also relevant are the interest groups, who in fact are not directly involved in the planning process itself, but get active when representing a group’s opinion on certain plans or projects, i. e. supporting or criticising them. The interest groups work together intensively with the concerned citizens/citizen initiatives and other participants, e. g. land holders (private land holders, farmers, companies, incorporated enterprises etc. whose interests are life quality and of course the value of the estate. In addition, the media plays an important role in representing and conducting spatial planning processes without being interested in the planning process itself but in their own success and number of editions. The planning process is – as shown in figure 3 – ongoing, meaning that it gets continuous input (socio-demographic data, economic data, changes in infrastructure, agriculture and aquaculture, natural risks

etc.) which constantly influences the stakeholders and in a further step influences the planning result (plans, explanatory reports etc).

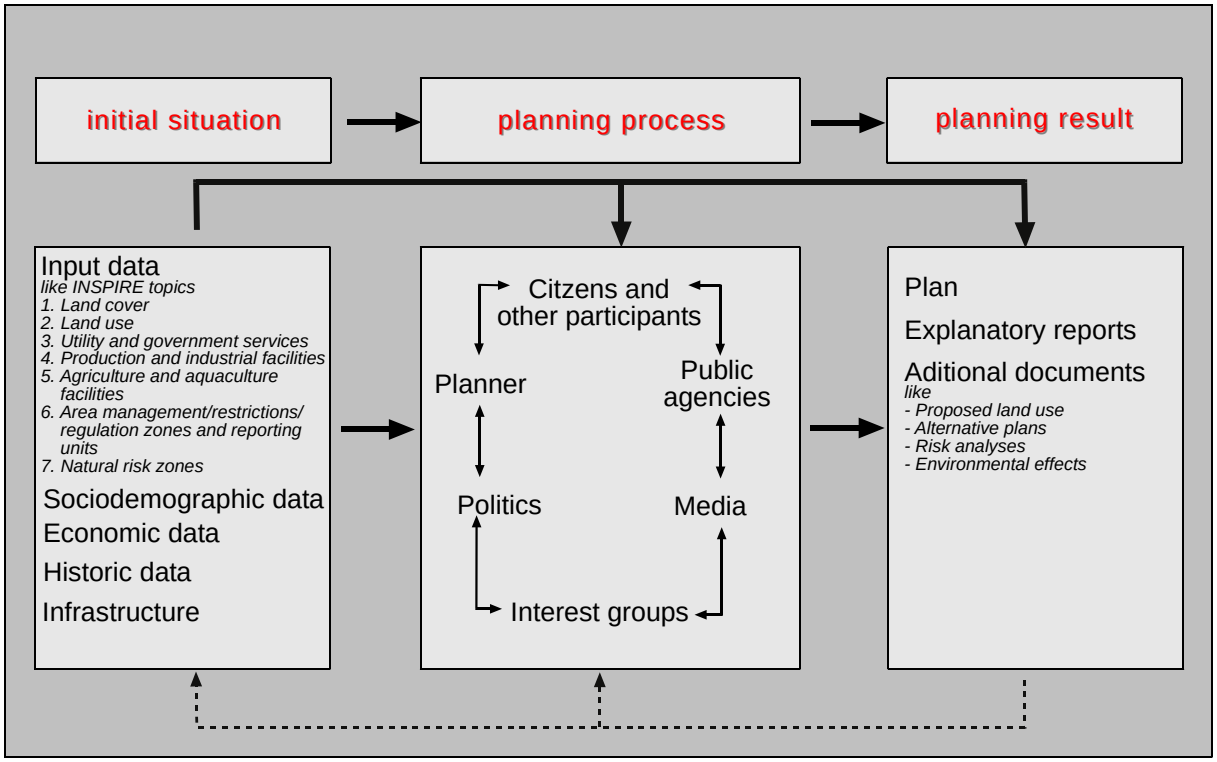


Fig. 3: Complexity of planning process

9.2 Different legal context

In addition to the general challenge that the spatial planning process is of high complexity, it is characterising for Plan4all that the project has to deal with challenges related to cross-border activities. As Plan4all integrates 24 partners in various European countries it also deals with many different legal frameworks. The legal situation on spatial planning is very diverse and complex. For example do planning laws exist on different levels, so do the responsible planners which then do not interact on the same eye level. In addition a plan in one country is not the same as a plan in another one, meaning that there are a variety of development plans available with different content, obligation etc. In some cases they are legally binding for the administration and for the public, in some cases only for the administration and in some cases they are not legally binding at all. As a result there is no common basis for cross-border planning, but the development of one cross-border region is regulated by multiple laws and regulations (see fig. 4).

9.3 Cross-border accuracy

A further challenge is to provide correct data. Cross-border accuracy is an important issue when datasets from different national geodatabases are brought together. Border lines between countries are usually not surveyed once per border line, but

twice: one time for the country on the one side of the border and another time for the neighbouring country. So there are two different datasets representing the same real life object, but as these datasets were surveyed by different institutions and stored in different cartographic projections, there may be (and often are) differences.

9.4 Differences in the use of terms

Further constraints are linguistic differences in the use of terms. Technical terms are difficult to translate into other languages and even within a country they are not always standardised. Take Austria as an example where spatial planning laws and their technical terms are embodied on the level of the nine Austrian federal states. This leads to an inhomogeneous terminology. A standardised terminology is important for spatial planning data harmonisation but also hard to achieve, as this would imply legal amendments.

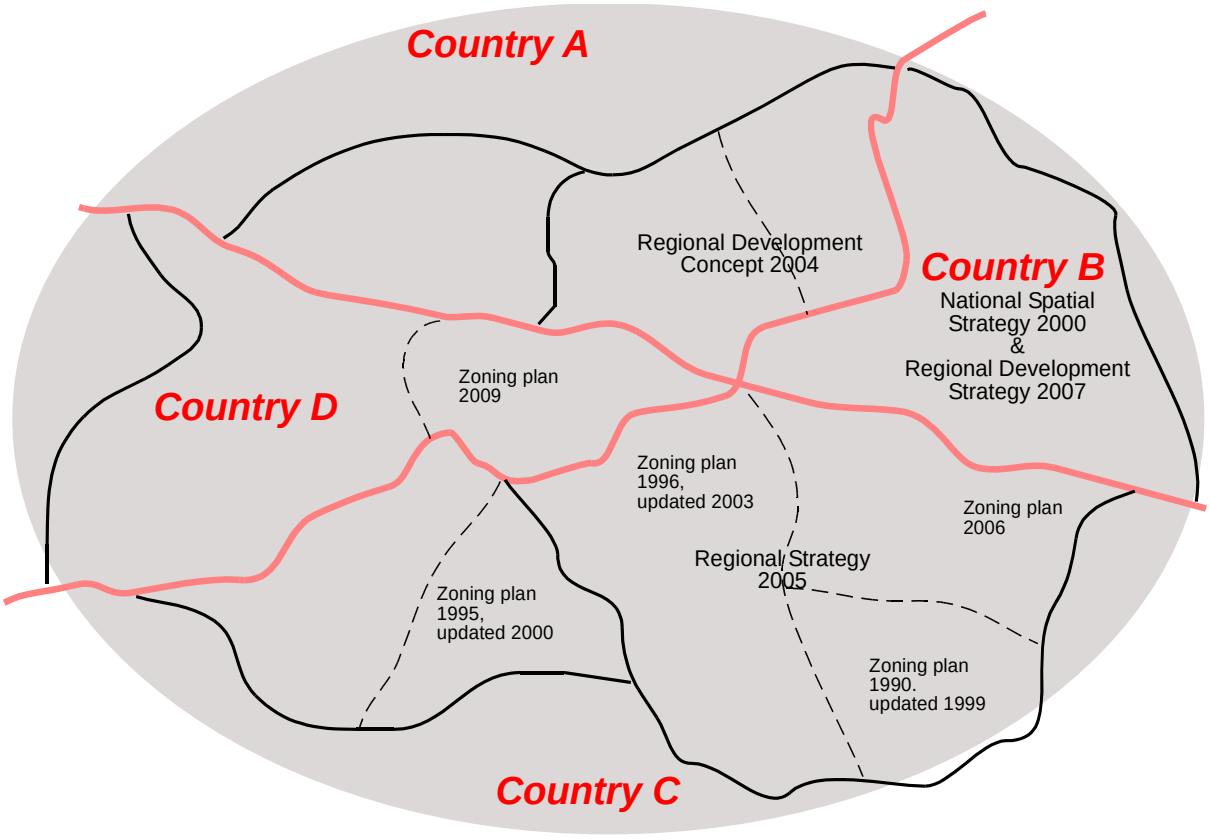
9.5 Differences between cultures

The challenge to overcome differences between cultures, mentalities and languages is also closely connected to cross-border activities. A challenge for Plan4all is to overcome those possible barriers as Plan4all has such a big dimension and integrates many different countries, many different languages and an uncountable number of different mentalities.

9.6 Lack of topology

The topology, i. e. the relation of objects to each other, nowadays is usually not included in spatial data, which has negative effects on the data accuracy. Because of the lack of topology mistakes in data accuracy, e. g. incongruent border lines (see above) can happen.

9.7 Geodata and time



	National level	State/ Region	Local/Municipal level
Country A	Planning law 1960 updated 1993 (NUTS 0)	Regional Development concept 2004 (NUTS 1/ NUTS 2)	No planning at state level
Country B	National Spatial Strategy 2000	Regional Development Strategy 2007	No planning at state level
Country C	Planning law 1966, updated 2005	Regional Strategy 2005	Different zoning plans at local level
Country D	Plannning law 1973 updated 1996	Strong role of national level (NUTS 1/ NUTS 2)	No planning at state level

Fig. 4: Complexity of planning and time

Geodata and time refers on the one hand to the validity of spatial data which is constricted to a certain number of years. This means that zoning regulations may

change after some years and as a consequence to spatial planning activities. For cross-border regions it is impossible to do holistic and integrated spatial planning if spatial planning data, plans and activities are not connected and harmonised.

On the other hand in some countries spatial planning data is outdated as it refers back to the 1990s and does not correlate with the actual spatial planning situation anymore. Therefore, a lot of spatial planning data gets updated at the moment (and urgently needs to get updated as soon as possible) (a large number of bigger municipalities are currently working on new zoning plans).

9.8 Technology

9.8.1 General

The big challenge is not the technology itself but to bring it to a wide group of users in the simplest way. A big number of different high quality GIS software, technologies and possible services already exist, so concerning the technology, data harmonisation and SDI building is possible. Of course there is always the need and mainly the wish to develop new services and to optimise for example the data visualisation, automation and updating. But the bigger challenge in technology is to bring it to the user. Plan4all integrates partners from different European countries who do not have the same experience and level of knowledge in spatial data, spatial data harmonisation, GIS technologies etc. Therefore, there is a need for knowledge transfer according to GIS technologies, relevant software and services as well as applied geographical information systems.

A challenge for the further development is also to work more towards the implementtation of the INSPIRE principles. There are still some initiatives that do not use certain standards like ISO, OGC or INSPIRE. Also of high importance is the comparability of data formats.

For future developments bigger efforts are necessary in data collection (quantity and quality) as there are still big disparities between different European Union regions. Harmonisation gets of high importance to enable meaningful cross-border use. Also regional data should be integrated on a national level.

9.8.2 Alternative Methods

9.8.2.1Collaborative Mapping

Collaborative mapping is defined as aggregation of web maps and user-generated content from a group of individuals or entities. Collaborative Mapping applications work in two different ways:

(1) Shared Surface: The map itself is created collaboratively by sharing a common surface, for example WikiMapia or OpenStreetMap. User-generated content place names and descriptions to locations. Collaborative mapping faces problems like revision control, concurrent access issues and versioning.

(2) Overlays: the same as shared surface, but with the use of third-party base maps below the collaboratively edited layers.

9.8.2.2Crowdsourcing

The term “crowdsourcing” has been deducted from the outsourcing model (i. e. subcontracting a service to a third-party company). Tasks are taken to a crowd (group of people, community) through an open call, so the group of solvers is intentionally unknown. The crowd then submits solutions, also sorts them and finds the best ones. These best solutions are then owned by the starter of the open call (the “crowdsourcer”). The people or the group responsible for the best solution is sometimes rewarded.

9.9 Sustainability

For the success of Plan4all it is essential to have a great sustainable impact which means to keep the process of data harmonisation and SDI building alive also after the project ending as this is the point on which many previous projects were not sustainable. Sustainability depends on different factors. One of them is funding: financial resources are a key element for a project and decide its future existence of failure. As some previous projects show, as soon as the funding is gone the project stops.

Moreover it is important to strengthen the awareness that SDI and data harmonisation is necessary, to point out the advantages of the Plan4all initiative, to promote it, to keep the network stable and to gain new partners for the future. Planners and others who work with spatial planning data need to be aware of the advantages that they can have out of the project. Otherwise they will stick to their old habits and daily routine, handling spatial data as they always did.

Further monitoring – not only during but also after the project ending – can be a support to ensure sustainability.

Another chance to gain sustainability is to bring in the results in normative processes or laws.

9.10 Organisational Challenges

Even if all technological challenges will be solved, still some organisational challenges will reside. As a last conclusion this may be one of the hardest solveable, on the other hand organisational changes often give the chance to solve technical problems on the way.

Plan4all will try to give them a chance.

10 Sources and short Glossary

10.1 Sources

http://en.wikipedia.org/wiki/Cartographic_generalization

http://en.wikipedia.org/wiki/Cartography

http://en.wikipedia.org/wiki/Service-oriented_architecture

Batini, Carlo: Data Quality. Concepts, Methodologies and Techniques (Data-Centric Systems and Applications). Berlin, 2006.

Kollarits, S., et al.: Das Strategische InformationsSystem Niederösterreich: Ziele und Methoden. In: Schrenk, M. (Hrsg.): Computer Aided Spatial Planning. Proceedings of 8th symposion on Information Technology in Urban and Spatial Planning. Vienna, 2003, pp. 53-60.

Schut, Peter: Open Gis Web Processing Service. 87 p. 2007.

10.2 Glossary

DOM – Document Object Model

FTP – File Transfer Protocol

HTTP – Hypertext Transfer Protocol

ODBC – Open Database Connectivity

OGC – Open Geospatial Consortium

SDI – Spatial Data Infrastructure, sometimes also GDI (geodata infrastructure)

WAP (W@P) – Wireless Application Protocol

11 Annex A: Known Software

11.1 Graphic Standards

SVG

Plan4all Product/Service description # 1		
Productname/Version		Scalable Vector Graphics (SVG) 1.2.T (2006)
Manufacturer		World Wide Consortium (W3C)
Developed from/to		1999, ongoing
Contact		Dean Jackson <dean@w3.org (staff contact); Chris Lilley <chris@w3.org> (chair of the working group)
Short Description		A free and normed file format for describing two-dimensional vector graphics, both static and dynamic (i. e. interactive or animated); SVG images and their behaviours are defined in XML text files. This means that they can be searched, indexed, scripted and, if required, compressed. Since they are XML files, SVG images can be created and edited with any text editor, but specialized SVG-based drawing programs are also available. Besides that, there are several GIS-Programs outputting SVG, incl. PostGIS; OpenLayers also supports SVG directly.
Type		Standard (W3C)
Approach		Vector image format
Interactivity		Fully interactive
Technology	Server side	
	Client side	PlugIn/AddOn support or Browser built in
	Used Services/ Protocols	• SVG • JavaScript • DOM-Model
Operating System	Server side	
	Client side	All
Webtechnology	Webserver	
	Browsers	All major modern web browsers except Microsoft Internet Explorer support and render SVG markup directly, but provide only basic functions. To view SVG files in Internet Explorer, either users have to download and install a browser plugin, or the webmaster can include SVG Web, a JavaScript library currently under development at Google Code. Besides that the OpenLayers JavaScript Library also supports SVG directly. For Internet Explorer Adobe ActiveX maybe used which provides extended functions, but is no more supported by Adobe. Microsoft offers its own proprietary format OVL.
Projections	Which	
	Where	
Metadata management		
Known usage in planning		See http://www.carto.net/
Challenges		Limited use of svg on the web, by the lack of browser support (esp. Microsoft Internet Explorer and extended functions on Mozilla Family)
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		Wolfgang W. Wasserburger (CEIT Alanova)
Remarks		Source (Oct. 2009): http://de.wikipedia.org/wiki/Scalable_Vector_Graphics; http://www.carto.net/

	http://www.w3.org/Graphics/SVG/

11.2 Commercial Software

Abaco s.r.l.

Plan4all Product/Service description # 2	
Productname/Version	DbMAP ASJ
Manufacturer	ABACO S.r.L.
Developed from/to	ABACO S.r.L.
Contact	r.orsi@abacogroup.eu
Short Description	Easily publish GIS data from existing spatial databases and distributed GIS data sources. Efficient, complete, cost-effective and user-friendly platform to build and release WebGIS applications. DbMAP ASJ has a simple, performing and scalable architecture providing the best interoperability among applications and the Spatial Data Infrastructure. DbMAP ASJ either takes advantage of all the features, reliability and scalability of Oracle Locator and Spatial, or the flexibility of PostGIS, or any relational database via JDBC/ODBC (Access, SQL Server, SyBase, MySQL, etc.). DbMAP ASJ works within any J2EE Containers (ORACLE, TOMCAT, IBM WEBSPHERE, etc.) running on Windows, Linux and MAC OS; it offers Web Map Services supported by any WMS clients and offers several other services, through Servlets, like the usage of Google Earth as a data source. It is supplied with royalty free advanced java applets, OCX and Java components. These components can be used freely in WebGIS applications developed with usual programming tools to build best-of-breed thin-client web applications, classic client/server desktop applications and handheld devices applications. DbMAP ASJ Runtime Server is either licensed per number of users, or per number of web server. In both cases DbMAP ASJ Runtime Server is independent from the number of sessions on the web server and it is equipped with the image services and spatial server components for both DbMAP and WMS clients. DbMAP Viewer & Author is required on any clients connected to the server component that needs to manipulate deeply the spatial data. It works via http and it is licensed per workstation in every environment where a Runtime Server exists. WebGIS Author application projects are dependant from the DbMap ASJ license owned. DbMAP Viewer & Author includes the Data Manager, which can be directly connected to the data server via Tcp/Ip. DbMAP Developer Kit is licensed per developer workstation and based on the runtime server license for the development, test and demonstration in the built applications. DbMAP Developer Kit is provided with a DbMAP Viewer & Author license (DataManager included) for development, test and demonstration. Java applets, OCX/activex and Java components (for pocket PC either) are used to build and deploy, royalty-free, all the WebGIS applications. DbMAP Developer Kit is supplied with source code for the satellite applets components, which can be modified for a complete customisation of the user interface. It comes with a full set of

	templates for the rapid development of advanced GIS application. End users of WebGIS client/server or handheld-based applications built with the Developer Kit must own a DbMAP ASJ Runtime Server user license, which can be provided by authorized developers. DbMAP ASJ has a simple, performing and scalable architecture providing the best interoperability among applications and the Spatial Data Infrastructure. DbMAP ASJ either takes advantage of all the features, reliability and scalability of Oracle Locator and Spatial, or the flexibility of PostGIS, or any relational database via JDBC/ODBC (Access, SQL Server, SyBase, MySQL, etc.). DbMAP ASJ works within any J2EE Containers (ORACLE, TOMCAT, IBM WEBSPHERE, etc.) running on Windows, Linux and MAC OS; it offers Web Map Services supported by any WMS clients and offers several other services, through Servlets, like the usage of Google Earth as a data source. It is supplied with royalty free advanced java applets, OCX and Java components. These components can be used freely in WebGIS applications developed with usual programming tools to build best-of-breed thin-client web applications, classic client/server desktop applications and handheld devices applications. DbMAP ASJ Runtime Server is either licensed per number of users, or per number of web server. In both cases DbMAP ASJ Runtime Server is independent from the number of sessions on the web server and it is equipped with the image services and spatial server components for both DbMAP and WMS clients. DbMAP Viewer & Author is required on any clients connected to the server component that needs to manipulate deeply the spatial data. It works via http and it is licensed per workstation in every environment where a Runtime Server exists. WebGIS Author application projects are dependant from the DbMap ASJ license owned. DbMAP Viewer & Author includes the Data Manager, which can be directly connected to the data server via Tcp/Ip. DbMAP Developer Kit is licensed per developer workstation and based on the runtime server license for the development, test and demonstration in the built applications. DbMAP Developer Kit is provided with a DbMAP Viewer & Author license (DataManager included) for development, test and demonstration. Java applets, OCX/activex and Java components (for pocket PC either) are used to build and deploy, royalty-free, all the WebGIS applications. DbMAP Developer Kit is supplied with source code for the satellite applets components, which can be modified for a complete customisation of the user interface. It comes with a full set of templates for the rapid development of advanced GIS application. End users of WebGIS client/server or handheld-based applications built with the Developer Kit must own a DbMAP ASJ Runtime Server user license, which can be provided by authorized developers. The efficient server component offers advanced GIS services via Web, taking advantage of any features offered by the existing spatial database engine, and accessing the whole Spatial Data Infrastructure. DbMAP ASJ Runtime Server offers Map and Image Server services (with multi-source data support) that can be used for remote visualization and editing, even directly on any centralised spatial databases. DbMAP

	ASJ Runtime Server allows to control the services and GIS data to be published, through a web interface, in order to completely integrate with the existing security system. DbMAP ASJ Runtime Server is easy to install and to configure; it directly accesses the GIS data sources to publish, whichever DB they are in and whatever the format of raster and vectorial files managed. Author & Data Manager make GIS portal development very easy. With the included **Data Manager, DbMAP Viewer & Author** ensures to database Administrators and to WebGIS applications developers a fast productivity, keeping complete control on the system and the spatial data. Data Manager, directly connected with the database, makes the population of geospatial tables easy and fast; it also guarantees the best flexibility and control of data migration activities. DbMap ASJ Viewer & Author connects to the DbMAP server component via http (internet or intranet) and it allows, among others: the best control on the data; the selection of the layers (even from different data sources, driver engines and web servers); the visibility of the services and the desired layout for any single application; the direct editing of geometries, depending on the available data management engine installed. The Developer Kit is complete for all standard development platforms. DbMAP Developer Kit is the most complete and powerful solution to develop WebGIS applications that are interacting with a central Spatial DB reachable via Web. DbMAP Developer Kit includes advanced components to build applications on every platform, using the same development tools already used for the management applications. These components are not simple modules to display and surf the GIS data, but complete “objects” (Applets, OCX/ActiveX and Java classes) offering advanced “methods” to build reliable and fully controlled applications requiring the best interaction and integration among the alphanumeric data and their graphic and geometric representation, georefered in the space. The Developer Kit is the complete solution for all the standard development platforms. DbMAP Developer Kit is a powerful solution to develop WebGIS applications that need to interact with a centralised spatial database, relaying even on a distributed Spatial Data Infrastructure, and reachable through the Web. DbMAP Developer Kit includes advanced components to build applications on any platforms, using the common development tools. These components are not only simple modules to display and navigate thrhough GIS data, but they are full extendeable “objects” (Applets, OCX/ActiveX and Java classes) offering advanced “methods” to develop reliable and fully controlled applications requiring the best interaction and integration among the alphanumeric data and their graphic and geometric representation, including the control on their georeference in the space. The main technical features of the system are: • Compliance with OGC® (Open Geospatial Consortium) requisites; • OGC® Web Map Service Implementation Specification, Version 1.1.1; • Compatibility with all the most common operative systems (Windows, MacOS, Linux); • DbMAP ASJ web components can be used with any

		internet browsers; no installation or additional plug-in required; Java 1.1 (or later) virtual machine is required; • Server components require Java 1.4 o later and are compatible with the most common web servers and Java/J2EE containers, like Oracle AS, Apache Tomcat, IBM Websphere, etc.
Type		Commercial
Approach		• Web Mapping • Web Mapping (Globe) • Web Cartography • Web GIS • Geodatabase • Location-based services • Routing
Interactivity		• Fully interactive
Technology	Server side	• Application Server • Tile Server • Database Access • WebGIS functions
	Client side	• standalone • ActiveX • PlugIn/AddOn • Applet • Scripts • HTML only
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • Simple Feature Specification for SQL (OGC) • GeoRSS • KML
Operating System	Server side	• Windows • Linux • MAC OS
	Client side	• Windows • Linux • MAC OS
Webtechnology	Webserver	• Web Server and J2EE Container (Oracle AS; Tomcat; IBM Websphere; etc.);
	Browsers	• Standard browser internet (MS Internet Explorer 7, 8, FireFox 3, Opera 9, Safari 3 ecc.)
Projections	Which	• Full support
	Where	• Server side • Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Provincia di Roma
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 3	
Productname/Version	DbMAP Web 3D
Manufacturer	ABACO S.r.L.
Developed from/to	ABACO S.r.L.
Contact	r.orsi@abacogroup.eu
Short Description	3D web visualization of bidimensional GIS data stored in a centralised standard geodatabase. It is an extension of DbMAP ASJ and easily allows to create 2D and 3D integrated Geographic Information Systems. The innovative DbMAP Web 3D introduces an additional point of view in the use of bidimensional GIS data stored in centralised geodatabases and relying on distributed Spatial Data Infrastructures. It takes advantage of all DbMAP ASJ's features, and consequently of an existing Web-GIS application, in order to establish a connection with any geodatabases. DbMAP Web 3D allows users to manage, publish and consult, on the internet and in 3D, the total amount of territorial data that the database may offer. Users basically “fly” over a tridimensional model of land published on the web and they can query on it interactively or select layers for real-time rendering of information. The model can also be enriched with tridimensional buildings created from the bidimensional plan (3D extruded objects), or with pre-built 3D models. To understand how DbMAP Web 3D works and how its features easily integrate in a Web-GIS application architecture to foster the Spatial Data Infrastructure contained information, a detailed description follows. DbMAP Web 3D Builder, is the tool needed to generate a 3D dataset, starting from DTM (Digital Terrain Model) files of several formats. In this phase the users can achieve a noticeable realistic representation of tridimensional objects and buildings, starting from the bidimensional plan provided as a georeferred Shapefile including the height value (creation of 3D extruded objects). The new City Vision tool tightly integrates with the DbMAP 3D Builder to use images and orthophotos to texturise the sides of the extruded object. Also pre-existent 3D models created with advanced graphic editing softwares (3D Studio MAX, AutoCAD, etc.) can be used, having perfect reproductions of real buildings, like monuments. The Builder can incorporate the models in the dataset through the Poser tool. DbMAP Web 3D Runtime Server, server component that interface with DbMAP ASJ Runtime Server, so with every geodatabase, and with 3D dataset created with Builder of DbMAP 3D, to provide functionality and data displayed in three dimensions using DbMAP Web 3D Flyer; DbMAP Web 3D Flyer, the thin-client component to be added to a web page, works out in real time data from DbMAP Web 3D RuntimeServer, that in turn interface with DbMAP ASJ and dataset (terrain model, extruded objects, monuments and facade image); DbMAP Developer Kit, SDK providing a multi-platform solution for the development of GIS applications interacting with a centralised geographic database accessible via web and taking advantage of the usual development environments already used for building applications. OCX, ActiveX and Java components and Java applets are available. DbMAP ASJ Runtime Server, an extremely powerful server

	component offering Map and Image Server services (multi-source data), which allows the direct access to the GIS data sources to publish, whichever database they are contained in and whatever format the raster and vectorial files (ECW, TIFF and DWG) are. DbMAP Viewer & Author, connect to the DbMAP server component via http (internet or intranet), allowing the maximum control on data, on the selection of the informative layers, on the services, on the web pages layout and on the editing of the geometries. It takes advantage of the existing spatial engine and ensures the interaction with the functionalities offered by the relational database used. DbMAP Data Manager, connects with the existing centralised database to import and export Shape files, and to create and import background images in shape format. The main technical features of the system are: • Conformity with OGC® (Open Geospatial Consortium) requisites • OGC® Web Map Service Implementation Specification, Version 1.1.1 • Support the NATIVE Oracle Spatial 11g 3D Data Types • Compatibility with the most common operative systems (Windows, MacOS, Linux) • DbMAP ASJ web components can be used with any internet browsers; no installation or additional plug-in required; Java 1.1 virtual machine (or later) is required • DbMAP Web 3D client component requires Macromedia Shockwave Player • Server components require Java 1.4 (or later) and are compatible with the most common web servers and Java/J2EE containers like Oracle AS, Apache Tomcat, IBM Websphere, BEA Weblogic, etc It is compatible with the following Input DTM: • Arc/Info ASCII Grid (.grd, .asc) • Arc/Info Binary Grid (.adf) • GeoTiff (.tif) • USGS ASCII DEM (.dem) • Surfer Grid (.grd) The user may take advantage of: • A graphic interface; • 2D navigation (zoom and pan) of the imported DTM; • Merge of several DTM into the same project; • Creation of a 3D dataset for DbMAP Web 3D Flyer; • Advanced correction of the invalid Input DTM points; • Resolution of T-Junction and Crack through algorithms of saturation; • Import of Shapefile data to generate extruded objects; • Topological solution alghorithms of the data used for the generation of extruded objects; • Texture application option for the buildings; • Import of data from City Vision.

	The main capabilities are: • Multi-resolution texture compatibility; • Data streaming via http of the 3D dataset built with DbMAP 3D Builder; • Independence from servers, because the 3D dataset is directly downloaded from a virtual web directory; • Multi-language configuration; • Use of Macromedia Shockwave Player for web pages; Compatible as .exe for Windows; • Visualization of the textures composed of more informative layers, vectorial maps and raster images; • No pre-processing required by the textures, because they are obtained in real time through DbMAP Web 3D servlet; • Dynamic 3D project; • Visualization of projects distributed via Web or by CD/DVD. The user may take advantage of:. • Realistic 3D navigation with collision control; • Real time analysis of the territory to know identify slopes, direction, difference in altitude, areas, 2D and 3D distances; • Queries (in motion either) of the informative layers; • Navigation by place-names associated with specific geometries deriving from SQL queries directly executed on the centralised database; • Customizable data forms compatible with DbMAP ASJ; • Dynamic localization of the initial point of view; • GIS Layer list coming in real time from the centralised database. DbMAP Web 3D City Vision is a brand new and innovative application within the DbMAP Web 3D suite. It perfectly integrates with the other components and allows to re-use all the bidimensional territorial data, either stored into an existing centralised geodatabase or available on a Spatial Data Infrastructure, to generate most of the textures needed to either represent an extremely realistic urban area, or the portion of a territory. DbMAP Web 3D Vision can manage orthophotos and Shapefile images (or even any Bitmaps or not-georeferred JPGs - digital pictures, 360° and perspective photos, etc.), which contain information about the height of the buildings and of the objects located on the portion of the land to show. The tool allows any developers to attach realistic textures to the facades of extruded buildings created by the Builder. DbMAP Web 3D Poser, works strictly together with Vision to insert, pose and scale libraries of 3D models (monuments, bridges, projects, symbols, etc.) previously created with any type of 3D graphic editing tools (for example, 3D Studio MAX®); they are then converted into a file format compatible with Shockwave®, in a 3D dataset. Poser offers both a bidimensional and a tridimensional preview of the territory in order to ease the visual positioning of models.
Type	Commercial
Approach	• Web Mapping • Web Mapping (Globe)

		• Web Cartography • Web GIS • Geodatabase • Location-based services • Routing
Interactivity		Fully interactive
Technology	Server side	• Application Server • Tile Server • Database Access • WebGIS functions
	Client side	• standalone • ActiveX • PlugIn/AddOn • Applet • Scripts • HTML only
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • Simple Feature Specification for SQL (OGC) • GeoRSS • KML
Operating System	Server side	• Windows; • Linux; • MAC OS.
	Client side	• Windows; • Linux; • MAC OS.
Webtechnology	Webserver	• Web Server and J2EE Container (Oracle AS; Tomcat; IBM Websphere; etc.);
	Browsers	• Standard browser internet (MS Internet Explorer 7, 8, FireFox 3, Opera 9, Safari 3 etc.)
Projections	Which	• Full support
	Where	• Server side • Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Provincia di Roma
Additions by		
Remarks		
Manufacturers remarks		

Autodesk Inc.

Plan4all Product/Service description # 4		
Productname/Version		Autodesk MapGuide Enterprise (MapGuide, V. 2010); Open Source (V. 2.0.2)
Manufacturer		Autodesk Inc./OS Geo
Developed from/to		2006 - 2010
Contact		Markus Briglmeier (markus.briglmeier@autodesk.com)
Short Description		Autodesk MapGuide Enterprise/ OS is a client server oriented technology. It offers a open and flexible platform for web development and supports a huge variety of dataformats, filebase formats like SHP, SDF,DXF,...; many standard databased formats like Oracle, SQLServer, MySQL, PostGIS, ODBC,...; a huge varity of rasterformats as well as Webservices like WMS, WFS,... The data are accessed through the data access technology FDO. FDO let you work with data natively from a variety of data formats and coordinate systems seamlessly in one application. This is enabled using FDO Data Access Technology. By using third-party and open source FDO data providers, you can extend the data access capabilities of the core application by yourself. For more information about formats see also www.autodesk.com/fdo or http://fdo.osgeo.org/
Type		• Commercial – Autodesk MapGuide Enterprise • Open Source – Map Guide
Approach		• Web Mapping • Partly Web GIS
Interactivity		• interactive – Web 2.0
Technology	Server side	• MapGuide Server/Web Server
	Client side	• Standalone (Author) • ActiveX • Netscape PlugIn • Applet • Servlet serving images • Ajax • Dwf-Viewer • Authoring tool – standalone, Autodesk MapGuide Studio
	Used Services/ Protocols	Development • Microsoft.net • Php • Java Enhancements through • Fusion • Open layers • ...
Operating System	Server side	serves all platforms because of Ajax, but also full Linux and Windows support
	Client side	serves all platforms because of Ajax • Linux, Windows • Autodesk MapGuide Studio – Windows only • Dwf-Viewer – Windows only Interactivity on platforms – Ajax

Webtechnology	Webserver	• Internet Information Server • Apache WebServer
	Browsers	Internet Explorer well established, others only poorly supported and used; Apple Safari, Mozilla Firefox, Google Chrome
Projections	Which	Many different; extendable Former mentor library – now MetaCRS, Open Source coordinates system library. Extendable – self defined coordinate systems possible
	Where	server side
Metadata management		limited
Known usage in planning		
Challenges		
Collected by		Wolfgang W. Wasserburger (CEIT Alanova)
Additions by		
Remarks		Displaced 2006 the original client server orientated Autodesk MapGuide
Manufacturers remarks		Autodesk Mapguide was donated to the OSGeo Foundation. At the moment there are two versions available: • Commercial – Autodesk MapGuide Enterprise • OpenSource – MapGuide Autodesk is working very closely with OSGeo, the intention is to provide two versions with the same functionalities. The reason is to address different user requirements. Both versions are free of charge, for the commercial version only a subscription fee is required. Autodesk MapGuide Enterprise is the proprietary version of MapGuide Open Source. Autodesk subjects the software to commercial-grade quality assurance testing and includes formal, dedicated support. Autodesk MapGuide Enterprise benefits from open-source innovation and adds the security and strength of Autodesk's reputation for stable, high quality software. More at www.mapguide.osgeo.org or www.autodesk.com/mapguideenterprise

Bentley

Plan4all Product/Service description # 5		
Productname/Version		BENTLEY CADASTRE
Manufacturer		Bentley Systems
Developed from/to		Bentley Systems Inc.
Contact		Rafael.orche@bentley.com
Short Description		Bentley Cadastre is an application for creating, maintaining, and analyzing land information. It can address any type of land management requirement, including parcel management and taxation, agricultural land management, easement and right-of-way maintenance. For parcel or cadastre management, it mirrors real world workflows for data capture and manipulation, resulting in a rigorous, accurate cadastral fabric. A truly universal product that can be easily adapted to standards around the world, Bentley Cadastre provides example XML schemas and data in both North American and European formats.
Type		• Commercial
Approach		• Graphic Display • Geodatabase • Location-based services • Routing • Planning • Parcel management and taxation • Land management
Interactivity		• Fully interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Complete coordinate projection system • Database Access (supported databases are Oracle Spatial; MySQL, SQL Server, etc…) • WebGIS functions
	Client side	None
	Used Services/ Protocols	• Proprietary (DGN) • SHP • ECW • MrSid • KML
Operating System	Server side	• Windows
	Client side	None
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	Server side
Metadata management		No
Known usage in planning		
Challenges		
Collected by		Agustín Lanero. Ayuntamiento de Gijón
Additions by		
Remarks		http://www.bentley.com/es-ES/Products/Bentley+Cadastre/
Manufacturers remarks		

Plan4all Product/Service description # 6		
Productname/Version		BENTLEY MAP version 08.11.05.49
Manufacturer		Bentley Systems
Developed from/to		Bentley Systems Inc.
Contact		Rafael.orche@bentley.com
Short Description		Bentley Map is a desktop geographic information system with tools for visualizing, printing and processing spatial data
Type		Commercial
Approach		• Graphic Display • Geodatabase • Location-based services • Routing • Planning
Interactivity		Fully interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Database Access (supported databases are Oracle Spatial; MySQL, SQl Server, etc…) • WebGIS functions
	Client side	None
	Used Services/ Protocols	• Proprietary (DGN) • SHP • ECW • MrSid • KML
Operating System	Server side	Windows
	Client side	None
Webtechnology	Webserver	
	Browsers	• Bentley Map Viewer (Free)
Projections	Which	• Server side
	Where	• Server side
Metadata management		No
Known usage in planning		
Challenges		
Collected by		Agustín Lanero. Ayuntamiento de Gijón
Additions by		
Remarks		http://www.bentley.com/es-ES/Products/Bentley+Map/
Manufacturers remarks		

Plan4all Product/Service description # 7		
Productname/Version		Microstation (Microstation, V8i)
Manufacturer		Bentley Systems; www.bentley.com
Developed from/to		-2009
Contact		? Via web pages or regional offices
Short Description		Microstation is desktop CAD system used above all for designs. In its latest version - V8i - enables viewing WMS (OGC). In combination with other software from Bentley it could be part of GIS system with web services etc.
Type		• commercial
Approach		• Graphic Display
Interactivity		• Only Viewing
Technology	Server side	
	Client side	• Standalone • ActiveX
	Used Services/ Protocols	• WMS (OGC conform) • KML (only export) • SVG (only export)
Operating System	Server side	•
	Client side	• Windows only
Webtechnology	Webserver	-
	Browsers	-
Projections	Which	• From version V8i Microstation supports projections from internal library (EPSG based)
	Where	• Client side
Metadata management		none
Known usage in planning		Microstation is used for plan drafting.
Challenges		
Collected by		Miloslav Dvorak (Olomouc)
Additions by		
Remarks		
Manufacturers remarks		

ERDAS

Plan4all Product/Service description # 8		
Productname/Version		ERDAS APOLLO Image Manager
Manufacturer		ERDAS, Inc.
Developed from/to		2007-2009
Contact		supporto.iws@planetek.it
Short Description		ERDAS APOLLO Image Manager allows you to share data using various domain specific applications. You can also centralize your geospatial information metadata, with search, retrieve and disseminate capabilities. ERDAS Image Manager implements comprehensive Web Mapping Service (WMS), Web Coverage Service (WCS), Catalogue Service (CS-W), Web Feature Service (WFS), Web Map Context (WMC) and ISO 19115/19139 standards.
Type		commercial
Approach		• Graphic Display • Web Mapping • Web Mapping (Globe) • Web Cartography • Web GIS
Interactivity		• Fully interactive
Technology	Server side	• Application Server • Tile Server • File Interpreting • Database Access (PostgreSQL/PostGIS, Oracle) • WebGIS functions
	Client side	• standalone • ActiveX • PlugIn/AddOn • Applet • Scripts • HTML only
	Used Services/ Protocols	• ECWP/JPIP (proprietary) • WSDL/SOAP/UDDI (OGC conform) • WRS 0.0.2 (OGC conform) • WMS-WSDL (OGC conform) • WMS POST (OGC conform) • WMS (OGC conform) • WMC (OGC conform) • WCS-WSDL (OGC conform) • WCS (OGC conform) • URN (OGC conform) • SOAP (OGC conform) • SLD (OGC conform) • OWS common (OGC conform) • Filter (OGC conform) • CAT2 AP ebRIM (OGC conform) • CAT CS/W (OGC conform) • Metadata ISO 19115/19139 (OGC conform)
Operating System	Server side	• Windows 2000/XP/2003 Server (32 bit)
	Client side	• Windows XP/Vista
Webtechnology	Webserver	• JBOSS 4.2.2

	Browsers	• Firefox 1.5 or later • Microsoft Internet Explorer 6.x or later
Projections	Which	• Many different; extendable
	Where	• Server side • Client side
Metadata management		ERDAS APOLLO Image Manager contains a detailed ISO 19115 Profile for describing aggregates and datasets, a stylized viewer for ISO 19115 metadata and detailed editing user interface. Persist and disseminate your metadata interoperability. Extended catalog API based on JAXR API. • Storage, harvest and management of OGC web services • Categorisation of registered resources based on ISO taxonomies and OpenGIS service classifications • Extended query capabilities allowing retrieving resources and services for instance by keyword, by date, by geo-extent and by organization search. Moreover, the extreme flexibility of the ebRIM model allows search based on virtually *any* possible criterion. • Built fully in Java and benefits from the latest Oracle Spatial, PostGIS and ebXML technologies.
Known usage in planning		
Challenges		
Collected by		
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 9	
Productname/Version	ERDAS APOLLO Server (EAS, Version 9.3.2)
Manufacturer	ERDAS Inc.
Developed from/to	2007-2009
Contact	supporto.iws@planetek.it
Short Description	ERDAS APOLLO Server is the Enterprise platform to catalog and serve vector, raster, terrain and map data based on the open standards of the Open Geospatial Consortium (OGC) and the International Standardization Organization (ISO). ERDAS Apollo Server delivers all the geospatial data allowing cataloguing and serving geospatial data of your enterprise over the web, via a user-friendly interface. ERDAS APOLLO Server implements the basic functionalities of a Spatial Data Infrastructure.
Type	commercial
Approach	Web Mapping Partly Web GIS Geodatabase Web Cartography
Interactivity	Semi interactive

Technology	Server side	• Mapserver • File Interpreting • Database Access
	Client side	• Applet • Scripts • Servlet serving images • HTML only
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • WMC (OGC conform) • SLD (OGC conform) • GeoRSS • KML • GML • WSDL/SOAP/UDDI (OGC conform) • SOAP (OGC conform) • URN (OGC conform) • OWS common • Gaz (OGC conform) • ECW-P • JPEG 2000 • JPIP
Operating System	Server side	• Windows Server 2003 Enterprise Edition (32-bit and 64 bit) • Windows XP Professional SP2 or higher • Solaris Sparc 10 • Red Hat Linux Enterprise 5 (32-bit and 64-bit) • CentOS 5.1, 5.2 (32-bit)
	Client side	• Windows • Linux
Webtechnology	Webserver	• Apache Tomcat 5.5. or 6.0 • Jboss-4.2.2 or higher • Weblogic 10.1
	Browsers	• IE 6 or higher , Mozilla Firefox 2.0 or higher
Projections	Which	• Many different; extendable
	Where	• Server side • Client side
Metadata management		none
Known usage in planning		-
Challenges		-
Collected by		Maurizio Cosmai
Additions by		-
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 10		
Productname/Version		ERDAS Catalog (Erdas Catalog, Version 3.0)
Manufacturer		ERDAS Inc.
Developed from/to		2003-today
Contact		Name (email)
Short Description		ERDAS Catalog is a software that enables the users to reference and discover geographic information based on content indexation and search processes. Thanks to its use of open standards and its following of OGC and ISO standards makes ERDAS Catalog is a key element in establishing a geospatial Data Infrastructure (in line with INSPIRE).
Type		• commercial • Standard (OGC, ISO)
Approach		• Web Service Catalog • Web Cartography • HMA Earth Observation • Location-based services
Interactivity ??		• Fully interactive
Technology	Server side	• Application Server • Web Service based • File Interpreting • Database Access (Oracle 10g, Oracle 11g, PostgreSQL ver 8.3 (with PostGis extension) • OpenGIS Catalog 2.0
	Client side	• DHTML • Scripts
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WCS/CPS (OGC conform) • CS-W (OGC conform) • SLD (OGC conform) • WMC • HMA Earth Observation • OGC Filter • GML • ISO 19119-Service Metadat • ISO 19115-Resource Metadata • ISO 19139-Metadata Encoding • HTTP/SOAP Web Service • eb-XML • ebRIM Application Profile 1.0.0
Operating System	Server side	• Windows Server 2003 Enterprise Edition (32-bit and 64 bit) • Windows XP Professional SP2 or higher • Solaris Sparc 10 • Red Hat Linux Enterprise 5 (32-bit and 64-bit) • CentOS 5.1, 5.2 (32-bit)
	Client side	Any platform
Webtechnology	Webserver	HTTP/SOA
	Browsers	IE 6 or higher , Mozilla Firefox 2.0 or higher
Projections	Which	Many different; extendable
	Where	• Server side • Client side
Metadata management		Extended catalog API based on JAXR API.

	• Storage, harvest and management of OGC web services • Categorisation of registered resources based on ISO taxonomies and OpenGIS service classifications • Extended query capabilities allowing retrieving resources and services for instance by keyword, by date, by geo-extent and by organization search. Moreover, the extreme flexibility of the ebRIM model allows search based on virtually *any* possible criterion. Provides an out-of-the-box web application that allows OpenGIS service registration and discovery, with a Client built using ERDAS Enterprise Web Toolkit. • Built fully in Java and benefits from the latest Oracle Spatial, PostGIS and ebXML technologies.
Known usage in planning	
Challenges	
Collected by	
Additions by	
Remarks	
Manufacturers remarks	

ESRI

Plan4all Product/Service description # 11		
Productname/Version		ESRI Arc Catalog V. 9.2
Manufacturer		ESRI
Developed from/to		-
Contact		www.esri.com
Short Description		Desktop application for managing GIS data such as maps, globes, databases, models, metadata and services. Functions: search, metadata view and maintenance, import and export of geodatabases, administration of geodatabases
Type		Metadata editor
Approach		Geodatabase management Desktop application
Interactivity		Fully interactive
Technology	Server side	Database Access
	Client side	standalone
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • GeoRSS • KML
Operating System	Server side	
	Client side	
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	• Server side • Client side
Metadata management		Yes, ISO standards
Known usage in planning		Database management
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Sources (oct. 2009): http://www.esri-germany.de/products/arcgis/about/arccatalog.html

Plan4all Product/Service description # 12	
Productname/Version	ArcGis Explorer 9.2
Manufacturer	ESRI
Developed from/to	-
Contact	http://www.esri.com/software/arcgis/explorer/index.html
Short Description	ArcGIS Explorer is a free, downloadable GIS viewer that gives you an easy way to explore, visualize and share GIS information. Access to ready-to-use ArcGIS Online basemaps and layers; combination of local data with map services for creating custom maps; performance of spatial analysis (e.g. visibility, modeling, proximity search); possibility of adding photos, reports, videos and other information to your maps.
Type	• free of cost (for everybody)
Approach	• Web Mapping (Globe) • WebGis

Interactivity		Semi interactive
Technology	Server side	• Application Server • WebGIS functions • Geodatabases can be added
	Client side	• ActiveX • PlugIn/AddOn • Applet
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • GeoRSS feeds can be added • KML can be added • GML is supported
Operating System	Server side	-
	Client side	Windows
Webtechnology	Webserver	-
	Browsers	Internet Explorer
Projections	Which	All
	Where	• Server side • Client side
Metadata management		Yes
Known usage in planning		-
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Sources (Oct. 2009): http://www.esri.com/software/arcgis/explorer/system-requirements.html http://services.arcgisonline.com/arcgisexplorer500/help/opencontent.htm

Plan4all Product/Service description # 13		
Productname/Version		ArcIMS / ArcGIS Server 9.2 / 9.3
Manufacturer		ESRI
Developed from/to		-2009
Contact		
Short Description		ArcGIS Server is a Geographic Information System (GIS) software package made by ESRI to provide Web-oriented spatial data services. Since version 9.2 the product ArcGIS Server includes also the spatial data management software (formerly known as ArcSDE).
Type		• Commercial
Approach		• Web Mapping • Web GIS • Building spatial data infrastructures • Geodatabase • Geo processing
Interactivity		• Fully interactive
Technology	Server side	• Spatial database access on underlying IBM DB2, Informix, Microsoft SQL Server, Oracle and PostgreSQL databases
	Client side	• HTML, Flex, Silverlight, JavaScript, .NET, JAVA

	Used Services/ Protocols	• WMS • WFS / WFS-T • WCS • KML • GML • REST / SOAP Web 3D Globe Publishing
Operating System	Server side	• Microsoft Windows Server, Red Hat Enterprise Linux AS/ES, SUSE Linux Enterprise Server, Sun Solaris
	Client side	
Webtechnology	Webserver	
	Browsers	Flex, Silverlight,.NET, JAVA, JavaScript
Projections	Which	• Many different; extendable
	Where	• Server side
Metadata management		
Known usage in planning		Providing Hamburg`s preparatory land-use plan, landscape programme and wildlife conservation programme
Challenges		
Collected by		Kai-Uwe Krause (LGV)

Plan4all Product/Service description # 14		
Productname/Version		ArcSDE 9.2 / 9.3
Manufacturer		ESRI
Developed from/to		1996-2009
Contact		
Short Description		ArcSDE (Spatial Database Engine) is a server software by ESRI that spatially enables a Relational Database Management System. ArcSDE technology serves as the gateway between GIS clients and the RDBMS. The spatial data may then be used as part of a geodatabase. ArcSDE is an application server that facilitates storing and managing spatial data (raster, vector, and survey) in a DBMS and makes the data available to many applications. ArcSDE allows you to manage spatial data in one of four commercial databases (IBM DB2, Informix, Microsoft SQL Server and Oracle). With the 9.3 release, support was added for the open source PostgreSQL database. ArcSDE serves data to the ArcGIS Desktop products (ArcView, ArcEditor and ArcInfo).
Type		Proprietary
Approach		Geodatabase
Interactivity		Fully interactive
Technology	Server side	Spatial database access on underlying IBM DB2, Informix, Microsoft SQL Server, Oracle and PostgreSQL databases
	Client side	
	Used Services/ Protocols	Simple Feature Specification for SQL (OGC)
Operating System	Server side	MS Windows; AIX, HP-UX, GNU/Linux, Solaris
	Client side	
Webtechnology	Webserver	
	Browsers	
Projections	Which	Many different; extendable
	Where	Server side
Metadata management		
Known usage in planning		storing Hamburg`s preparatory land-use plan, landscape programme and wildlife conservation programme
Challenges		

Collected by	Kai-Uwe Krause (LGV)

Help Service Remote Sensing

Plan4all Product/Service description # 15		
Productname/Version		Micka 3.011
Manufacturer		Help Service Remote Sensing
Developed from/to		2003
Contact		http://www.bnhelp.cz/produkty/metadata/
Short Description		Functionality with metadata for spatial data (ISO 19115) Functionality with metadata for services (ISO 19119) Functionality with Dublin Core metadata (ISO 15836) Functionality with Feature catalogue (ISO 19110) Support of OGC CSW 2.0.2 (catalogue service) Functionality with metadata user profiles Support of INSPIRE metadata profile Web interface for metadata editing Multilingual (both user interface and metadata records). Currently following languages are supported: Czech, English, German, French, Latvian, Polish. It is possible to dynamically extend the system for other languages. Context help (multilingual) Import of the following metadata formats are supported: ESRI ArcCatalog, ISO 19139, MIDAS OGC services (WMS, WFS, WCS, CSW) Feature catalogue XML Export – ISO 19139, GeoRSS Support of thesauruses and gazetteers. Display of changes by using GeoRSS User templates for appearance and functionality management. Possibility of map client connection for display of on-line map services. System requirements: Relational database (Oracle >= 9, PostgreSQL >= 8.0, MS-SQL >= 2005, or other SQL databases); PHP >= 5.2, support of XSLT; Independent on Operating system
Type		Commercial
Approach		Metadata and catalogue
Interactivity		Fully interactive
Technology	Server side	Oracle, PostGIS, MS SQL, ..
	Client side	PHP Scripts
	Used Services/ Protocols	CSW2.0.2
Operating System	Server side	any
	Client side	any
Webtechnology	Webserver	any
	Browsers	any
Projections	Which	N/a
	Where	N/a
Metadata management		Yes
Known usage in planning		Chotebor, Mravske Budejovice, Telc, Zemgale region, TDF
Collected by		Karel Charvat

Plan4all Product/Service description # 16		
Productname/Version		URM GeoPortal
Manufacturer		Help Service Remote Sensing, CCSS, WirelessInfo, Help Forest
Developed from/to		2007
Contact		http://portal.plan4all.eu
Short Description		The URM GeoPortal[4] is a new, integrated solution being designed as combination of previous technologies Uniform Resource Management, Geohosting and new technological development of a visualization client based on Open Layers. The URM GeoPortal is not one integrated solution, but set of modules and services, which are able to communicate trough interoperable services (OGC, W3C). The solution is modular and could be easy modifying for different purposes. URM Geoportal is based on Open Source technologies, but it could be integrated with different technologies like MS SQL or ArcSDE. Uniform Resource Management (URM supports validation, discovery and access to heterogeneous informa-tion and knowledge. It is based on utilization of metadata schemes. The URM models currently also integrate different tools, which support sharing of knowledge. The GeoPortal system is developed on the OpenSource platforms (MapSer-ver, GeoServer) and contains common visualization, data sharing, metadata and catalogue functionalities. Additional parts of solution are also tools for management sensor observation and spatial data transformation and processing.
Type		Commercial
Approach		Inspire Geoportal Based on Open Source technologies but can be integrated with different technologies (MS SQL, ArcSDE, …)
Interactivity		
Technology	Server side	Any
	Client side	ExtJS
	Used Services/ Protocols	OGC – CSW, WMS, WFS, WCS, WPS
Operating System	Server side	any
	Client side	any
Webtechnology	Webserver	any
	Browsers	any
Projections	Which	N/a
	Where	N/a
Metadata management		MICKA (compatible with INSPIRE); for storing of metadata can also be used: PostgreSQL, mySQL, MS SQL, Oracle
Known usage in planning		
Challenges		
Collected by		Karel Charvat
Additions by		Julia Neuschmid (Ceit Alanova)
Remarks		
Manufacturers remarks		

[4] Karel CHARVAT & Stepan KAFKA, Jachym CEPICKY, Martin VLK, Petr HORAK, Premysl VOHNOUT GEOPORTAL - A NEW WEB 2.0 APPROACH FOR SDI, GI2009 – Symposium Dresden, May 2009

Intergraph

Plan4all Product/Service description # 17		
Productname/Version		GeoMedia WebMap 6.0
Manufacturer		Integraph
Developed from/to		-
Contact		www.intergraph.com/sgi. Integraph Austria: **Tel:** +43 (1) 9610567-0 **Fax:** +43 (1) 9610567-4601 **E-Mail**: info-austria@intergraph.com
Short Description		Webbased map visualization and analysis; it enables users to build powerful geospatial Web applications – either interactive Web sites or programmable Web Services. These Web applications provide real-time access to geospatial data that your organization maintains or to geospatial data from any organization that has chosen to make it available through industry-standard methods; raster and vector format.
Type		commercial
Approach		Web Mapping
Interactivity		Fully interactive
Technology	Server side	Database Access
	Client side	• ActiveX • Applet
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • GML • SVG • CS-W
Operating System	Server side	
	Client side	All
Webtechnology	Webserver	
	Browsers	All
Projections	Which	Full coordinate systems, projections, and datums transformation and support
	Where	• Server side • Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Source (Oct. 2009): http://www.intergraph.com/literature/geomedia_webmap.pdf
Manufacturers remarks		

Manifold

Plan4all Product/Service description # 1		
Productname/Version		Manifold System 8.0 (Manifold, Build 8.0.15.0)
Manufacturer		Manifold Net Ltd, 1805 North Carson Street Suite 700, Carson City, NV 89701
Developed from/to		© 1993-2008 CDA International Ltd.
Contact		sales@manifold.net
Short Description		Manifold System is a single, integrated product that provides three major classes of GIS functionality in a single package: as a desktop application, as an objects library for programmers and as an Internet Map Server for web applications Different Manifold System editions make it possible to deliver advanced features to organizations.
Type		• commercial
Approach		• fully featured Desktop GIS (drawing, image, raster, surface, terrain) • Spatial DBMS • Web Mapping • Web GIS
Interactivity		• Fully interactive
Technology	Server side	• Application Server • WebGIS functions • OGC WFS server functionality to enable OGC WFS clients (see remarks)
	Client side	• standalone • .Net application (C#) • Scripting (.Net languages) • VBScript, JScript, Python (Forms)
	Used Services/ Protocols	• proprietary • Manifold Spatial SQL (superset of Microsoft SQL, Jet SQL, ANSI SQL) • KML, KMZ (import/export) • GeoTIFF • XML
Operating System	Server side	Windows Server 2008
	Client side	Microsoft (XP, Vista, 7)
Webtechnology	Webserver	Manifold IMS, Microsoft IIS
	Browsers	any
Projections	Which	any
	Where	• Server side • Client side
Metadata management		No
Known usage in planning		Community Services, City Planning, Hazard Simulation
Challenges		web cartography, image/raster analysis
Collected by		Wolfgang W. Wasserburger (CEIT Alanova)
Remarks		---
Manufacturers remarks		Manifold System is both a client and a server for OGC WMS and the Manifold Image Server interface; however, although Manifold IMS can be a server for OGC WFS, Manifold does not yet provide OGC WFS client capabilities. Manifold provides OGC WFS server capabilities so that those users who are using OGC WFS clients can get data from a Manifold IMS website.

Mapinfo

Plan4all Product/Service description # 18		
Productname/Version		Mapinfo Professional (Mapinfo, version 10.0)
Manufacturer		Pitney Bowes Business Insight
Developed from/to		1989 - 2009
Contact		Italia@mapinfo.com; richieste.info@csh.it
Short Description		An easy to use gis desktop; its strengths are its simplicity of use and flexibility but also its price. It works very well with Oracle (read and write); in the last version it can also employ Postgis Database (open source) and has been improved its management of maps and layers and user interface.
Type		Commercial
Approach		Gis Desktop
Interactivity		Fully interactive
Technology	Server side	Database Access
	Client side	• Standalone • programming Language • .NET integration
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • KML (export raster and vector map on Google-Earth) • ECWP (MapImagery) • RDBMS: Oracle, SQL Server, MS Access, PostGIS
Operating System	Server side	
	Client side	Windows only
Webtechnology	Webserver	
	Browsers	
Projections	Which	Many different; extendable
	Where	Client side
Metadata management		Something
Known usage in planning		Provincia di Roma
Challenges		
Collected by		Mario Gianfelice (Provincia di Roma)
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 19		
Productname/Version		MapXtreme
Manufacturer		MapInfo
Developed from/to		
Contact		Isabel van der Torre Tel.: +49 (0) 6142-203-605 Fax: +49 (0) 6142-203-444 Email: germany@mapinfo.com
Short Description		A Java Enterprise Mapping Server, which allows developers to build custom mapping applications, provide tailored views of geographic data and automate and augment business processes. It can deliver mapping applications for one to many users, so that customers can see coverage areas or find nearest locations, engineers can spot network disruptions and notify customers, sales and service reps can get directions to their next call. Also it can share location intelligence across the organization, i.e. to access original enterprise databases and varied data formats, manage growing web traffic with highly scalable architecture and turn spatial information into a valuable corporate asset.
Type		commercial
Approach		Mapping Server
Interactivity		Viewing Location based analyses
Technology	Server side	• Application server • Full-featured mapping server • Fully Java – full xml interface that allows interaction with non-Java clients
	Client side	• Spatial Data Access (support for Oracle Spatial and Oracle Locator)
	Used Services/ Protocols	• WMS (OGC conform) compliant • GML Export • SVG Support
Operating System	Server side	
	Client side	Multi-platform: Unix, Microsoft Windows, etc.
Webtechnology	Webserver	
	Browsers	Supports thin, medium, thick webbrowser clients
Projections	Which	
	Where	Server side Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Sources (Oct. 2009): http://resource.mapinfo.com/static/files/document/MapInfo_MapXtreme_Java_471_Datasheet_GER.pdf http://www.pbinsight.com/products/location-intelligence/developer-tools/desktop-mobile-and-internet-offering/mapxtreme-2008/
Manufacturers remarks		

Oracle

Plan4all Product/Service description # 20		
Productname/Version		Oracle Spatial & Oracle Locator
Manufacturer		Oracle Corp.
Developed from/to		
Contact		http://www.oracle.com/technology/products/spatial/index.html
Short Description		Oracle Locator is a feature of Oracle Database 11g Standard and Enterprise Editions that provides core location functionality needed by most customer applications. Oracle Spatial is an option for Oracle Enterprise Edition that provides advanced spatial features to support high-end GIS and LBS solutions. Also, Oracle provides the Oracle Application Server MapViewer, a Java component for map rendering and viewing geospatial data managed by Oracle Spatial or Locator. Oracle Spatial, Oracle Locator and MapViewer comply with germane OGC Standard Specifications.
Type		Commercial
Approach		Geodatabase
Interactivity		Full, DB level
Technology	Server side	• Spatial data management functions • Java and XML APIs • PL/SQL • SQL/MM
	Client side	
	Used Services/ Protocols	• WMS (OGC conform), through Oracle Application Server MapViewer • WFS (OGC conform) • WFS-T (OGC conform) • CSW (OGC conform) • OpenLS • GML (committed to support)
Operating System	Server side	any
	Client side	any
Webtechnology	Webserver	-
	Browsers	-
Projections	Which	All
	Where	Server side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Norma Zanetti Hyperborea S.r.l.
Additions by		
Remarks		
Manufacturers remarks		

11.3 Commercial Software (partly without costs)

Adobe

Plan4all Product/Service description # 21		
Productname/Version		Flash (Version CS 4 Professional (2008); Version CS5 to be released in April 2010)
Manufacturer		Adobe (former Macromedia)
Developed from/to		1996, ongoing
Contact		http://www.adobe.com/products/flash/
Short Description		Multimedia platform, method for adding animation and interactivity to web pages. Flash can manipulate vector and raster graphics.
Type		Commercial, partly free
Approach		Multimedia platform
Interactivity		scriptable
Technology	Server side	
	Client side	PlugIn/AddOn
	Used Services/ Protocols	• WMS (OGC conform) • GeoRSS • KML
Operating System	Server side	
	Client side	Microsoft Windows, Mac OS X
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	Server side Client side
Metadata management		yes
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Source (Oct. 2009): http://de.wikipedia.org/wiki/Adobe_Flash http://www.adobe.com/se/products/flashplayer/
Manufacturers remarks		

Clark Labs

Plan4all Product/Service description # 22		
Productname/Version		**IDRISI Taiga**
Manufacturer		Clark Labs
Developed from/to		
Contact		Name (email)
Short Description		DRISI Taiga is an integrated GIS and Image Processing software solution for the desktop. Researchers and professionals work primarily with raster data in areas such as climate change modeling, land change planning, natural resource & environmental management, and ecosystem dynamics.
Type		commercial
Approach		• Graphic Display • Geodatabase • Location-based services
Interactivity		• Fully interactive
Technology	Server side	Database Access
	Client side	• Standalone • programming Language (Visual Basic or Python)
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • KML (export raster and vector map on Google-Earth) • ECWP (MapImagery) • RDBMS: Oracle, SQL Server, MS Access
Operating System	Server side	
	Client side	Windows only
Webtechnology	Webserver	
	Browsers	
Projections	Which	Many different
	Where	Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Stelian Dimitrov (EPF)
Additions by		
Remarks		
Manufacturers remarks		

ERDAS

Plan4all Product/Service description # 23		
Productname/Version		ERDAS TITAN (TITAN, Version 9.3)
Manufacturer		Erdas Inc.
Developed from/to		
Contact		amy.zeller@erdas.com
Short Description		ERDAS TITAN is an innovative real-time data sharing solution, enabling users and organizations to publish, discover and ultimately consume geospatial data, web services and location-based content, in an online, dynamic, collaborative network. ERDAS TITAN enables users and organizations to easily make their geospatial data available to others, while retaining digital ownership rights. Employing a 3D virtual globe, users can create data and content mashups that can be quickly published and viewed by others. ERDAS TITAN also translates data on the fly to "view only" formats for consumption into a variety of other geospatial applications, including Google Earth, Microsoft Virtual Earth, ERDAS IMAGINE, ArcMap, and more.
Type		• commercial
Approach		• Graphic Display • Web Mapping (Globe) • Location-based services • Caching proxy server • Permission-based
Interactivity		• Only Viewing • Fully interactive
Technology	Server side	• Application Server • Tile Server • File Interpreting • Database Access (MySQL Server 5.x or later)) • WebGIS functions
	Client side	• Standalone • web-based
	Used Services/ Protocols	• Web Map Service (WMS) • Web Feature Service (WFS) • Web Coverage Service (WCS) • ECWP image streaming protocol from IWS • ImageX simple HTTP protocol from IWS • ERDAS Apollo Image Manager (EAIM) metadata catalog
Operating System	Server side	• Linux Red Hat 5.0 (32-bit) • Linux CentOS 5.1.0-2 (32-bit) • Microsoft Windows Server 2008 (32-bit) • All above servers supported running on VMWare
	Client side	• Microsoft Windows XP Professional SP2 (32-bit) • Microsoft Windows Vista Enterprise (32-bit)
Webtechnology	Webserver	• JRE, Tomcat (server application embedded) • IIS
	Browsers	
Projections	Which	• Decimal Degrees, Degrees Minutes Seconds, or Degrees Decimal Minutes
	Where	• Server side • Client side
Collected by		Maurizio Cosmai (AMFM)

11.4 Open Source Software

Konsortiums, various, unknown

Plan4all Product/Service description # 24		
Productname/Version		Diva GIS, Version 7 (2009)
Manufacturer		Developers were the CIP International Potato Center (Persu), International Plant Genetic Resources Institute, University of California in Berkeley, Food and Agriculture Organization, and others
Developed from/to		Since 1999
Contact		r.simon@CGIAR.org , http://www.diva-gis.org/contact
Short Description		Free GIS for mapping and geographic data analysis (of distribution); vector and raster
Type		OpenSource
Approach		Desktop GIS Connect to local databases
Interactivity		Semi interactive
Technology	Server side	Geoserver
	Client side	• standalone • PlugIn • Access to local databases (Oracle, PostGIS, mySQL, dBase, ArcSDE)
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform)
Operating System	Server side	
	Client side	Microsoft Windows (incl. Vista, 7)
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	Client side
Metadata management		
Known usage in planning		DIVA-GIS is particularly useful for mapping and analyzing biodiversity data, such as the distribution of species, or other point-distributions.
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Sources (Oct. 2009): http://www.diva-gis.org/ http://www.icis.cgiar.org/icis/images/3/39/DIVA-GIS-Tool.pdf
Manufacturers remarks		

Plan4all Product/Service description # 25		
Productname/Version		GeoDjango v1.1
Manufacturer		
Developed from/to		2007 - 2009
Contact		http://geodjango.org/
Short Description		GeoDjango is an add-on for on python language based Django web framework that includes support for geometry fields and extends the ORM to allow spatial queries. GeoDjango is based on various open source libraries python binding usage like GDAL/OGR,proj4 and geos to provide this library functionality in web framework. As default front-end is used OpenLayers JavaScript library.
Type		OpenSource
Approach		• Web GIS • Location-based services
Interactivity		Fully interactive
Technology	Server side	• Database Access • WebGIS functions
	Client side	• Scripts • HTML only
	Used Services/ Protocols	• Simple Feature Specification for SQL (OGC) • GeoRSS • KML • GML • WKT
Operating System	Server side	Windows, Unix/Linux and other
	Client side	Windows, Unix/Linux and other
Webtechnology	Webserver	Webserver requires possibility to use Python applications
	Browsers	
Projections	Which	Full projection/re-projection support through WKT coordinate system definitions and the PROJ-library. Comes with comprehensive EPSG codes and easily extensible.
	Where	Server side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Peteris Bruns (TDF)
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 26		
Productname/Version		Geoserver 1.6.2
Manufacturer		
Developed from/to		
Contact		http://geoserver.org/
Short Description		GeoServer is a Java-based software server that allows users to view and edit geospatial data. Using open standards set forth by the Open Geospatial Consortium (OGC), GeoServer allows for great flexibility in map creation and data sharing.
Type		OpenSource
Approach		Web GIS
Interactivity		Only Viewing
Technology	Server side	WebGIS functions
	Client side	
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • KML • GML • SVG • SLD (OGC-conform)
Operating System	Server side	JAVA
	Client side	any
Webtechnology	Webserver	any
	Browsers	any
Projections	Which	All
	Where	Server side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Norma Zanetti Hyperborea S.r.l.
Additions by		Wolfgang W. Wasserburger (CEIT Alanova)
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 27		
Productname/Version		JOSM (Java OpenStreetMap Editor)
Manufacturer		Originally developed by Immanuel Scholz and currently maintained by Dirk Stöcker
Developed from/to		Continuous development
Contact		http://josm.openstreetmap.de/
Short Description		JOSM is an editor for OpenStreetMap (OSM) written in Java 1.5. Currently it supports loading stand alone GPX tracks and GPX track data from the OSM database as well as loading and editing existing nodes, ways, metadata tags and relations from the OSM database.
Type		OpenSource (GPL)
Approach		Web Cartography (it acts as a front-end editor for OpenStreetMap)
Interactivity		Fully interactive
Technology	Server side	
	Client side	standalone

	Used Services/ Protocols	OSM proprietary Protocol
Operating System	Server side	OS independent under JAVA
	Client side	
Webtechnology	Webserver	
	Browsers	
Projections	Which	• Unprojected • Mercator
	Where	Client
Metadata management		
Known usage in planning		
Challenges		
Collected by		Pasquale Di Donato
Additions by		Wolfgang W. Wasserburger (CEIT Alanova)
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 28		
Productname/Version		Ka-Map!
Manufacturer		
Developed from/to		2005-2007
Contact		http://ka-map.maptools.org/, http://ka-map.ominiverdi.org/wiki/index.php/Main_Page
Short Description		ka-Map! ("ka" as in ka-boom!) is an open source project that is aimed at providing a javascript API for developing highly interactive web-mapping interfaces using features available in modern web browsers. ka-Map! official web site is ka-Map.MapTools.org ka-Map! was originally developed by, and most of it is Copyright (c) 2005, DM Solutions Group Inc.
Type		OpenSource
Approach		• Graphic Display • Web Mapping
Interactivity		Semi interactive
Technology	Server side	• Tile Server/… • WebGIS functions
	Client side	Scripts HTML only
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) – only points
Operating System	Server side	http://ka-map.maptools.org/
	Client side	http://ka-map.maptools.org/
Webtechnology	Webserver	UMN MapServer PHP MapsScript dependent
	Browsers	
Projections	Which	Many different; extendable;
	Where	Server side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Peteris Bruns (TDF)
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 29		
Productname/Version		pgRouting 1.03
Manufacturer		
Developed from/to		2006-2009
Contact		http://pgrouting.postlbs.org/
Short Description		This project's main objective is to provide routing functionality to PostGIS / PostgreSQL. pgRouting is part of PostLBS, which provides core tools for Location Based Services (LBS) as Open Source Software (OSS). Its tools are similar to those found on proprietary software.
Type		OpenSource
Approach		• Geodatabase • Location-based services • Routing
Interactivity		Semi interactive
Technology	Server side	• Database Access • WebGIS functions
	Client side	
	Used Services/ Protocols	Simple Feature Specification for SQL (OGC)
Operating System	Server side	Linux; Windows; Mac OS X and other (needs PostgreSQL/PostGIS)
	Client side	Linux; Windows; Mac OS X and other (SQL-Client)
Webtechnology	Webserver	
	Browsers	
Projections	Which	Many different; extendable
	Where	Server side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Peteris Bruns (TDF)
Additions by		Wolfgang W. Wasserburger (CEIT Alanova)
Remarks		Probably not SDI relevant
Manufacturers remarks		

Advanced Information Systems Group of the University of Zaragoza and GeoSpatiumLab

Plan4all Product/Service description # 30		
Productname/Version		CatMDEdit – 4.5
Manufacturer		Advanced Information Systems Group of the University of Zaragoza and GeoSpatiumLab
Developed from/to		Continuous development
Contact		iaaa@unizar.es
Short Description		CatMDEdit is a metadata editor tool that facilitates the documentation of resources, with special focus on the description of geographic information resources. CatMDEdit is a desktop application that enables to create, edit, delete, view, replicate, import, export, validate, and automatically generate metadata files. The product automatically generates XML file identifier and some metadata elements for spatial series and from raster and vector files: additional tools to facilitate metadata edition are a contacts repository, a thesaurus tool, and a tool for the selection of bounding box coordinates.
Type		OpenSource (GPL License)
Approach		
Interactivity		Fully interactive
Technology	Server side	
	Client side	standalone
	Used Services/ Protocols	Others (ISO 19115, ISO 19139, Dublin Core, INSPIRE Metadata Regulation)
Operating System	Server side	
	Client side	OS independent
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	
Metadata management		Yes
Known usage in planning		
Challenges		
Collected by		
Additions by		Pasquale Di Donato
Remarks		
Manufacturers remarks		

ALOV Software

Plan4all Product/Service description # 31		
Productname/Version		AlLOV Map
Manufacturer		ALOV Map/TMJava is a joint project of ALOV Software and the Archaeological Computing Laboratory, University of Sydney, Australia. ALOV Map was started in November 2001 as an offshoot from work on the Windows version of TimeMap® software(commenced 1999).
Developed from/to		
Contact		Contact6@alov.org johnson@acl.arts.usyd.edu.au
Short Description		ALOV Map/TMJava is free, portable Java® application for publication vector and raster maps to Internet and interactive viewing on web browsers. It supports the complex rendering architecture, the unlimited navigation and allows working with multiple layers, thematic maps, hyperlinked features and attribute data.
Type		• Commercial • OpenSource
Approach		• Graphic Display • Web Mapping • Web Mapping (Globe) • Web Cartography • Web GIS • Location-based services
Interactivity		• Only Viewing
Technology	Server side	• Application Server • Tile Server/… • WebGIS functions
	Client side	• standalone • ActiveX • PlugIn/AddOn • Applet
	Used Services/ Protocols	• WMS (OGC conform) • ESRI Shapefiles • MapInfo (MIF) • MrSID • GIF and JPG images
Operating System	Server side	GNU/Linux, MS Windows,
	Client side	GNU/Linux, MS Windows,
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	
Metadata management		Limited metadata management system (no support of any standard)
Known usage in planning		
Challenges		
Collected by		Agustin Lanero. Ayuntamiento de Gijón
Additions by		
Remarks		
Manufacturers remarks		http://alov.kgbinternet.com/index.html

Autodesk Inc.

Plan4all Product/Service description # 32		
Productname/Version		Autodesk MapGuide OpenSource (?, V.?)
Manufacturer		Autodesk Inc.
Developed from/to		2006-
Contact		Michaela Schneeberger (michaela.schneeberger@autodesk.com)
Short Description		
Type		Commercial (?) OpenSource
Approach		Web Mapping
Interactivity		
Technology	Server side	
	Client side	
	Used Services/ Protocols	
Operating System	Server side	
	Client side	
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	
Metadata management		
Known usage in planning		
Challenges		
Collected by		Wolfgang W. Wasserburger (CEIT Alanova)
Additions by		
Remarks		Displaced 2006 the original client server orientated Autodesk MapGuide
Manufacturers remarks		

Armin Burger

Plan4all Product/Service description # 33		
Productname/Version		p.mapper - MapServer PHP/MapScript Framework 4.0
Manufacturer		Armin Burger
Developed from/to		200x-2009
Contact		Armin Burger arminburger@users.sourceforge.net , http://www.pmapper.net/
Short Description		The p.mapper framework is intended to offer broad functionality and multiple configurations in order to facilitate the setup of a MapServer application based on PHP/MapScript. Functions included are: DHTML (DOM) zoom/pan interface (no use of frames) Zoom/pan also via keyboard keys, mouse wheel, reference map, slider Easy configuration of layout and behaviour with XML config file Query functions (identify, select, search) Fully featured attribute search, including suggest, select boxes, etc. Flexible layout of query results via JavaScript templates Query results display with database joins and hyperlinks Multilingual user interface - pre-defined: EN, DE, IT, FR, NL, SK, ES, RU, BR, HR, HU, ZH, JA, BG, CZ, EL, HE Fully XHTML 1.0 Strict compliant HTML legends and various display styles of legend and layers/TOC Print functions: HTML and PDF DHTML pop-up windows and dialogs Pop-up identify when moving with mouse over map Support for point layers with data in a database supported by PEAR framework Distance and area measurement function Adding points of interest with labels on map Start map with pre-defined zoom extent: via explicit extent or layer feature Plugin API to add custom functionality Various plugins: layer transparency, query result export, and more
Type		OpenSource
Approach		• Graphic Display • WEB Mapping
Interactivity		• Semi interactive
Technology	Server side	• Database Access • WebGIS functions
	Client side	• Scripts • HTML only
	Used Services/ Protocols	WMS (OGC conform)
Operating System	Server side	Linux , Unix, Windows, OS X
	Client side	Linux , Unix, Windows, OS X
Webtechnology	Webserver	UMN MapServer PHP MapsScript dependent
	Browsers	
Projections	Which	Many different; extendable;
	Where	Server side
Metadata management		
Known usage in planning		http://www.gisnet.lv/sne/map.phtml http://www.gisnet.lv/kr/map.phtml
Challenges		
Collected by		Peteris Bruns (TDF)

Camptocamp SA

Plan4all Product/Service description # 34		
Productname/Version		Cartoweb – 3.5.0
Manufacturer		Camptocamp SA
Developed from/to		Continuous development
Contact		http://cartoweb.org/contact.html
Short Description		CartoWeb is a comprehensive and ready-to-use Web-GIS as well as a convenient framework for building advanced and customized applications; is written using PHP5. Functions: searching, browsing, querying, outlining, recentering, layers management, tabs browsing and PDF printing, routing, data editing and layout customisation.
Type		OpenSource (GPL License)
Approach		• Web GIS • Routing
Interactivity		
Technology	Server side	WebGIS functions
	Client side	Standalone PlugIn
	Used Services/ Protocols	WMS and WFS (based on MapServer) KML
Operating System	Server side	OS Indipendent, Windows 2000 / XP, GNU / Linux Debian
	Client side	
Webtechnology	Webserver	Apache is recommended, CartoWeb may be set up as a SOAP Web Service enabling to have front-end server on one maschine and data and map generation on another.
	Browsers	all
Projections	Which	Different projections can be defined (e. g. WGS 84)
	Where	
Metadata management		Yes
Known usage in planning		
Challenges		
Collected by		
Additions by		Pasquale Di Donato, Julia Neuschmid (Ceit Alanova)
Remarks		Source (Oct. 2009): http://cartoweb.org
Manufacturers remarks		

Cenia

Plan4all Product/Service description # 35		
Productname/Version		Janitor
Manufacturer		Cenia
Developed from/to		2001
Contact		http://www.janitor.cz
Short Description		several interconnected applications, enabling simple and quick data management - JanMap, JanDat, SQLTools, DataBuilder, FieldGIS; provides tools for primary data collection and additional data processing - storage, organization, surveying, analysis
Type		freeware
Approach		Desktop GIS
Interactivity		Fully interactive
Technology	Server side	• Database access • File interpreting
	Client side	standalone
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • Simple Feature Specification for SQL (OGC)
Operating System	Server side	
	Client side	Windows
Webtechnology	Webserver	
	Browsers	
Projections	Which	all
	Where	Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Petr Horak
Additions by		
Remarks		
Manufacturers remarks		

DM Solutions Group

Plan4all Product/Service description # 36		
Productname/Version		Chameleon v2.6rc1
Manufacturer		DM Solutions Group
Developed from/to		2002 - 2007
Contact		http://chameleon.maptools.org/index.phtml
Short Description		**Chameleon** is an open source, distributed, highly configurable, environment for developing Web Mapping applications. It is built on UMN MapServer as the core mapping engine and works with all MapServer supported data formats. It also works well with OpenGIS Consortium standards for Web Map Services WMS and Web Map Context Documents (WMC) through MapServer's support for these standards. Chameleon was originally developed in 2002 by DM Solutions Group under contract to NRCan, in support of Canada's GeoConnections program, contributing to the Canadian Geospatial Data Infrastructure (CGDI). Chameleon is written in the PHP scripting language with snippets of Javascript code to handle browser functionality. The latest version as of September 6, 2007 was v2.6rc1
Type		OpenSource
Approach		• Graphic Display • Web Mapping
Interactivity		Fully interactive
Technology	Server side	• WebGis functions • php-mapscript
	Client side	• JavaScripts • HTML only
	Used Services/ Protocols	WMS, WMC
Operating System	Server side	Multi-platform - Windows, Linux, and Mac OS X
	Client side	Multi-platform - Windows, Linux, and Mac OS X
Webtechnology	Webserver	UMN MapServer PHP MapsScript dependent
	Browsers	
Projections	Which	All
	Where	Server side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Peteris Bruns (TDF)
Additions by		
Remarks		
Manufacturers remarks		

Fraunhofer Institute for Computer Graphics Research (IGD)

Plan4all Product/Service description # 37		
Product name/Version		HALE - HUMBOLDT Alignment Editor Version 1.0
Manufacturer		Fraunhofer Institute for Computer Graphics Research (IGD), Darmstadt, Germany
Developed from/to		Febr. 2009, software will be usable for end-users end of October 2009 with Version 1.0. Until then the schema, the instance data import and definition of simple mappings can be tested.
Contact		Thorsten Reitz, thorsten.reitz@igd.fraunhofer.de
Short Description		RCP application that allows users to interactively design transformations on a conceptual schema level. It supports import of schemas from different sources, such as Eclipse ecore, WFS and GML Application Schemas. The defined transformations are stored either locally or in the HUMBOLDT Model Repository and used by the Conceptual Schema Transformer to perform Schema Transformation on actual geodata. HALE is a tool for geodomain application experts and GI experts, especially data custodians. It provides a means to create automatically executable horizontal mappings on the conceptual schema level and in addition in some aspects on the logical schema level. It provides the means to ensure the validity of a mapping on the base of the source and target schema as well as on the base of the source and a reference data set. It uses schemas created in the HUMBOLDT Editor. It does not execute those mappings. Three are very few Conceptual Schema Alignment tools for the geodomain, and available alignment tools like FME focus strongly on the physical and logical level, whereas tools like Protégé PROMPT and COMA++ do not make use of the specifics of geoinformation.
Type		OpenSource
Approach		• Graphic Display • Mapping • Geodatabase
Interactivity		Fully interactive
Technology		
	Client side	standalone
	Used Services/ Protocols	• WFS (OGC conform) • GML
Operating System	Server side	
	Client side	Linux & Windows versions, downloadable from http://builds.esdi-humboldt.eu/hale-linux-m3.zip and http://builds.esdi-humboldt.eu/hale-win32-M3.zip
Projections	Which	
	Where	Client side
Metadata management		Mapping rules for metadata elements; INSPIRE compliant. Uses using OTL(Ontology Mapping Language).
Known usage in planning		Subproject of: HUMBOLDT Harmonisation Toolkit, which consist of (1) The HUMBOLDT Model Editor,(2) The HUMBOLDT Alignment Editor and (3) The WCDS Client.
Collected by		Julia Neuschmid, CEIT ALANOVA
Additions by		John O'Flaherty, MAC
Remarks		Source (Oct. 2009): http://www.community.esdi-humboldt.eu/projects/show/hale

Gigateway – AGI

Plan4all Product/Service description # 38		
Productname/Version		MetaGenie – 2.0
Manufacturer		Gigateway - AGI
Developed from/to		??
Contact		info@gigateway.org.uk - http://www.gigateway.org.uk/metadata/metagenie.html
Short Description		MetaGenie is metadata creation software . It enables create geographic metadata compliant with the *UK GEMINI specification.* *MetaGenie allows to create metadata in two different ways:* • by entering data directly into the tool to create individual metadata records • by automatically saving and exporting metadata records from own database, even if a database structure for these records is not present.
Type		?? (maybe freeware)
Approach		
Interactivity		
Technology	Server side	
	Client side	standalone
	Used Services/ Protocols	*UK GEMINI (ISO 19115 and INSPIRE profile)*
Operating System	Server side	
	Client side	MS Windows, Linux, Solaris
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	
Metadata management		
Known usage in planning		
Challenges		
Collected by		
Additions by		Pasquale Di Donato
Remarks		
Manufacturers remarks		

Help Forest, Wirelessinfo

Plan4all Product/Service description # 39		
Productname/Version		DATa MANager (DataMan)
Manufacturer		Help forest, WIRELESSINFO
Developed from/to		2008
Contact		horak@helpforest.cz
Short Description		DataMan is application for management of spatial data. It supports management of data in databases or files. It supports export and import of this data and also publishing and updating of related metadata. In database, it is possible to store both, vector and raster data, including their attributes. Also for file oriented storage, it supports both, vector and raster data. From raster formats, it currently supports IFF/GeoTIFF, JPEG, GIF, PNG, BMP, ECW, from vector formats ESRI Shapefile, DGN, DWG, GML.
Type		OpenSource (available from end of 2009 under GPL licence)
Approach		Web Application
Interactivity		• Only Viewing • Semi interactive • Fully interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Database Access • WebGIS functions
	Client side	• standalone • ActiveX • PlugIn/AddOn • Applet • Scripts • HTML only
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • SLD/… (OGC conform) • Simple Feature Specification for SQL (OGC) • GeoRSS • KML • GML • SVG • Others (specify …)
Operating System	Server side	
	Client side	
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	Server side Client side
Known usage in planning		
Challenges		
Collected by		Petr Horak

Plan4all Product/Service description # 40		
Productname/Version		MAP project MANager (MapMan)
Manufacturer		Help forest, WIRELESSINFO
Developed from/to		2006
Contact		horak@helpforest.cz
Short Description		The Map Project Manager (MapMan) is a web tool for users who want to publish or create new map projects and compositions. It supports publication of spatial composition from locally stored data (fields or database-stored in DataMan), with external WMS, WFS data services. MapMan provides visualization in web browser using such clients like OpenLayers, GoogleMaps, DHTML client, Desktop viewer GoogleEarth, DIS Janitor or publish data as OGC WebMapService (WMS), OGC WebFeatureService (WFS). All published data are also connected with metadata stored in Micka.
Type		OpenSource (available from end of 2009 uder GPL licence)
Approach		• Web Mapping • Spatial data publication on the web
Interactivity		Fully interactive
Technology	Server side	Web Application
	Client side	Scripts
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform)
Operating System	Server side	any
	Client side	any
Webtechnology	Webserver	any
	Browsers	any
Projections	Which	all
	Where	Server side
Metadata management		Micka
Known usage in planning		
Challenges		
Collected by		Petr Horak
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 41		
Productname/Version		Teredit System
Manufacturer		Help forest, WIRELESSINFO
Developed from/to		2007
Contact		horak@helpforest.cz
Short Description		Teredit system is a special solution for data transfer from mobile unit to server and back. This solution is realized via form of transactional component system when one part of system is installed on server (Broker). Broker enables preparation of the project, project sharing with other users and data checking before saving into target database. The second part of system is installed on mobile device (PDA) and provides communication between server and PDA. The own collection or editing can be enable by any applications in common use (tested for geographical data ArcPad, Topol CE, SiteMate, FieldCheck or for non-geographical data the own database editor)
Type		OpenSource (available from end of 2009 under GPL licence)
Approach		Data Collection in the field
Interactivity		Fully interactive
Technology	Server side	• Application Server • Database Access • Web application
	Client side	• standalone • Scripts
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • Simple Feature Specification for SQL (OGC) • GML
Operating System	Server side	Any
	Client side	Windows mobile
Webtechnology	Webserver	Any
	Browsers	
Projections	Which	All
	Where	• Server side • Client side
Metadata management		Micka
Known usage in planning		
Challenges		
Collected by		Petr Horak
Additions by		
Remarks		
Manufacturers remarks		

Help Service Remote Sensing

Plan4all Product/Service description # 42		
Productname/Version		HSLayers 1.3.0
Manufacturer		Help Service Remote Sensing
Developed from/to		2008
Contact		http://dev.bnhelp.cz/trac/hslayers/wiki/WikiStart
Short Description		HSLayers is an Open Source extension of popular Open Layers. It include: Dynamic adding of OGC (Open Geospatial Consortium) services into map - clients for WMS and WFS Portrayal of independent data sources on the client side. Map composition is composed on the basis of requests to various servers. It isa thus not necessary to install a map server. Saving of map composition according to WMC (Web Map Context) OGC specification on user computer for repeated future use or for sharing between users. Extension of compute functions based on WPS (Web Processing Service) OGC service - according to user needs Multilingual environment Map requests to various types of data stored on various servers, with automatic processing of results Work with micro-formats Search on the map On-the-fly projection on client side including S-JTSK coordinate system (direct portrayal of e.g. GPS data is therefore possible) Connection of the application with catalogue client (OGC CSW) in the geoportal, which enables display of the searched service from catalogue directly on the map. Edit function - snapping to chosen layers Possibilities for advanced configuration of user requests Advanced measuring of length and surfaces Print of map compositions - possibility of large print outs (up to A0 format), user configuration of print settings Display of description information of cadastre directly from COSMC web site
Type		OpenSource
Approach		Graphic Display Web Mapping
Interactivity		Fully interactive
Technology	Server side	
	Client side	Scripts
	Used Services/ Protocols	Raster: OGC WMS(-T), Image (PNG, JPEG, GIF), …; Vector: OGC WFS(-T), GML, GeoRSS, KML, GPX, GeoJSON, … Data sources from commercial servers: Google Maps, Virtual Earth, Yahoo Maps, …
Operating System	Server side	any
	Client side	any
Webtechnology	Webserver	any
	Browsers	any
Projections	Which	All
	Where	Client side
Metadata management		In relation with Micka system
Known usage in planning		Zemgale region, TDF

Collected by	Karel Charvat
Manufacturers remarks	Dual licensing is used. For OS is used GPL

Plan4all Product/Service description # 43		
Productname/Version		PyWPS
Manufacturer		Help Service Remote Sensing
Developed from/to		2003
Contact		http://pywps.wald.intevation.org/
Short Description		**PyWPS** is project, which is developed since 2006, and tries to implement OGC WPS standard in it's 0.4.0 version. It is written in Python programming language. The main goal of PyWPS is, that it has been written from the beginning, with direct support for GRASS GIS. So, PyWPS can be understand, as kind of translation library, which translates requests complain to WPS standard, overhands them to GRASS GIS or other command line tool (such as GDAL/OGR, PROJ.4 or R statistical package), monitors the calculation progress and informs the user and after the calculation is completed, it returns back it's result.
Type		Open Source
Approach		OGC Web Service WPS
Interactivity		Library
Technology	Server side	Grass, Linux
	Client side	Phyton
	Used Services/ Protocols	WPS 1.0.1
Operating System	Server side	Linux
	Client side	any
Webtechnology	Webserver	any
	Browsers	any
Projections	Which	N/a
	Where	N/a
Metadata management		Yes
Known usage in planning		
Challenges		
Collected by		Karel Charvat
Additions by		
Remarks		
Manufacturers remarks		

IDEC Spain

Plan4all Product/Service description # 44		
Productname/Version		MetaD – 3.05
Manufacturer		IDEC Spain
Developed from/to		??
Contact		http://www.geoportal-idec.net/geoportal/eng/metad.jsp
Short Description		Metadata editor for geospatial data
Type		?? (Maybe freeware)
Approach		
Interactivity		
Technology	Server side	
	Client side	standalone
	Used Services/ Protocols	ISO19115, ISO 19139, IDEC Schema (ISO 19115 profile)
Operating System	Server side	
	Client side	MS Windows
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	
Metadata management		Yes
Known usage in planning		
Challenges		
Collected by		
Additions by		Pasquale Di Donato
Remarks		
Manufacturers remarks		

Intelec Geomatic

Plan4all Product/Service description # 45		
Productname/Version		M^3CAT – 1.5
Manufacturer		Intelec Geomatique
Developed from/to		??
Contact		http://www.intelec.ca/html/en/technologies/m3cat.html
Short Description		M^3CAT is a tool that assist users in entering and managing metadata about geospatial data sets. M^3CAT allows users to enter metadata using any standard (Multistandard) and any language (Multilingual). It is provided with the FGDC, GILS, NBII and ISO 19115 metadata standards and in English and French. Functions are available to add other standards and/or languages. It works in a Web environment, supports XML and SGML, and can interface to the ANSI/NISO Z39.50 FGDC GEO profile.
Type		Freeware
Approach		
Interactivity		Fully interactive
Technology	Server side	
	Client side	standalone
	Used Services/ Protocols	• FGDC • GILS • NBII • ISO 19115
Operating System	Server side	MS Windows
	Client side	
Webtechnology	Webserver	Requires MS IIS and Oracle or Access
	Browsers	
Projections	Which	
	Where	
Metadata management		Yes
Known usage in planning		
Challenges		
Collected by		Pasquale Di Donato
Additions by		
Remarks		
Manufacturers remarks		

Intevation GmbH / TechniData AG

Plan4all Product/Service description # 46		
Productname/Version		Thuban, Version 1.2.2 (2009), Versions have been released about 1-1,5 years periods since dec. 2003
Manufacturer		Intevation GmbH and TechniData AG
Developed from/to		2001-2008
Contact		Bernhard Reiter (bernhard@intevation.de)
Short Description		Thuban is an interactive, multi-platform geographic data viewer, which can visualize and analyze spatial data (only query, join) and convert between projections. Multi-Language Support; vector and raster data support, extensability and flexibility for deriving individual GIS applications.
Type		OpenSource
Approach		• Desktop GIS Viewer • Geodatabase can be added: PostGis
Interactivity		Fully interactive (but not too many functions)
Technology	Server side	-
	Client side	• standalone • PlugIn/AddOn
	Used Services/ Protocols	• WMS (OGC conform) • Export to SVG
Operating System	Server side	
	Client side	Multi-platform: Windows, Mac, Linux
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	• Server side • Client side
Metadata management		-
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Sources (Oct. 2009): http://www.cascadoss.eu/en/PDFs/SW_Documentation_Thuban.pdf http://thuban.intevation.org/concept.html
Manufacturers remarks		

IVER

Plan4all Product/Service description # 47		
Productname/Version		GvSIG 1.9
Manufacturer		IVER Tecnologías (Spain) together with the Generalitat Valenciana and the Jaume I University of Castellón 1.1 (latest stable version; Version 1.9 – latest unstable version)
Developed from/to		2003-200x
Contact		http://www.gvsig.gva.es
Short Description		Desktop GIS oriented to manage geographic information which is characterised by a user-friendly interface. It can handle both vector and raster data. It features basic ans advanced editing tools for the creation and maintenance of vector or raster spatial data on a variety of file formats, including remote data sources. Application interface is in Spanish, Valencian, English, Basque, Gallego, Czech, Chinese, French, German, Italian, Romanian, Polish and Portuguese. In some cases application is able to use JUMP (Java Unified Mapping Platform) plugins. On gvSIG base is developed also mobile application gvSIG Mobile version for use in mobile devices.
Type		OpenSource
Approach		• Graphic Display • Web Mapping • Geodatabase • Modelling and Analysis (e.g. network analysis) • Simple data processing (union,clip,dissolve etc.)
Interactivity		• Fully interactive
Technology	Server side	
	Client side	• Standalone • PlugIn/AddOn • Applet
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WCS (OGC conform) • SLD/… (OGC conform) • GeoRSS • KML • GML • SVG • possible to extend with plugins (ArcIMS, ArcSDE and other)
Operating System	Server side	Multi-platform - Windows, Linux, and Mac OS X
	Client side	Multi-platform - Windows, Linux, and Mac OS X
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	Server side Client side
Metadata management		According to ISO 19115 Standards
Known usage in planning		It is aimed at users of geographic information, whether professionals or civil servants (city councils, councils, regional councils or ministries); It is also interesting for university settings due to its R&D&I component.

Challenges	
Collected by	Norma Zanetti Hyperborea
Additions by	Peteris Bruns
Remarks	Sources (Oct. 2009): http://www.cascadoss.eu/en/PDFs/SW_Documentation_gvSIG.pdf http://www.gvsig.gva.es/index.php?id=gvsig_desktop&L=2 http://www.gvsig.gva.es/fileadmin/conselleria/images/Documentacion/ponencias/gvSIG_Intergeo08.pdf
Manufacturers remarks	

lat/lon

Plan4all Product/Service description # 48		
Productname/Version		deegree
Manufacturer		lat/lon / Department of Geography, GIS Unit
Developed from/to		?-2009
Contact		mail@deegree.org
Short Description		deegree is a Java Framework offering the main building blocks for Spatial Data Infrastructures. Its entire architecture is developed using standards of the Open Geospatial Consortium (OGC) and ISO/TC 211 (ISO Technical Committee 211 -- Geographic Information/Geomatics).
Type		• OpenSource
Approach		• Graphic Display • Web Mapping • Web GIS • building spatial data infrastructures
Interactivity		Fully interactive
Technology	Server side	• Application Server • Tile Server • File Interpreting (shp / gml) • Database Access, Support of PostGIS 1.0 and Oracle spatial/locator (9i/10g) • WebGIS functions
	Client side	HTML only
	Used Services/ Protocols	• WMS (official reference implementations of the Open Geospatial Consortium) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (official reference implementations of the OGC) • pre-standards of Sensor Observation Service (SOS) • Web Terrain Service / Web Perspective and View Service (WTS/WPVS) • Web Processing Service (WPS) • SLD (OGC conform) • Simple Feature Specification for SQL (OGC) • KML • GML, Support of GML 3.1 with a complex Feature Model and 3D-geometries • SVG
Operating System	Server side	java
	Client side	
Webtechnology	Webserver	java servlet engine e.g. apache tomcat
	Browsers	
Projections	Which	Many different; extendable
	Where	Server side
Metadata management		CSW supports ISO19115/ISO19119 Application Profile, fully transactional
Known usage in planning		spatial data infrastructure Hamburg Metropolitan Region (SDI-MRH) xplanung (Germany) Informatiemodel Ruimtelijke Ordening (*IMRO*) (Netherlands)
Collected by		Kai-Uwe Krause

Plan4all Product/Service description # 49		
Productname/Version		GeoPista
Manufacturer		
Developed from/to		Ministerio de Fomento, Ministerio de Administraciones Públicas, Ministerio de Industria, Turismo y Comercio, Ministerio de Economía y Hacienda
Contact		http://www.grupotecopy.es/cotesa/
Short Description		**GEOPISTA** is a **Territorial Information System for City Councils** that on the basis of a mapping geopositions both municipal information and Management, providing thus online services based on Geographical Information Systems.
Type		OpenSource
Approach		• Graphic Display • Web Mapping • Web Cartography • Web GIS • Geodatabase • Location-based services
Interactivity		• Full interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Database Access (supported databases are Oracle Spatial; MySQL; PostgreSQL (PostGIS)) • WebGIS functions
	Client side	• ActiveX • PlugIn/AddOn • Applet
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • SLD/… (OGC conform) • GML • SVG • ECW, Tiff, GeoTiff, MrSid
Operating System	Server side	Windows
	Client side	Windows, GNU/Linux and other Unice
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	Server side Client side
Metadata management		
Known usage in planning		• Ayuntamiento de Moya, Las Palmas • Diputación Provincial de Albacete • Ayuntamiento de Olot, Gerona • Ayuntamiento de Villablino, León • Grupo de Acción Local de la Sierra del Segura, Albacete • Ayuntamiento de Aspe, Alicante • Ayuntamiento de Xativa, Valencia • Diputación de Cuenca • Grupo de Acción Local Campos de Hellín, Albacete • Diputación Provincial de Lleida • Ayuntamiento de Tomelloso, Ciudad Real • Diputación Provincial de Barcelona • Ayuntamiento de Abegondo, La Coruña • Ayuntamiento de As Pontes de García Rodríguez, La Coruña • Junta de Comunidades de Castilla La Mancha • Diputación Provincial de A coruña • Ayuntamiento de Las Rozas, Madrid • Ayuntamiento de Cuenca, Cuenca

	• Diputación Provincial de Valencia • Diputación Provincial de Badajoz • Diputación Provincial de Huesca • Mancomunidad de Municipios del Bajo Guadalquivir, Sevilla • Diputación Provincial de Almería • Consell de Mallorca • Junta de Castilla y León • Diputación Provincial de Pontevedra • Diputación Provincial de Soria • Ayuntamiento de Miranda de Ebro, Burgos • Diputación Provincial de Palencia • Ayuntamiento de Salamanca • Ayuntamiento de Córdoba • Diputación Provincial de León • Ayuntamiento de Lalín, Pontevedra • Mancomunidad de Sierra Morena Cordobesa, Córdoba • Ayuntamiento de Roses, Girona • Ayuntamiento de Abaran, Murcia • Ayuntamiento de Valverde del Camino, Huelva • Ayuntamiento de Alzira, Valencia • Ayuntamiento de Ciutadella de Menorca, Baleares • Ayuntamiento de Pizarra, Málaga • Mancomunidad de Municipios de la Sierra de Cádiz, Cádiz • Diputación de Guadalajara • Ayuntamiento de Alhaurin el Grande, Málaga • Ayuntamiento de Écija, Sevilla • Ayuntamiento de Guillena, Sevilla • Ayuntamiento de Pineda de Mar, Barcelona • Ayuntamiento de Montilla, Córdoba • Región de Murcia • Consorcio Cuenca Minera de Río Tinto, Huelva • Ayuntamiento de Ceutí, Murcia • Ayuntamiento de Algarrobo, Málaga • Mancomunidad de Desarrollo Condado de Huelva, Huelva • Ayuntamiento de A Estrada, Pontevedra • Mancomunidad de Servicios del Suroeste de Madrid, Madrid • Ayuntamiento de Badalona, Barcelona • Diputación de Tarragona Diputación de Alicante • Ayuntamiento de San Lorenzo de el Escorial, Madrid • Municipio de Caranavi, Bolivia • Ayuntamiento de Santa Lucia, Las Palmas • Ayuntamiento de Fondón, Almería • Ayuntamiento de Puerto del Rosario, Las Palmas • Ayuntamiento de El Ejido, Almería • Ayuntamiento de Laviana, Asturias • Ayuntamiento de Calvia, Illes Baleares • Ayuntamiento de Tineo, Asturias • Ayuntamiento de Manresa, Barcelona • Diputación Provincial de Burgos • Ayuntamiento de Fuentidueña de Tajo, Madrid • Ayuntamiento de Alhaurín de la Torre, Málaga • Ayuntamiento de Bellreguard, Valencia • Ayuntamiento de Almansa, Albacete • Ayuntamiento de Balaguer, Lleida • Ayuntamiento de Barrios de Colina, Burgos • Ayuntamiento de Valdes, Asturias • Ayuntamiento de Cambre, A Coruña • Ayuntamiento de Tuineje, Las Palmas • Ayuntamiento de Mérida, Badajoz • Ayuntamiento de Riofrío de Aliste, Zamora • Ayuntamiento de Jaén, Jaén • Ayuntamiento de Almonte, Huelva • Ayuntamiento de Tordesillas, Valladolid • Ayuntamiento de Finestrat, Alicante • Diputación Provincial de Sevilla • Ayuntamiento de Vigo, Pontevedra • Grupo de Acción Local de Alto Guadiana Mancha, Ciudad Real
Challenges	
Collected by	Agustín Lanero. Ayuntamiento de Gijón
Additions by	
Remarks	
Manufacturers remarks	http://www.geopista.com/

OSGeo

Plan4all Product/Service description # 50		
Productname/Version		GDAL 1.6.2 (Geospatial Data Abstraction Library)
Manufacturer		Frank Warmerdam (OSGEO)
Developed from/to		
Contact		http://www.gdal.org/
Short Description		GDAL is a translator library for raster geospatial data formats that is released under an X/MIT style Open Source license by the Open Source Geospatial Foundation. As a library, it presents a single abstract data model to the calling application for all supported formats. It also comes with a variety of useful commandline utilities for data translation and processing. The NEWS page describes the August 2009 GDAL/OGR 1.6.2 release. The related OGR library (which lives within the GDAL source tree) provides a similar capability for simple features vector data.
Type		OpenSource
Approach		Data transformation library
Interactivity		Library
Technology	Server side	
	Client side	Standalone
	Used Services/ Protocols	WMSTS
Operating System	Server side	Multi-platform - Windows, Linux, and Mac OS X
	Client side	Multi-platform - Windows, Linux, and Mac OS X
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	
Metadata management		
Known usage in planning		Uses a lot of desktop and server side applications like UMN Mapserver, Qgis even commercial ArcGIS software.
Challenges		
Collected by		Peteris Bruns (TDF)
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 51	
Productname/Version	GRASS (Geographic Resources Analysis Support System), current version GRASS 6.4.0RC5 (June 2009)
Manufacturer	Open Source Geospatial Foundation, community
Developed from/to	1982 - today, continuous updates
Contact	http://grass.itc.it/community/team.php, http://lists.osgeo.org/mailman/listinfo/grass-dev irc://freenode.net #grass
Short Description	GIS used for data management, image processing, graphics production, spatial modeling, spatial analysis, creating, managing and storing spatial data (raster/vector format) and visualization. GRASS can interface with commercial printers, plotters, digitizers, and databases to develop new data as well

		as manage existing data. 3D (raster and vector) capabilities (analyze, display). No 3D vector topology is build.
Type		OpenSource & Free Software
Approach		Desktop GIS Allows integration with WebGis applications Geodatabase, GRASS can be linked to one or many database management systems (e.g. PostgreSQL, mySQL, SQLite, ODBC, …) PostgreSQL is prefered. Routing – network analysis Visualization, Analysis, Processing Remote sensing data analysis Spread modelling ...
Interactivity		Fully interactive
Technology	Server side	-
	Client side	standalone
	Used Services/ Protocols	• SVG – very limited • Support of OGC services • ODBC
Operating System	Server side	GNU/Linux, MS Windows, MacOSX
	Client side	GNU/Linux, MS Windows, MacOSX
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	Client side
Metadata management		Rather poor, limited metadata management system (no support of any standard). It is on the top of GRASS developers TODO list.
Known usage in planning		GRASS is currently used in academic and commercial settings around the world, as well as by many governmental agencies and environmental consulting companies.
Challenges		Metadata, new raster architecture, GUI, new vectorization, new 3D visualization tool (wxnviz),..Ongoing development in 7.0 branch. Small developer community.
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		Jachym Cepicky (HSRS-Help Service Remote Sensing)
Remarks		Sources (Oct. 2009): http://grass.osgeo.org/intro/general.php http://www.cascadoss.eu/en/PDFs/SW_Documentation_GRASS.pdf http://grass.itc.it/devel/grasshist.html http://gama.fsv.cvut.cz/~landa/publications/2007/workshop-cvut-07/landa-metadata-grass.pdf http://www.ohloh.net/p/grass_gis
Manufacturers remarks		

Plan4all Product/Service description # 52	
Productname/Version	Mapbender 2.5.2
Manufacturer	OSGeo
Developed from/to	
Contact	see http://www.mapbender.org/Partners
Short Description	Mapbender is the software and portal site for geodata management of OGC OWS architectures. The software provides web technology for managing spatial data services implemented in PHP, JavaScript and XML and licensed under the GNU GPL. It provides a data model and interfaces for displaying, navigating and querying OGC compliant map

		services. The Mapbender framework furthermore provides authentication and authorization services, OWS proxy functionality, management interfaces for user, group and service administration in WebGIS projects.
Type		Open Source
Approach		Web Mapping
Interactivity		Fully interactive
Technology	Server side	• PHP • Database Access
	Client side	• Scripts • HTML
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • SLD/… (OGC conform)
Operating System	Server side	every
	Client side	every
Webtechnology	Webserver	every
	Browsers	every
Projections	Which	depends on queried map servers
	Where	Server side
Metadata management		none
Known usage in planning		CentropeMAP
Challenges		
Collected by		Clemens Beyer, CEIT ALANOVA
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 53		
Productname/Version		MapServer v5.4.2
Manufacturer		OSGeo (formerly University of Minnesota)
Developed from/to		199x-2009
Contact		OSGEO
Short Description		Multi-purpose web map portal
Type		• OpenSource
Approach		• Graphic Display • Web Mapping • Web Cartography • Web GIS • Location-based services
Interactivity		• Only Viewing • Semi interactive • Fully interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Database Access • WebGIS functions
	Client side	• Scripts • HTML only

	Used Services/ Protocols	• Legacy proprietary interface • WMS client/server (OGC) • WFS client/server (OGC) • WMC (OGC) • WCS (OGC) • Filter Encoding SLD (OGC) • GML (OGC) • SOS (OGC) • OM (OGC) • Simple Feature Specification for SQL (OGC) • GeoRSS • KML • SVG
Operating System	Server side	Windows, Unix/Linux, FreeBSD (written in C)
	Client side	Multiple tools use Mapserver as back-end, e.g. KaMAP, MapBender
Webtechnology	Webserver	Integrates with Apache or IIS through PHP add-on module, also .NET and JAVA bindings.
	Browsers	Browser independent
Projections	Which	Full projection/re-projection support through WKT coordinate system definitions and the PROJ-library. Comes with comprehensive EPSG codes and easily extensible.
	Where	Server side: YES Client side: NO
Metadata management		Metadata for WMS/WFS services may be maintained within map definition file both on MAP and LAYER level.
Known usage in planning		Used as back-end for many client solutions, e.g. widely in Norway.
Challenges		
Collected by		Runar Bergheim
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 54		
Productname/Version		OpenLayers 2.8
Manufacturer		OSGeo
Developed from/to		
Contact		http://openlayers.org/
Short Description		OpenLayers is an Open Source map viewing library, written in pure JavaScript. The OpenLayers library provides a JavaScript API which makes it easy to incorporate maps from a variety of sources into your webpage or application. OpenLayers currently has support for OGC WMS layers, navigation, icons, markers, and layer selection
Type		OpenSource
Approach		• Graphic Display • Web Mapping
Interactivity		• Fully interactive
Technology	Server side	
	Client side	Scripts
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform)
Operating System	Server side	any
	Client side	any
Webtechnology	Webserver	any

	Browsers	any
Projections	Which	All
	Where	Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Norma Zanetti Hyperborea
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 55		
Productname/Version		Proj4 – 4.4.6 (MS windows), 4.4.8 (Linux)
Manufacturer		Originally developed by Gerald Evenden (USGS), now within the OSGEO Community
Developed from/to		Continuous development
Contact		http://trac.osgeo.org/proj/
Short Description		Cartographic projection library
Type		OpenSource (MIT License)
Approach		Projection library used by several software
Interactivity		Command line tools
Technology	Server side	Not applicable, but used by other server side applications such as MapServer, PostGIS
	Client side	standalone
	Used Services/ Protocols	
Operating System	Server side	MS Windows, Linux
	Client side	
Webtechnology	Webserver	
	Browsers	
Projections	Which	several
	Where	Proj4 is a library and as such can be embedded in server side applications. Command line tools are available for desktop use.
Metadata management		
Known usage in planning		
Challenges		
Collected by		Pasquale Di Donato
Additions by		
Remarks		
Manufacturers remarks		

PortalU

Plan4all Product/Service description # 56		
Productname/Version		InGrid
Manufacturer		Federal-State-Cooperation PortalU (environmental ministries on federal and state level), Coordination Center PortalU
Developed from/to		From 2005
Contact		kst@portalu.de
Short Description		The technology of the German Environmental Information Portal PortalU® (www.PortalU.de) InGrid® is a modular software for the central access to online available environmental information. The name InGrid is a shortcut for *Information Grid*. In an InGrid®-Portal it is possible to integrate web pages, data and metadata. The software InGrid® is applicable for different kinds of purposes. Main components of InGrid®: User-friendly and flexible configurable portal surface Metadata catalog InGrid®Catalog (webcatalog) Map viewer Diverse enquiry interfaces for the search in connected system and for information transfer
Type		OpenSource components Webcatalog: INSPIRE (IR Metadata), ISO 19115 / ISO 19119 conform OGC-CSW-2-0 interface (DE profile) based on ISO standards 19115, 19119 and 19139 an INSPIRE OGC conform WMS viewer Software can be used without licence fees on federal, state and municipal level in Germany Rights on Software are reserved by German Federal Ministry for Environment, Nature Conservation and Nuclear Safety
Approach		Portal and Search functions with full text search, thesaurus based search, display of ongoing news, measurement data and special topic pages Visualisation of digital maps by an integrated map viewer and WMS (Web Mapping) Spatial search for maps, services and other information objects Determination of spatial reference from non referenced content by semantically analysis of the place names within the document ISO conform description and management of geo data and geo services in the integrated metadata catalog InGrid®Catalog Involvement of external geo data catalogs via OGC-CSW-2.0 compatible interface Transfer from information via CSW-2.0 interface to other systems -> thus an integration in spatial data infrastructure like GDI-DE or INSPIRE is possible
Interactivity		Fully interactive
Technology	Server side	• Java 6 SDK • Tomcat • Apache • PHP • Relational Database (MySQL, PostgreSQL, MS SQL Server, Oracle)

	Client side	Web Browser
	Used Services/ Protocols	• Java Binary Objects • TCP/IP • HTTP • HTTPS • XML • CSW (OGC conform) • WMS (OGC conform) • OpenSearch / GeoRSS
Operating System	Server side	Windows or Linux derivates
	Client side	Any (as far as a web browser is included)
Webtechnology	Webserver	Apache
	Browsers	Firefox, Internet Explorer, Opera, Safari, Chrome, …
Projections	Which	Many different; extendable
	Where	Server side
Metadata management		Metadata are managed by the webcatalog InGridCatalog (INSPIRE IR Metadata, ISO 19115, ISO 19119 conform) where different kind of environmental information can be described: geoinformation, maps, services, applications, informationsystems, data collections, data bases, documents, reports, literature, projects and programmes
Known usage in planning		Besides PortalU InGrid is used for running two environmental information portals on state level (Saxony and Rhineland Platinate) and one on municipal level (Lower Saxony); furthermore it is used within the EU-funded eContenplus Project GS Soil (www.gssoil.eu)
Challenges		
Collected by		
Additions by		
Remarks		For further information: www.kst.portalu.de
Manufacturers remarks		

QGIS Project Steering Committee (PSC)

Plan4all Product/Service description # 57		
Productname/Version		Quantum GIS (QGIS) (1.2.0)
Manufacturer		QGIS Project Steering Committee (PSC)
Developed from/to		2002 to 2009
Contact		www.qgis.org, sherman@mrcc.com
Short Description		QGIS is an Open Source GIS, providing common GIS functions and features. QGIS supports a number of raster and vector data formats, with new format support easily added using the plugin architecture. QGIS is released under the GNU General Public License (GPL). Developing QGIS under this license means that everybody can inspect and modify the source code.
Type		OpenSource
Approach		Graphic Display
Interactivity		Fully interactive
Technology	Server side	Database Access (PostgreSQL PostGIS)
	Client side	Standalone
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • Simple Feature Specification for SQL (OGC) • GML
Operating System	Server side	
	Client side	Java (Linux , Unix, Windows, OS X)
Webtechnology	Webserver	
	Browsers	
Projections	Which	Many different; extendable.
	Where	Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Giuseppina Pellegrino (DIPSU)
Additions by		
Remarks		
Manufacturers remarks		

Refrations Research

Plan4all Product/Service description # 58		
Productname/Version		PostGIS
Manufacturer		Refractions Research
Developed from/to		
Contact		http://postgis.refractions.net/
Short Description		PostGIS provides support for geographic objects to the PostgreSQL DBMS. PostGIS follows the OpenGIS "Simple Features Specification for SQL" and has been certified as compliant with the "Types and Functions" profile. PostGIS has been developed as a project in open source spatial database technology and is released under the GNU General Public License.
Type		OpenSource
Approach		GIS
Interactivity		Full, DB level
Technology	Server side	Spatial data management functions
	Client side	
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • GML • WKT
Operating System	Server side	any
	Client side	any
Webtechnology	Webserver	any
	Browsers	any
Projections	Which	All
	Where	Server side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Norma Zanetti Hyperborea S.r.l.
Additions by		
Remarks		
Manufacturers remarks		

Plan4all Product/Service description # 59		
Product name/Version		uDig
Manufacturer		
Developed from/to		
Contact		http://udig.refractions.net
Short Description		uDig is an open source (LGPL) GIS desktop application framework, built with Eclipse Rich Client (RCP) technology. uDig s a complete Java solution for desktop GIS data access, editing, and viewing. uDig aims to be: **U**ser friendly, providing a familiar graphical environment for GIS users; **D**esktop located, running as a thick client, natively on Windows, Mac OS/X and Linux; **I**nternet oriented, consuming standard (WMS, WFS, WCS) and de facto (GeoRSS, KML, tiles) geospatial web services; and, **G**IS ready, providing the framework on which complex analytical capabilities can be built, and gradually subsuming those capabilities into the main application.
Type		• OpenSource
Approach		• Graphic Display • Web Mapping • Web GIS • Geodatabase
Interactivity		Fully interactive
Technology	Server side	-
	Client side	• standalone • PlugIn/AddOn
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • WFS (OGC conform) • SLD/… (OGC conform) • GeoRSS • KML • GML • SVG
Operating System	Server side	
	Client side	All platform (Java based)
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Norma Zanetti Hyperborea
Additions by		
Remarks		
Manufacturers remarks		

SAIG

Plan4all Product/Service description # 60		
Productname/Version		Kosmo GIS Desktop 1.2.1
Manufacturer		SAIG is a company centered at the development of **Geographic Information Systems** and **solutions** over them.
Developed from/to		
Contact		http://www.opengis.es/
Short Description		Desktop GIS oriented to manage geographic information which is characterized by a user-friendly interface. Application is based on JUMP (Java Unified Mapping Platform) annd is able to use JUMP and Open Jump plugins.
Type		OpenSource
Approach		• Graphic Display • Web Mapping • Geodatabase • Modelling and Analysis (e.g. network analysis) • Simple data processing (union,clip,dissolve etc.)
Interactivity		Fully interactive
Technology	Server side	
	Client side	• Standalone • PlugIn/AddOn • Applet
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • SLD/… (OGC conform) • GML • SVG • possible to extend with plugins (ArcIMS, ArcSDE and other)
Operating System	Server side	Multi-platform - Windows, Linux, and Mac OS X
	Client side	Multi-platform - Windows, Linux, and Mac OS X
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	Server side Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		
Additions by		Peteris Bruns (TDF)
Remarks		
Manufacturers remarks		

SDRN, FAO et. al

Plan4all Product/Service description # 61		
Productname/Version		GeoNetwork 2.4.2 (Oct. 2009)
Manufacturer		The Environment and Natural Ressource Service (SDRN) and the FAO (Food and Agriculture Organisation of the United Nations) joined by WFP (World Food Programme), UNEP and UN-OCHA (United Nation Environment Programme)
Developed from/to		-
Contact		FAO UN – SDRN Viale delle Terme di Caracalla, Rome, Italy +39 06 57051 www.fao.org
Short Description		GeoNetwork opensource is a standards based, free and Open Source catalog application to manage spatially referenced resources through the web. It provides powerful metadata editing and search functions as well as an embedded interactive web map viewer. It implements both the Portal component and the Catalog database of a Spatial Data Infrastructure (SDI) defined in the OGC Reference Architecture.
Type		OpenSource
Approach		• SDI • Portal service: Interactive web map viewer • Catalogue service: database of the SDI (managing and publishing metadata)
Interactivity		• Fully interactive
Technology	Server side	• Application Server • Database Access
	Client side	• standalone • PlugIn/AddOn
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • SLD/… (OGC conform) • GeoRSS • KML
Operating System	Server side	
	Client side	Windows, Linux and Mac OS X.
Webtechnology	Webserver	
	Browsers	
Projections	Which	
	Where	• Server side • Client side
Metadata management		Synchronisation of metadata between distributed catalouges, support for a number of metadata formats (compliant for ISO19115/19119 following ISO19139, FGDC and Dublin Core)
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Source (Oct. 2009): http://geonetwork-opensource.org/ http://geonetwork-opensource.org/GeoNetwork_opensource_20_Flyer.pdf

Manufacturers remarks	

T-Systems España, SAU

Plan4all Product/Service description # 62		
Productname/Version		MonoGIS
Manufacturer		T-Systems España, SAU Calle Sancho de Ávila, 110-130. 08018 Barcelona. España
Developed from/to		
Contact		michael.paul@t-systems.com
Short Description		MonoGis as an map server open source project. It includes a benchmarking between other open source map server. Mono is multi-platform, multi-language and multi-technology. The term multi-technology means that you may couple a variety of different programming platforms within the same application.
Type		OpenSource
Approach		• Graphic Display • Web Mapping • Web Cartography • Web GIS • Geodatabase • Location-based services
Interactivity		Semi interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Database Access (supported databases are Oracle Spatial; MySQL; PostgreSQL (PostGIS)) • WebGIS functions
	Client side	• ActiveX • PlugIn/AddOn • Scripts
	Used Services/ Protocols	• Geomedia GDO (stored in MDB, SQL Server or Oracle) • some OGR supported formats (DGN v7, MapInfo, Oracle Spatial, GML, S-57) • Oracle Spatial • JPEG, PNG, TIFF and ECW raster data sets.
Operating System	Server side	Windows
	Client side	Windows, GNU/Linux and other Unice
Projections	Which	All
	Where	• Server side • Client side
Metadata management		
Known usage in planning		• Ayuntamiento de Gijón • Ayuntamiento de Leganés • Ayuntamiento de San Feliu de Llobregat • Ayuntamiento de Terrasa • Diputación de Tarragona
Challenges		
Collected by		Agustín Lanero. Ayuntamiento de Gijón
Manufacturers remarks		http://galadriel.grokthis.net:8011/ http://biblioteca.universia.net/html_bura/ficha/params/id/42168158.html

Stuttgart University, Utah State University, Idaho State University

Plan4all Product/Service description # 63		
Productname/Version		PHPMy WMS
Manufacturer		University of Applied Science Stuttgart, Department of Geomatics, Computer Science and Mathematics, Schellingstraße 24, D-70174 Stuttgart
Developed from/to		
Contact		Franz-Josef Behr (*franz-josef.behr*@hft-*stuttgart*.de)
Short Description		A SVG oriented Framework for extended Web Map Services.
Type		OpenSource
Approach		Web Mapping
Interactivity		Fully interactive
Technology	Server side	
	Client side	• Standalone viewer application • PlugIn/AddOn • Conversion from many GIS formats / systems
	Used Services/ Protocols	• WMS (OGC conform) • Visualization for GML • SVG • CGI protocol
Operating System	Server side	
	Client side	
Webtechnology	Webserver	• Php based applications • Geo database (currently MySQL)
	Browsers	Standard browser, increasing browser support (Opera, Firefox)
Projections	Which	
	Where	• Server side • Client side
Metadata management		
Known usage in planning		
Challenges		Possible improvements : Support of Styled Layer Descriptor (SLD) specification or user-defined symbolization. Extension to cascading server. LBS extension: User support like GSM-based positioning techniques, or GPS support would be helpful. Extending browser based client Adding additional services (like better GetFeature support based on geo-coordinates) Better sample data in the geo-database.
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Sources (oct. 2009): http://www.gis-news.de/papers/PHPMyWMS_2.ppt
Manufacturers remarks		

Plan4all Product/Service description # 64		
Productname/Version		MapWindowGIS version 4.3
Manufacturer		Utah State University. Idaho State University
Developed from/to		
Contact		http://www.mapwindow.org/contact.php
Short Description		**MapWindow GIS** The MapWindow application is a free, extensible, geographic information system (GIS) that can be used: As an alternative desktop GIS To distribute data to others To develop and distribute custom spatial data analyses **MapWinGIS ActiveX Control** At the core of the MapWindow application is the MapWinGIS ActiveX control. Using this control, you can program custom mapping functionality directly into your own software
Type		Open source component (free distribution)
Approach		• Graphic Display • Web Mapping • Web Cartography • Web GIS • Geodatabase • Location-based services
Interactivity		Semi interactive
Technology	Server side	• Application Server • Tile Server/… • File Interpreting • Database Access (supported databases are Oracle Spatial; MySQL; PostgreSQL (PostGIS)) • WebGIS functions
	Client side	ActiveX
	Used Services/ Protocols	• ESRI Shapefiles • ASCII Grids • GeoTiff Grids
Operating System	Server side	Windows
	Client side	Windows
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	• Server side • Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Agustín Lanero. Ayuntamiento de Gijón
Additions by		
Remarks		
Manufacturers remarks		http://www.mapwindow.org/

Vivid Solutions

Plan4all Product/Service description # 65		
Productname/Version		JUMP 1.2
Manufacturer		Vivid solutions
Developed from/to		2003 - 2006
Contact		http://www.vividsolutions.com/JUMP/
Short Description		The **Unified Mapping Platform** (JUMP) is a GUI-based application for viewing and processing spatial data. It includes many common spatial and GIS functions. It is also designed to be a highly extensible framework for developing and running custom spatial data processing applications. JUMP has the following features: JUMP provides an interactive Workbench for viewing, editing, and processing spatial datasets JUMP provides an API giving full programmatic access to all functions, including I/O, feature-based datasets, visualization, and all spatial operations JUMP is highly modular and extensible JUMP supports important industry standards such as GML and the OpenGIS Consortium spatial object model JUMP is written in 100% pure Java JUMP is open source JUMP uses the JTS Topology Suite to provide an OGC-compliant spatial object model and the fundamental geometric operations.
Type		OpenSource
Approach		• Graphic Display • Web Mapping • Geodatabase • Modelling and Analysis (e.g. network analysis) • Simple data processing (union,clip,dissolve etc.)
Interactivity		• Fully interactive
Technology	Server side	
	Client side	• Standalone • PlugIn/AddOn • Applet
	Used Services/ Protocols	• SLD/… (OGC conform) • GML • SVG • possible to extend with plugins (wms,wfs, ArcIMS, ArcSDE and other)
Operating System	Server side	Multi-platform - Windows, Linux, and Mac OS X
	Client side	Multi-platform - Windows, Linux, and Mac OS X
Webtechnology	Webserver	
	Browsers	
Projections	Which	All
	Where	Server side Client side
Metadata management		
Known usage in planning		
Challenges		
Collected by		Peteris Bruns (TDF)
Additions by		
Remarks		

11.5 Portals

INSPIRE Geoportal

Plan4all Product/Service description # 66		
Productname/Version		Inspire Geoportal (prototype)
Manufacturer		Published by the EU, Joint Research Center
Developed from/to		Sept. 2008, ongoing
Contact		http://www.inspire-geoportal.eu/
Short Description		The geoportal provides the means to search for spatial data sets and spatial data services, and subject to access restrictions, view and download spatial data sets from the EU Member States within the framework of the Infrastructure for Spatial Information in the European Community (INSPIRE) Directive.
Type		Popular Network Service without costs
Approach		• Graphic Display • Metadata editor (create metadata according to INSPIRE)
Interactivity		Fully interactive (create metadata)
Technology	Server side	Do not know
	Client side	Do not know
	Used Services/ Protocols	• WMS (OGC conform) • WFS (OGC conform) • WFS-T (OGC conform) • WCS (OGC conform) • CSW • WPS • GML
Operating System	Server side	
	Client side	Windows, Linux, MAC OS X
Webtechnology	Webserver	
	Browsers	All
Projections	Which	ETRS89 (?), compatible to other projections
	Where	Server side Client side
Metadata management		Yes, according to INSPIRE, at the moment not much metadata is available as it is just a prototype so far
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Sources (Oct. 2009): http://www.inspire-geoportal.eu/index.cfm/pageid/241/documentid/502/doctype/341
Manufacturers remarks		

11.6 Popular services without costs

Google

Plan4all Product/Service description # 67		
Productname/Version		Google Earth (Version 5)
Manufacturer		Original author Keyhole Corp. (2001) > Google Inc. (2004)
Developed from/to		2001 (under the name “keyhole; Earth Viewer 3D”) > from 2004 Google Earth by Google
Contact		http://earth.google.com/
Short Description		2D view/3D model of the earth (satellite images, aerial photography) as well as vector data (border lines, localities, transportation network, POIs); functions: search, navigation, measurement, zoom; additional features like googly sky, google moon, street view, google ocean, flight simulator, etc.; 41 languages; image data and resolution vary
Type		Free software with limited functionality (Google Earth) Commercial (Google Earth Pro)
Approach		Desktop application, Virtual Globe
Interactivity		Only Viewing (3D)
Technology	Server side	• Application Server • Tile Server/… • File Interpreting
	Client side	PlugIn/AddOn
	Used Services/ Protocols	• proprietary • WMS server • WFS (OGC conform) • SLD/… (OGC conform) • GeoRSS • KML for customising Google Earth • GML • SVG
Operating System	Server side	
	Client side	Windows (2000, XP, Vista), Mac OS X (ab 10.3.9) und Linux, iphone OS
Webtechnology	Webserver	
	Browsers	Internet Explorer, Mozilla Firefox, Google Chrome, Safari
Projections	Which	WGS84
	Where	Server side Client side
Metadata management		Yes
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		
Remarks		Source (Oct. 2009) http://en.wikipedia.org/wiki/Google_Earth http://computer.howstuffworks.com/google-earth11.htm
Manufacturers remarks		

Plan4all Product/Service description #...		
Productname/Version		Google Maps
Manufacturer		Google Inc.
Developed from/to		2005 (published)
Contact		http://maps.google.at/
Short Description		A web service that allows the search for locations and objects in a map/satellite picture. Functions are search, navigation, zoom; it is multilingual. Google Maps API allows developers to integrate Google Maps into their websites with their own data points. It is a free service. Spatial data comes from Tele Atlas.
Type		• Commercial • free use of the web service without registration/costs for non commercial use (commercial use partly free)
Approach		• Web Mapping • Web based 2D viewer • Routing (for some countries, sometimes also including public transportation data)
Interactivity		Semi interactive (option of personalisation: create own overlays, save maps)
Technology	Server side	• Application Server • Tile Server/…
	Client side	• PlugIn/AddOn • Applet • Scripts • xml
	Used Services/ Protocols	• proprietary • WMS (OGC conform) • WFS (OGC conform) • SLD/… (OGC conform) • GeoRSS is supported • KML is supported • GML • SVG
Operating System	Server side	
	Client side	Windows, Mac OS X, Linux
Webtechnology	Webserver	
	Browsers	Internet Explorer, Google Chrome, Firefox, Safari
Projections	Which	Mercator
	Where	• Server side • Client side
Metadata management		Yes
Known usage in planning		
Challenges		
Collected by		Julia Neuschmid (CEIT Alanova)
Additions by		Wolfgang W. Wasserburger (CEIT Alanova)
Remarks		Source (Oct. 2009) http://de.wikipedia.org/wiki/Google_Maps http://en.wikipedia.org/wiki/Mercator_projection
Manufacturers remarks		

11.7 Open data projects

Open Street Map Foundation

Plan4all Product/Service description #...		
Productname/Version		Open Street Map
Manufacturer		Steve Coast, Open Street Map Foundation
Developed from/to		2004, ongoing
Contact		www.openstreetmap.org
Short Description		OSM is a collaborative project to create a free editable map of the world. The maps are created using data from portable GPS devices, aerial photography, other free sources or simply from local knowledge. OpenStreetMap was inspired by sites such as Wikipedia — it is a distribution of free geospatial data and provides geospatial data for anybody to use and share. Registered users can upload GPS track logs and edit the vector data using the given editing tools.
Type		Free database and map server with geographic data and editable maps
Approach		• Web Mapping • Geodatabase • OSM maps can be included in other Location-based services
Interactivity		Fully interactive (users can edit data but not too many GIS functions, no analysis etc.)
Technology	Server side	Tile Server/API/Web Mapping Services (Mapnik, Osmarender)
	Client side	• Scripts
	Used Services/ Protocols	• OSM API Via derived services also other Protocols
Operating System	Server side	
	Client side	Windows, Linux, Mac OS X
Webtechnology	Webserver	
	Browsers	All
Projections	Which	Mercator, Lat/Lon
	Where	• Server side • Client side
Metadata management		yes
Known usage in planning		-
Challenges		Quality criteria for data; add standards
Collected by		Julia Neuschmid (Ceit Alanova)
Additions by		Wolfgang W. Wasserburger (CEIT Alanova)
Remarks		Source (Okt. 2009): http://www.corp.at/corp_relaunch/papers_txt_suche/CORP2009_156.pdf http://www.geofabrik.de/media/2009-05-18-osm-qualitaetsmanagement-fossgis2009.pdf
Manufacturers remarks		

12 Annex B: Survey results

To give an overview of used Software, built up SDI etc. a Survey was done among Partners and ISOCARP Members. May be that not all results present the absolute truth since answers were given from a very subjective point of view. Answers being worth to present publicly will be shown here.

12.1 Assessment of national and regional policies

12.1.1 Legal Situation

Nearly all (86.7 %) of the countries have planning laws or planning regulations on national level (centralised or federal). (Question 4 of the task 2.1 and 2.2. survey). About a quarter has planning laws on state level and half of the countries have planning laws on regional and/or local level. It is interesting that (with only one exception) in all countries with planning laws on the regional level there are also planning laws on the local level.

The “classic” distribution of planning laws (stated for 7 of 15 countries) is national, region/province, and local (municipality).

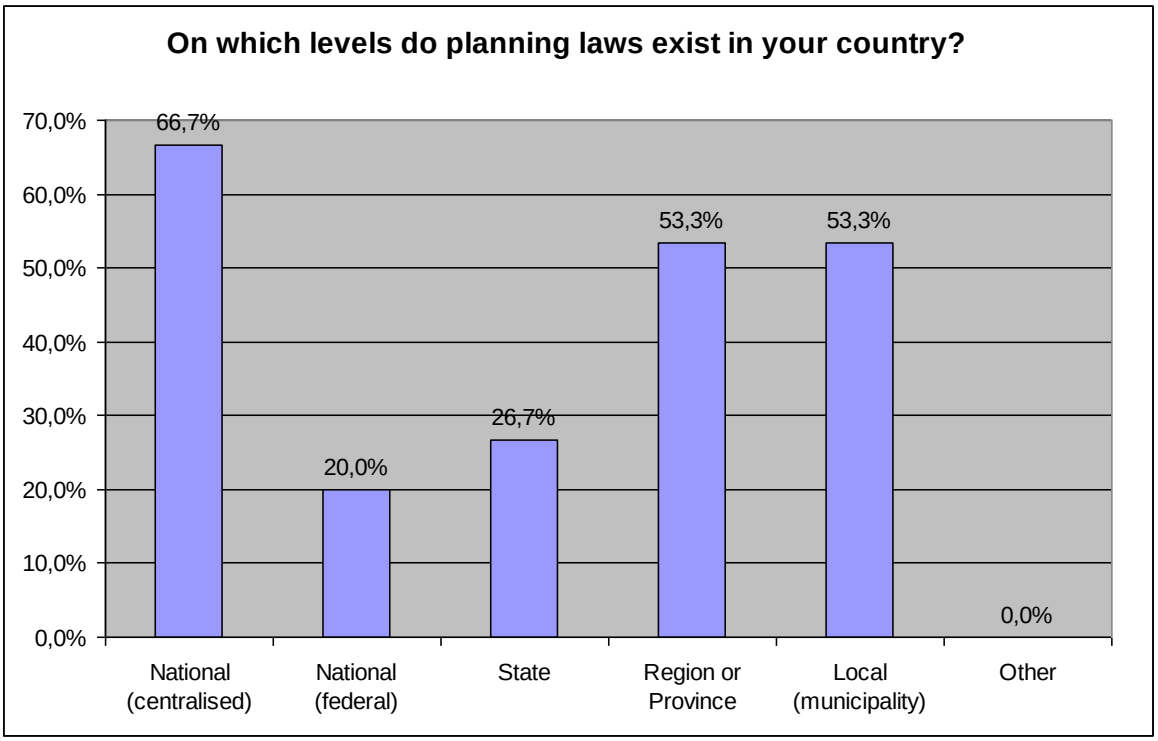


Fig. 5: Levels of planning laws or planning regulations

Almost all countries have development plans or similar planning instruments in each of the three categories shown in the graph below. (Survey questions 5-7.)

General remark:

The term law in the survey was not specified clearly, so some countries used it for a legal act whereas others included also included edicts formulated by municipalities. So this is a typical example where Plan4all could give guidelines how to use specific terms by defining a thesaurus.

Remark for France:

In France the local spatial planning documents are in charge of local governments (potentially 36 000 municipalities, practically only half of them got one). The local governments are free to administer themselves. Thus no specification will force them to do something unless a law forces them to do so. As far as land planning is concerned, the spatial planning documents are sometimes viewed as a "sign of sovereignty" by the mayor as he takes the final decision to authorise a new construction to be built or not. Thus, there is some reluctance to make spatial planning documents freely available on the internet or to follow strict standards. Therefore the SDI issue is really to operate a kind of peer pressure on the reluctant mayors so that the most advanced show the way forward for the "old" fashioned one. Therefore one of the biggest challenge in the INSPIRE context is to achieve an "interoperability regulation" for land use data that "forces" local governments to make available their land planning documents throughout the SDI.

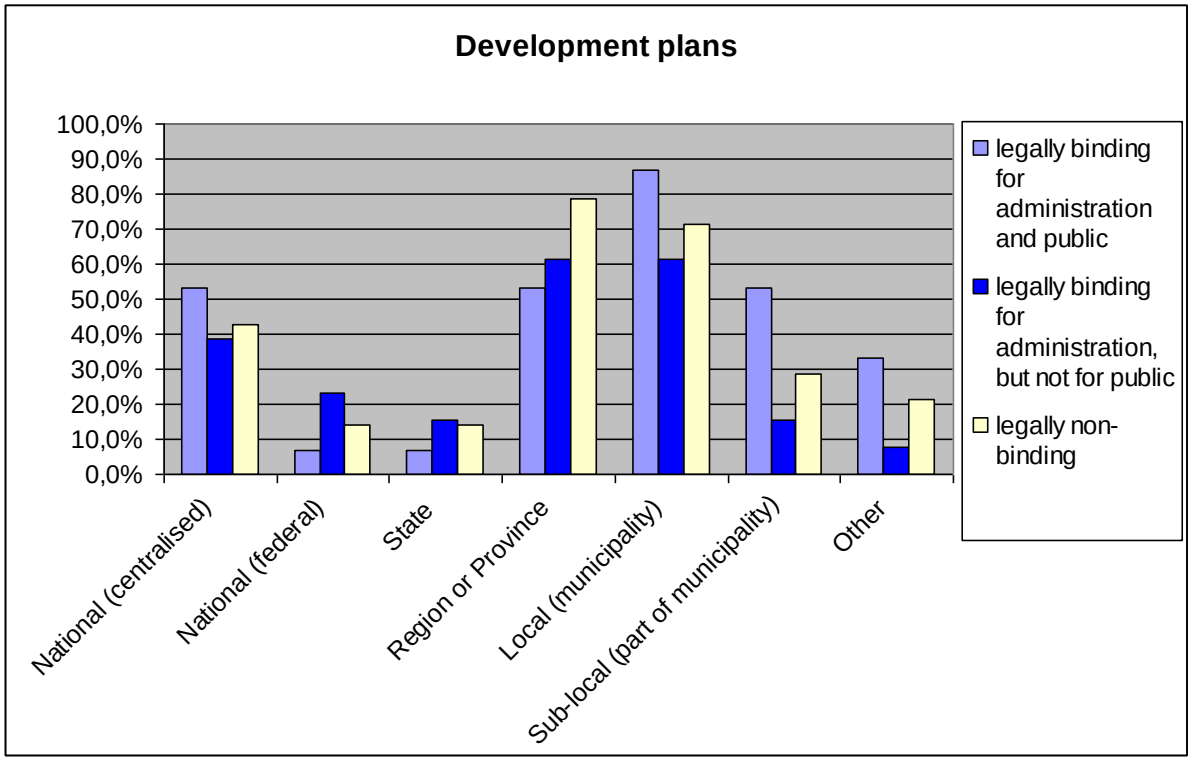


Fig. 6: Development Plans

The majority of plans can be found in the regional and local levels. Throughout every level the relation between legally non-binding plans and plans having at least a partly legal obligation is approximately 1:2.

General remark:

The term development plan in the survey was not specified clearly, so some countries used it in different ways. So this is a typical example where Plan4all could give guidelines how to use specific terms by defining a thesaurus.

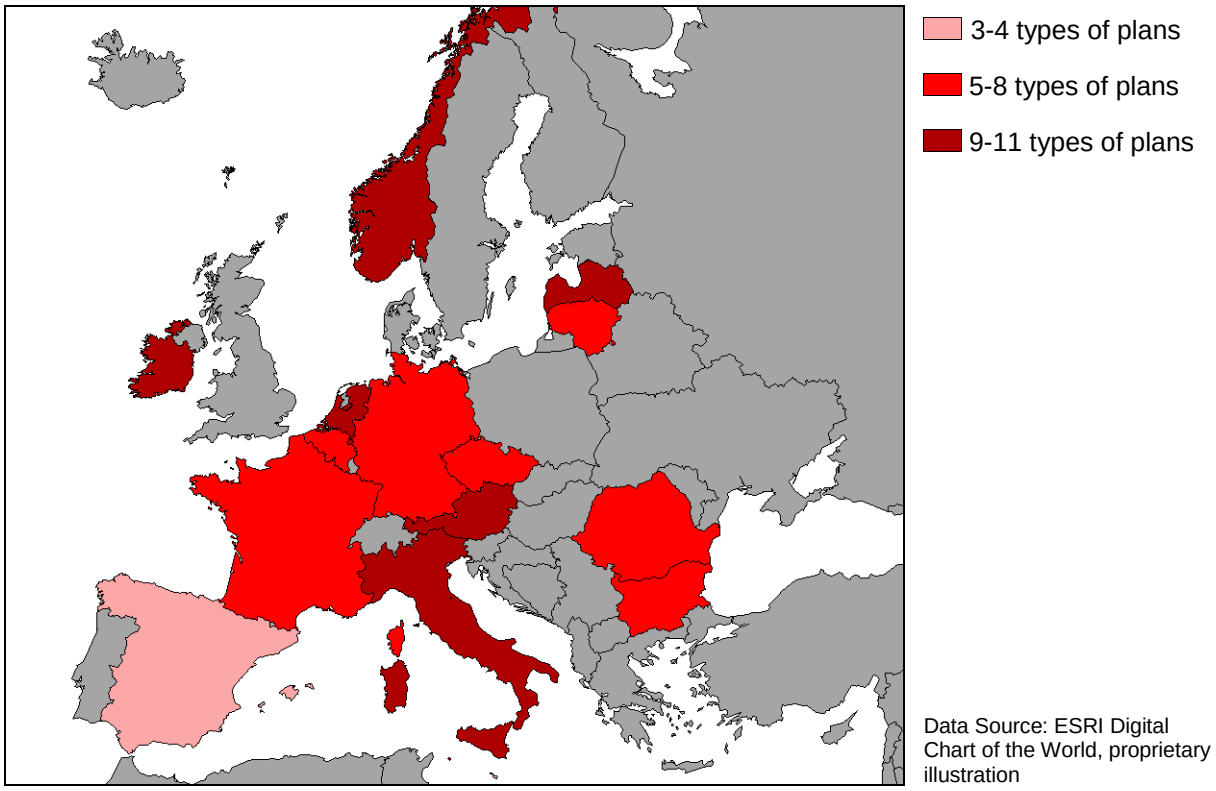


Fig. 7: Map: Types of Plans

In all countries various plans are available to the public (survey question 8). Whereas in higher administrative levels plans tend to be available both printed and digital. On local (municipal) or sub-local level the majority of plans is available only in printed version. No plan is available in digital version without print – this is most probably because planning laws all have their origin in the pre-digital era, so they demand printed plans which are legally binding them. Moreover, once a digital version exists it is no big deal to produce a printed version whereas the opposite – turning a printed map into a digital version – is likely to take higher amounts of time and money.

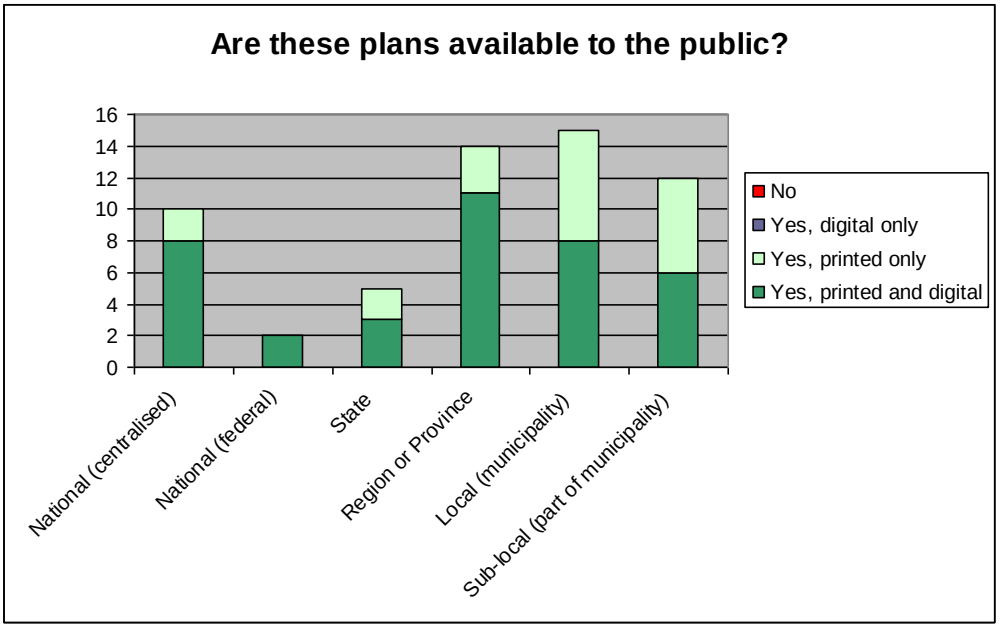


Fig. 8: Public available plans

Remarks (survey question 9)

- **Netherlands:** Even with the new law (guilty starting at 1/10/2010) which says that plans have to be made digital, paper maps are still present. Only in doubt the digital ones are more authentic.

This is a remarkable fact as older laws tend to emphasise the printed versions because in terms of many older planning laws digital versions of plans simply do not exist at all.

- **Belgium:** Digital access of local plans depends on the municipality – some municipalities have web-based digital access, others only offer hard copies.
- **Italy:**
  - **Question 5:** Regional plans legally binding the public: only as far as some part of Regional Landscape plan is concerned.
  - **Question 8:** all existing plans are public and are available in printed form. The availability in digital form of plans varies from region to region, in a region from province to province, in a province from municipality to municipality.
    The most recent territorial and urban plans at regional, provincial and municipal level are available on the Internet, often with WebGIS services.
- **Romania:** The availability of plans depends mainly on the size of municipalities or settlements. Bigger municipalities also have these documents in digital versions on their website, other settlements do not even have a webpage.

- **Czech Republic:** Legally non-binding plans are usually available only in printed version to the public on demand. Legally binding plans on local level are always available printed and partly digital.
- **Latvia:** In digital format most of all plans are available in dgn or jpg formats.
- **France:** The plans are available to the public printed (always) or digital (sometimes).

Conclusion

There is a significant correlation between planning laws on a certain level and having legally binding development plans on the same level, which is not quite surprising. Also legally non-binding plans are more likely to appear on levels which have their own planning laws.

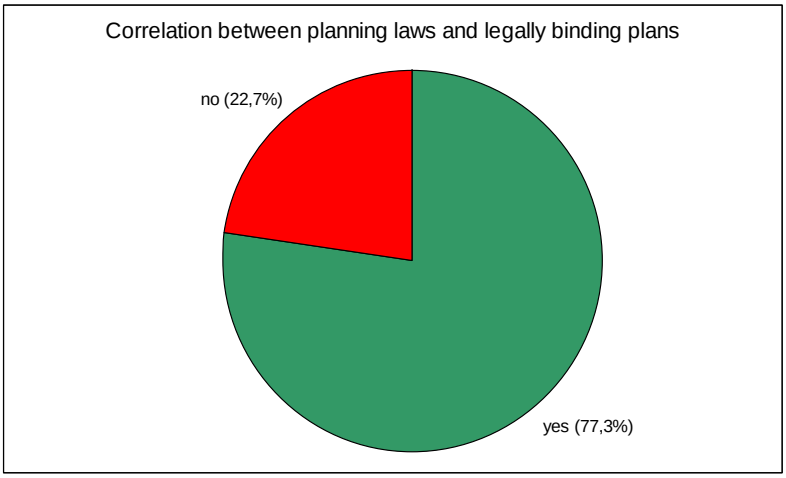


Fig. 9: Correlation between planning laws and legally binding plans

The above correlation was calculated counting levels with planning laws and legally binding plans and levels without planning laws and also without legally binding plans as “yes” and all other levels without commonality regarding planning laws and legally binding plans as “no”.

The availability of digital planning information is still a very heterogeneous issue, but throughout all countries there is a significant trend towards the supply of digital maps. The main commonality is the lack of legal obligation for digital planning documents. It can be taken for granted that this situation is going to change during the next few years as the INSPIRE implementation has to be done and therefore some countries will have to adapt their laws or administration structure. So it is not surprising at all that there is no planning information which is available in a digital, but not in a printed version.

12.1.2 Data Management

Six of the 15 responding countries have a separate data clearinghouse or data distribution institution. Three of the institutions are parts of the public administration, the other three are separate, but publicly owned companies (see map).

Is there a separate data clearinghouse institution or data distribution institution? If yes, is this data clearinghouse or data distribution institution a part of the public administration? (taken from survey questions 19 and 21)

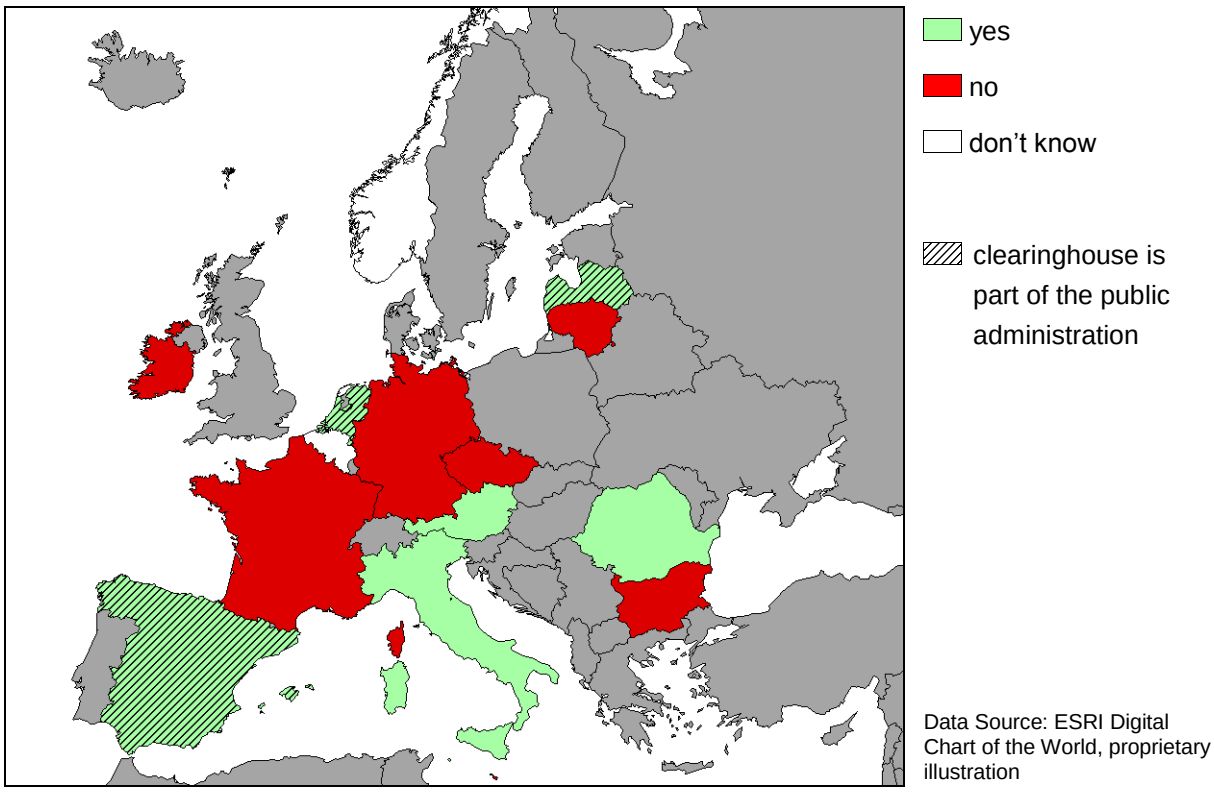


Fig. 10: Map: Data distribution institution or Clearinghouse

However, no significant correlation between the data situation in a country and the existence of a data clearinghouse could be detected. There are also some organisational structures where it is not clear whether they can be defined as separate clearinghouse institution or if they are still a part of the administration.

Remarks:

- Spain: Spatial data management is centralised, use is public.
- Netherlands: www.ruimtelijkeplannen.nl alidator.ruimtelijkeplannen.nl www.ruimtelijkeplannen.nl/index/
- Italy: How data is distributed depends on the case. As far as paper data are concerned there is an office… As far as digital data is concerned it is available and distributed via web, in various format and in various ways. In the same case spatial planning data is included in the regional or provincial SDI. In the background there is the issue of juridical value of digital documents, still not

definitely addressed. Part of the public administration or a separate, but publicly owned company.
Some examples: the SINA network collects, manages and distributes environmental data on behalf of the Ministry of Environment, through its Regional Focal Points which in turn collect data on behalf of Regions and Autonomous Provinces. “Sistema Piemonte” is a web portal, based on a consortium among public authorities, for accessing services of the Region of Piemonte; among these, geographic data.

- Romania: They have different kind of data, mostly orthophoto plans, geocoded topographic maps, partially vectorised maps, etc...
- Latvia: On state level (for all territories of country - 100% coverage): Cadastre data (State Land Service - www.vzd.gov.lv), ortho-photo data - Latvia's Geospatial Information Agency (www.lgia.gov.lv)
- Ireland: Ordanance Survey Ireland, www.osi.ie; Irish Spatial Data Exchange, www.marine.ie/isde/
- France: The intention is at the ministerial level to survey which DTA, SCOT and PLU exist in digital form and to provide later on access to these digital data.

Conclusion

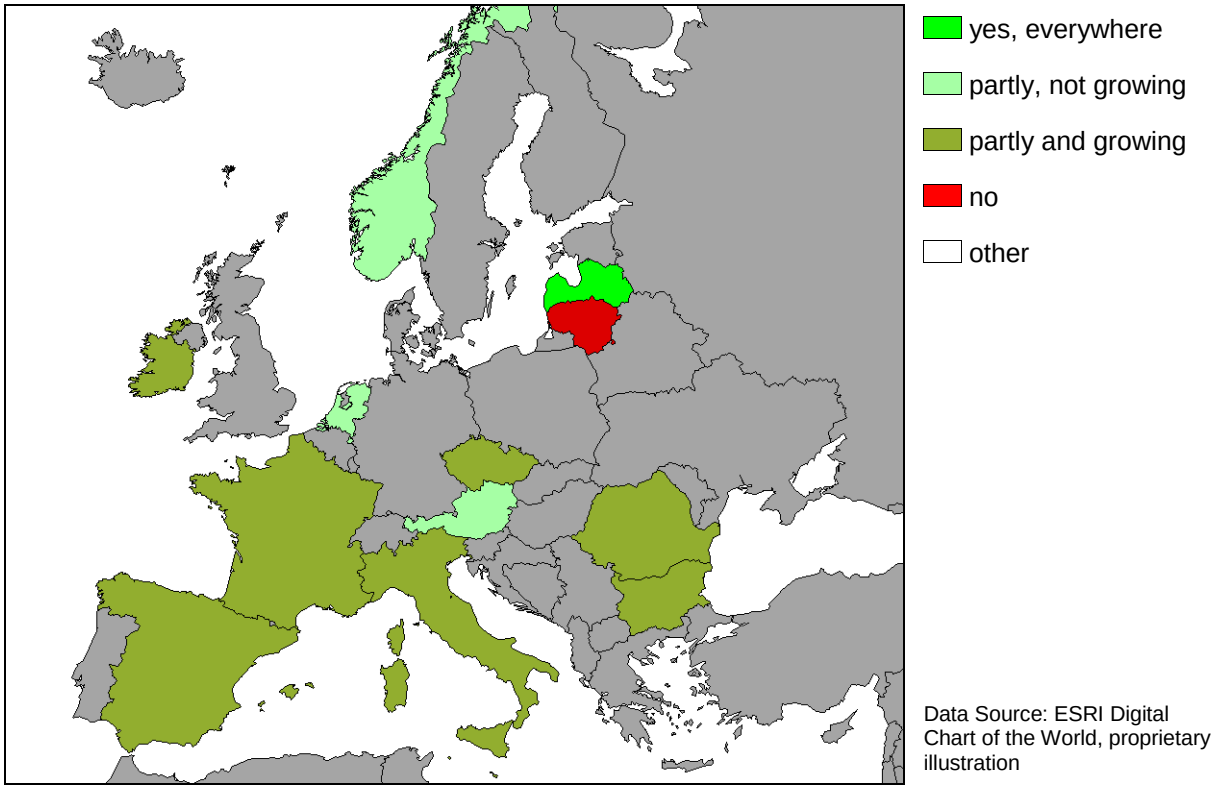
Spatial data is available at quite similar scale levels in all countries. On the local level there are scales around 1:1,000 to 1:10,000, on the national level the available scales vary depending on the absolute area of each country. The data access and data distribution infrastructure is heterogeneous. It depends on clearinghouse existence, hierarchic structure of the administration, responsibilities within the administrational structure, and, of course, the legal situation.

In some cases own data infrastructures are set up on local or regional levels because the national SDI building process is too slow. This leads to inconsistency, redundancy and problems with up-to-dateness of the required datasets. Large harmonisation efforts have to be spent to create a consistent SDI from fragmented, inhomogeneous structures.

Only if there are clear data and metadata requirements and specifications, there can be working national SDIs which are also comparable and compatible with each other. It will be the task of the upcoming Plan4all work packages to define data models which can help to solve the problems which are shown in this survey chapter.

12.1.3 Survey answers regarding metadata

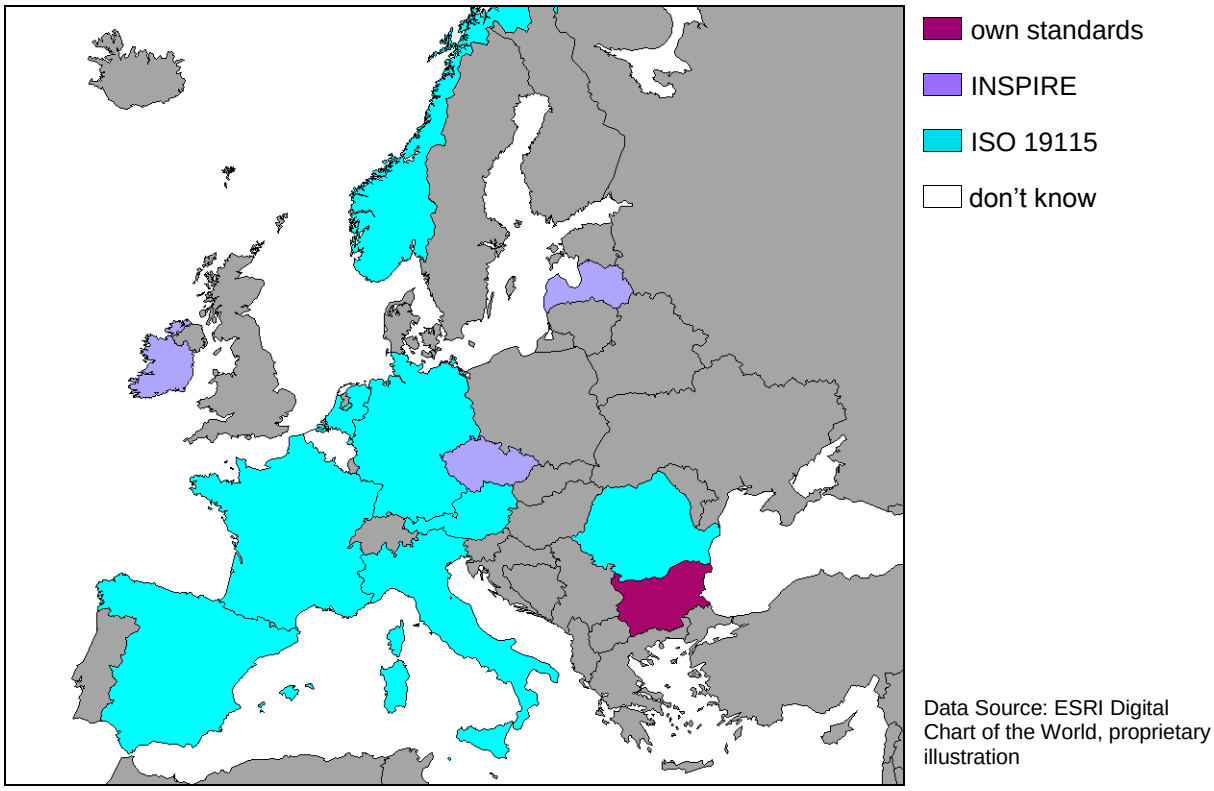
Question 22 – Does your country collect metadata?



Tab. 2: Map: Collection on Metadata

All countries are collecting metadata except Lithuania.

Question 23 – According to which standards is your metadata collection done?



Tab. 3: Map: Standards of Metadata

14 countries are collecting metadata, the vast majority follows either the INSPIRE or the ISO 19115 rules which basically follow a similar approach as INSPIRE originated on the ISO 19115 standards. (However, there are several differences and it must be kept in mind that conformance to ISO 19115 does not automatically guarantee conformance to INSPIRE and vice versa.) Only Bulgaria claims to have own standards for metadata collection; Belgium's respondent did not know.

Question 24 – Other Remarks (if necessary):

- Ireland: Government policy is to adhere to INSPIRE. Some organisations use ISO 19115 and there was a push towards a Geo-ID, but it is not well coordinated.
- Romania: In the past no standards were used, for most of the geodatasets no metadata is available but first actions regarding metadata collection are taken (also according to Inspire and OGC/ISO Standards). Standards used depend on the needs of the users. Each institution that collects metadata has its own needs in mind, depending on what they use it for. There are no companies specialised in collecting and centralizing metadata and there are no laws regarding the collection of metadata. There are a few autonomous, partly state owned companies that collect them (National Agency for Cadastre and Land Registration, Romanian Waters, Electrica).

- Czech Republic: CENIA Czech information agency manages own metadata accordant with ISO 19115.
- Italy: Inspire directive should be the standard for metadata collection. Anyway, different administrations use different standards for metadata collection. The technical specifications for the "National repertory of territorial data" are under construction and they refer to the INSPIRE Directive, which refers to the ISO 19115. At national level an ISO 19115-based profile has been developed: this includes also INSPIRE requirements.
- Netherlands: Shifting from 19115 to INSPIRE.

Conclusion from this section of the survey

14 out of 15 responding countries are involved in metadata collection. Apart from Bulgaria where own standards are used, all other countries refer to either ISO 19115 metadata standards or are already collecting their metadata according to the INSPIRE requirements which rely on ISO 19115/19119 over wide areas. However, this consistency throughout nearly all respondent countries shows that there are initiatives for metadata collection. This does not implicate that the metadata collection itself is also at a homogeneous progress status in these countries.

For the countries using the ISO 19115 metadata profile it will not be a great change to adapt their metadata collection to the INSPIRE requirements.

12.2 Spatial Data Infrastructures: State of the Art (survey evaluation)

In addition to the collection of best practise projects the survey asks for information about the existence of spatial data infrastructure in each partner country to give an overall picture and a complete state of the art analysis on the SDI situation in Europe.

12.2.1 SDI Organisation

Question 32

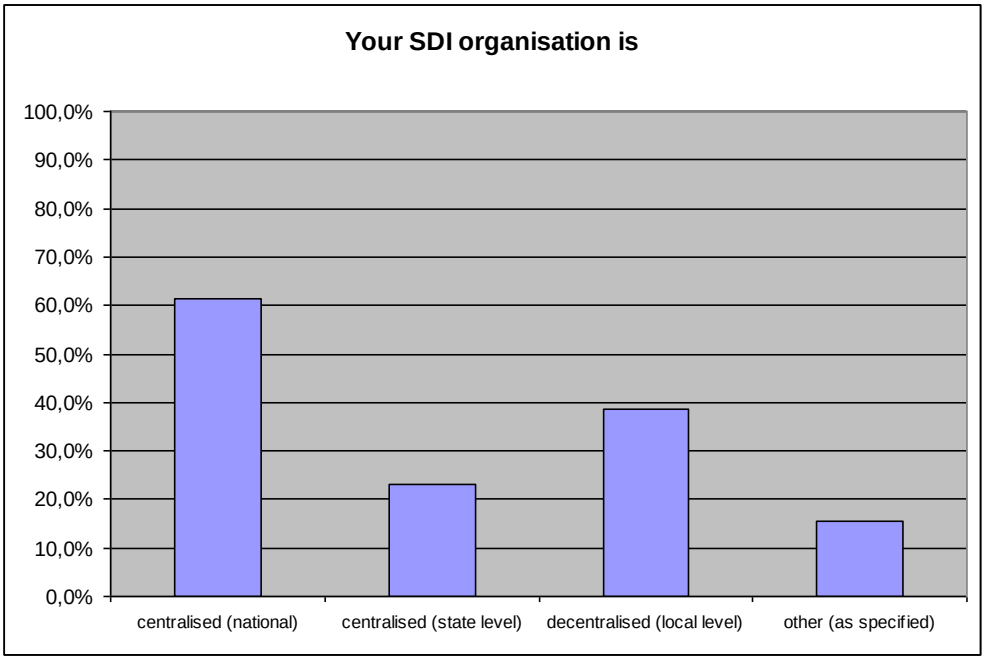


Fig. 11: SDI organisations

Over 60 % of the responding countries have an SDI organisation on national level and about a quarter has a state level SDI. Ten out of 15 respondents claim to have an SDI which is centralised anyway (on national or state level; this fact cannot be seen in the chart as multiple selection was allowed for this question).

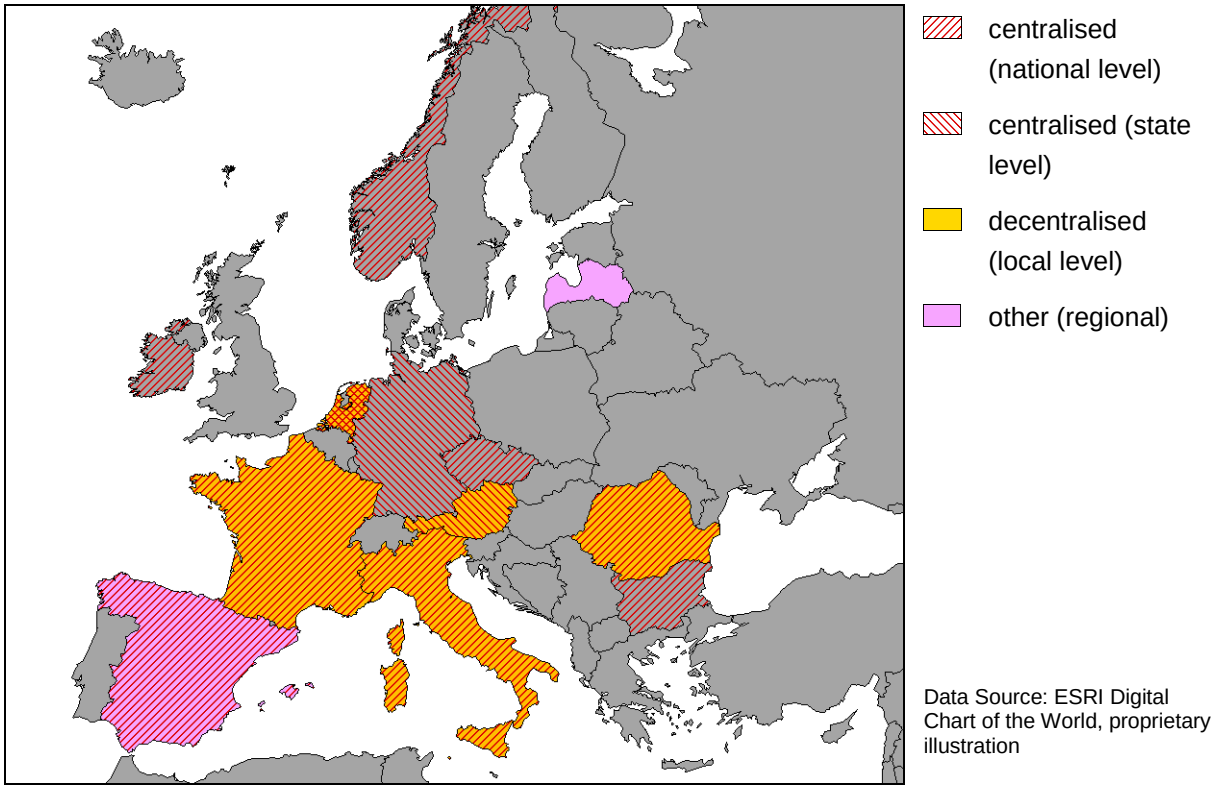


Fig. 12: Map: SDI Organisational Level

Nearly 40 % of the responding countries have a local level SDI. Regarding the “other” option, Spain and Latvia have a regional SDI.

Question 33 – Which themes are available on which level?

Regarding the availability of themes, the majority of data is available on national level, mostly around 80 to 100 % of themes are available on national level and 60 to 70 % on local level. Just a few themes are available on local level only, this is mostly regarding farming, biota, planning, and structure data.

In a few countries some data themes are not available, the large “not available” area in the category “oceans” is, of course, due to the fact that not all countries are situated next to an ocean.

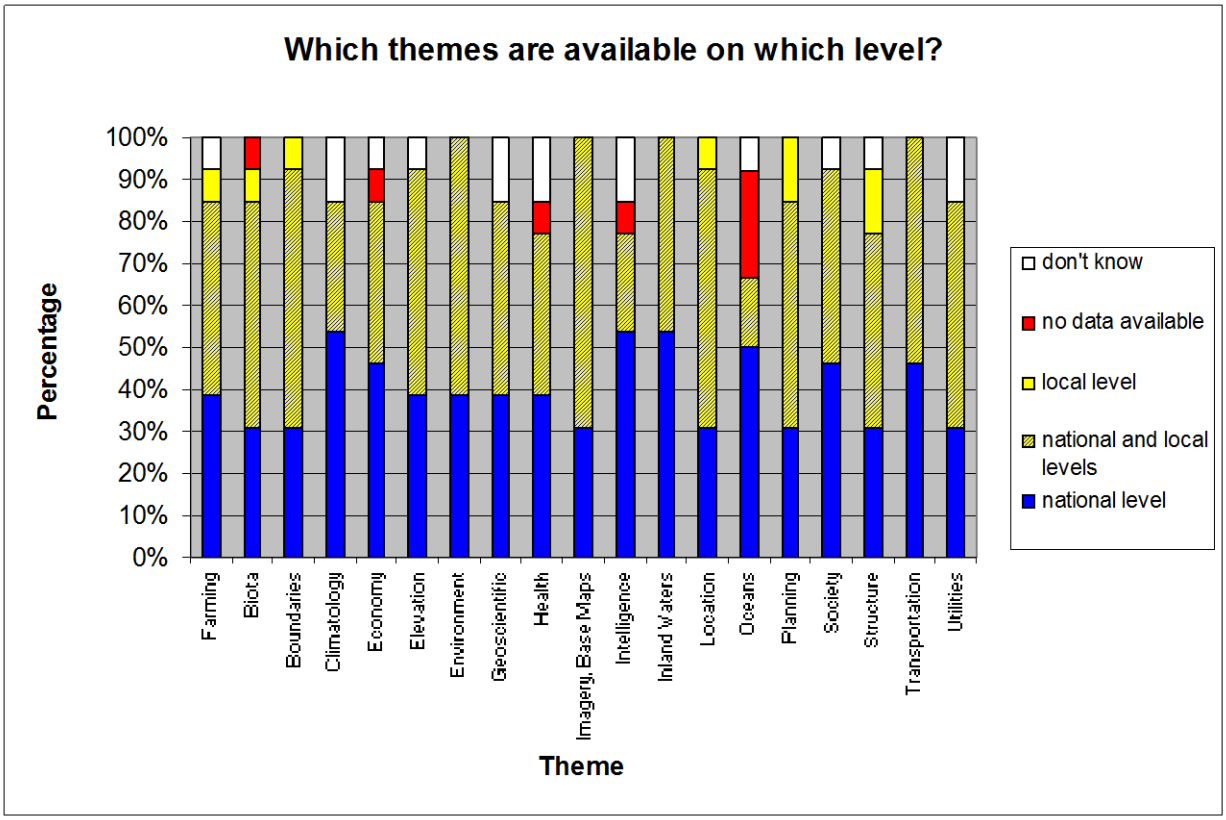


Fig. 13: Map: available Themes

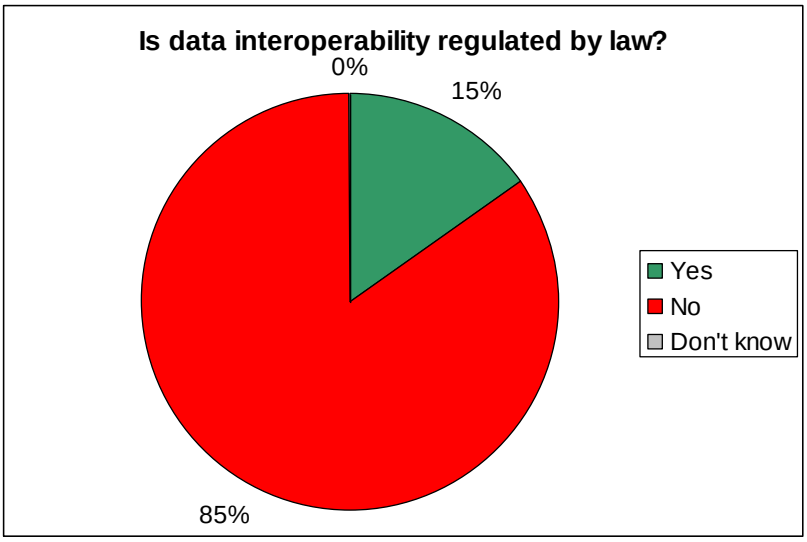
To sum up, it can be said that data availability is given throughout Europe. The differences in data formats are dealt within question 35.

Question 34 – Other remarks (if necessary):

- Italy: Most of the data available at national level (e. g. through the National Cartographic Portal and the SINA network) comes from the Regions and Provinces.
- Romania: Even though most of the data can be found, the themes are collected by different institutions and are stored separately. Also, because everyone uses own standards, quality and resolution may vary. Economy theme only includes income/earnings and unemployment data. Society theme only includes population distribution, age and gender structure, and data for urban and rural population.
- Spain: Due to the existence of many sub-national SDIs (more than 50 according to eSDINet+ project) it is difficult to give a consistent answer for the local level.
- Bulgaria: The situation is very dynamic – some municipalities just started their own initiatives for building detailed geodatabases.

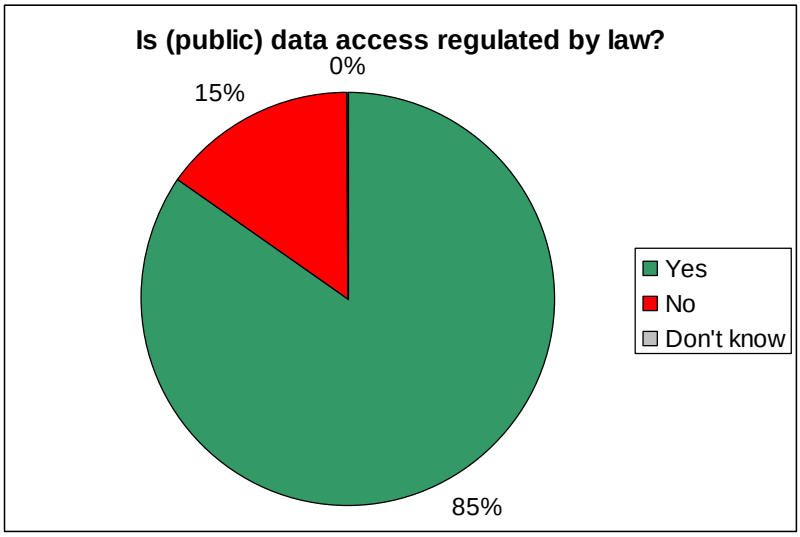
12.2.2 Interoperability and Metadata

Question 39



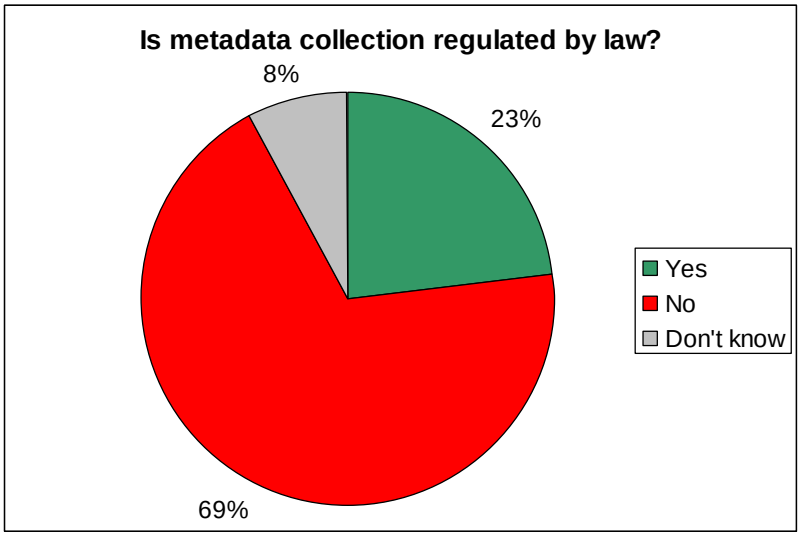
Data interoperability is regulated by law only in 15 % of the responding countries (equals to 2 of 13). In 11 countries there are no interoperability regulations, only the Netherlands and Germany claim to have according legal context.

Fig. 14: Data Interoperability Regulation by Law



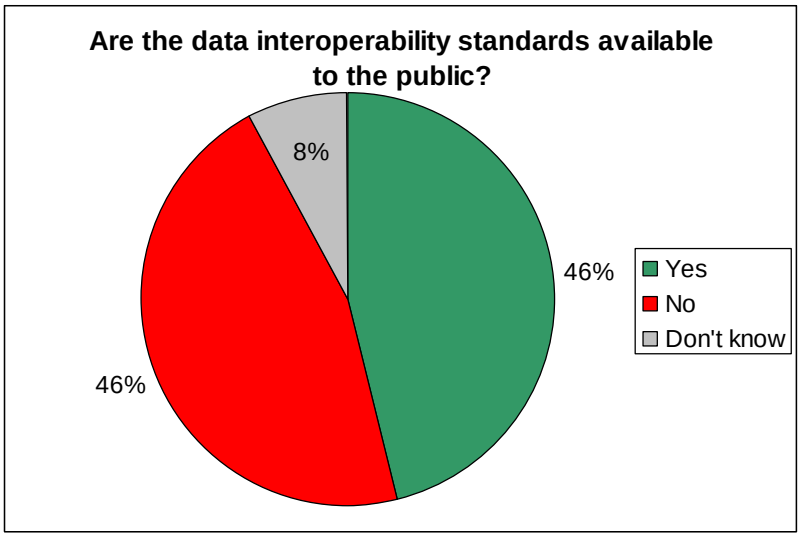
Regulations concerning data access exist in nearly all responding countries. With Italy and Norway only 2 out of 13 countries (or 15 % of the respon-ding countries) state to have no (public) data access regulation by law.

Fig. 15: Public Data Access Regulations



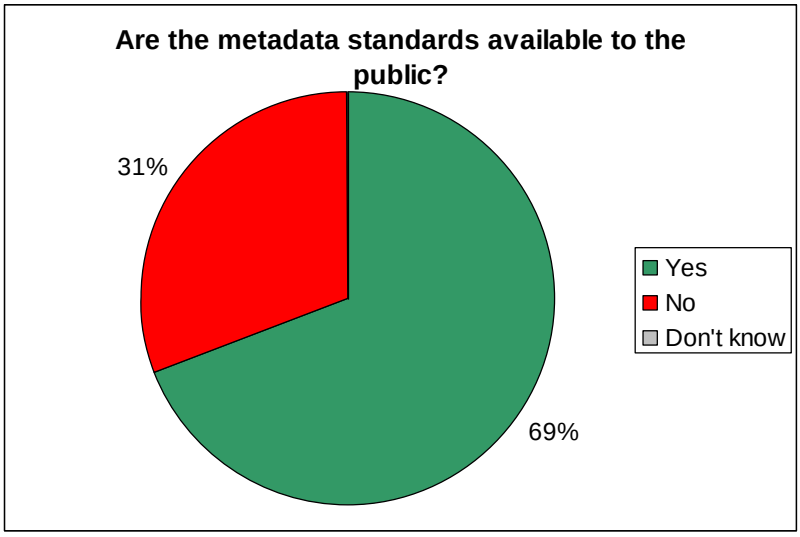
A quarter of the responding countries has laws dealing with metadata collection: Germany, the Czech Republic, and the Netherlands. The experts from Norway could not find out the current situation in their country.

Fig. 16: Meta Data Collection Laws



Data interoperability standards are available to the public in about half of the responding countries, i. e. Romania, the Netherlands, Spain, France, Germany, and Norway (6 out of 13).

Fig. 17: Availablity of Interoperability Standards to the public



In 69 % of the responding countries (or 9 of 13) the metadata standards are available to the public. In fact, it must be more than 9 here because 12 countries claimed to use INSPIRE or ISO 19115 for their metadata collection; the definition of standard of both is available to the public.

Fig. 18: Public available Metadata Standards

Remark for Italy:

The technical specifications for the "National repertory of territorial data" are currently under construction, but they are available to the public in draft version. Data interoperability issues are regulated by guidelines which are not legally binding.

Question 40 – Is data storage in your country...

All responding countries claim to have a de-centralised data storage structure; 54.5 % (6 out of 11) also have centralised data storage. Therefore, in any case there is a need for efforts on data harmonisation within each country.

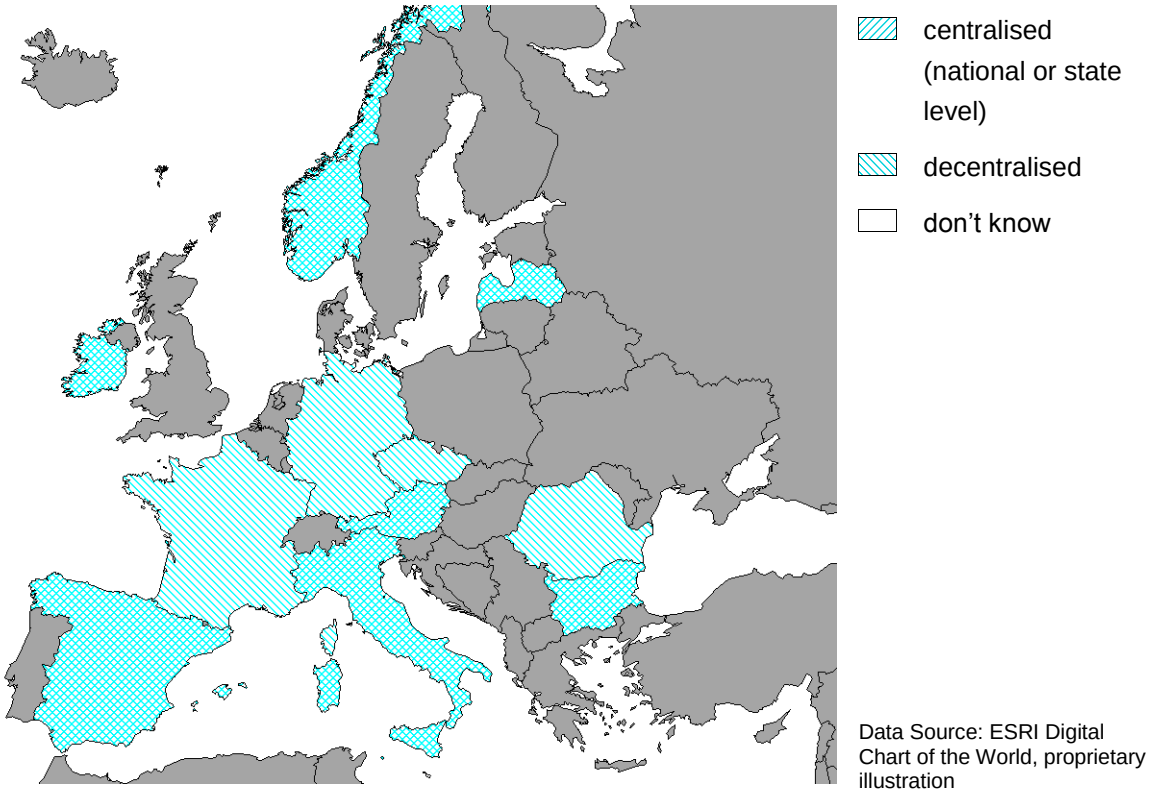


Fig. 19: Map: Organisational Level of Data Storage

Question 41 – Other remarks (if necessary):

Spain: At regional level in Navarra, storage information is centralised. At national level in Spain it is decentralised: There are several regional and local SDIs offering WMS available also at the National SDI. They work as nodes from the National SDI.

Romania: There are not really interoperability and metadata standards (except from INSPIRE). Regarding data storage: Each organisation has a separate database with data they collect or buy.

Italy: Both the National Cartographic Portal and the SINA network collect data from the regional levels and integrate it with the data available at central level.

12.2.3 SDI Coordination

Questions 43-45

66.7 % (8 out of 12) of the responding countries state that there is a national SDI coordination. A third claims to have no such institution, one respondent says that it is not known.

In half of the countries the efforts of building an SDI are coordinated. Five countries explain that they have no such coordination, one respondent says that they do not know.

SDI coordination and SDI building efforts

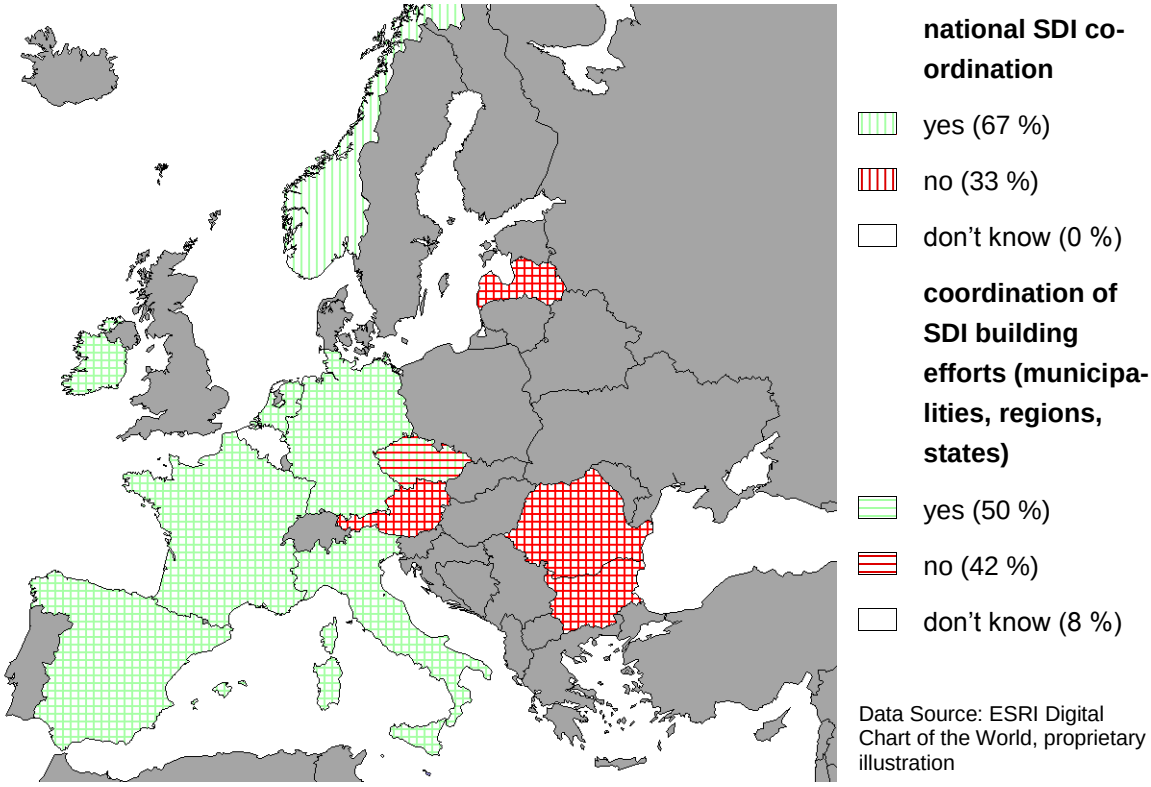


Fig. 20: Map: SDI Coordination

The very high "Don't know" rate (see fig. below) for SDI use outside the public administration does not allow any interpretation; it implicates only the answer for question 3 (point of view) where slightly more than half of the responding experts stated to come from a public administration authority, so it is likely that these experts do not know much about potential use of their SDI outside the public administration.

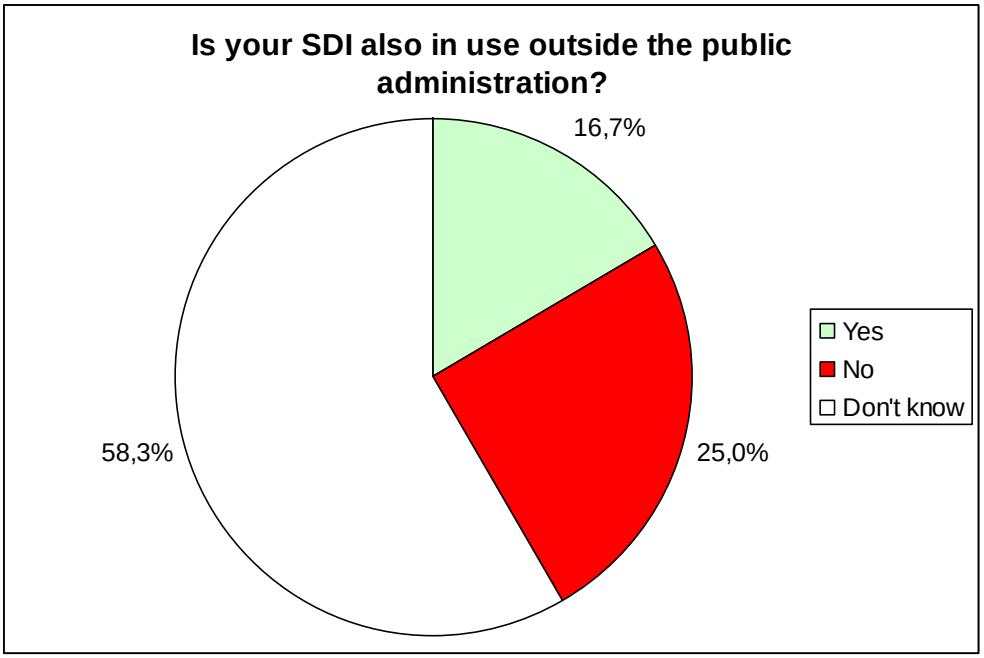


Fig. 21: Public use of SDI

Question 47 – Other remarks (if necessary):

- **Italy:** As for questions 43 and 44: The National Cartographic Portal is a National SDI project currently under implementation. CNIPA (National Centre for the IT in the Public Administration) is in charge of defining the technical specifications for the use of the public authorities' geographic data. The Interregional Centre for the information, geographic and statistical data (http://www.centrointerregionale-gis.it) is a voluntary association among Regions and Autonomous Provinces that led to the definition of an agreement among State, Regions and local authorities (Intesa GIS) for coordinating the creation and management of the geographic information systems.

12.2.4 National Geodatabases

Question 48 – Is there a national geodatabase?

Question 49 – Are there also external partners involved in your country's efforts of building a (national) geodatabase?

These eight countries state to have a national geodatabase: Norway, Bulgaria, Germany, France, Italy, Spain, Malta, Romania. From the eight countries stating to have a national geodatabase, five (62.5 %) say that there are also external partners involved in their geodatabase building efforts: Germany, France, Italy, Romania, Spain (see map).

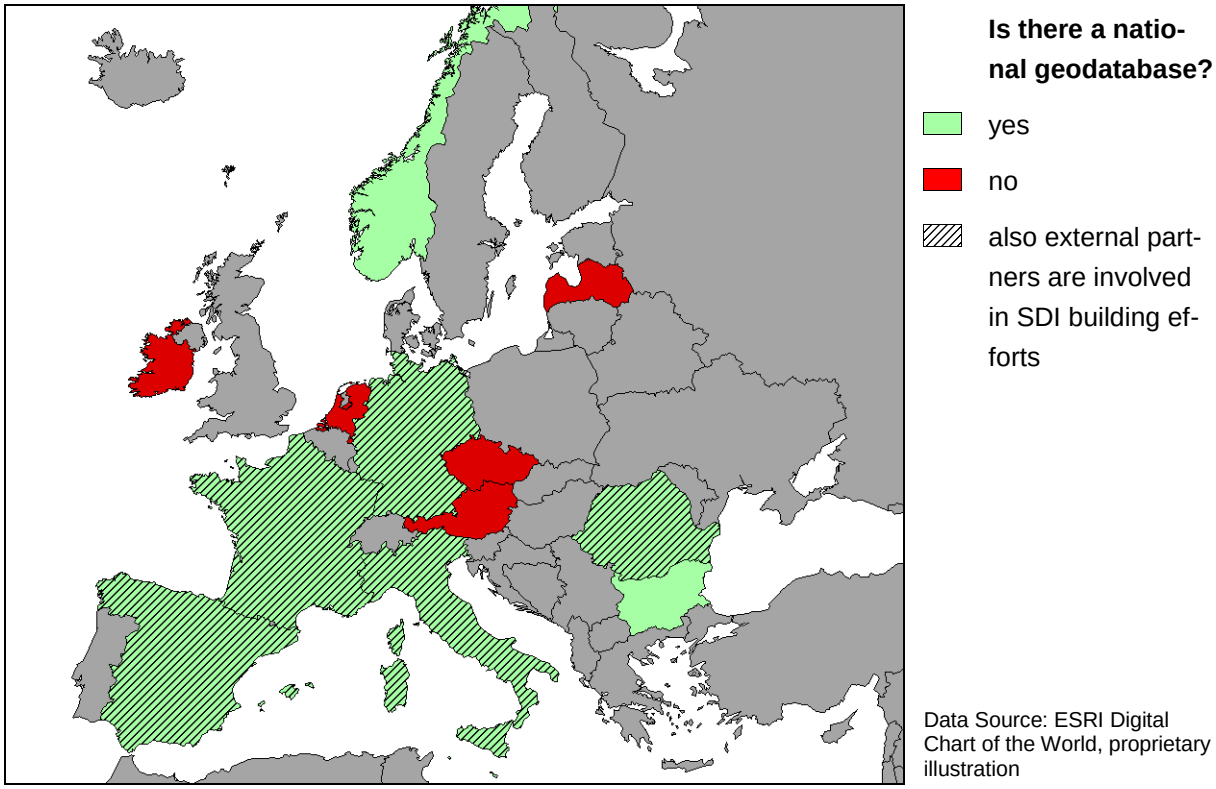


Fig. 22: Map: external involvement in national Geodatabase

Question 50 – For public use of geodata we have…

Two countries do not have web map services for public use (Latvia and Spain). The others offer WMS or WFS either free of charge or for a fee. Printed maps are available for a fee throughout all respondent countries, and files are also available everywhere for a fee.

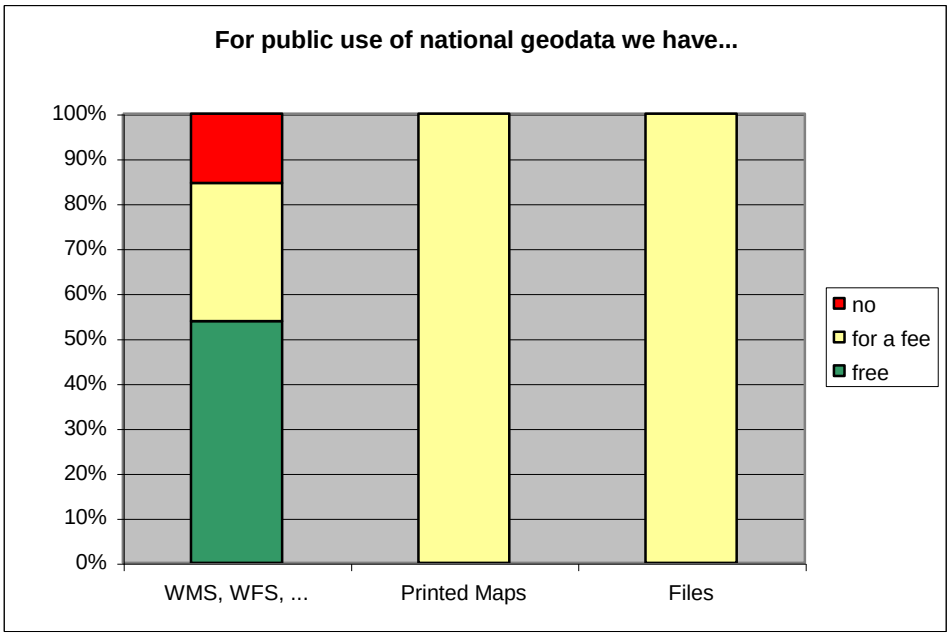


Fig. 23: Availability of Maps

12.2.5 Conclusion from this section of the survey

Nearly all responding countries have a centralised SDI, there is no country with a local SDI only. In most cases datasets are coming from lower levels and are stored centrally or centrally and locally. Data availability is given in all ISO 19115 topic categories. However, it must be distinguished between data availability and data access (see also section (3) answers): Whereas data are available in most cases, there might be accessibility problems due to legal restrictions, copyright and license issues or lack of knowledge.

Most countries use ESRI software and file formats but also CAD file types are quite common. In earlier years this could have led to compatibility and conversion problems for online data access (through WMS), but nowadays CAD-derived filetypes often support attribute data management so that there is, despite the underlying file format, almost no handling difference between GIS and CAD-derived geodata. Also, projection conversion is no difficult issue any more. All common projections are collected in the EPSG library and can be converted from one to another on the fly.

Metadata collection and data interoperability are not regulated yet in about three quarters of the responding countries. This fact is, however, soon subject to changes as the INSPIRE guidelines require exactly such regulations to be introduced in national legislation. Plan4all is going to give valuable inputs regarding the further implementation of INSPIRE.

There is a lot of national, international and EU projects dealing with SDI building and data harmonisation. As every country is active in some of these initiatives, a big expert network is growing paving the way towards INSPIRE. Most countries which have a national SDI coordination also support coordination activities on lower

administrational levels, mostly in western part of Europe. Central European countries tend to have no SDI coordination according to the survey responses.

There is a high “don’t know” rate for SDI use outside public administration. This result might come from a consistent, but slow change from single data providers to national SDI services so that many users simply have not recognised yet that the data sources they are dealing with belong to an SDI meanwhile – for reason of daily habit or because the SDI structure is in its beginnings and therefore still too small to be recognised as what it is growing to.

12.3 Used software

In this chapter we provide the corresponding results of the survey mentioned before.

All survey responding countries have online access to spatial planning related geodata except Latvia which explains that online data access is not available because of a lack of this kind of developments on state level. Cadastre GIS and state geoportal are planned in the near future (within 2 or 3 years). The following software packages are used in these countries (question 28: Which software is used to provide these web map services?):

	ArcGIS Server	ArcIMS	Autocad Map	deegree	Geoserver	Intergraph CS sro	Mapbender	MapInfo	MapXsite	Open Gis	UMN Mapserver	WebMap Server	own software
Austria	✓	✓		✓	✓		✓				✓		✓
Bulgaria	✓												
Czech Republic						✓						✓	
France		KO-GIS									✓		
Germany		✓		Frame work									
Ireland	various												
Italy		✓			✓	✓					✓		
Malta								✓	✓				
Netherlands				✓									
Norway	✓					✓					✓	✓	

Romania	✓		✓			City of Oradea							
Spain	Cadastre												

Tab 4: Software Usage in Survey Countries

Question 29: In which year did your country start with WMS (approximately if you don't know exactly)?

Ireland and the Netherlands were the first partner countries to deal with web map services (WMS); Norway, Malta, and Austria joined them approximately one year later. Germany boarded in the year 2003. The rest of the responding countries started working with WMS 2004 or later, which may have been much easier as the web mapping technology had emerged from its childhood at that time.

Ireland	2000
Netherlands	2000
Norway	2001
Malta	2001
Austria	2001
Germany	2003
Czech Republic	2004
Romania	2004/2005
Spain	2005
Italy	around 2005/2006
Bulgaria ○ (Ministry of regional development) ○ Sofia municipality (the capital)	 2009 2006
France	2007
Belgium	did not know
Latvia	did not know
Lithuania	did not know

Tab 5: WMS Start in Survey Countries

Although Belgium, Latvia, and Lithuania did not know when their countries started with own WMS, it can be assumed that these countries do run such services.

Comments (question 30: other remarks if necessary):

- Ireland: WMS is somewhat uncoordinated in Ireland at present.
- Netherlands: Software which provides WMS is not the issue. To distribute data with OGC services you have to stick to same version/profile/etc. In that case you need SLD to filter on specific plans. Deegree serves this very well, but many clients (MapInfo, ArcGIS Desktop) cannot handle it.

Vector Data (multiple choice question 35: Which data formats are used for vector data?)

It is not very surprising that all responding countries are working with ESRI geodatabases (Arc). The vast majority is also using the proprietary ESRI file formats SHP, E00 or coverage. Also DWG and DXF are very widely spread – many institutions still seem to be working with CAD (with/without GIS-Functions) in addition to GIS.

The commercial database format Oracle is used by nearly three quarters of all respondents, the open source counterpart PostGIS only by less than half of the responding countries. Formats like MapInfo, TAB, MIF, Geomedia or Intergraph are also still quite common.

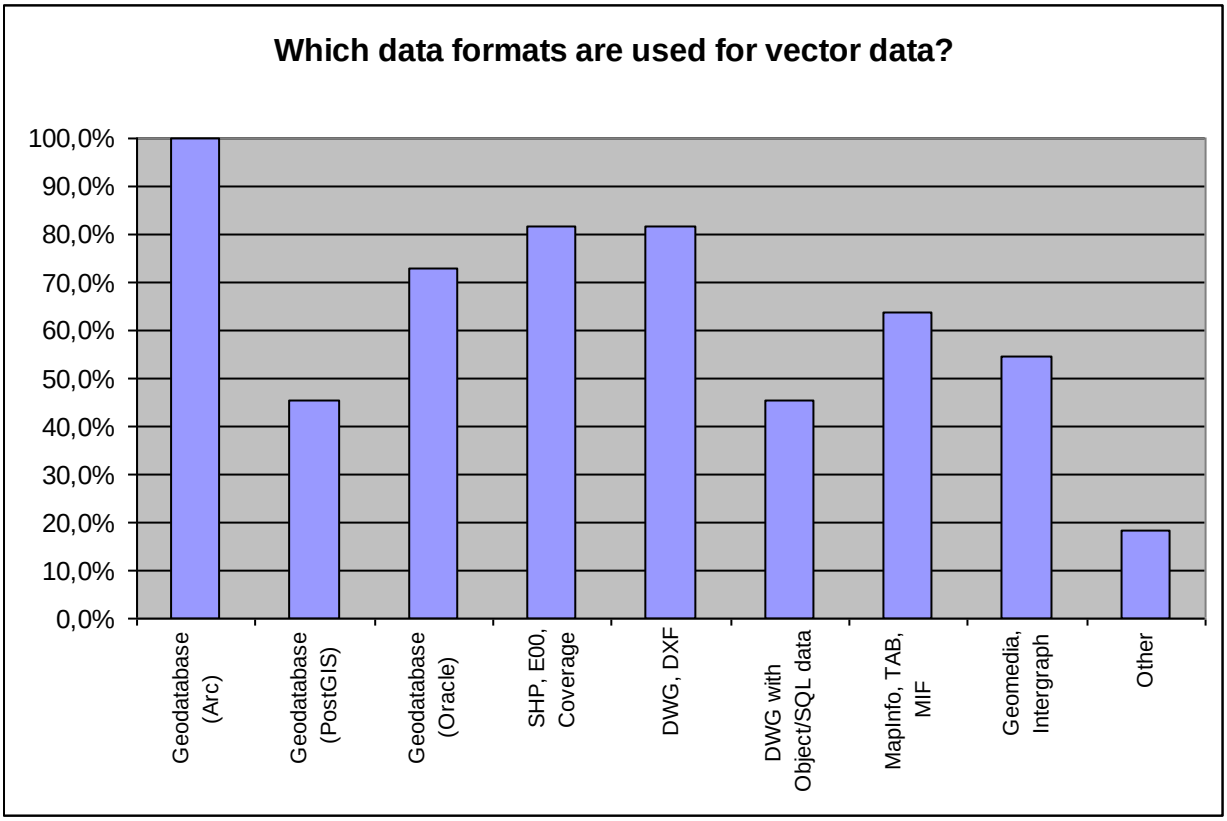


Fig. 24: Data Formats for Vector Data

Regarding the “other” option: In Germany all data formats are possible. Romania also uses SQD (SICAD), MegaCAD, Megatel, ESRI ArcSDE, Microstation, ArchiCAD, and VectorWorks. In Spain DGN is available. In Netherlands data exchange is done via exchange in GML/WMS/WFS.

As a short conclusion of used Software and technical data format, we can see, that it really makes sense to find some technical way to harmonise data. All experts will know how much work it might be to convert data to other formats. Even if there are technical methods sometimes the contents have to be reorganised afterwords.