Spatial Data Infrastructures in *Czech Republic:* State of play 2011

Report meta-information

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Executive summary

The Czech Republic has developed a dynamic NSDI since years and is implementing INSPIRE at a high pace. The Czech Republic has not only developed a clear framework for NSDI as part of a broader national information infrastructure, but has also gone quite far in implementing its key components which include the establishment of a dynamic coordination body, core data and metadata. Since several years, portals and network services have been developed as well.

The INSPIRE directive was transposed by an amendment of Act No. 123/1998 Coll. On the Right of Access to Environmental Information (Aarhus Convention) and entered into force in November 2009. The executive regulation is currently in preparation. At the same time the Act on the Right of Access to Environmental Information was amended, Act No. 200/1994 Coll. On surveying was also changed.

The situation in the Czech Republic can be considered as a single SDI, covering the entire country involving all the relevant stakeholders. In November 2010 a INSPIRE national coordinating committee (INCOCO) was put in place with 21 organisations involved. The aim is to Coordination of data providers, strategies and obligations towards EC. The INCOCO secretariat is CENIA and its secretary is the CENIA director.

The Czech Environmental Information Agency, CENIA, has been created in April 2005 to perform synthetic research in ecology and environmental protection and provide professional support to public administrations in the area of integrated prevention. Since beginning of 2006, CENIA is responsible for the implementation of the INSPIRE Directive. The Ministry of Environment (MoE) and Ministry of Informatics (MoI) prepared the transposition of INSPIRE into national law. These ministries now play a major role in communicating both on EU and national level on the INSPIRE status, needs and obstacles. Special attention will be paid to balancing the financial issues such as return of investment compared to benefits of public access to data aiming a win-win situation.

Nemoforum, a cadastral and GIS user forum, started in 1999 the project National Geo-Information Infrastructure (NGII, further termed NSDI) that covers many important information sources at national level and was adopted in 2001 by the most important state administrative bodies and private sector actors. The NGII Project has ten priority areas including aiming at formalizing the NGII-initiative, giving it a legal foundation and making it evolve with respect to data content and technical performance. All five theoretic SDI-components are addressed (legal issues, reference and core thematic data, metadata, access services, standards). Standardisation is based on Czech and CEN-standards but has moved towards ISO.

Although there is not yet a national geoportal the CENIA geoportal acts as one since it includes datasets from the Ministry of Environment, Transport, Health, Research Institute of Soil, etc.

Table of Contents

Abbreviations and acronyms

ATI   Army Topography Institute
CAGI   Czech Association for Geoinformation
CCSS   Czech Centre for Science and Society
CCO   Czech Coordination Office
CENIA   Czech Environmental Information Agency
CGS   Czech Geological Survey
CHMI   Czech Hydrometeorological Institute
CLF   Czech Land Fund
COSMC   Czech Office for Surveying, Mapping and Cadastre (CUZK)
CZSO   Czech Statistical Office (CSO)
DMU   DMU
EEA   European Environmental Agency
EIA   Energy Information Administration
EU   European Union
EULIS   European Land Information Service
FIR   Further Investigation Required
GEMET   General Multilingual Environmental Thesaurus
GI   Geographical Information
GINIE   Geographic Information Network in Europe
GIS   Geographical Information System
GMES   Global Monitoring for Environment and Security
IACS   Integrated Agricultural Control System
ISS   Information Society Services
INSPIRE   INfrastructure for SPatial InfoRmation in Europe
MICKA   Czech Metadata System
MIDAS   Main on-line metadata service for GI
MIS   Metainformation system
MIT   Ministry of Industry and Trade
MoA   Ministry of Agriculture
MoE   Ministry of the Environment
MoH   Ministry of Health
MoI   Ministry of Informatics
MRD   Ministry for Regional Development
MS-NPSA   Map Service of NPSA
MUNI   Masaryk University in Brno
NIA   No Information Available

NGII	National Geo-Information Infrastructure
NGO	Non Governmental Organisation
NLCA	Nature and Landscape Conservation Agency
NPSA	National Portal of State Administration
NSDI	National Spatial Data Infrastructures
OGC	Open Geospatial Consortium
OSS	Open Source Software
PPP	Public-private partnerships
PSI	Policy and legislation on access to public sector information
RBA	River Basin Administrations
RA	Regional Administrations
SDI	Spatial Data Infrastructures
SEIS	Shared Environmental Information System
SME	Small and Medium Enterprise
TRC	Transport Research Centre
UNGIWG	United Nations Geographic Working Group
UNSDI	United Nations Spatial Data Infrastructure
URL	Universal Resource Locator
WFS	Web Feature Service
WMS	Web Mapping Service
WRI	Water Research Institute
ZABAGED	Czech Office for Surveying, Mapping and Cadastre (COSMC)

1 GENERAL INFORMATION

1.1 Method

This report aims at summarizing the state of play of SDI in the Czech Republic, and at reflecting the degree to which the SDI situation in the Czech Republic is similar to the ideas set out in the INSPIRE Directive and its implementing rules.

The report is based on information found on websites, in documents and received during workshops and conferences. The old versions of the report have been completed by integration and consolidating the comments received between 2003 and 2005 from various INSPIRE & NSDI experts.

In this version obsolete information was removed and the report was restructured to bring it more in line with the topics assessed.

1.2 The Czech SDI-scene

The Czech Republic has developed a dynamic NSDI since years and is implementing INSPIRE at a high pace. The Czech Republic has not only developed a clear framework for NSDI as part of a broader national information infrastructure, but has also gone quite far in implementing its key components which include the establishment of a dynamic coordination body, core data and metadata. Since several years, portals and network services have been developed as well. In the past, efforts have already been made to the national meta-information system MIDAS, the environmental meta-information system and to web mapping services. Based on this experience the Czech Republic is implementing INSPIRE. One of the strong points of the Czech Republic is the strong involvement of the major players which helped the NSDI to take shape. We describe the most important ones below.

Supported by the **Ministry of Environment and the Ministry of Informatics** introduced already in 2004 a Map Service as an integral part of National Portal of State Administration (NPSA). MS-NPSA published over time more and more information sources in line with INSPIRE Annexes I-III. While environmental data was the first focus, other areas followed quickly, as well as hybrid cadastral maps.

Nemoforum, a forum on real estate issues played an important role since its creation in 1999 to help the NSDI taking shape. The Activities of Nemoforum are focused on four main topics agreed by the member organisations:

- National Geoinformation Infrastructure
- Spatial Identification in Basic Public Registers
- Cadastre of Real Estates
- Support of Land Market

Nemoforum members from the Public platform include: Czech Office for Surveying, Mapping and Cadastre, Ministry of Finance, Ministry or Regional Development, Ministry of Interior, Ministry of Agriculture, Union of Towns and Municipalities of the CR, Office for State Information System. Members from the professional platform are: Association of Real Estate Offices of Bohemia, Moravia and Silesia, Czech Association for Geoinformation, Czech Society of Certified Property Valuers, Chamber of Notaries of the CR, Chamber of Surveyors and Cartographers, Masaryk University Brno, Union of Land Owners and Private Farmers in the CR, University of West Bohemia in Pilsen, Utilities East Bohemia, Utilities West Bohemia. Ongoing activities based on the four topics mentioned before include: web portals of technical maps and communication between, SDI in the Czech Republic and INSPIRE and round table discussion on digitisation of cadastral maps. Nemoforum is participating in other activities as well such as conferences and professional studies.

The **Czech Office for Surveying, Mapping and Cadastre** (COSMC) is an autonomous supreme body of the state administration of surveying, mapping and cadastre in the Czech Republic. The president of COSMC is subordinated only to the prime minister of the Government. COSMC took an initiative in the past called the National Geographic Information Infrastructure (NGII) in order to achieve better communication between data providers and users. COSMC publishes annual reports providing a detailed overview of its activities.
(http://www.cuzk.cz/Dokument.aspx?PRARESKOD=998&MENUID=10384&AKCE=DOC:10-ANNUAL)

CAGI is a civil professional association of the individuals and legal persons working in the sphere of geo-information in the Czech Republic. One of the aims of CAGI is to create the conditions for a universal development of geo-information systems and for a wide use of geo-information in all areas. CAGI initiated or participated in a series of projects dealing with geo-information, and is still doing so. To accomplish this, expert groups and committees are established with their own budgets and organization structure, whilst controlled by the board of CAGI.

The "programme of further development of the National Geo-Information Infrastructure (NGII, further termed NSDI) for 2001-2005" has been set in place in 1999. In 2001 all members of the Association Nemoforum adopted the NGII program as well as the private sector. COSMC has the intention to review the NGII program and this will be addressed in 2010.

The Czech NSDI can be described as a system of interconnected conditions that in the Czech environment enables to ensure access for a maximum number of uses to a wide range of geo-information in a user-friendly way with the full use of the modern geo-information and communication technology potential.

With a clear focus on the implementation of the INSPIRE Directive, **CENIA** became the key driver of the INSPIRE and NSDI developments. CENIA brings together all the SDI

stakeholders involved: the relevant Ministries, Agencies dealing with spatial data, the regions, universities and private companies.

An example of the involvement of research and private sector is the **Czech Centre for Science and Society** (CCSS). It is an association of SMEs, the public administration and research organisations; an independent, non-profit and non-governmental organisation; a virtual centre of excellence with the focus on the implementation of new communication and navigation technologies which have potential for sustainable development. CCSS is active in the field of land management, risk management, ecology, municipal and regional management, the development of IS applications and SDI components and training. Members are: UHUL, MJM, Lesprojekt, Lesinfo, Help Forest, MU, Zapadoceska Universita and CrossCzech. More information about projects and activities can be found at: http://www.ccss.cz/ .

Several **projects** have been finished or are ongoing in the field of SDI. One of them is NaturNet (http://www.naturnet.org). It consists of a metadata system (MICKA), map applications, a web processing server, multimedia and 3D tools, and a mobile and e-learning solution. Another important project is EULIS (http://eulis.eu/): European Land Information Service; Czech participants in this EU project are Czech Research institute of geodesy, topography and cartography and Czech Office for Surveying, Mapping and Cadastre.

Details of the NSDI-situation in the Czech Republic

1.3 General Information

Official address:

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INSPIRE Coordinating Committee (INCOCO)

Contact persons:

INSPIRE NCP: Jiri Hradec

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INCOCO Contactpoint: Jiri Hradec

INCOCO Substitute Contactpoint: Šárka Lacinová

1.4 Component 1: Coordination and organizational issues

The situation in the Czech Republic can be considered as a single SDI, covering the entire country involving all the relevant stakeholders. In November 2010 a **INSPIRE national coordinating committee (INCOCO)** was put in place with 21 organisations involved. The aim is to Coordination of data providers, strategies and obligations towards EC. The INCOCO secretariat is CENIA and its secretary is the CENIA director.

Key players involved in the coordination effort are:

- The Ministry of Environment (www.env.cz) and especially CENIA, the Czech Environmental Agency who is leading the INSPIRE and NSDI implementation;
- The Ministry of Informatics (http://www.mvcr.cz);
- The Czech Office for Surveying, Mapping and Cadastre (http://www.cuzk.cz/);
- The Czech Association for Geoinformation (CAGI) (http://www.cagi.cz) and

The platform for co-operation of the state administrative bodies, regional and local authorities, different professional unions and associations, representing users in the commercial sector, universities: Nemoforum.
(http://www.cuzk.cz/Dokument.aspx?AKCE=GEN:UVOD&PRARESKOD=999).

The role of the INCOCO is:

- To monitor the preparation of INSPIRE implementation;
- To assess progress in achieving the objectives of INSPIRE implementation;
- To analyse the results of INSPIRE implementation;
- To approve the INSPIRE implementation strategies, amend the implementation strategy and identify priorities for implementation;
- To consider and approve monitoring reports on the implementation of INSPIRE infrastructure before they are dispatched to the European Commission;
- To approve annual reports on the status of the INSPIRE infrastructure for the Czech Government;
- To approve its plan of activities and the agenda of its meetings;
- To draft the presentations to be delivered by the Minister for the Environment within the Czech Government concerning INSPIRE-related adjustments and changes reflected in the national geo-information policy.

The Czech Environmental Information Agency, **CENIA**, was created in April 2005 to perform synthetic research in ecology and environmental protection and provide professional support to public administrations in the area of integrated prevention. Since beginning of 2006, CENIA is responsible for the implementation of the INSPIRE Directive. There is a strong cooperation with the EEA. The working model and types of activities are very similar. Major projects that are currently ongoing are the ETC/water of which CENIA is the leader, the set-up of a satellite receiving station, the creation of a

register on emission resources, and the creation of an assessment centre. The list of current and completed projects can be found at:

http://www.cenia.cz/__C12572570032F2DB.nsf/$pid/MZPMSFX2CDW9

CENIA plays a coordinating and stimulating role together with the MoE, the MoI and the two Associations CAGI and Nemoforum, but also takes the lead in development of components of the infrastructure.

The CAGI and Nemoforum associations/platforms are helping to bring together all the SDI stakeholders through different initiatives. CAGI is bringing together the users of the regional and local levels, the NGO's, universities and private companies. Neoforum includes also authorities. CAGI wants to focus on best practices and creation of awareness through the organisation of conferences, info days, etc. It also stresses the need for education and training and organises an award for "Best geo application of the year". Neoforum started more from the idea to develop potential applications in the Real estate Market using cadastral data. Neoforum is focusing also on the organisation of seminars and events which it sometimes organises jointly with CAGI.

1.4.1 Conclusions of Component 1

The Czech Republic's SDI approach is truly national. SDI building blocks have reached a significant level of operationality. CENIA plays a coordinating and stimulating role together with the MoE, the MoI and the two Associations CAGI and Nemoforum, but also takes the lead in development of components of the infrastructure. The CAGI and Nemoforum associations/platforms are helping to bring together all the SDI stakeholders through different initiatives. CAGI is bringing together the users of the regional and local levels, the NGO's, universities and private companies, while Neoforum includes also authorities.

Based on these conclusions we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national

- One or more components of the SDI have reached a significant level of operationality (5)

- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (No)

- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users

- An organisation of the type 'national GI-association' is involved in the coordination of the SDI

- Producers and users of spatial data are participating in the SDI

- Only public sector actors are participating in the SDI (No)

1.5 Component 2: Legal framework and funding

1.5.1 Legal framework

Next to the strategic documents for the NGII programme, which were adopted by the state administrative bodies, regional and local governments, and professional unions and the private sector, the following legal instruments should be mentioned.

First, Law 183/2006 Sb. on landscape planning and building regulations – in force since 1 January 2007 – imposes the development and updating of "spatial analytical data records", which have the character of spatial data derived from primary sources and expected (even though it is not explicitly required in the law) to be available in digital form. Next, the amendment of the State Statistical Act (act no. 89/1995 Sb o státní statistické službě) in 2006 imposed the development of system of statistical registers including a territorial Register of census districts and buildings.

The INSPIRE directive was transposed by an amendment of Act No. 123/1998 Coll. On the Right of Access to Environmental Information (Aarhus Convention) and entered into force in November 2009. The executive regulation is currently in preparation. At the same time the Act on the Right of Access to Environmental Information was amended, Act No. 200/1994 Coll. On surveying was also changed.

1.5.2 Public-private partnerships (PPPs)

There is no tradition of PPP's. Nevertheless their usefulness and necessity are now considered to be obvious.

Good examples can be found in several areas, e.g. in the cooperation and functioning of CAGI and Nemoforum. Concrete examples of broader importance are e.g. the cooperation between public and private institutions and organizations in the production of the information system of the cadastre and real estates or the cooperation between the Czech Ministry of Informatics and the Czech Association for Geoinformation.

1.5.3 Policy and legislation on access to and re-use of public sector information (PSI)

In general terms, access to information is regulated by the law on free access to information on public administration activities and actions (Act no. 106/1999), which entered into force in January 2000. The Act gives citizens the right to ask for any information connected with the functioning and dealing of the state administrative bodies, local self-governing authorities and certain other official institutions. Act 106/1999 is based on the Freedom of Access to Environmental Information Act (123/1998 Sb.). This act regulates the compulsory availability to the public of a range of information and adopts the Aarhus Convention and Directive 2003/4 on access to environmental information. Act 106/1999 also implements the PSI directive, by an amendment of 2006.

The transposition of INSPIRE has amended the Act on Freedom of Access to Environmental Information, ensuring that citizens do not need any specific application to access the free of charge maps, and imposing technical parameters on the spatial data. Searching data on the Geo-Portal is free of charge, while charges are made for download, analysis and specific actions.

(see http://www.epsiplatform.eu/news/news/czechs_to_get_access_to_spatial_info_maps)

1.5.4 Legal protection of GI by intellectual property rights

On 1 December 2000 the Copyright Act (Law no. 121/2000 of 7 April 2000 on Copyright, Rights Related to Copyright and on the Amendment of Certain Laws) came into effect.

Article 3 of the Copyright Act determines that copyright protection does not apply to an official work, such as legal regulations, decisions, public charters, publicly accessible registers and the collection of their records, and also official drafts of an official work and other preparatory official documentation including the official translation of such work, Chamber of Deputies and Senate publications, memorial chronicles of a municipality (municipal chronicle), state symbols and symbols of a regional self-governing unit, and other such works where there is public interest in their exclusion from copyright protection.

On the other hand, the act gives traditionally copyright to cartographic products. A related important copyrighted area is the protection of databases schemas.

The Czech Copyright Act of 2000 was discussed in the Parliament in 2005-2006 in order to complete the implementation of the EU Copyright Directive and the EU Enforcement Directive. The amendments were adopted in summer 2006.

1.5.5 Restricted access to GI further to the legal protection of privacy

The individual's privacy is safeguarded by article 7(1) of the 1993 Charter of Fundamental Rights and Freedoms. Article 10 provides the right to human dignity, protection from unauthorized interference in person and family life, and misuse of his or her personal information. Article 13 prohibits the violation of "letters and other papers and records" held privately or communicated through the mail or other means.

Act no. 101 of 2000 on Personal Data Protection came into force on 1 June 2000. It is based on the EU Data Protection Directive as part of the Czech Republic's efforts towards membership of the EU. The new act creates an Office for Personal Data Protection as an independent supervisory body.

The "Act on Information Society Services" (ISS Bill) implements Article 7 of Directive 2000/31/EC and Article 13 of Directive 2002/58/EC.

1.5.6 Licensing framework

Datasets produced and managed by the public administrations are available under very different conditions depending on the bodies and authorities themselves. No general approach or regulations exist yet.

Besides licensing, general trade agreements and other approaches can be found. In general every transfer is considered as a special trade case and no general and prefabricated licenses are available in advance (exceptions exist).

The geodata portal offers map services for on-line access to data and a business module for direct ordering of digital data files and map services, and printed maps of the Land Survey Office. Orders can be made electronically after registering on the website. Different license agreements are available for personal use and any other use. The agreements have to be printed, signed and sent between the Land Survey and the customer, and then the data are delivered, either by e-mail, download from the server, personal withdrawal or regular mail.

For the INSPIRE geoportal, one universal licence will be applied that will regulate the use of the data and services.

1.5.7 Funding model for SDI and pricing policy

In addition to the funding of specific projects from the individual organizations involved, a central fund was established for the Action Plan of Implementation of the State Information Policy. The funding policy for the implementation of INSPIRE is not clear yet, but some national funds are in any case available for the new national geoportal and the national INSPIRE committee secretariat.

The Czech Office for Surveying, Mapping and Cadastre has its own account in the State budget of the Czech Republic and is partly financed by a cost recovery policy. This is also the case for other state administrations. Free of charge access was exceptional, but this will be increasingly implemented due to the transposition of the INSPIRE directive.

A number of data sets only require the costs of the medium (CD/DVD), such as hydrography, protected sites, land cover, geology, natural risk zones, atmospheric conditions, mineral resources.

1.5.8 Conclusions of Component 2

The strategic documents for the NGII programme were adopted by the state administrative bodies, regional and local governments, and professional unions and the private sector. The INSPIRE directive was transposed by an amendment of Act No. 123/1998 Coll. on the Right of Access to Environmental Information (Aarhus Convention) and entered into force in November 2009. Concrete examples of broader importance are e.g. the cooperation between public and private institutions and

organizations in the production of the information system of the cadastre and real estates. The transposition of INSPIRE has amended the Act on Freedom of Access to Environmental Information, ensuring that citizens do not need any specific application to access the free of charge maps, and imposing technical parameters on the spatial data. Searching data on the Geo-Portal is free of charge, while charges are made for download, analysis and specific actions. For the INSPIRE geoportal, one universal licence will be applied that will regulate the use of the data and services. The funding policy for the implementation of INSPIRE is not clear yet, but some national funds are in any case available for the new national geoportal and the national INSPIRE committee secretariat.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or – development

- There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects

- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (In Preparation)

- GI can specifically be protected by copyright (In Preparation)

- Privacy laws are actively being taken into account by the holders of GI (In Preparation)

- There is a framework or policy for sharing GI between public institutions

- There are simplified and standardised licences for personal use (No)

- The long-term financial security of the SDI-initiative is secured (Partially)

- There is a pricing framework for trading, using and/or commercialising GI (No)

1.6 Component 3: Data for themes of the INSPIRE annexes

1.6.1 Data sets at different resolutions covering the INSPIRE and other themes

According to the INSPIRE MR results of 2011 (status end 2010), 334 spatial data sets were reported for the three annexes of INSPIRE: 136 for annex I themes, 54 for annex II and 144 for annex III. Most of the themes are covered with some exceptions: statistical units, soil, population distribution, meteo stations and species distribution, although for most of these themes data sets exist.

Examples of spatial data sets from multiple providers are described below.

Czech Republic provides maps in different scales and resolution according to its needs. Key spatial data providers are the MoE, COSMC, CZSO, Geodis Brno a.s. and others.

COSMC provides state map series at:

State Map 1: 5000
Raster base map CR 1 10 000
Raster Base Map CR 1: 25 000
Raster base map CR 1: 50 000
Raster base map ČR 1: 200 000
Raster Map of the Czech Republic 1: 500 000
Raster Map of the Czech Republic 1: 1 000 000

Moreover Administrative and Cadastral Boundaries are available at 1:10 000 and 1:50 000 scale.

Reference geographic data (ZABAGED) created by COSMC are at an equivalent scale of 1:10.000. Data ZABAGED ® is currently providing the map sheets also as Vector and mdb files (in GML or SHP format).

Data are given in S-JTSK, WGS84/UTM or in S-42/1983 coordinate system and vertical reference system for Balt compensation.

The available map products of COSMC can be found at: http://www.cuzk.cz/Dokument.aspx?PRARESKOD=10&MENUID=10009&AKCE=DOC:30-ZU_GEOPODKLADY.

In addition, the DMU (Digital Map of the Territory) has been created by the Army Topographic Institute at scale of 1:25.000. This datasets is extensively used in military, environmental and risk management applications. This dataset has been based on WGS84-based S-42 coordinate system allowing continuous work when exceeding Czech borders.

Virtually all data relevant to Annexes I-III are available. Key providers are MoE, COSMC, CZSO, Geodis Brno a.s. and others.

Geographical names are managed by the COSMC Office in Czech language. The toponymic guidelines of the Czech Republic (ISBN 80-902321-0-8) publication edited in 1997 represents an atypical handbook dealing with geographical names in English. It is designed in the first row for the foreign specialized public.

1.6.2 Geodetic reference systems and projections

Spatial referencing is mostly done by coordinates.

Data set	Map projection	Datum	Spheroid
SABE	UTM	WGS-84	Int.
ZABAGED1	National oblique conical conformal	Krovak-CZ	Bessel
3D contours	National oblique conical conformal	Baltic Datum (Kronstadt)	
(digital raster data) RZM	Uniform Trigonometric Cadastral Net System	Baltic Datum after Adjustment (Bpv)	

Transformation from the S-JTSK-system to the ED 87 system is done with 2m accuracy and to ETRF system with 3m accuracy.

The national elevation datum with normal heights is derived from middle sea level at Kronstadt - Baltic Datum after Adjustment – Bpv.

1.6.3 Quality of the data

No special procedures on data quality assessment have been used till now. INSPIRE Implementation Rules will treat the quality issues and will be applied by the Czech Republic.

In the case of the state map series data and the cadastral map (core data) a set of quantitative measures including the positional accuracy, precision and resolution is published and guaranteed by the publishing COSMC Office.

In the case of thematic or core thematic data the situation is partially similar, partially the quality is not stated explicitly.

The meta-information system MIDAS requires unified quality description of the geodatasets. This requirement certainly has improved the quality assessment.

1.6.4 Interoperability

Some of the transfer formats are standardized (standards officially published) by the producer (case of state maps, cadastral map - COSMC Office). They are mainly based on special text-like formats, and on database structures.

Some of the transfer formats are standardized as formats of the public information systems by the Ministry of Informatics (prepared by CAGI mainly), e.g. for digital forms of technical maps or urban plans or metadata description of geodatasets and its transfer.

In other cases the data transfer is based on unpublished formats following the GIS product formats or obvious raster formats in case of raster data.

Some data are published (and there is a trend to increase this) in the form of OGC compatible web services (WMS, WFS).

Ministry of Environment developed a system Mapmaker acting as an OGC abstraction layer allowing WMS clients to connect to any commercial or freeware map server. This software has been deployed on 80+ installations in the Czech Republic. See als section on networks services.

Important work is going on to harmonise the geological data as far as possible and make them available to the users (geoXML). CGS is working with test beds to test interoperability. One of the services to be developed will integrate knowledge rules to translate the geological maps of CZ into useable information.

1.6.5 Language and culture

Metadata and similar descriptions are mostly in Czech only. An English version is considered as necessary for the near future. SDI related documents are partially available and published in English too.

A feature catalogue for the ZABAGED fundamental base of geographic data is available in Czech.

The Czech Office for Surveying, Mapping and Cadastre and the Authority of Geodesy, Cartography and Cadastre of the Slovak Republic have co-edited a specialized dictionary containing 859 fundamental terms that describe geographical phenomena on maps in the extent of lists of conventional signs for maps at scales of 1:10 000 and smaller. The dictionary gives simultaneously term definitions in Czech and Russian languages. It is divided into thematic groups: selected general terms, terrain relief, hydrology, pedology and land coverage, settlements, agriculture, industry, transport.

The Czech Association of Geoinformation and the Ministry of Informatics published a general glossary containing about 100 main terms from the field of geoinformatics and related fields to support the unification of terminology.

Ministry of Environment uses GEMET (General Multilingual Environmental Thesaurus) developed by EEA as a standard keyword vocabulary.

ISO8859P2 is the standard character set. WIN CP 1250 or UTF-8 are sometimes used as well.

1.6.6 Conclusions of Component 3

Already from the previous CZ's SoP report Geodatasets existed which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components while the geodetic reference system and projection systems are standardised, documented and interconvertable. The INSPIRE 2010 MR confirms the statement. 334 data sets have been reported for the three INSPIRE annexes. No special procedures on data quality assessment have been used till now. Ministry of Environment developed a system Mapmaker acting as an OGC abstraction layer allowing WMS clients to connect to any commercial of freeware map server. Moreover, important work is going on to harmonise the geological and other spatial data as far as possible and make them available to the users. Metadata and similar descriptions are mostly in Czech only, while SDI related documents are partially available and published in English too.

Based on these conclusions we score the indicators as follows:

- Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components

- The geodetic reference system and projection systems are standardised, documented and interconvertable

- There is a documented data quality control procedure applied at the level of the SDI (No)

- Concern for interoperability goes beyond conversion between different data formats

- The national language is the operational language of the SDI

- English is used as secondary language (Partially)

1.7 Component 4: Metadata

1.7.1 Availability

Metadata are produced for most of the reference and core thematic data. This is confirmed by the INSPIRE MR results (2011, status end 2010): 99% of the reported annex I data sets, 100% of the annex II data sets and 91% of the annex III data sets have metadata.

1.7.2 Metadata catalogues

The new INSPIRE geoportal contains a rich catalogue which is continuously updated (http://geoportal.gov.cz/web/guest/home).

The MoE Metadata portal enables searching and browsing the metadata of geodata and web map services from resort organizations and other organizations in Czech Republic. It is based on catalogue service defined by the Open Geospatial Consortium and supports ISO 19115, 19119, 19139 standards.

The MIDAS-metadata catalogue is on-line. The catalogue contains metadata of more than 3.000 geodatasets.

Metainformation system MIS covers about 1000 environmental data sources.

1.7.3 Metadata implementation

The metadata catalogue of the INSPIRE portal is coordinated by CENIA. The National metadata portal allows searching (simple and advanced) and browsing of metadata for geodata and web map services from resort organizations and other organizations in Czech Republic. It is based on catalogue service defined by Open Geospatial Consortium and supports ISO 19115, 19119, 19139 standards. The portal operates also in English and to our knowledge provides 846 metadata sets

The Metadata service build on top of MIDAS is implemented and coordinated by the Ministry of Informatics representing the public sector bodies and the Czech Association for Geoinformation representing the users and the private sector. CAGI has developed and is maintaining the MIDAS.

There is implemented simple basic thematic classification as well as GEMET thesaurus in the MIDAS presently. Other thesauri and classifications may be simply added. Both thesaurus and classification is bi-lingual (Czech and English).

There are formalized update procedures, technologically possible both in on-line and in off-line version. The off-line version is supported by a special freely available software product MIDASLite.

Per month some 10.000 to 18.000 accesses to the MIDAS-system are registered. The most frequent visitors are public authorities and commercial firms from the area of geoinformation technologies.

Priority of the CSO will go to the development of WMS and the development of a metadata system (ISO compliant – ISO 19115, ISO 19119, ISO 15836).

1.7.4 Conclusions of Component 4

Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes. The 2010 MR reveals that for the reported datasets of INSPIRE (99%, 100% and 91% of the data sets have metadata for annex I, II and III respectively). The MoE Metadata portal enables searching and browsing the metadata of geodata and web map services from resort organizations and other organizations in Czech Republic. The metadata service is implemented and coordinated by the Ministry of Informatics representing the public sector bodies and the Czech Association for Geoinformation representing the users and the private sector.

Based on these conclusions we score the indicators as follows:

- Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes

- One or more standardised metadata catalogues are available covering more than one data producing agency

- There is a coordinating authority for metadata implementation at the level of the SDI

1.8 Component 5: Network Services

On the next page an overview of services and their characteristics are given for several stakeholders of the CZ SDI. There are several discovery, viewing and download services. However, often the portal through which services can be reached is given as reference ID.

1.8.1 Geoportals

The Czech Republic has a long history of developing, populating and using geoportals. In November 2008, the INSPIRE official information site was launched at www.inspire.gov.cz. CENIA is responsible for the site content. The current national geo-portal http://geoportal.gov.cz is part of the MoI public administration portal. It was launched in 2000 as a geo-portal for the MoE under agreement with the MoI. It is the central geo-portal, with data about the different themes of the INSPIRE annexes. The portal gives access to the metadata catalogue. Metadata can be uploaded and searched for. Since 2008, data have also been disclosed via WMS. It also provides a metadata and view service validator. The portal is further developed in stages to ensure that the obligations under the INSPIRE Directive are fulfilled. The INSPIRE geoportal as it is now became operational in 2010. The geo-portal is largely used today in the operations of private companies and public administration authorities, and for teaching material in courses or at schools (INSPIRE MR, 201).

Some of the other geoportals are operational as well. In 2005, the COSMC geo-portal was launched, initially as base maps, subsequently with property register map services.

The INSPIRE MR report mentions 20 examples of other geo-portals at state administration institutions at national level and 14 at the sub-national level.
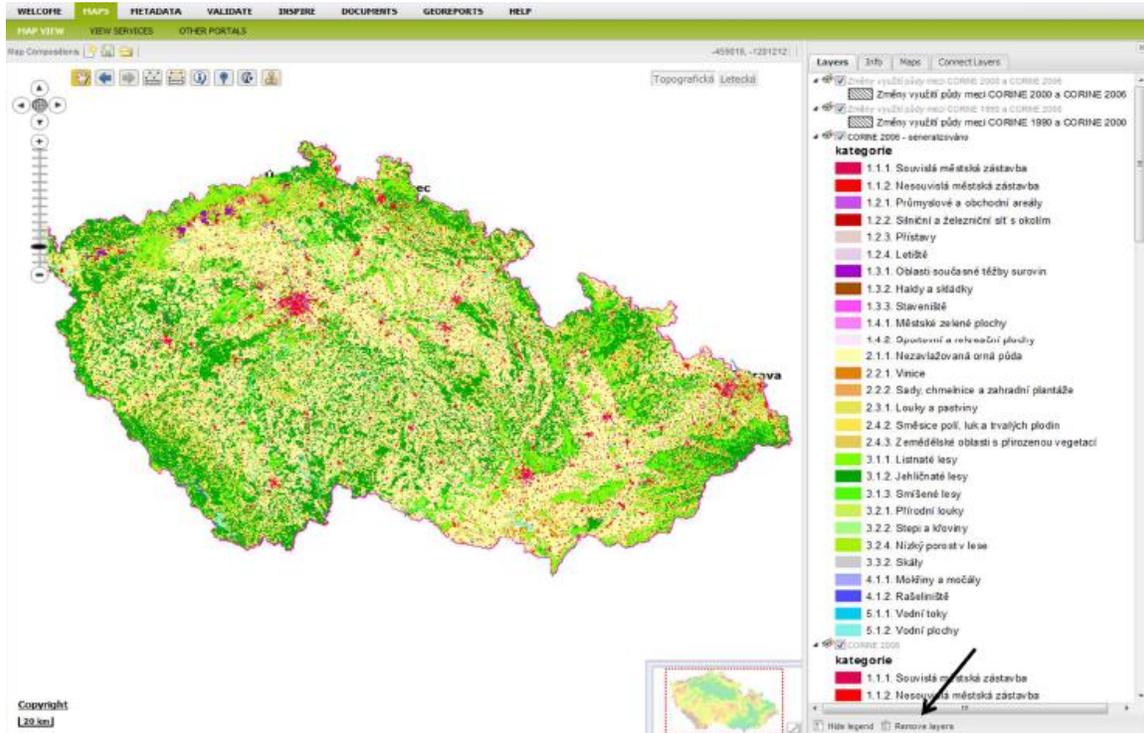
1.8.2 Network services

1.8.2.1 Discovery services

The INSPIRE MR reports 5 discovery services (reporting 2011, status end 2010). In 2010 two services were mentioned in the list of services made available – the MIS catalogue service (all MoE metadata and from some other areas) and the COSMC portal (data on the medium-scale cadastral and base maps, orthophotos, FBGD®, the database of geographical names of the Czech Republic, administrative boarders, the State Map 1:5000, and the point field database). Although data providers produce metadata, there are relatively few discovery services for the metadata which would facilitate their retrieval.

The INSPIRE geoportal allows to discover the metadata of spatial data sets and services through an OGC CSW discovery service.

The other main geographic information metadata service is MIDAS, developed by CAGI. MIDAS is an on-line (http://www.cagi.cz/midas) catalogue of geodata of the public administration. It allows an overview of existing data for the GIS community and is a tool for system analysis (coordinating requirements, removing duplicities, possible data sharing etc.). A pilot version was developed in 1999. MIDAS system was completed in 2009. It is freely accessible and provides complete set of records for download.

Environmental metainformation system MIS (http://mis.cenia.cz/) has a well established user base and provides metadata of numerous organisations such as cuzk.. More than that MIS has been linked to MS-NPSA (http://geoportal.cenia.cz) and Environmental Portal (http://portal.env.cz) allowing portal visitors access to data description of the maps shown.

The websites of COSMC (EN and CZ) and CZSO (EN and CZ) provide descriptions of the available data products of these institutions at www.cuzk.cz and www.czso.cz .

The portal of geohazards provides map applications, which allow access to geoscientific data from geodatabases and the Digital Archive of the Czech Geological Society. The CGS Map Sever was started in the 2003 and is based on ESRI technology − ArcIMS map server and ArcSDE spatial database (http://www.geology.cz/extranet-eng/geodata/mapserver).

1.8.2.2 Viewing services

Web-mapping services have been developing in an increasing amount during last two years. The above mentioned access-to-reference-and-core thematic data services are fully based on them. The INSPIRE MR reports 51 viewing services. A list of available WMS servers is available in MIDAS. Both the portals of CENIA and CUZK give access to several services. Data that can be discovered and viewed are topographic base maps, road infrastructure, geology, environment, registers, population data, etc.

COSMC has developed view services for spatial data since 2005. In accordance with INSPIRE principles, at the end of 2007, the COSMC also started providing view services for the general public (without authentication). The existing application, "Property Register Access", was expanded to include WMS cadastral map viewing, and a free WMS service was provided for the cadastral map. In the first half of 2010, the COSMC started providing a WFS service drawing on the Czech Database of Geographic Nomenclature (Geonames) for Eurogeonames.

Furthermore, Czech Republic participates in the United Nations Spatial Data Infrastructure (UNSDI) with The Czech Coordination Office (CCO) that was established in the United Nations Geographic Working Group (UNGIWG)-UNSDI initiative on the 18th of May 2006. The CCO is supported by the Czech Centrum for Science and Society and its goal is coordinate Czech activities for the establishment of a UNSDI and coordinate Czech national activities with the UNGIWG Membership. More detailed information about UNGIWG-UNSDI can be found on www.ungiwg.org.

The portal.UNSDI.cz provides a package of applications that allows users to work with maps in a web environment based on OGC web services. These include a catalogue for metadata searching and a web map client. This client allows viewing maps based on OGC web services and other formats (Google maps, KML, MapServer, GML) (http://www.unsdi.cz/map/).

The Basic functions are:

- Viewing web services(OGC WMS, WFS) selected by user from catalogue or directly by address.

- Saving user defined map('project') on local hard drive a rereading of this saved composition (OGC WMC)

- Distance and area measurements.

- Searching in map.

- Inserting user defined objects into map.

- Large format print in PDF.

- Showing legends, metadata and querying in map.

1.8.2.3 Download services

Ministry of Informatics publishes authorized geodata on http://geoportal.cenia.cz as a national geoportal. Further development towards future Implementation Rules is expected. Therefore, there not yet download services available at the INSPIRE geo-portal. However, 6 download services from different providers are reported under INSPIRE MR.

1.8.2.4 Transformation services

The INSPIRE MR refers to one transformation service from CZ-CUZK: http://geoportal.cuzk.cz/SDIProWCTS/WCTService.aspx

1.8.2.5 Invoking services

Although several invoking services are reported in the INSPIRE MR monitoring for CZ (2011), it is not clear if they are real invoking services..

1.8.3 Spatial data and other services

No information found.

1.8.4 Use of software and SDI applications

Mainly world-wide used GIS-products from companies like ESRI, Intergraph, Smallworld etc. are used. Limited use is made of Czech products.

The news developments have been following the OpenSource ideas and recommendations. The "mapmaker" portal software facilitating access to various map

services (OGC, ESRI, Intergraph, …) has been published under GPL license. It has been deployed on 80+ sites in the Czech Republic saving extensive funds.

Several services have been developed in an OSS environment, including GeoNetwork from FAO.

Not only public administration bodies and institutions but also the non-governmental and commercial organizations and firms and the public are users and a lot of different applications exist. The best user applications have been awarded in an every-year contest "Geoapplication of the year", organized by CAGI. The awarded applications are presented in English on WEBCASTLE (see GINIE project) - www.ec-gis.org/ginie and are part of the case studies used for INSPIRE Impact Assessment. In Czech they are available through CAGI website www.cagi.cz .

CSO will prepare its Census 2011 in a different way: checking of the state territory at decided time in 2011 – cooperation with Map Agency and municipalities; preparation of dynamic services for cooperation, presentation; creation of house and flat lists (with addresses) for the census commissioners, including situation maps and provision of digital data packet of Territorial Information of Census 2011.

Another example of an integrated approach is in the NatureNet project offering the user the possibility to publish data, to discover and view it. The project is using UMN Mapserver. An overview of the architecture is given in the figure below:
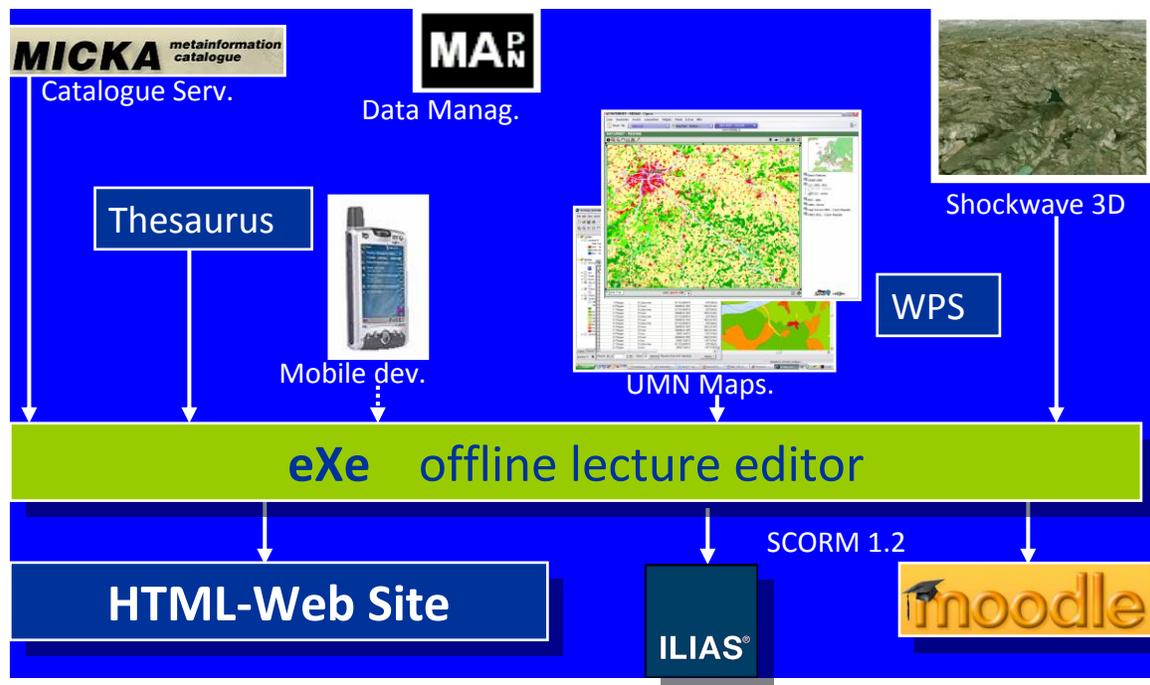
1.8.5 Conclusions of Component 5

The main geographic information metadata service is MIDAS, developed by CAGI. MIDAS is an on-line (http://www.cagi.cz/midas) catalogue of geodata of the public administration. MIDAS system is freely accessible and provides complete set of records for download. CENIA provides several web mapping services with basic administrative, topographic and environmental data. The geoportal enables authorised users to upload new data sets. Discovery and view services are available free of charge in the geoportal while downloading, transformation and invoke services are available according to charging procedures. However the latter services are not yet clear how they operate.

Based on these conclusions we score the indicators as follows:

- There are one or more discovery services making it possible to search for data and services through metadata

- There are one or more view services available for to visualise data from the themes of the INSPIRE annexes

- There are one ore more on-line download services enabling (parts of) copies of datasets

- There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability (Not so clear)

- There are middleware services allowing data services to be invoked (Not so clear)

1.9 Component 6: Thematic environmental data

Environmental management is based on national legislation − large set of acts and regulations. Some of them are related to issues how to use or evaluate environmental data (not only spatial data).

A large set of environmental data is maintained by institutions supporting the Ministry of the Environment of the Czech Republic (www.env.cz):

- A portal to environmental information (http://portal.env.cz) with its map services (http://geoportal.cenia.cz/mapsphere/MapWin.aspx?M_Site=cenia&M_Lang=cs) provides access to information sources within the environmental sector and mutual links between various systems:

- CENIA, Czech Environmental Information Agency (www.cenia.cz): EIA, IPPC, cross-media data

- Agency for Nature Conservation and Landscape Protection of the Czech Republic (www.nature.cz): Information System of Nature Conservation - localities, protected areas, zoology, botany, memorial trees

- Czech Geological Survey (www.cgs.cz): geoatlas of the Czech Rep., geodatabase of maps, geochronology, geochemistry of surface waters, ore objects, radon measurement, waste disposal sites etc.)

- Czech Hydrometeorological Institute (www.chmi.cz): Air Quality Information System (air pollution sources, air quality monitoring, models), Meteorology, Hydrology (ground & surface water volume and quality)

- Czech Environmental Inspection Agency (www.cizp.cz): inspection and prevention activities − water protection, accidents caused by hazardous chemicals, waste management

- Geofond of the Czech Republic (www.geofond.cz): geological objects, hydrogeology, landslides and dangerous slope deformations, undermined areas, mineral deposits, mining claims, recultivated areas, spas and natural curative resources, geochemistry, fault tectonics etc. Geofond provides a list of web applications at: http://www.geofond.cz/en/web-applications/list-of-applications

- The State Environmental Fund of the Czech Republic (www.sfzp.cz): supported activities and their environmental benefits

- Administration of Protected Landscape Areas of the Czech Republic (http://www.ochranaprirody.cz/index.php?lang=en): protected landscape area (large, small), zones of nature conservation, memorial trees

- administration of national parks (NP) - the Krkonose National Park (www.krnap.cz), the Sumava NP (www.npsumava.cz), Ceské Svycarsko NP (www.npcs.cz), Podyji NP (www.nppodyji.cz): various geographical data -

orthophotomaps, inventories, vegetation, forests, birds, zonation, damages, plans, territorial systems of ecological stability etc.

- Silva Tarouca Research Institute of Landscape and Ornamental Gardening (www.vukoz.cz): alternative energy sources, ornamental gardening data, atmospheric deposits etc.

- T. G. Masaryk Water Research Institute (www.vuv.cz): water management map, basins and watercourses, register of pollution sources, atmospheric deposition monitoring, groundwater resources, inventory of water abstraction and effluent discharges, contaminated sites

Besides these institutions important data are maintained by other national government institutions, ministries and their organisations: Czech Statistical Bureau, Ministry of Agriculture, Ministry of Transportation, Ministry of Public Health etc. Ministry of the Environment produces every year report on the state of the environment of Czech Republic where information sources are indicated.

Aerial photos and land-use data are obtained also on commercial base (e.g. Geodis Brno a.s., Argus company). Other environmental data are created and used in research institutes and universities (Charles University in Prague, University in Ostrava etc.).

Environmental data are created, maintained and used by regional and local governments (regional development, planning). An example of specific local activities is Prague Environmental Information System organised by the City of Prague, managed by the Prague City Hall – IT Department. This system collects data from various sources, maintains databases and set of spatial data based on city background data (from Institute of Municipal Informatics), initiates studies such as air pollution modelling and noise mapping, produces regular reports on the state of the environment, provides information for the public (report, CD, website). Specific information output of the system is Atlas of the Prague Environment that presents more than 70 thematic maps in the interactive GIS application on the web (www.premis.cz/atlasen).

A large project for development and compilation of the metainformation system for the environmental sector was completed by the Ministry of the Environment in 2000. The MIS catalogue has been produced as one of the outputs of the project (printed and on the web http://mis.cenia.cz/). The definition of metadata was based on the EEA Catalogue of Data Sources, now converted to ISO19115:2000. GEMET thesaurus has been adopted for the description of the sources. Specific attributes and auxiliary database were used for geographic data. MoE developed spatial and temporal thesauri for unified description of all possible types of information sources (data, information, services, documents, experts, …)

Related documents:

- Catalogue of Data and Information Sources, Ministry of the Environment of the Czech Republic, 2000;

- Prague – Environment 2002, Prague City Hall, 2003.

There are some good examples of on-line access services for environmental data:

- "mapmaker" - access to maps and data from environmental and other sectors have been provided by the Ministry of Environment (see map.env.cz) – this system provides data based on INSPIRE structure covering nearly all of the data required and is now integrated in the Cenia geoportal;

- "public administration portal" – on-line access to government services and information – utilizes "mapmaker" for map, data and metainformation publishing (http://geoportal.cenia.cz);

- "data store of forestry data" - access to maps and data used in forestry sector maintained by Forest Management Institute of Ministry of Agriculture - www.uhul.cz .

Both ZABAGED and DMU reference datasets have been used in the environmental data creation combining advantages of both.

Internal MoE standards have been issued.

1.9.1 Conclusions of Component 6

A large set of environmental data is maintained by institutions supporting the Ministry of the Environment of the Czech Republic (www.env.cz).

Based on the information provided on the previous paragraph we score the indicator as follows:

- Thematic environmental data are covered by the described SDI-initiative or there is an independent thematic environmental SDI

1.10 Component 7: Standards

Standards for the creation of metadata were harmonised and were gradually being converted from the original CSN and CEN standards to ISO standards and INSPIRE profiles.

At European level, data content standards are sometimes configured in Structural Fund projects in which Czech institutions are also frequently involved (e.g. the Czech Geological Survey contributes to OneGeology Europe project). Standards related to EU obligations often become national standards along with the data models defined in projects.

The Czech NSDI makes extensive use of the OGC WMS and to some degree the CSW web mapping and catalogue standards.

1.10.1   Conclusions of Component 7

Based on the above paragraph we score the indicator as follows:

- The SDI-initiative is devoting significant attention to standardisation issues

1.11 Use and efficiency of SDI

From the information collected, it is obvious that the Czech GI-producer and user community is very committed to the concept and implementation of an advanced NSDI based on agreements and standards. With the CENIA geoportal, the MIDAS-system and underlying agreements, an important step has been taken in the establishment of the NSDI. Although documentation for more than 3.000 geodatasets is available through the MIDAS-system, the availability of high quality, analytical (vectorial) reference and core thematic data could not be fully verified.

National Geo-portal – from 1 September 2006 it operates at 14 instead of 4 servers. Daily visit rate have grew up until 30 000 unique visits. There are 2 million maps generated each month.

Monitoring system available at
http://geoportal.cenia.cz/awstats/awstats.pl?config=geoportal.cenia.cz.

For the 2009 update some monthly figures are given to illustrate the use of the portal.

Statistics 2009 for the Map services of the Portal of the Public Administration operated by CENIA:

Month	Unique visits	Number of visits	Pages	Hits	Volume
Jan 2009	18141	44731	2603462	4397921	195.04 GB
Feb 2009	18909	44867	2798751	4571869	226.73 GB
Mar 2009	17889	48352	3220559	5266323	219.33 GB
Apr 2009	14357	43020	3077455	4674630	204.74 GB
May 2009	13547	39580	2430302	3808092	162.08 GB
Jun 2009	14683	40303	2449667	3713469	189.77 GB
Jul 2009	13956	36596	2252224	3457895	154.87 GB
Aug 2009	15356	38132	2185401	3443178	154.63 GB
Sep 2009	14601	39594	2480567	3663029	223.00 GB
Oct 2009	16653	47197	3199700	4768106	239.27 GB
Nov 2009	16839	50409	3336177	4899525	249.96 GB
Dec 2009	14167	41341	2621364	3823641	199.98 GB
Total	189098	514122	32655629	50487678	2419.40 GB

It is obvious that compared to 2007 we have 100000 more visits (416431 in 2007) and a higher volume of data (1687.51 GB in 2007)

Some examples of sector in which the SDI is used:

- Territorial planning – access to data for planners at all levels of planning
- Environment – EIA/SEA process, report on the wells quality, NATURA accuracy improvements

- Investment occasions – access to the territorial information inc. environmental

- Insurance – flooding zones, land slides, impacts on health

- Development companies – administrative, transport, environmental context

- Education & Research

- Transparency and State administration control - equal data for decision making process for the public administration and citizens

2 Annexes

2.1 SDI addresses & contacts for the Czech Republic

Table: SDI contact list			
SDI Name (full)	Web address	Organisational mailing address	Over-all contact person: tel./fax/e-mail
National			
CENIA, Czech Environmental Information Agency	www.cenia.cz	Kodanska 10, CZ-100 10, Praha 10, CZECH REPUBLIC	Jiri HRADEC Tel.: ++420- 267 225 226 e-mail: jiri.hradec@cenia.cz
Association Nemoforum	www.cuzk.cz/nemo forum	Pod Sidlistem 9 CZ-182 11 Praha 8 CZECH REPUBLIC	Ruzena ZIMOVA Tel. 420 284 041 595 Fax: ++ 420 284 041 428 e-mail: nemoforum@cuzk.cz
Czech Association for Geoinformation	www.cagi.cz	Novotneho lavka 5 Praha 1 CZ-110 00 Praha 1 CZECH REPUBLIC	Milan KONECNY Tel.: ++420- 549 495 135 e-mail: konecny@dior.ics.muni.cz Eva PAUKNEROVA Tel. ++ 420 233 324 472 e-mail: eva.pauknerova@cagi.cz Stepan KAFKA Tel. ++ 42O 327 514 118 e-mail: kafka@email.cz
Ministry of Environment of the Czech Republic	http://www.mzp.cz/	Vrsovicka 65, CZ-100 10, Praha 10, CZECH REPUBLIC	Miloslav HLAVACEK Tel.: ++420- 267 310 266 e-mail: mihl@env.cz
Ministry of Informatics of the Czech Republic	http://www.mvcr.cz	Havelkova 2, CZ-130 00, Praha 3, CZECH REPUBLIC	Stepan ZEZULA Tel.: ++420- 221-008-111 e-mail:

			stepan.zezula@micr.cz
Czech Office for Surveying, Mapping and Cadastre	www.cuzk.cz http://www.agi.org.uk/	Pod Sidlistem 9, CZ-182 11, Praha 8, CZECH REPUBLIC	Jan RAMBOUSEK Tel. ++ 420 284 041 209 Fax. ++ 420 284 041 204 e-mail. jan.rambousek@cuzk.cz
Czech Statistical Office	www.czso.czhttp://www.ordsvy.gov.uk/	Sokolovská 142 CZ-186 04 Praha 8 CZECH REPUBLIC	Jaroslav KALINA GIS specialist Tel. ++420 274 052 275 Fax. ++420 266 311 243 e-mail. kalina@gw.czso.cz

2.2 List of references for the Czech Republic

Table: list of references used to compile the Country Report	
Web sites:	http://www.psp.cz http://www.vlada.cz http://www.env.cz http://www.micr.cz http://portal.gov.cz geoportal.cuzk.cz geoportal.cenia.cz www.cenia.cz/inspire arwen.ceu.cz/izgard http://portal.uur.cz http://www.czso.cz/csu/rso.nsf/i/registr_scitacich_obvodu http://gis.vsb.cz/midas/ http://www.cagi.cz http://mis.env.cz/ http://portal.env.cz

	http://map.env.cz http://indikatory.env.cz
Publications	Papers at the following conferences: Local and Regional Information Systems (April 2004, Hradec Králové) Local and Regional Information Systems (April 2005, Hradec Králové) Spatial planning and environment (September 2005, Znojmo) Horák, J., Ardielli, J., and Horáková, B., 2009. Testing Web Map Services. GSDI 11, Rotterdam, 2009