



Spatial Data Infrastructures in Croatia: State of play 2011



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Executive summary

This report presents the status of the NSDI and INSPIRE in Croatia for 2011.

The Croatian SDI approach is truly national. SDI building blocks have reached a significant level of operationality. SGA is a state administrative organisation dealing with administrative and professional tasks in the field of geodesy, geoinformatics, state survey, cartography, real estate cadastre, spatial units registry, and spatial data infrastructure.. The Ministry of Environmental Protection, Physical Planning and Construction represent the SGA in the Government of the Republic of Croatia. The institutional NSDI-framework consists of three levels: NSDI-Council, NSDI-Committee and working groups. In addition, the SGA acts as the Secretariat of the SDI Council, coordinates all SDI bodies and provides technical support.

The law on State Survey and Real Property Cadastre contains a separate chapter on SDI. As during the adoption procedure of the law, the draft INSPIRE directive was available, the SDI chapter of the law was attuned to some of the provisions of the directive. However, not all provisions of the directive are included in the Law yet. Recently, PPPs have been developed on the basis of the law on State Survey and Real Property Cadastre. The Croatian Act on the Right of Access to Information was adopted in October 2003, on the basis of Article 88 of the Constitution. Under the Act, all information possessed, disposed of or controlled by bodies of public authorities have to be available to any interested beneficiary of the right to information. The Croatian Act on Personal Data Protection is based on the constitution and dates from 2003 (Official Gazette, no. 103/2003). It has been brought in line with the European directive 95/46/EC on the processing of personal data. Under the law on State Survey and Real Property Cadastre, a working group has been set up on spatial data sharing policies, with the task to coordinate, develop and maintain an interoperable and customisable licence model that allows the spatial data providers to define and publish access conditions for their data and services. Draft versions of agreements templates for data exchange between public bodies and for access and re-use by third parties are developed.

Croatia has geodatasets 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 interconvertible. The Croatian Geodetic Institute in collaboration with State Geodetic Administration (SGA) performs quality control of the topographic products (e.g. maps and orthophotos). In addition, quality documents for the management systems and process management systems are produced. A working group Technical Standards has been established focusing strongly on interoperability and data harmonisation issues as defined in the specifications of the INSPIRE implementing rules. Finally, the national language can be considered as the operational language of the SDI with additional information in English.

Metadata development is just started in Croatia. The SGA Geoportal is designed as a geospatial built on Service Oriented Architecture (SOA) principles and in line with

ISO/OGC standards and specifications of the INSPIRE directive. The Geoportal includes a metadata-driven catalogue service. The catalogue contains metadata descriptions and allows users and other applications/portals for querying and finding. The implementation of metadata is still in a stage of infancy. Metadata creation, maintenance, setting up catalogues, metadata quality happens mainly at SGA. SGA is the implementing authority for metadata. Working group Technical Standards deals with technical implementation specifications concerning metadata.

There is no formal national geoportal established in the Republic of Croatia. The SGA Geoportal (<http://www.geo-portal.hr>) is the main point of access to distributed geoinformation resources in Croatia. Via this geoportal it is possible to search the available geodata (data, applications and services) and order them into digital form. Several projects are set up to establish the national geo-portal. Croatia provides discovery and view services for a selected number of the INSPIRE themes while a number of them can be also downloaded.

The Ministry of Environmental Protection, Physical Planning and Construction performs administrative and other tasks related to the protection of air, soil, water, sea, animal and plant life as an mutually interactive system; making of a draft of the strategy for improving the conditions in the area of environment protection; proposing, promoting and monitoring measures for improving the environment protection; ensuring the implementation of pollution registry (monitoring); maintenance of IT system of environment protection; formulation of measures, conditions and conformity of environment protection; etc. ARKOD is a national system of identification of land parcels, or evidence of use of agricultural land in Croatia. ARKOD aim is to provide farmers easier and simpler ways of applying for incentives and more transparent use. It is established on the basis of digital orthophotos (DOF5) at the scale 1:5000. In addition, the following data sets are included: Digital cadastral maps (DCM), Digital Terrain Model (DTM), Topographic Map (TK25), and Central Register of spatial units (SRPJ). The Croatian Hydrographic Institute (HHI), as the state hydrographic office has had the main role in establishing a maritime SDI (MSDI).

Croatia applies the common standards of ISO/TC211 and OGC. The organization which sets standards is the Croatian Standards Institute at which the Committee HZN/TO211 deals with standardizing geoinformation in accordance with the international Committees ISO/TC211 and CEN/TC 278.

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Abbreviations and acronyms

CEN	Comité Européen de Normalisation (European Committee for Standardization)
CGI	Croatian Geodetic Institute
CROMAC	Croatian Mine Action Centre
CROPOS	CROatian POSitioning System
DCM	Digital Cadastral Mps
DOF	Digital Orthophoto
DSP	Differential Positioning Service
DTM	Digital Terrain Model
EC	European Commission
ENC	Electronic Navigational Charts
GI	Geographical Information
GIS	Geographical Information System
GNSS	Navigation Satellite Systems
GPPS	Geodetic Precision Positioning Service
HHI	Croatian Hydrographic Institute
HITRO.HR	Service of the Government of Republic of Croatia intended for quick communication of citizens and business subjects with the state administration.
HTRS	Croatian Terrestrial Referent System
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
ISO	International Organization for Standardization
MSDI	Maritime SDI
NMCA	National Mapping and Cadastre Authorities
NSDI	National Spatial Data Infrastructures
OGC	Open Geospatial Consortium
PPP	Public-Private Partnerships
PSI	Policy and legislation on access to public sector information
RINEX	Receiver Independent Exchange
RTCM	Radio Technical Commission for Maritime Service
SDI	Spatial Data Infrastructures
SGA	State Geodetic Administration
SOA	Service Oriented Architecture
SRJP	Central Register of spatial units
TK	Topographic Map
VPPS	Mobile internet and GSM Precision Positioning Service

1. GENERAL INFORMATION

1.1 Method

This report is summarizing the SDI review for Croatia, and reflects the degree to which the SDI situation in Croatia is similar to the ideas set out in the INSPIRE-directive. .

In comparison with the previous country report, this report has been updated to the situation of Spring 2011. In order to achieve this, expert knowledge, literature and websites are used to describe the current situation of NSDI-development and INSPIRE-implementation in Croatia.

For more background about the method applied, see Vandembroucke, D., Zambon, M.-L., Crompvoets, J., and Dufourmont, H., 2008. Chapter 16, INSPIRE Directive: Specific requirements to monitor its implementation. In: J. Crompvoets, A. Rajabifard, B. van Loenen, and T. Delgado Fernández (Eds.), *A Multi-view Framework to Assess Spatial Data Infrastructures*. The Melbourne University Press, Melbourne, Australia, pp. 327-355.

1.2 The NSDI-scene in Croatia

1.2.1 National Spatial Data Infrastructure of the Republic of Croatia

The law on State Survey and Real Property Cadastre contains a separate chapter on SDI (e.g. SDI-definition, data content, necessary services, institutional framework, metadata, ...). During the adoption procedure of the law, the draft INSPIRE directive was available, the SDI chapter of the law was attuned to some of the provisions of the directive. The law defines the NSDI as a set of measures, standards, specifications and services within the framework of e-government for enabling the effective collection, management, exchange and usage of the geo-referenced spatial data that are subject to the law. Under the law, the bodies that are part of the NSDI are responsible for the regular maintenance of their spatial data sets and services and have an obligation to make their sets and services available to the national geo-portal. This law distinguishes three levels for organising and coordinating the NSDI of Croatia: NSDI-Concil, NSDI-Committee, and working groups..

The State Geodetic Administration (SGA), in charge of the official cartography and cadastre, and the Ministry of Justice in charge of the land registers have given priority to necessary reforms in order to establish an NSDI. Real Property Registration and Cadastre Project was launched in 2003 and co-financed by a World Bank loan, European Union assistance funds and State Budget totalling EUR 47 million. Its main goal was to accelerate land administration processes and to help operation of cadastral offices and municipal courts.

A number of concrete steps and research initiatives have been followed towards an NSDI approach. The first step towards establishment NSDI was achieved in 2001, when the

first study analyzing situation concerning Geoinformation in Croatia was produced “Review of EU Requirements for Geoinformation Infrastructure in Croatia”. Using the European Union grant under the CARDS 2002 Program as part of the Real Property Registration and Cadastre Project, in 2005 the Study on the National Spatial Data Infrastructure in Croatia was produced by a group of foreign and Croatian experts gathered by the German company Conterra. Based on the analysis of spatial information status given in the study, concrete steps were proposed regarding the NSDI establishment in Croatia (Remke et al. 2005). Using a grant by the Foreign Office of the Great Britain and Commonwealth in cooperation with Geolink Consulting Ltd. Conterra's study was evaluated as well as the development of the European spatial data infrastructure and Inspire which resulted in the third study entitled: “*Croatia: National Spatial Data Infrastructure and INSPIRE*” (Geolink Consulting Ltd, 2006).

Similarly the Faculty of Geodesy, university of Zagreb conducted in 2006 a Web research at national level, to gather data and opinions on different subjects in the process of the NSDI improvement and thus support the creation of an efficient improvement strategy.

At the same time The Croatian Geodetic Institute (CGI) carries development-research projects and performs professional geodetic tasks including jobs of state survey and real estate cadastre defined by Law of State Survey and Real Estate Cadastre (NN 16/07) and scientific jobs in collaboration with State Geodetic Administration (SGA).

In May 2008, the SGA issued a publication on the National Spatial Data Infrastructure in the Republic of Croatia that was printed in Croatian with the circulation of 1,000 copies (State Geodetic Administration, 2008). The production was aided by the European Union under the Real Property Registration and Cadastre Project. The main idea was to familiarize the professional audiences directly involved in the NSDI development, at the national, regional, local or commercial level, about the NSDI principles and current status in Croatia and European Union as well as to inform the wider audience, i.e. the users. Therefore, SDI workshops were launched to transfer best practices. Three workshops with the Swedish, Canadian and German colleagues were held in 2007 and 2008, where a crosscut trough the whole GI market was made and more then 100 participants were invited. SGA organised the First Croatian NSDI and INSPIRE day on November 26th, 2009. The conference was organised in cooperation with the Croatian Cartographic Society in frame of the Fifth Conference of the Croatian Cartographic Society. The second Croatian NSDI and INSPIRE happened on November 25th 2010. About 200 experts from various administrative structures (state, regional, local), commercial sector (geodetic, gei-information, IT), and education at different levels were informed about the latest INSPIRE developments as well as the Croatian achievements in NSDI. These scientific-professional-promotion conferences were held within the frame of the annual cartographic conferences forming the basis of the creation of the geo-enabled society in line with European policies.

Unlike the member states, Croatia as a candidate country of the European Union was not obliged to implement the INSPIRE Directive until 2009, but the Directive is subject of the accession treaty. The national SDI-development in Croatia is therefore conformant to

the INSPIRE Directive. In 2009, the INSPIRE Directive was included for the first time in the National Program for the European Union Accession and the transposition of the Directive was monitored. Since 2007, no further steps have been taken with regard to the transposition of INSPIRE into national regulations, but in line with the National Program for the European Union Accession the proposal of the new law describing the spatial data infrastructure in line with INSPIRE should be finished in 2011 and adopted till its joining European Union.

2 Details of the Croatia NSDI

2.1 Introduction

In the period between 1996 and 2000, Croatia adopted a new legislative framework for the land administration by enforcing the new laws related to the ownership and other real rights, the land registers, and the State survey and the Real Property Cadastre. Those regulations created a framework for launching a comprehensive land administration reform that became fully-fledged with the adoption of the new regulations on the physical planning and construction (2007) and the agricultural land (2008).

The State Geodetic Administration (Croatian NMCA) took the first activities in the country producing several studies analysing situation concerning spatial data, providers, legal framework, and comparison with situation in other European countries. It led to the organising of spatial data community, firstly by adoption of the first regulation concerning NSDI. The Law on State Survey and Real Estate Cadastre which came into force in February 2007, actually the chapter about NSDI, defined the institutional framework which is already in place. The SGA acts as coordination body for NSDI establishment, giving technical support to NSDI bodies.

Furthermore, the SGA has taken steps to achieve a horizontal cooperation between the State institutions on the projects of importance for particular bodies while at the same time representing a part of the SDI. Thus the SGA supports or indirectly participates in the establishment of the national databases supported by spatial data under the jurisdiction of the Ministry of Culture (GIS for national parks and nature reserves), Ministry of Agriculture (Land Parcel Identification System), Ministry of Defence (Military GIS), Institute for Viticulture and Enology (Vineyard GIS) and the Croatian Mine Action Centre (CROMAC GIS). Apart from the spatial datasets, the SGA has also been involved in defining these databases as well as harmonizing the specifications and carrying out the projects. These projects defined through formal agreements or contracts that the SGA has signed with more than 50 entities form the foundation for building a network consisting of involved national institutions, regional and local governments all participating or contributing to the development of Croatian SDI.

2.2 Component 1: Coordination and organizational issues

SGA is a state administrative organisation dealing with administrative and professional tasks in the field of geodesy, geoinformatics, state survey, cartography, real estate

cadastre, spatial units registry, and spatial data infrastructure. The Ministry of Environmental Protection, Physical Planning and Construction represent the SGA in the Government of the Republic of Croatia. SGA is today organised in Central Office and Regional Offices for cadastral systems and it also represents Croatia in EuroGeographics as an active member. SGA's experts have been also participating in EuroGeographics Quality Knowledge Exchange Network Expert Group and Business Interoperability Group. SGA took part in EuroBoundaryMap, EuroGlobalMap, EuroRegionalMap and EuroDem projects.

The Law on State Survey and Real Estate Cadastre defines SDI institutional framework for SDI establishment. Three-level organisation has been foreseen and already established. The supreme SDI governing body is the SDI Council appointed by the Croatian Government. It is the body at the highest, political level. The Council is appointed by the Government and comprised besides the president of 15 members coming from different ministries responsible for environment protection and spatial planning, defence, land registry, transport and communications, agriculture, forestry and water management, science and education, culture, state administration body responsible for e-government, and agencies such as state survey and real property cadastre (NMCA), statistics office, the Croatian Hydrographic Institute, Croatian Geodetic Institute, geodetic and geoinformatics economic community, IT economic community as well as Croatian Chamber of Architects and Civil Engineers. The SDI-Council is responsible for leading the establishment of the national SDI and the coordination of national SDI-activities

At the managerial level, there is the SDI Committee appointed by the Council and consisting of three representatives from the Council, two from the SGA and the heads of working groups. The NSDI Committee implements the NSDI establishment policy determined by the NSDI Council, performs the works and tasks delegated by the NSDI Council, coordinates and monitors the work of the working groups, coordinates the implementation activities of the NSDI stakeholders related to their establishment in accordance with the NSDI Council guidelines, informs the NSDI Council on the progress in the NSDI establishment and reports to the NSDI stakeholders and the public about the activities related to the NSDI establishment. At the operational level, the working groups are active in developing certain tasks and obligations.

At operational there are working groups. Members of the working groups are civil servants, regional/local or public officials, scientists and representatives of professional associations and experts from the private sector. So far five working groups have been established: 1) Technical Standards, 2) Data Sharing, 3) E-Government, 4) Capacity Building, and 5) Business Models. These working groups meet regularly and are composed differently based on the number of relevant stakeholders. The working Group on Technical Standards and the working group Data Sharing were established in 2008, while the other three working groups were established in July 2009.

The mission of the working group Technical Standards is to coordinate and conduct the development and maintenance of the technical implementation specifications that enable the interoperable operation of geo-services meeting the needs of Croatia's NSDI

stakeholders. The objectives of this Working are to test, verify and elaborate as necessary the technical specification provided by the INSPIRE Directive with regard to the metadata and network services, to give feedback to the INSPIRE drafting teams, to provide proposals for adoption in national regulations. This working group analysed the INSPIRE Implementing Rule for metadata in 2010, and analyses the INSPIRE Implementing Rule for Network Services.

The mission of the working group Data Sharing Policies is to coordinate and conduct the development and maintenance of an interoperable and customisable license model which is in line with the Croatian legislation framework and which allows the NSDI stakeholders to unambiguously define and publish access conditions for their owned data and services. The working group has already provided a template agreement on the spatial data exchange, usage and access among all NSDI stakeholders. Subsequently, the working group should provide a harmonised template of rules and conditions for the data and services access and re-use by third parties. All specifications shall be in line with the INSPIRE Implementing Rules and Guidance documents.

The objective of working group E-Government is to harmonise the activities of e-Croatia and NSDI by supporting the determination and fulfilment of mutual needs. It should work on the integration of NSDI into the E-government processes in order to connect the public sector with spatial information. In 2011 this working group analyses the connection between E-government strategies and NSDI, defines common points as well as creates suggestions of institutional connection/communication between E-government and NSDI-strategies holders.

The working group Capacity Building is dealing with the problems resulting from the lack of GI/SDI-professionals needed to strengthen the NSDI establishment process as well as the readiness of user communities to utilise NSDI-concepts and to adopt those concepts into their workflows. The objectives of this working group are to identify gaps, produce best practice guidelines and work on NSDI specific curricula for geo-information science courses at different educational levels. This working group produced in 2010 a survey related to spatial data and SDI for high schools and educational levels.

The working group Business Model should develop business models for establishing sustainable partnerships and business networks, in particular for operating common services like catalogues, etc. Due to the complex range of tasks that make up the market-oriented provision of data, networking with technology partners, content partners and business partners is necessary.

The SGA acts as the Secretariat of the SDI Council, coordinates all SDI bodies and provides technical support (Figure 1).

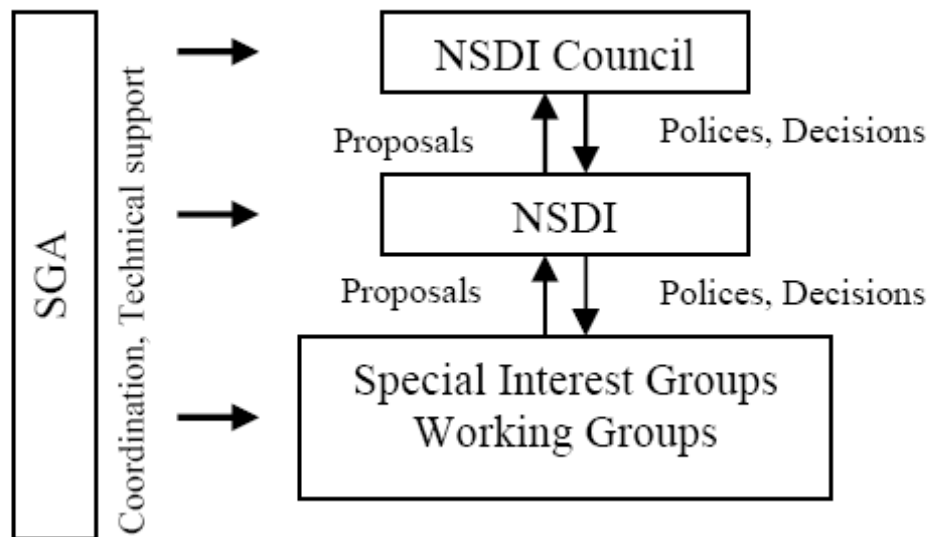


Figure 1 NSDI Institutional Framework (Bačić et al. 2008)

In Croatia, the NSDI and INSPIRE are considered as very similar. There are no specific structures only for the guidance of the INSPIRE implementation. In 2010, the SGA has been nominated as the national National Contact Point.

Conclusions of Component 1

The Croatian SDI approach is truly national. SDI building blocks have reached a significant level of operability. SGA is a state administrative organisation dealing with administrative and professional tasks in the field of geodesy, geoinformatics, state survey, cartography, real estate cadastre, spatial units registry, and spatial data infrastructure.. The Ministry of Environmental Protection, Physical Planning and Construction represent the SGA in the Government of the Republic of Croatia. The institutional NSDI-framework consists of three levels: NSDI-Council, NSDI-Committee and working groups. In addition, the SGA acts as the Secretariat of the SDI Council, coordinates all SDI bodies and provides technical support.

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 operability (2)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation

- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users (No)
- An organisation of the type ‘national GI-association’ is involved in the coordination of the SDI (No)
- Producers and users of spatial data are participating in the SDI
- Only public sector actors are participating in the SDI

2.3 Component 2: Legal framework and funding

2.3.1 Legal framework

In 1999, the Law on State Survey and Real Estate Cadastre was adopted and followed by implementing rules on the procedure for topographic surveys, the production of state maps and the state geodetic administration. In addition, the Parliament adopted the State Survey and Real Property Cadastre Programme for 2001-2005.

In 2007, the State Geodetic Administration prepared a new law on State Survey and Real Property Cadastre (Official Gazette no. 16/2007) and new Rules and Regulations on Topographic Survey and State Map Production (Official Gazette no. 109/2008).

The law on State Survey and Real Property Cadastre contains a separate chapter on SDI e.g. SDI-definition, data content, necessary services, institutional framework, metadata, ...). As during the adoption procedure of the law, the draft INSPIRE directive was available, the SDI chapter of the law was attuned to some of the provisions of the directive. However, not all provisions of the directive are included in the Law yet. This will be done in a next step.

The law defines the NSDI as a set of measures, standards, specifications and services within the framework of e-government for enabling the effective collection, management, exchange and usage of the geo-referenced spatial data that are subject to the law. Under the law, the bodies that are part of the NSDI are responsible for the regular maintenance of their spatial data sets and services and have an obligation to make their sets and services available to the national geoportal.

The law sets up an NSDI Council, Committee and Working Groups. In May 2007, the Croatian Government appointed the 15 members and the president of the council (Official Gazette no. 16/2007).

2.3.2 Public-private partnerships (PPPs)

Topographic mapping was performed during the 1990s in cooperation with the private sector. Recently, PPPs have been developed on the basis of the law on State Survey and Real Property Cadastre. A large part of the data production is outsourced to the private sector.

2.3.3 Policy and legislation on access to public sector information (PSI)

The Croatian Act on the Right of Access to Information was adopted in October 2003, on the basis of Article 88 of the Constitution. Under the Act, all information possessed, disposed of or controlled by bodies of public authorities have to be available to any interested beneficiary of the right to information. This right of access to information covers the right to seek and receive information and the obligation of public bodies to make access to the requested information possible or to publish information when there is no special request for them. Any domestic or foreign natural or legal person can obtain access to public information.

Access to State Survey and the Real Property Cadastre data and documents, print-outs, aerial images and other documents is regulated separately by the law on State Survey and Real Property Cadastre.

2.3.4 Legal protection of GI by intellectual property rights

The Copyright and Related Rights Act (O.G. 167/2003) replaced earlier legislation of 1999 and entered into force on 30 October 2003. (see <http://www.wipo.int/clea/en/details.jsp?id=2176>). The Act protects original intellectual creations in the literary, scientific and artistic domain, having an individual character, irrespective of the manner and form of its expression, its type, value or purpose. Photographic and cartographic works, drawings, plans, sketches and tables are explicitly protected. Copyright is excluded for official texts in the domain of legislation, administration, judiciary (acts, regulations, decisions, reports, minutes, judgments, standards, and the like) and other official works and their collections, which are published for the purpose of officially informing the public.

Next to copyright, databases are also protected by a separate right of the producer of the database, in line with the provisions of the 1996 database directive.

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

Article 37 of the Croatian Constitution states that “everyone shall be guaranteed the safety and secrecy of personal data. Without consent from the person concerned, personal data may be collected, processed and used only under conditions specified by law. Protection of data and supervision of the work of information systems in the Republic

shall be regulated by law. The use of personal data contrary to the purpose of their collection shall be prohibited” (see <http://www.azop.hr/default.asp?ru=282&sid=&akcija=&jezik=2>).

The Croatian Act on Personal Data Protection is based on the constitution and dates from 2003 (Official Gazette, no. 103/2003). It has been brought in line with the European directive 95/46/EC on the processing of personal data. Two other acts should also be mentioned:

- the Regulation on the method of maintaining records on personal data filing system and the form of such records (Official Gazette, No. 105/04); and
- the Regulation on the manner of storing and special measures of technical protection of the special categories of personal data (Official Gazette, No. 139/04)

2.3.6 Licensing framework

Under the law on State Survey and Real Property Cadastre, a working group has been set up on spatial data sharing policies, with the task to coordinate, develop and maintain an interoperable and customisable licence model that allows the spatial data providers to define and publish access conditions for their data and services. Draft versions of agreements templates for data exchange between public bodies and for access and re-use by third parties are developed.

2.3.7 Funding model for SDI and pricing policy

Funding

The new Law on State Survey in Real Estate Cadastre starts from a co-financing model, stating that counties, cities, municipalities and other interested legal and natural persons can contribute funds for carrying out the state survey and real estate cadastre works.

The development of the cadastre was sponsored partly by the World Bank.

Pricing policy

According to the Law on State Survey in Real Estate Cadastre, excerpts, transcripts, certificates, copies from and direct access to the State Survey and Real Estate Cadastre documentation can be charged for, either an administrative fee, the actual costs for issuing the data or the actual costs for performing certain activities (article 148).

Conclusions of Component 2

The law on State Survey and Real Property Cadastre contains a separate chapter on SDI. As during the adoption procedure of the law, the draft INSPIRE directive was available, the SDI chapter of the law was attuned to some of the provisions of the directive.

However, not all provisions of the directive are included in the Law yet. Recently, PPPs have been developed on the basis of the law on State Survey and Real Property Cadastre. The Croatian Act on the Right of Access to Information was adopted in October 2003, on the basis of Article 88 of the Constitution. Under the Act, all information possessed, disposed of or controlled by bodies of public authorities have to be available to any interested beneficiary of the right to information. The Croatian Act on Personal Data Protection is based on the constitution and dates from 2003 (Official Gazette, no. 103/2003). It has been brought in line with the European directive 95/46/EC on the processing of personal data. Under the law on State Survey and Real Property Cadastre, a working group has been set up on spatial data sharing policies, with the task to coordinate, develop and maintain an interoperable and customisable licence model that allows the spatial data providers to define and publish access conditions for their data and services. Draft versions of agreements templates for data exchange between public bodies and for access and re-use by third parties are developed.

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 (Not so Clear)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector
- GI can specifically be protected by copyright
- Privacy laws are actively being taken into account by the holders of GI
- There is a framework or policy for sharing GI between public institutions (In Preparation)
- There are simplified and standardised licences for personal use (In Preparation)
- The long-term financial security of the SDI-initiative is secured (No)
- There is a pricing framework for trading, using and/or commercialising GI (No Information Found)

2.4 Component 3: Data for themes of the INSPIRE annexes

2.4.1 Data sets of different resolutions covering the INSPIRE and other themes

Croatia provides data sets at different scales and resolutions according to the need. Spatial data producers create data in digital form, and a big amount of the existing analogue data has been digitized. Access to these data is nevertheless limited to direct contact with the producer or sometimes to a few webpages available of a specific producer.

The main data producer SGA takes care of automating the cadastral and geodetic spatial system, the official state cartography (1:5 000, 1:25 000, 1:100 000, 1:200 000), geodetic documentation, statistical data on real estate cadastre, spatial units and lines, geodetic and cadastral works for the state border.

It furthermore provides:

- Cadastral maps at scales of 1:1000, 1:2000, 1:2880, 1:2904
- EURO GLOBAL MAP 1:1 000.000
- Digital Terrain model scales of 1:5000 and 1:25000

More about the available products of SGA can be found at: <http://www.dgu.hr/default.asp?ID=127>.

Regarding the three INSPIRE annexes addressing the 34 spatial data themes, Croatia is providing discovery and view services for some of them while a number of them can be also downloaded.

2.4.2 Geodetic reference systems and projections

The Croatian Terrestrial Referent System of epoch 1995.5 (HTRS96) has been adopted as official positioning reference coordinate system in the Republic of Croatia. The projection reference coordinate system of Transverse Mercator projection (HTRS96/TM) is adopted for the detailed state topographic cartography. The territory of the Republic of Croatia is projected into one zone. The origin for nomenclature is defined in the upper left corner of division area and has coordinates N 5 170 000 m and E 200 000 m in the HTRS96/TM.

Furthermore, Croatian Geodetic Institute and specifically the department for cadastral survey established a project, in order to transform cadastral maps to the new coordinate reference system including quality control of the process, entitled: 'the transformations of digital cadastral map to new reference system'.

CROPOS (CROatian POsitioning System) is the developed national network of reference GNSS stations of the Republic of Croatia. The purpose of the CROPOS System is to enable point positioning in real time with an accuracy of 2 cm horizontally and 4 cm vertically on the entire territory. CROPOS was launched on December 9, 2008, and has already been widely used by the professional geodetic circles and beyond. The system encompasses 30 permanent GNSS stations and 2 control GNSS stations covering the entire Croatian territory with a network offering three services and guaranteeing high accuracy and surveying reliability (Rašić and Bačić, 2010). Information about CROPOS can be found at www.cropos.hr.

2.4.3 Quality of the data

An important issue that needs to be resolved is the fragmentation and existence of the double records and databases, which results in redundancy and inefficiency.

The Croatian Geodetic Institute in collaboration with State Geodetic Administration (SGA) performs quality control of the topographic products (e.g. maps and orthophotos). It furthermore established an ‘implementation of quality documents management system (SQM) and process management system (SPM+)’ (http://www.cgi.hr/english/projects_ti.html#pr3).

2.4.4 Interoperability and harmonization of data

The need for interoperable data between three environments (land, coast, marine) requires a management system that incorporates them all. There is a growing need to develop a unified SDI model as one platform instead of two separate ones (terrestrial and marine) in order to increase the efficiency/effectiveness of management of the land, marine and coastal environments.

The working group Technical Standards focuses strongly on the interoperability and data harmonisation issues as defined in the specifications of the INSPIRE implementing rules

2.4.5 Language and culture

The Croatian language is main language used in most websites. Some services provide information in English, such as the Gazetteer Internet service..

The Gazetteer Internet service allows querying of the national geographical names database. This Gazetteer contains names of counties, towns/municipalities, settlements, UNESCO cultural heritage places, airports, national parks, natural parks and other protected objects of nature, names of the new topographic map sheets, EuroRegionalMap, EuroGlobalMap v.3.0, etc. In addition, there is an intention to import all names of islands, rivers, lakes, mountains, peaks and other dominant geographical objects..The Service provides information on:

- Geographical name – name of a geographical feature (object),

- Administrative unit - administrative unit where geographical object is located
- Class - classification of geographical object,
- E, N - East and North coordinate of geographical name in Croatian Terrestrial Referent Frame 1996, transverse Mercator projection in meters,
- Location – cartographic visualization,
- Object classification after EuroGeoNames system of European infrastructure of geographical names in other languages

Conclusions of Component 3

Croatia has geodatasets 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. The Croatian Geodetic Institute in collaboration with State Geodetic Administration (SGA) performs quality control of the topographic products (e.g. maps and orthophotos). In addition, quality documents for the management systems and process management systems are produced. A working group Technical Standards has been established focusing strongly on interoperability and data harmonisation issues as defined in the specifications of the INSPIRE implementing rules. Finally, the national language can be considered as the operational language of the SDI with additional information in English.

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 (Partially)
- 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
- Concern for interoperability goes beyond conversion between different data formats (Partially)
- The national language is the operational language of the SDI
- English is used as secondary language (Partially)

2.5 Component 4: Metadata

2.5.1 Availability of metadata

One of the tasks of the SGA based on this Law is to establish and maintain a public metadata service through a geo-portal. The SGA has taken the initial steps in that direction with the development of the geo-portal, currently containing only the data owned by the SGA.

2.5.2 Metadata catalogues

SGA Geoportal is designed as a geospatial portal according to the reference architecture of geospatial portals defined by Open GIS consortium (OGC) built on Service Oriented Architecture (SOA) principles and in-line with ISO/OGC standards and INSPIRE directive. The Geoportal offers a metadata driven catalogue-service for publish-and-find functionality. The catalogue contains metadata descriptions of all resources and allows users and other applications/portals to query and find these resources. The metadata records are also accessible for engine-to-engine access in a standardized ISO-based structure (<http://www.geo-portal.hr/Portal/ptk>).

In the first phase five data sets have been put on the Geoportal: orthophotos, cadastral maps in raster format, Croatian base map at the scale 1:5000, geodetic points and spatial units registration system.. This Geoportal includes an e-commerce facility..

2.5.3 Metadata implementation

The implementation of metadata is still in a stage of infancy. Metadata creation, maintenance, setting up catalogues, metadata quality happens mainly at SGA. SGA is the implementing authority for metadata.

Working group Technical Standards deals with technical implementation specifications concerning metadata. One of the objectives of this working group is to test, verify and elaborate technical specification provided by the INSPIRE Directive with regard to the metadata. It analysed the INSPIRE Implementing Rule for metadata in 2010

Conclusions of Component 4

Metadata development is just started in Croatia. The SGA Geoportal is designed as a geospatial built on Service Oriented Architecture (SOA) principles and in line with ISO/OGC standards and specifications of the INSPIRE directive. The Geoportal includes a metadata-driven catalogue service. The catalogue contains metadata descriptions and allows users and other applications/portals for querying and finding. The implementation of metadata is still in a stage of infancy. Metadata creation, maintenance, setting up catalogues, metadata quality happens mainly at SGA. SGA is the implementing authority for metadata. Working group Technical Standards deals with technical implementation specifications concerning metadata.

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 (Partially)
- One or more standardised metadata catalogues are available covering more than one data producing agency (Partially)
- There is a coordinating authority for metadata implementation at the level of the SDI

2.6 Component 5: Network Services

2.6.1 Geoportals

There is no formal national geoportal established in the Republic of Croatia. The SGA Geoportal (<http://www.geo-portal.hr>) is the main point of access to distributed geoinformation resources in Croatia. Via this geoportal it is possible to search the available geodata (data, applications and services) and order them into digital form. Several projects are set up to establish the national geo-portal of Croatia.

2.6.2 Network services

2.6.2.1 Discovery services

The SGA Geoportal includes a discovery service built on Service Oriented Architecture (SOA) principles and in-line with ISO/OGC standards and INSPIRE directive.

2.6.2.2 Viewing services

SGA provides at <http://www.srpj.geo-portal.hr/> the central register of spatial data with three different zones. A map viewer is generated for each zone sheets at 1:100.000 and 1:25.000 with information about administrative boundaries, villages, traffic, hydrography and elevation.

2.6.2.3 Download services

In addition to the SGA Geoportal, at <http://www.geotocke.geo-portal.hr/dgushop/> users can order data and download them via the Internet.

2.6.2.4 Transformation services

No information has been found

2.6.2.5 Invoking services

No information has been found.

2.6.3 Spatial Data services and other services

The application of the Ministry of Justice <http://e-izvadak.pravosudje.hr/home.htm> is used to access to the central database of the real property department of the municipal courts in Croatia and has an informative and corrective role. The database however includes data from the land registers which content is compliant with the Land Cadastre (establishment, renewal, amendment, etc.)

CROPOS offers DSP (differential positioning service), VPPS (Mobile internet and GSM precision positioning service), and GPPS (geodetic precision positioning service) services in a range of several formats (RTCM and RINEX): http://www.cropos.hr/index.php?option=com_content&view=article&id=30&Itemid=16&lang=en).

www.katastar.hr provides the public alphanumeric cadastral data of the SGA. Alphanumeric cadastral data are originally maintained by cadastral offices and their data can be accessed through the cadastral map browser used for searching databases. One of the basic principles of the browser is “completeness“, thus enabling the possibility accessing data of all cadastral municipalities. The data can be accessed by entering a certain parcel number in a selected cadastral municipality or by entering the proprietorship certificate number.

2.6.4 Use of software

No information has been found.

Conclusions of Component 5

There is no formal national geoportal established in the Republic of Croatia. The SGA Geoportal (<http://www.geo-portal.hr>) is the main point of access to distributed geoinformation resources in Croatia. Via this geoportal it is possible to search the available geodata (data, applications and services) and order them into digital form. Several projects are set up to establish the national geo-portal. Croatia provides discovery and view services for a selected number of the INSPIRE themes while a number of them can be also downloaded.

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 (No information found)
- There are middleware services allowing data services to be invoked (No information found)

2.7 Component 6: Environmental themes and activities

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).

The Ministry of Environmental Protection, Physical Planning and Construction performs administrative and other tasks related to the protection of air, soil, water, sea, animal and plant life as an mutually interactive system; making of a draft of the strategy for improving the conditions in the area of environment protection; proposing, promoting and monitoring measures for improving the environment protection; ensuring the implementation of pollution registry (monitoring); maintenance of IT system of environment protection; formulation of measures, conditions and conformity of environment protection; etc. (http://www.vlada.hr/en/naslovnica/o_vladi_rh/ministarstva/ministarstvo_zastite_okolisa_prostornog_uredenja_i_graditeljstva).

ARKOD is a national system of identification of land parcels, or evidence of use of agricultural land in Croatia. ARKOD aim is to provide farmers easier and simpler ways of applying for incentives and more transparent use. ARKOD the upgrade of an existing register of farms.. The project was launched by the Ministry of Agriculture, Fisheries and Rural Development in collaboration with SGA, Croatian Geodetic Institute and the Central State Administration Office. ARKOD system is established on the basis of digital orthophotos (DOF5) at the scale 1:5000. In addition, the following data sets are included: Digital cadastral maps (DCM), Digital Terrain Model (DTM), Topographic Map (TK25), and Central Register of spatial units (SRPJ).

The Croatian Hydrographic Institute (HHI), as the state hydrographic office, has had the main role in establishing a maritime SDI (MSDI). This HHI activity is strategically important for the Republic of Croatia, as defined in the Hydrographic Activity Act (OJ 69/98, 163/03), and other laws within the competence of the Ministry of the Sea, Transport and Infrastructure (e.g. Maritime Code and the Maritime Domain and Seaports Act). HHI is involved in multidisciplinary projects, dealing mainly with the safety of navigation as well as with other sea-related activities such as tourism, protection of the

environment (ship damage, places of refuge, sewage systems, etc.), and oil and gas exploitation. HHI paper charts and publications are available for purchase from authorised distributors (<http://www.hhi.hr/en/distributeri>). HHI official Electronic Navigational Charts (ENC) are available from distributors C-MAP at www.c-map.no and Primar at www.primar.no. The HHI catalogue presents four different formats

1. Printed publication
2. Internet edition of the catalogue
3. PDF edition of official printed catalogue (<http://www.hhi.hr/en/catalogpublications/viewpublication/10>)
4. Google Earth™ catalogue of nautical charts and Electronic Navigational Charts.

Conclusions of Component 6

The Ministry of Environmental Protection, Physical Planning and Construction performs administrative and other tasks related to the protection of air, soil, water, sea, animal and plant life as an mutually interactive system; making of a draft of the strategy for improving the conditions in the area of environment protection; proposing, promoting and monitoring measures for improving the environment protection; ensuring the implementation of pollution registry (monitoring); maintenance of IT system of environment protection; formulation of measures, conditions and conformity of environment protection; etc. ARKOD is a national system of identification of land parcels, or evidence of use of agricultural land in Croatia. ARKOD aim is to provide farmers easier and simpler ways of applying for incentives and more transparent use. It is established on the basis of digital orthophotos (DOF5) at the scale 1:5000. In addition, the following data sets are included: Digital cadastral maps (DCM), Digital Terrain Model (DTM), Topographic Map (TK25), and Central Register of spatial units (SRPJ). The Croatian Hydrographic Institute (HHI), as the state hydrographic office has had the main role in establishing a maritime SDI (MSDI)..

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 (Partially)

2.8 Component 7: Standards

Croatia applies the common standards of ISO/TC211 and OGC. The organization which sets standards is the Croatian Standards Institute at which the Committee HZN/TO211 deals with standardizing geoinformation in accordance with the international Committees ISO/TC211 and CEN/TC 278.

In order to harmonise the Committee's activities with the working groups, certain members of the Committee HZN/TO211 actively engage in work of the working group

Technical Standards, so as to ensure cooperation and work synergy for the NSDI improvement. (Cetl et al., 2009). The working group Technical Standards includes nine members from: Ministry of Agriculture, Forestry and Water Management, Central State Administrative Office for eCroatia, State Geodetic Administration, Croatian Hydrographic Institute, Croatian Geodetic Institute, County of Varaždin, Faculty of Geodesy University of Zagreb, and private companies Geofoto LLC and GISDATA Group. The mission of this working group is to coordinate, develop and maintain the technical implementation specifications which enable the interoperability of geo-services and meet the needs of NSDI entities. The specific objectives of this working group are:

- to enable interoperable geo-services that meet the needs of NSDI subjects;
- to test, verify and apply the technical specifications provided by INSPIRE Implementing Rules and Guidance Documents;
- to secure additional information for INSPIRE teams;
- to report to the NSDI Committee and Council about the workgroup's recommendations; and
- to provide the best practical examples.

Conclusions of Component 7

Croatia applies the common standards of ISO/TC211 and OGC. The organization which sets standards is the Croatian Standards Institute at which the Committee HZN/TO211 deals with standardizing geoinformation in accordance with the international Committees ISO/TC211 and CEN/TC 278.

Based on these conclusions we score the indicator as follows:

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

2.9 Use and efficiency of the NSDI

An interesting application is the HITRO service. HITRO.hr is a service of the Government of Republic of Croatia intended for quick communication of citizens and companies with the state administration. HITRO.hr enables the citizens and entrepreneurs to have quicker, simpler access to information and services in one location. At one address users get quickly all the information about the necessary actions to establish a company and opening trades. In addition to founding a company and opening a trade HITRO.hr allows access to various public web services (<http://www.hitro.hr/Default.aspx?sec=18>).

3 Annexes

3.1 SDI addresses & contacts for Croatia

Table: SDI contact list			
	Web address	Organisationa l mailing address	Over-all contact person: tel./fax/e-mail
National			
State Geodetic Administration (SGA)	http://www.nls.fi/ http://www.dgu.hr/default.asp?ID=390	Gruška 20, 10000 Zagreb	Tel: +385 (01) 6165 404 Fax: +385 (01) 6165 484 Email: zeljko.bacic@dgu.hr
Croatian geodetic institute Department for geoinformation systems	http://www.cgi.hr/	Željko Hećimović, dr. sc. Savska 41/VII 10144 Zagreb, PP19	Tel.: +385-1-6312- 401 Fax.: +385-1-6312- 410 E-mail: zeljko.hecimovic@ cgi.hr

3.2 List of references for Croatia

Table: list of references used to compile the Country Report	
Web sites:	
	http://e-izvadak.pravosudje.hr/home.htm
	http://gisandscience.com/2010/02/17/croatia-launches-first-spatial-data-infrastructure-in-southeast-europe/
	http://www.cropos.hr/index.php?lang=en
	http://www.cgi.hr/english/projects_ti.html
	http://www.geo-portal.hr/Portal/ptk
	http://www.dgu.hr/default.asp
	http://www.arkod.hr/
	http://www.hhi.hr/en

Publications:	
	Z. Bačić Lj. Rašić, I. Landek, N. Malnar, 2008. Building Croatian Spatial Data Infrastructure in Line with European Standards, <i>Proceedings of ISPRS Commission IV Congress, Beijing, China.</i>
	V. Cetl, I. Skender, S. Cvitković, M. Srdelić and L. Rašić, 2009. Continuous improvement of NSDI in Croatia in accordance with INSPIRE. GSDI 11. Rotterdam The Netherlands 15-19 June 2009.
	Ž. Bačić and L. Rašić, 2009. Croatian SDI: A Tool for Accelerated Development of the Geo-conscious Society. FIG Working Week 2009. Surveyors Key Role in Accelerated Development, Eilat, Israel, 3-8 May 2009.
	V. Cetl, M. Roić and S.M. Ivić, 2009. Creation of an NSDI strategy – Case Study Croatia. <i>International Journal of Spatial Data Infrastructures Research</i> , 2009, Vol. 4, 96-110.
	L. Rašić and Ž. Bačić, 2010. The Role of National Mapping and Cadastre Agencies in Establishment of NSDI: Croatian Example. FIG Congress 2010 Facing the Challenges – Building the Capacity Sydney, Australia, 11-16 April 2010.
	Z. Bačić Lj. Rašić, S. Zekušić, 2011. Development of Croatian and regional SDI as part of European SDI. FIG Working Week 2011. Bridging the Gap between Cultures. Marrakech, Morocco, 18-22 May 2011.