

Croatian SDI: a Tool for Accelerated Development of the Geo-Conscious Society

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Key words: SDI, INSPIRE, geo-conscious society

SUMMARY

In the past ten years, Croatia, just like other European countries in transition, has experienced an accelerated overall development which has resulted in the growing need of the society, economy and citizens for the spatial information and services of the State related to the spatial component. The need has been further emphasized by the specificities of Croatia as a tourist and transit country, the extreme growth of the real estate market and the pronounced need to manage the space in a rational and efficient manner. This growth, though, is hindered by the historic legacy reflected in the poor condition of the State registers, especially the cadastre and land registers. Croatia has, therefore, initiated comprehensive reform activities aimed at building the national spatial data infrastructure and the land administration system that will not only resolve the problems generated in the past but also serve as an educational and efficient tool for the fast growth of the Croatian society while, at the same time, building a geo-conscious society.

For that purpose, on the basis of the EU INSPIRE Directive, a legal framework has been defined and the NSDI (National Spatial Data Infrastructure) bodies established in order to serve as agents for its establishment. The system of the public-public and private-public partnerships of the geo-subjects in Croatia has been developed on that basis at all levels. The effect of such an approach in the past years has been a significant growth in investments in the geo-sector in Croatia, which has resulted in numerous projects that are today yielding results and further stimulating the development of the SDI.

This paper describes the principles on which the Croatian SDI (Spatial Data Infrastructure) has been built, the role of different subjects in its development of the NSDI and its present status. The principles of the partnership achieved and the developed models of the project financing for the NSDI establishment have also been described. The level of the achievements to date has been shown along with an overview of the structural projects that have been carried out as well as future expectations. The international assistance has been of particular importance in the overall activity related to the building of the Croatian SDI, both in terms of Croatia as the receiver as well as the transmitter of the know-how, which is described separately in this paper.

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1. INTRODUCTION

The Republic of Croatia is one of the successor States of the former Yugoslavia that had to win its independence during a long-standing war for independence. This has resulted in the fact that the ever-demanding process of transition has been slowed down and aggravated. Due to historical facts, upon winning its independence, Croatia did not have the developed State institutions that were instantaneously ready to take over all the functions that a State fulfils, and this fact has to be added to the above. On the other hand, regardless of the adversary circumstances, the Croatian economy has in the past fifteen years shown a high degree of capability for adjustment and this has caused a strong economic development, especially in the building sector, real property transactions, financial sector, tourism and transport as well as, at the same time, a pronounced increase in the environmental actions and efforts to direct the development by conducting systematic physical planning activities. All the aforementioned activities have a common premise for their success: the existence of the high-quality information on the space and the spatial status, real property titles and an efficient system of registering real property titles.

The accelerated economic boom began in Croatia already at the end of the last century and the State as well as economic subjects became aware that Croatia lacked the required spatial information, especially the information of a satisfactory quality. The afore-mentioned especially concerned the land administration sector or more particular, official maps, cadastral and land registers. For the purpose of illustration, ten years ago it took on the average almost 400 days to carry out title transactions in Croatia (World Bank, 2002). In those circumstances, the State institutions responsible for the land administration (the State Geodetic Administration (hereon: SGA) in charge of the official maps and cadastre, and the Ministry of Justice (hereon: MoJ) in charge of the land registers located at municipal courts) have been charged with launching and implementing the necessary reforms in order for the land administration in Croatia not to represent an obstacle but an instrument of the economic growth.

2. STRUCTURAL REFORMS AND THE NEED FOR THE NATIONAL SDI

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). By adopting those regulations, the ownership in Croatia became inviolable while the cadastre lost its former function of taxing the agricultural land, i.e. instead of the former possessors, it started to register owners in its

capacity of offering support to the title registration. At the same time, the content of the cadastral documentation and the specifications of new official maps became aligned with the needs of the physical planning, environmental protection and economy.

As early as 2000, the Croatia Parliament adopted a five-year State Survey and Real Property Cadastre Program worth EUR 130 million. Furthermore, the 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. The objective of this program and project, as well as a number of other projects, is to transform within 10 years the existing registers in digital format and verify the digitized data, implement systematic cadastral resurveys for 5% of the State territory in the areas of special interest (towns, coastline, islands, non-regulated State agricultural land and infrastructural corridors), perform a topographic survey, set up the basic topological database and produce new official topographic and orthophoto maps of Croatia, as well as to improve the processes of implementing the changes or rather issuing the documents from the registers (cadastre and land registers). The magnitude of the interventions is best illustrated by the fact that the investments of the State in this reform through the SGA budget multiplied by ten in the ten-year period between 1999 and 2008.

The majority of the set objectives have been achieved. As an illustration, all land registers will be digitized and verified by the end of 2010 with the average time of processing changes not surpassing 60 days. All 56,000 cadastral maps will be vectorized and the systematic renewal will encompass as much as 250 out of 3,342 cadastral municipalities, or 7.5% of the total number, see: Figure 1.

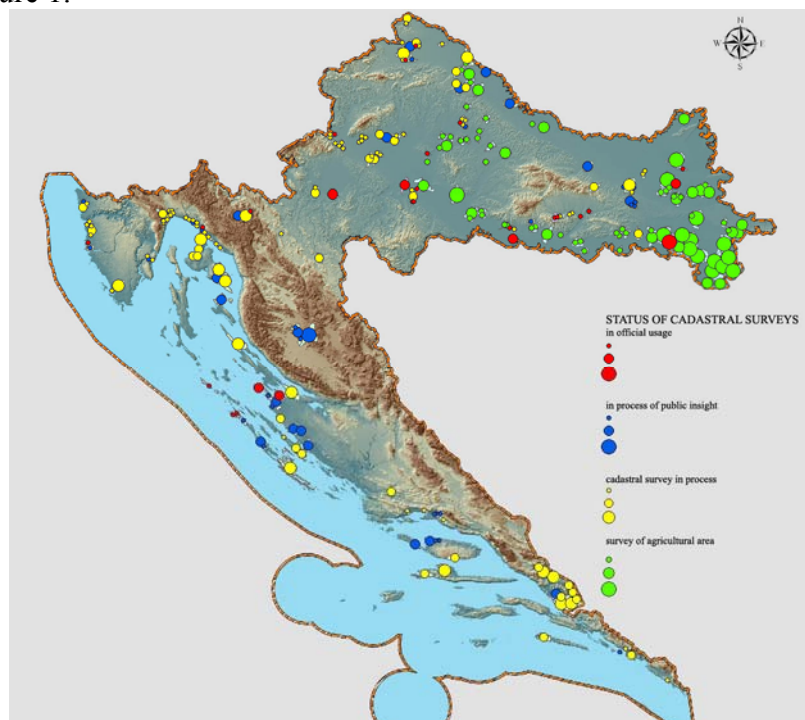


Figure 1: Cadastral municipalities encompassed by the renewal of the cadastre and land registers.

Furthermore, at the end of 2009, the production of the digital ortophoto map of Croatia in the scale of 1:5,000 will be completed along with the basic topologic map in the scale of 1:10,000 and the new topographic map in the scale of 1:25.000 (TM25). The status of the TM25 production is shown in Figure 2.

The changes did not happen in the land administration sector alone. As an illustration, all the laws, adopted by the Republic of Croatia in the past ten years, for which the spatial information was of relevance, contain the provisions about the obligation of establishing a GIS database whose platform are official spatial backgrounds. This has posed a great challenge of satisfying the user needs for the Croatian institutions, especially the SGA, and has at the same time created a unique opportunity for establishing a comprehensive system of national registers and databases of the State, local and public governmental bodies along modern principles, and implementing the SGA concept from the very beginning of the establishment of the national registers and databases in question.

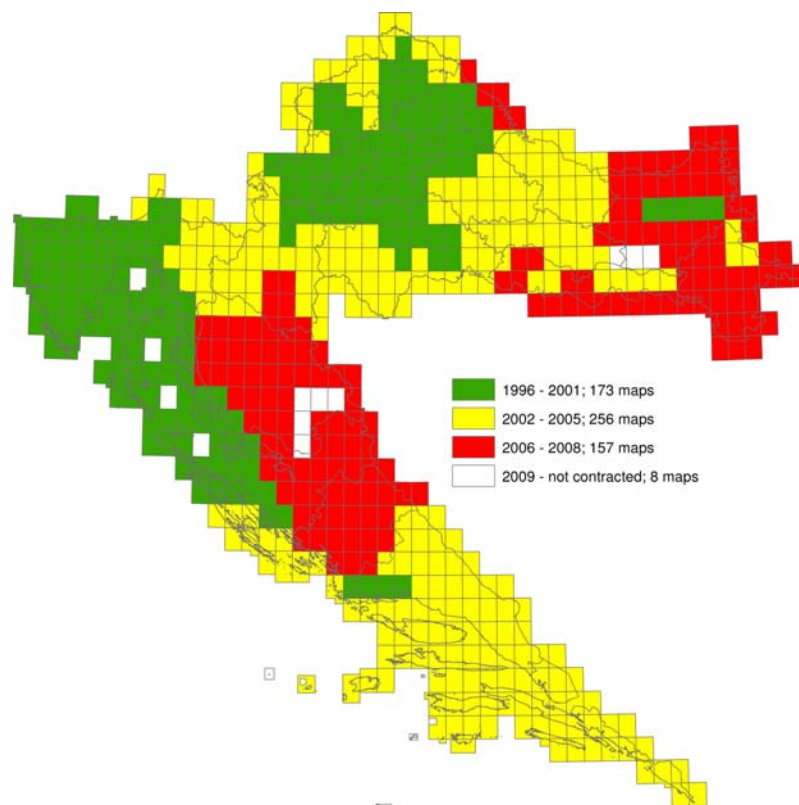


Figure 2: Production status of topographic maps in the scale of 1:25,000 as of January 1, 2009

3. ESTABLISHMENT OF THE CROATIAN SDI

3.1 Legislative and institutional framework

Since Croatia is not a member State of the European Union, it is not currently bound to implement the INSPIRE Directive. However, as a candidate State on its way to a fully-fledged membership, it has taken the first steps to transpose the afore-mentioned directive into

the Croatian legislation, as confirmed by the fact that the INSPIRE Directive is part of the National Program for the European Union Accession for 2009. The first steps of transposing the INSPIRE Directive are indicated in the Law on State Survey and Real Property Cadastre published in Official Gazette no. 16/07 (hereon: Law). The Law entered into force in February 2007, actually even before the INSPIRE Directive itself (May 2007). At the time when the afore-mentioned Law was being prepared, the draft INSPIRE Directive was published. Preparing its new Law, the SGA recognized the importance of the timely adoption of the Croatian legislation defining the spatial data infrastructure, used the fact that the draft INSPIRE Directive existed and transferred the important principles into the Law. There were ideas of a separate law on the spatial data. However, it was estimated that such an approach would not be realistic at the time and that it required much more time. Therefore, it was concluded that a new chapter defining the establishment of the spatial data infrastructure be introduced in the afore-mentioned law.

The Law defined the National Spatial Data Infrastructure as a set of measurements, standards, specifications and services within the framework of establishing e-Government aimed at enabling the effective gathering, managing, exchange and usage of the geo-referenced spatial data specified by this Law. The Law also gives a definition and content of the metadata, services, NSDI data and subjects that are obliged to participate in its establishment and maintenance. According to the Law, the NSDI subjects are responsible for the regular maintenance of the data regarding their spatial data sets and services and are obliged to make available the spatial data information under their jurisdiction or authority for the national geoportal (Republic of Croatia, 2007). In the Law, the Chapter on the NSDI is aligned with the INSPIRE Directive which does not mean that the latter is completely transposed into the Croatian legislation but that the basic framework has been created and that the basic principles have been transferred.

Furthermore, the Law defines the institutional framework, i.e. the NSDI bodies at three management levels: NSDI Council, Committee and working groups as well as their obligations. The NSDI establishment and coordination of the activities of the NSDI subjects are governed by the NSDI body composed of a chairman and 15 members appointed and relieved of duty by the Croatian Government. The Council chairman is a representative of the ministry in charge of the environmental protection and spatial planning while the Council members are recruited among the ministries in charge of the defence, land registry, transport and communications, agriculture, forestry and water management, science and education, culture, State administration bodies responsible for e-Government, State survey and real property cadastre, statistics, the Croatian Hydrographical Institute, Croatian Geodetic Institute, geodetic and geo-informatics economic community, IT economic community as well as the Croatian Chamber of Architects and Civil Engineers. The NSDI Council promotes the establishment of the spatial data sets and services as well as the establishment and monitoring of the spatial metadata system functioning of the NSDI subjects. It monitors and aligns the NSDI subjects' activities related to its establishment, proposes to the Croatian government the criteria and standards for establishing the spatial data sets and services of the NSDI subjects and takes care that the spatial data sets and services are established in line with

the adopted standards and criteria. The NSDI Council also monitors and directs the work of the NSDI Committee and sets up the working groups.

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 subjects 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 subjects 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. The SGA acts as the Secretariat of the SDI Council, coordinates all SDI bodies and provides technical support (Figure 3).

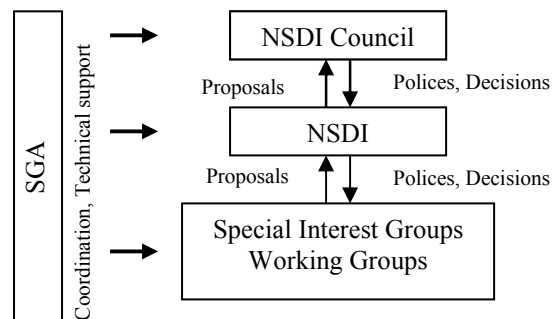


Figure 3. NSDI Institutional Framework (Bačić et al. 2008b)

3.2 Current status and projected activities

The stated Law has created a legislative framework for the NSDI establishment in Croatia to be followed by concrete activities. One of the first tasks was to establish the institutional framework defined by the Law. The NSDI Council was established in its initial composition at the session of the Croatian Government of May 31, 2007. After the reorganization of the works and jurisdictions of the ministries upon the general elections at the end of 2007, the initially appointed NSDI Council *de facto* did not start with its work so, at the Government session of July 31, 2008, a new NSDI Council was appointed by the Decision on the Appointment of the National Spatial Data Infrastructure Chairman and members (OG 92/08). The first constitutive session was held on September 4, 2008, whereby the annual working plan was adopted *inter alia*, defining the main activities related to the NSDI establishment in 2008. At the same session, the Council established the NSDI Committee and two working groups:

- Working Group for the NSDI Technical Standards,
- Working group for Spatial Data Sharing Policies.

The Law defined the composition of the NSDI Committee while the working group members come from the State administrative bodies, regional and local government, scientific institutions and the private sector.

The basic task of the Working Group for Technical Standards is to coordinate and lead the development and maintenance of the technical implementation specifications that will enable the interoperability of the geo-services aimed at fulfilling the needs of the NSDI subjects. All the developed specifications will be in line with the Implementing Rules of the INSPIRE Directive. The Working Group for Spatial Data Sharing Policies is tasked with the coordination and implementation of the development and maintenance of the interoperable and adjusted licensing model that is in line with the Croatian legislation and enables the NSDI subjects to provide a unique definition and publish the conditions for accessing their data and offered services. The results of the work of this group will serve as the basis for developing the mechanisms that will enable the NSDI subject to automatically implement the terms for the joint use and thus improve the monitoring of the course of their intellectual property rights. All specifications will be in line with the Implementing Rules and Guideline Documents of the INSPIRE Directive. The working groups meet once a month and have been formed as permanent working groups.

In order to prepare Croatia for its EU membership regarding the environmental sector, the European Commission initiated a project in 2004 entitled „Monitoring the Transfer and Implementation of the EU Environmental Economy“. For the first time, the INSPIRE Directive (2007/2/EC) was included in the Project in 2008 in the field of Horizontal Legislation. At the request of the Ministry of Environment, Physical Planning and Construction coordinating the entire „Environment“ chapter, the SGA participated in drafting a report in the part concerning the INSPIRE Directive and in drafting the National Program of the Croatian Government for accessing the EU for 2009 as related to the INSPIRE Directive. The Program envisages certain implementing measures whose implementation and enforcement are monitored by the Ministry of Foreign Affairs and European Integrations.

At the NSDI Council session held on February 27, 2009, the Council Working Plan for 2009 was adopted. For the purpose of promoting and spreading the awareness among the professionals and the general public regarding the activities related to the NSDI establishment, the printing of a brochure on the NSDI establishment was planned as well as the development of the NSDI web site. Furthermore, it is planned to organize the national SDI and INSPIRE day in 2009 in Croatia in order to inform the overall geo-information society with the existing SDI structure in the RoC, the objectives and activities, the INSPIRE Directive and RoC obligations as well as to inform the general public about the SDI and its significance for the citizens and the economy. The objective of the afore-mentioned is to strengthen the awareness of the benefits of the NSDI for the entire society.

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 so the development of the geo-portal, currently containing only the data owned by the SGA, is in its final stage. The Council Working Plan for 2009 highlights the obligation of adopting draft specifications on the implementing and technical guidelines for the metadata and metadata services of other NSDI subjects.

4. INTERNATIONAL COOPERATION

4.1 NSDI Publication

In May 2008, the State Geodetic Administration 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. The production was aided by the European Union under the Real Property Registration and Cadastre Project. The intention was to familiarize the professional audiences directly involved in the NSDI development, be it at the national, regional, local or commercial level, about the NSDI basics as well as to inform the wider audience, i.e. the users. The publication consists of two studies described below (State Geodetic Administration, 2008).

Using the European Union grant under the CARDS 2002 Program as part of the Real Property Registration and Cadastre Project, the SGA ordered the production of the Study on the National Spatial Data Infrastructure in Croatia. The Study was produced by a group of foreign and Croatian experts gathered by the German company named Conterra. This study represents a comprehensive effort that collected and analyzed the information on the current status of the spatial data in Croatia in a systematic and very clear way and in the context of the needs of Croatia and the expectations coming from the European Union. Based on the analysis, concrete steps were proposed regarding the NSDI establishment in Croatia (Remke et al. 2005).

Before this study materialized, the SGA – using a grant by the Foreign Office of the Great Britain and Commonwealth in cooperation with Geolink Consulting Ltd. – evaluated the study itself as well as the development of the European spatial data infrastructure which resulted in a second study entitled: “*Croatia: National Spatial Data Infrastructure and INSPIRE*”. This study upheld the conclusions of the first study and extended it with new information related to the adoption of the INSPIRE Directive (Geolink Consulting Ltd, 2006).

Given the connection between the two studies leaning on each other, one publication encompassed the afore-mentioned studies in order to provide the readers with a more comprehensive overview of the NSDI establishment as well as of the activities in Europe.

4.2 Sharing of experiences

In order to inform the overall geo-information society about the NSDI concept and introduce the preparations for the work of the Council and other NSDI bodies, the State Geodetic Administration has organized the consultancies and brought in the experts from the countries where the NSDI development had been the most successful. In collaboration with the Swedish Agency for Development Cooperation (SIDA) and the Swedish Geodetic Authority (Lantmateriet), the first consultancy on the NSDI establishment was organized on May 29, 2007, for the representatives of the institutions contributing their members to the NSDI Council, and on May 30, 2007, for the representatives of all NSDI subjects (approx. 150 members). The manner of the NSDI establishment in the Kingdom of Sweden was presented

along with the concept and components, international experiences of development and implementation, legal and organizational aspects and other important steps in the NSDI development in Sweden. The results of the poll conducted among the consultancy participants (114 respondents) showed that 97% of the participants considered their organization part of the NSDI while all thought that the digital and updated spatial data and the data browsers would contribute to the development of the spatial data market itself. As the key factor of success of the Croatian NSDI establishment, they stated a clear vision and an NSDI establishment plan, the provision of accurate, updated data of adequate quality, a good organizational structure and coordination in updating the information, and the NSDI visionaries, i.e. the right people at the right positions. On September 12, 2007, the SGA organized in cooperation with the Canadian Embassy in Zagreb the presentation of the Canadian model of the NSDI establishment. The consultancy participants represented a cross-section of the geo-information society in Croatia and got the opportunity to see a new concept of the successfully established NSDI. In cooperation with the German Association for Technical Assistance (GTZ) a two-day consultancy was organized, presenting the NSDI system of the Federal Republic of Germany. The consultancy was held on May 26, 2008, for the members of the NSDI Council while on May 27, 2008, it was held for the representatives of all the NSDI entities. The consultancy participants had an opportunity to get familiarized with the spatial data infrastructure of Germany in the context of the European guidelines and the INSPIRE Directive as well as with a concrete example of the development of the spatial data infrastructure in the Lower Saxony (Bačić et al. 2008a).

As part of the cooperation with the Swedish Agency for Developmental Cooperation (SIDA) and the Swedish Geodetic Authority as part of the Real Property Registration and Cadastre Project, courses have been organized for the target group of the SGA and Ministry of Justice participants. The goal of the courses was to transfer the experiences from the field of management, standards and delivery of the NSDI data.

4.3 Support to the SDI establishment by using the EU PHARE 2005 assistance

As part of the European Union PHARE 2005 assistance funds, the Ministry of Finances signed on behalf of the Republic of Croatia in late 2007 the following agreement: „Modernisation and Capacity Building of the Integrated Land Administration System in Croatia“, consisting of three components. The support to the NSDI establishment in Croatia has been provided for under the R1 component: Technical Assistance for the Integrated Land Administration System in Croatia. It is a contract performed by the GFA Consulting Group company in joint venture with GCI Dr. Schindler Geoconsult International. The beneficiaries of the entire contract are the Ministry of Justice and the State Geodetic Administration or, more precisely, the State Geodetic Administration when it comes to the NSDI component.

The NSDI component is geared to the activities related to the geo-portal of the State Geodetic Administration, and the alignment with the INSPIRE Directive and Implementing Rules, along with improving the web sale through a geo-portal and the support to the establishment and functioning of the NSDI in Croatia. As part of this project, two working groups described in Chapter 3 of this Article were set up. Apart from the afore-mentioned two working groups,

the analysis of the needs and requirements for establishing other working groups was also carried out. The result of the analysis is the need to create the following working groups:

- WG for linking the NSDI program and e-Government whose objective is to link the public sector with the network of the spatial data infrastructure through integrating the NSDI into the e-Government processes
- WG for establishing a business model for the NSDI establishment that will develop a business model for the establishment of a sustainable partnership and business network and, especially, the functioning of common services such as catalogues, etc., and
- WG for building the NSDI establishment capacities that will identify the capacities lacking for the NSDI establishment, give the best practice examples, work on the professional NSDI literature related to the courses and geo-informatics curricula at various educational levels, and establish a network or communication channels with the European and Croatian educational institutions (Buschhoff et al., 2008).

As part of this component, a study trip was organized for the working group members and the future NSDI Secretariat. The objective of the study trip was to share the experiences with the NSDI's already established in Europe. The trip destination and the program itself were adjusted to the objectives, tasks and working plan of the stated NSDI bodies so the Centre of Support IDEC of the SDI of Catalonia (Spain) was selected. It runs a successful approach to integrate local governments into the regional SDI. The second destination was the Business and Coordination Office GDI-DE as well as the Federal Agency for Cartography and Geodesy in order to exchange experiences related to the organisational and technical aspects of the establishment of the National Spatial Data Infrastructure and Geoportal in Germany. Travelling through Germany, the study trip participants had the opportunity to visit the Conterra GmbH company and obtain the information directly from the members of the INSPIRE Drafting Teams for Metadata and Network Services.

5. SDI STAKEHOLDERS PARTNERSHIP

Already the first study, drafted for the SGA by a group of authors in 2001 (Arponen et al., 2001) as part of the contract with the Blom company, has pointed to the fact that the basic premises of the SDI development in Croatia are the dissemination of high-quality information and the education or rather good communication and partnership between the SDI subjects. The fact that numerous national databases based on the spatial data are being established in Croatia, has underlined in particular the need for the coordination of the SDI subjects in Croatia. If the permanent lack of IT and GIS experts in the State institutions is added to this, it is easy to conclude that this is one of the key obstacles to a faster development of a fully equipped, geo-conscious society which is the task of the SDI subjects, making the need for their mutual good communication even more pronounced. The afore-mentioned was one of the reasons for the NSDI Council to number 15 members gathering the representatives of the key bodies of the State administration as well as the geodetic, geo-informatics and IT economy of Croatia. Although the Council faces a long journey, a basic precondition has been created for the development of the National Spatial Data Infrastructure and the geo-conscious society.

However, as the things are now developing, the SGA has taken steps, at the horizontal level, 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. Such or similar projects, defined through formal agreements or contracts that the SGA has signed with more than 50 subjects that are building a network of involved institutions and the regional and local governments also participating or contributing in development of Croatian SDI (Bačić i Šainović, 2006).

In implementing these activities, the quality of the basic information representing the basis for all the databases in the SDI is of particular importance. Having in mind the goal of providing quality or rather ensure the implementation of the quality control and the provision of expertise in building various systems, the Croatian Geodetic Institute (hereon: CGI) was established in 2001. Since its establishment, the CGI has managed to set up an efficient quality control system for the production of topographic and ortophoto maps while currently developing a system of the independent quality control for the production of cadastral maps. All of the afore-mentioned is of particular importance for the entire SDI system in Croatia because the gathering of the spatial data (surveying) and the production of spatial datasets have been outsourced to commercial entities: geodetic, geo-information and IT companies.

In order to have the entire process function efficiently, the exchange of information has been established at the strategic and project level. Apart from the NSDI Council, the bodies that are also charged with the task of passing strategic decisions on specific SDI areas in Croatia, such as the Real Property Registration and Cadastre Project Steering Committee or the Steering Committee for implementing the National Program of Establishing the Land Parcel Identification System, have been formed in such a way as to involve the representatives of the subjects that are relevant from the point of view of the SDI development. At the project level, the SGA and other institutions contribute their people to project teams of numerous projects who are working at establishing separate systems in order to achieve the highest level of alignment of various national databases and registers. The afore-mentioned also applies to the cooperation with the participating economic subjects or the ones producing specific databases and registers, which must have the required information on other databases and registers in order to be able to carry out their tasks successfully.

6. DEVELOPMENT OF GEO-CONSCIOUS SOCIETY

Since the communication and partnership between the subjects presuppose the understanding of the issues and the very concept of the SDI, the dissemination of the information on the activities and the training pose as a serious obligation with clear objectives and tasks in the development of the geo-conscious society. Given all the reform interventions implemented in

the land administration system in Croatia, as described in Chapter 2, a comprehensive public awareness campaign is being carried out and is also used in the promotion of the SDI in Croatia. The manner in which this is carried out is partially described in Chapter 4. Apart from the stated activities, the SGA is informing the public about the SDI activities of the subjects in several ways. The achievements in 2008 were reported on at the Second INSPIRE Conference in Maribor (Bačić and Rašić, 2008a) while the following will be realized in 2009:

- promotion through the monthly bulletin of the SGA entitled „Visura“ distributed at almost 4,000 addresses,
- co-organization or patronage of the events containing sessions on the topic of the SDI (in 2009, this will encompass the First CROPOS Conference, Gisdata User Conference, Second Symposium of Licensed Geodetic Engineers, GIS form and the Fifth Symposium of the Croatian Mapping Society),
- printing of the publications and brochures on the topic of the SDI and related topics,
- translation of the regulations and studies published in other European countries, and
- organization of a separate promotional INSPIRE day.

Namely, since a significant number of the SDI subjects and users shows a lack of awareness of their own role in the Croatian SDI, the SGA as the operational organizer, under the auspices of the NSDI Council and in cooperation with the Croatian Mapping Association, shall organize a separate promotional activity entitled „INSPIRE day“ as part of the fifth symposium on mapping and geo-information, with the objective of gathering the Croatian SDI subjects and users, inform them on the SDI activities and mobilize them to get involved in the SDI events in Croatia. The visible result of these efforts is contained in the fact that several professional periodicals have extended their contents to the field of the geo-informatics and SDI as well.

All the afore-mentioned activities should directly enable the accelerated and harmonized development of the national databases and registers encompassed by the Croatian SDI whose final goal is the development of the geo-conscious society in Croatia that will be based on a strong and capable SDI, support and instigate the economic growth of Croatia for the benefit of its citizens and, at the same time, implement high standards of protecting the environment, nature, physical planning and security.

7. CONCLUSION

We believe that, by establishing legislative solutions and organizational forms along with their further upgrading and development as well as the continuous partnership between the subjects and the information/education campaign, it is possible to speed up the development of and build the Croatian NSDI for the purpose of establishing the geo-conscious society. Based on the high-quality information about the space that are available to everyone and at every moment in time, Croatia may accelerate its growth and increase the organized influence on that development by using its comparative advantages. At the same time, when building the NSDI, it is necessary to resolve numerous problems and challenges underlined in this article so additional efforts, energy and resources need to be invested in order to achieve the set objectives and establish a geo-conscious society.

REFERENCES

- Arponen, M; Eggers, O; Larsen P.E.; Skender I. (2001): Study on Review of EU Requirements for Geographic Information Infrastructure in Croatia, State Geodetic Administration of Republic of Croatia.
- Bačić, Ž., Šainović, I. (2006): "Developing Infrastructural Frame for Nationwide Management of Spatial Information's in Croatia", Proceedings of XXIII FIG Congress Shaping the Change, Munich, Germany.
- Bačić, Ž., Divjak D., Landek I., Rašić Lj. (2007): Croatia on the Way to the European Information Society, Proceedings 13th EC-GI & GIS Workshop ESDI, July 4–6 2007, Porto, Portugal
- Bačić, Ž., Rašić, Lj. (2008a): Sharing of experiences: A tool for building a National Spatial Data Infrastructure, Abstracts, Inspire Conference, 23-25 June 2008, Maribor, Slovenia
- Bačić, Ž., Rašić, Lj., Landek, I., Malnar, N. (2008b): Building Croatian Spatial Data Infrastructure in Line with European Standards, Proceedings of ISPRS Commission IV Congress, Beijing, China.
- Busschhoff K., Wytzisk A., Link H.-P., Hemert v.H. (2008): Technical Assistance for Intergrated Land Administration System in Croatia, Final Inception Report.
- Geolink Consulting Ltd (2006): Croatia: National Spatial Dana Infrastructure and INSPIRE - A study and report by Geolink Consulting Ltd, State Geodetic Administration of Republic of Croatia.
- Remke, A; Wytzisk, A; Buehler, W, Stipić, D. (2005): Study on Development of National Spatial Data Infrastructure in Croatia, State Geodetic Administration of Republic of Croatia.
- Republic of Croatia (2007): Law on State Survey and Real Property Cadastre, Narodne novine, 17/2007, pp. 1309-1328.
- State Geodetic Administration (2008): National Spatial Data Infrastructure in the Republic of Croatia, May 2008.

BIOGRAPHICAL NOTES

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Graduated in 1986 from the Faculty of Geodesy, University of Zagreb, and obtained his Ph.D. at the Institute for Applied Geodesy and Photogrammetry at the Technical University in Graz in 1997. He started his professional career as a teaching assistant at the Faculty of Geodesy in Zagreb. In 2002, he was elected Professor at the Satellite Positioning and Navigation Chair of the same Faculty. In 1999, he was appointed Deputy Director and in 2000 Director-General of the State Geodetic Administration of the Republic of Croatia. Since 2002, he is member of the EuroGeographics Management Board and served as President in 2005-2007 period. Since 2008, he is a member of the Croatian National Spatial Data Infrastructure Council and

President of the NSDI Committee. He authored or co-authored more than 50 papers in various fields of geodesy and geoinformatics.

Ljerka Rašić, M.Sc., graduate geodetic engineer

Graduated in 1993 from the Faculty of Geodesy, University of Zagreb. Immediately upon the graduation, she went to Frankfurt/M, Germany, where she worked until 1996 in the Institute for Applied Geodesy, now: Bundesamt für Kartographie und Geodäsie, processing the GPS surveying. In 1997, she became employed at the State Geodetic Administration in the Department for Basic Geodetic Works where she has been involved with the satellite geodesy- She obtained her M.A. degree in 2002 from the Faculty of Geodesy of the University of Zagreb, specialization: satellite geodesy. At present, she works at the Photogrammetry and Remote Sensing Department and has been participating in the recent years in the activities related to the NSDI establishment in Croatia. Since 2008 is member of Croatian National SDI Board. She has co-authored over 20 papers.

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