

LEARNING FROM OTHERS – CAPACITY BUILDING FOR GIS AND SDI IN SOUTH EAST EUROPE

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Abstract

This paper addresses the need for capacity building for using GIS and building spatial data infrastructures (SDIs) in South-East Europe. This is a recognized need, which is dealt with, amongst others, by the European project eSDI-NET+ that has build a network of users and key European SDI stakeholders in Europe to share experiences and best practices. Using a detailed assessment methodology for SDIs, the project has collected and documented 135 regional and local SDIs in 26 countries in Europe.

These SDIs were identified and analysed in twelve SDI Best Practice workshops with one in South-East Europe. All SDIs were presented in the International Conference “SDI Best Practice Award 2009”, November 2009 in Turin, Italy, which awarded the twelve best SDIs. This experience is now fed back to support SDIs in development that they can learn from successful SDI implementation. This proposed paper is part of this process in emphasizing the needs of the South-East European region. The SD in Croatia is presented in more detail as significant example of SDI development in the region.

Keywords: GIS, SDI, NSDI, South East Europe, capacity building

INTRODUCTION

The importance of the use of geospatial data and Geographic Information Systems (GIS) is today widely accepted. When different sources of geospatial data are combined, Spatial Data Infrastructures (SDIs) are created. SDIs normally use GIS and may grow out of the use of GIS and a distributed infrastructure. However, whereas GIS comprise technology and data, Spatial Data Infrastructures require policy agreements and a proper organization that they can operate. Metadata are important for Spatial Data Infrastructures as well in order to be able to identify data.

SDIs are formal arrangements with its main goal to increase access to and availability of geographic data across a given area or domain. The goal is for organisations to reduce costs, to share data between themselves and others, to realise and to foster services, and to enhance the diffusion of public data to other stakeholders, especially private companies and citizens. SDIs may exist on several levels: on national level, initiated by national governments, making data available for the whole country, or on local or regional level, with arrangements valid only for a certain geographical region.

A recent shift in emphasis has taken place in the SDI field from national SDIs to sub-national SDIs. Whereas a great deal of the discussion in earlier years revolved around talking about national SDIs, much more time is now being spent on discussing different ways of creating and operating sub-national SDIs. Success at the sub-national level has become a crucial yardstick of overall success for SDI development and acceptance.

In industrialized countries, since about 30 years, considerable experience with Spatial Data Infrastructures exists in research and implementation [Masser, 2005]. In transition and developing countries, the development of Spatial Data Infrastructures lags behind, but could be greatly improved if using the rich experience of existing implementations. Thus, dialogue and exchange of experience is necessary between countries and stakeholders in different stages of development. Development and use of standards, that is operational agreements, is necessary as well in order to be able to operate together. This is exemplified by the European directive INSPIRE [Annoni, Craglia (2005); Craglia, Annoni (2007)] that sets standards for SDIs in Europe, where vast differences in SDI implementation are visible as well.

The purpose of this paper is to point to existing undertakings and endeavours of creating a dialogue between SDIs in different stages of development, prompted by a project that is partly financed by the European Union, “eSDI-NET+”, and

that aims at bridging different levels of knowledge and implementation of SDI by creating a Europe wide dialogue. The paper will first describe the project and its achievements, then present the activities of the project partners in South-East Europe and the status of SDIs in this region, before presenting lessons learnt and a way forward to an enhanced exchange of experiences. The authors of the paper are members of the Association for Geospatial Information in South-East Europe (AGISEE), partner in the project “eSDI-NET+”.

CREATING AND DISSEMINATING SDIs IN EUROPE: eSDI-NET+

The project “eSDInet+” (<http://www.esdinetplus.eu/>) is a network for the promotion of a European wide dialogue and exchange of best practices with respect to Spatial Data Infrastructures. “eSDInet+” targets users and SDI stakeholders to bring them together for communication and knowledge exchange. The project emphasizes in particular SDIs on sub-national level and collects from them lessons to be learnt for building up new SDIs. The project will end in August 2010 after a duration of 3 years.

Intensive dissemination campaigns have created awareness of the important role SDIs. Existing SDI solutions at the sub-national level were identified and discussed in twelve national and regional SDI Best Practice workshops. These workshops also addressed promotion of best practices and knowledge exchange between stakeholders involved in the creation and use of SDIs. In all these workshops and through thorough investigation throughout Europe, 135 SDIs from 26 countries in Europe could be collected and described.

The study and evaluation of sub-national SDIs was a main task of the project. A comprehensive methodology and criteria were developed in order to assess existing SDIs, [Rix, Fast, 2010] which includes issues such as:

1. Level of technology and innovation and originality of the project;
2. Implementation and/or readiness for INSPIRE principles;
3. Level of fostering cooperation between different users (proof of visibility and/or user feedback);
4. Possibility of extension or transfer to other countries and regions.

The criteria were formulated in a questionnaire that was distributed to sub-national SDIs all over Europe. The results of the survey allowed to compare and assess the selected 135 SDIs. An international jury of 6 SDI experts selected 12 SDIs as exemplary best practice cases and these were awarded at the International Conference “SDI Best Practice Award 2009” that took place on 26th and 27th November 2009 in Turin, Italy. The aim of the event was to highlight promising SDI solutions in Europe, to exchange experiences and to learn from each other. The main message of the award jury was that "each Spatial Data Infrastructure is a special case" and the diversity of experiences made was a fundamental challenge for the selection.

SPATIAL DATA INFRASTRUCTURES IN SOUTH-EAST EUROPE

It can safely be said that SDIs in SEE lag behind those in Western Europe or other industrialized countries. There are also many differences of development in the different countries of SEE. An early study to understand the status of the development in these countries had been carried out in 2002 by the project GISEE, “GIS Technology and Market in South-East Europe – a market study”. The study identified several problems: although spatial data exist throughout the region, they are not updated and not compatible; access to data is difficult, data owners are often not known and access conditions are not made available. There is a lack of collaboration between data owners and providers, along with unclear procedures and planning and a lack of financing [Boes, Pavlova, 2004].

The project “eSDI-net+” provided an opportunity to review the status of SDIs in South-East Europe. The South-East European SDI workshop [Boes, Dimopoulos, 2009] took place in February 2009 in Thessaloniki. It was a place for exchange, communication and documentation of achievements in South-East Europe and an occasion to obtain information about what is going on in the whole of Europe with respect to SDI and INSPIRE. The workshop brought together representatives of the ten countries Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Greece, Kosovo, (Former Yugoslav) Republic of Macedonia, Romania, Slovenia and Turkey. Each representative had before contacted SDIs on local level in their countries and reported about the situation of SDI on national and sub-national level in their countries.

It was found that despite a generally well developed legislation that could theoretically support establishment of SDIs, very often, political decision makers lack willingness and understanding for supporting SDI development; bureaucracy and heavy

decision procedures constitute a problem. Lack of cooperation was perceived as an obstacle. SDIs enforce transparency and it seems that politics is not ready for this. On the data side, many data are old, it is difficult to update them and they are scattered in many places; they are difficult to find and to identify, and not shared. International standards are not widely adopted, but it is an ongoing process and they become more and more accepted.

Some applications drive the development of SDIs, such as cadastre and land registration, or land management and agriculture. E-government could be considered as an important application of SDIs that would drive the general use of spatial data. Environmental applications exist, but rarely as drivers. User needs can become a driving force for SDI establishment. Examples are the nature park directorates in Bulgaria, for which spatial data are important. They have to answer questions of citizens, for example what an owner of a parcel that belong to a protected area is allowed to do on his parcel. Such local authorities realise that they need GIS and spatial data for their services. This demonstrates on local level the purpose and usefulness of an SDI.

There was general agreement on the importance of awareness creation and education. It is important to increase the awareness and education of people that work in the services of a country, including low level officials. Raising awareness at different levels of decision makers would convince them of the advantages of investment in SDIs.

As a result of the workshop, eleven local SDIs had been selected as best practice cases from the region of South-East Europe and proposed to the eSDI-net+ for European wide consideration. Most of them clearly show the process of SDI development at local level which starts with the use of GIS which is then made available to more users first internally in an organization then also to the public via the Internet. User reactions drive providers to make more spatial data available on their web portals. Municipalities in a next step tend to integrate spatial data with other services provided online to citizens. SDIs outside of municipalities exist but are rare. Thematic SDIs are reported from Slovenia and Macedonia for environmental or agricultural purposes or simply for information provision.

THE EXAMPLE OF CROATIA

The case of Croatia has clearly demonstrated the advantage of having a visionary leader who pushes things ahead. The Croatian State Geodetic Administration (SGA) and their head have early recognized that simple access to spatial data is the key prerequisite for an efficient and economically prosperous society. The need for NSDI improvement has been included as part of the Croatian e-Government infrastructure [Cetl et al. 2009].

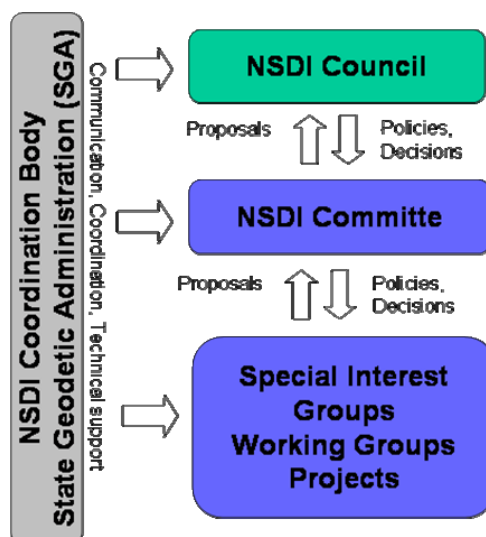


Figure 1: NSDI Institutional structure

A synergy of different initiatives and activities, mostly driven by SGA, resulted in February 2007 in a new “Law on State Survey and Real Estate Cadastre”. A separate chapter defines the national SDI (NSDI) as a set of measurements, standards, specifications and services which, within the framework of establishing e-government, aim at enabling effective gathering,

managing, exchange and usage of georeferenced spatial data. The Law also sets up an institutional framework for improving the NSDI in Croatia. The INSPIRE directive was in its final phase when the law was developed, and as a result there is a high compatibility between the Law and the INSPIRE directive [Bačić et al. 2008].

The Law gives an institutional framework and defines NSDI bodies and their responsibilities. It distinguishes three bodies in the NSDI institutional structure (Figure 1).

The main NSDI governing body is the NSDI Council as a political body responsible for managing the NSDI establishment. It was formed by the Government's decision on 31 May 2007 and consists of 15 members, representatives of: Central State Administrative Office for E-Croatia, Ministry of Defence, Ministry of Justice, Ministry of the Sea, Tourism, Transport and Development, Ministry of Agriculture, Forestry and Water Management, Ministry of Science, Education and Sports, Ministry of Culture, Ministry of Economy, Labour and Entrepreneurship, State Geodetic Administration, Central Bureau of Statistics, Hydrographic Institute of the Republic of Croatia, Croatian Geodetic Institute, Sector of Geodetic and Geoinformation Activities, Sector of Information Technology Industry, and Croatian Chamber of Architects and Civil Engineers.

On the managerial level, there is the NSDI Committee appointed by the Council consisting of three representatives from the Council, two from SGA and heads of Working Groups. Working Groups are temporary or permanent work bodies responsible for the concept and implementation aspects. Their members are representatives of the state authorities at all levels, of users and producers of spatial data, research and educational institutions, etc. These bodies are appointed or dismissed by the NSDI Committee, with approval of the NSDI Council. A prerequisite for forming a body is a clearly defined mission and a detailed execution plan. During 2008 two working groups (WGs) were created: a WG for NSDI technical standards and a WG for spatial data sharing policies. At the end of 2009 three new working groups were created: WG for building the NSDI establishment capacities, WG for linking the NSDI program and e-Government and WG for establishing a business model for the NSDI.

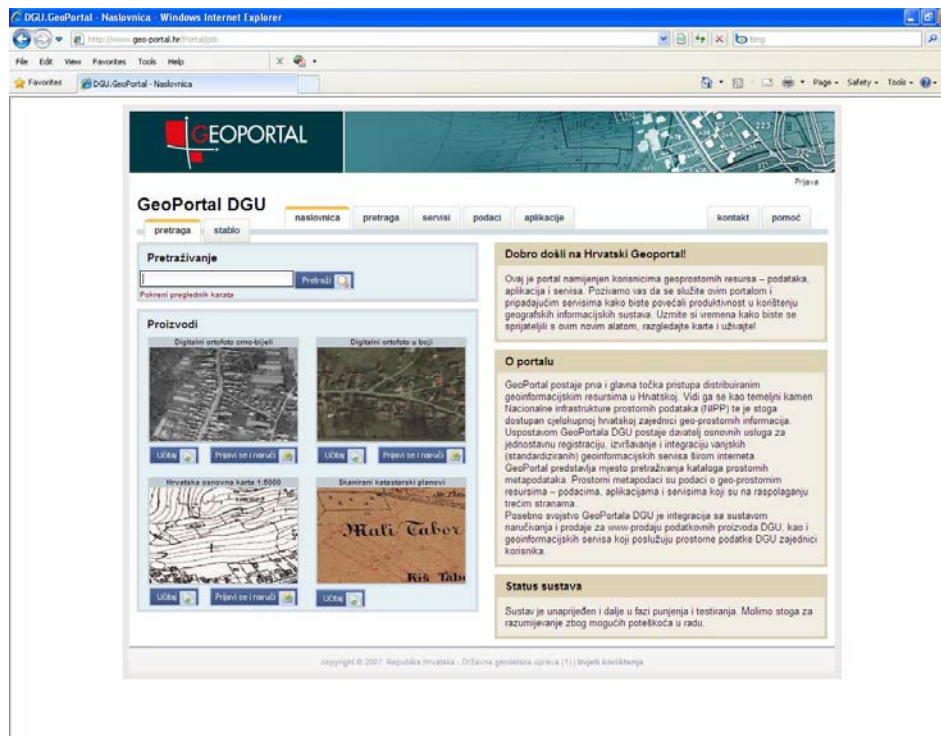


Figure 2. SGA Geoportal (www.geo-portal.hr)

The State Geodetic Administration in the organizational structure is a coordination body, a kind of secretariat, providing continuous support in the NSDI development process, coordinating work of all NSDI bodies, and providing technical support. Its main tasks are: set-up and maintenance of the central NSDI web portal, securing communication support, public

relations, services of leading projects, services of quality control, etc. This organizational structure is similar to that in countries like Germany or the Netherlands.

One of the tasks of the SGA is to establish and maintain a public metadata service through a geoportal. The development of the geoportal, currently containing only the data owned by the SGA, is in its final stage (Figure 2).

Having a geoportal in operation means that other governmental organizations can not only use SGA data but also make their data accessible. Through SGA geoportal Croatian GIS users have access to vast quantities of spatial data that will make their everyday work much easier. This is the first step to the establishment of a Croatian national geoportal as part of an NSDI.

The steps taken at national level are also drivers for SDI improvement at local level. It can be concluded with certainty that the local levels now can clearly see benefits from the SDI activities at the national level that will raise awareness about the importance of spatial data and services at local levels. There are already some good examples of local SDI in the several cities e.g. Zagreb, Rijeka and Varazdin.

LESSONS LEARNT

The project “eSDI-net+” has collected and analysed 135 SDIs on sub-national level from all over Europe including those of South-East Europe. These SDIs and the respective achievements were presented at the International Conference “SDI Best Practice Award 2009”. A summary view of these achievements and of SDI development applied several criteria such as organizational and institutional aspects, user involvement and technological aspects. Twelve SDIs had been selected and awarded as outstanding European best practice cases, which means that other SDIs in development can learn from them. More detail will be published in an “eSDI-net+” book that is in preparation.

Overall, it had to be recognized that the current practice at the regional and local levels in Europe is diverse, which raised some important questions about the nature of SDIs. While some SDIs represented the classic case of a SDI that has been translated from national level of the administrative hierarchy to the regional level many of the others did not easily fit this model. This was particularly the case with the thematic SDIs that are often limited to some aspects of national SDIs. For this reason it turned out to be very difficult to compare sub national SDI submissions like trying to compare apples and pears. This led to the conclusion that “each SDI is a special case”, notwithstanding the strenuous efforts that have been made during the eSDI-Net+ project to develop quantitative indicators for evaluation purposes.

Some SDIs have **grown from the use of GIS**. One example is the Forth Valley GIS in Scotland which evolved from an informal collaborative agreement between three local authorities in 1993 to combine their GIS activities. The Danish Spatial Planning System aimed at eliminating duplication in the reporting of the 30,000 local plans that have been prepared by the 98 municipalities in Denmark. The basic philosophy of this system is summarised by the slogan ‘data are available in one and only place.’ The Italian “Infrastruttura per l’Informazione Territoriale della Regione Lombardia” was driven by spatial planning considerations and its main emphasis was on the creation and maintenance of a regional topographic database which acts as a platform for other applications.

An important factor in nearly all considered SDIs is **collaboration**. The “Centre Regional de l’Information Geographique for the Provence-Alpes-Côte d’Azur” (CRIGE-PACA) extends over six departments in south east France with one of their main objectives as coordinating communities of practice within the region. The SDI for the state of Nordrhein-Westfalen in Germany has created strong links between the state organisation and the municipalities in the region because the latter are responsible for the collection and maintenance of cadastral information. The information that is held in this SDI is made widely available to private as well as public sector bodies. The “Infraestructura de Datos Espaciales de Cataluña” (IDEC) in Spain described itself as ‘a network of labelled web services’. As a result of IDEC’s activities more than half the municipalities in the region are actively making use of geographic information in their work and private sector users account for forty per cent of all usage. The X Border GDI of the province of Limburg in the Netherlands is a collaborative venture which involves four Dutch provinces, three Belgian provinces and 12 districts (Kreise) from Germany.

SDIs can be organized both in a **centralised and in a decentralised way**. Only few of the selected SDIs are truly centralised such as the Danish Spatial Planning System or IDERioja, the SDI for the autonomous region of Rioja in Spain, which is regarded as a neat example of centralised GI management. Most SDIs however are decentralised such as IDEC, the X Border GDI, which is in fact cross border, or the Forth Valley GIS in Scotland; the “National Land and Property

Gazetteer and the National Street Gazetteer in England and Wales” is a highly decentralised initiative that provides a consistent platform for local authorities to develop a wide range of thematic applications.

Users and their needs drive the development and use of various SDIs. More than a million maps are downloaded every month by the users of the SDI of the state of Nordrhein-Westfalen; private sector users can freely use information held in the regional topographic database of the “Infrastruttura per l’Informazione Territoriale della Regione Lombardia” in Italy. The main objectives of the “Infraestructura de Datos Espaciales de Cataluña” (IDEC) in Spain were to facilitate the use of geographic information and to motivate all kinds of users. The activities of the “X Border GDI” of the province of Limburg in the Netherlands are reported to be very much problem oriented and user driven. Business needs have driven the Forth Valley GIS in Scotland to develop a wide range of applications in many different parts of Scotland as well as the components of a SDI for its three main shareholders. Its success in meeting these needs was recognised in a recent survey of local authority services in Scotland as a whole when it was described as the ‘most frequently mentioned example of good practice.’ And finally, the French “SIG Pyrenées” recognised the different needs of five main groups of users from agriculture, forestry, climate, economy and spatial planning respectively and created bespoke solutions for each of them.

The original concept of an SDI is to make all kinds of data available via a single point of access. **Thematic SDIs** provide only those data that match the purpose of the theme or application and thus contradict the original basic idea. However, those SDIs turned out to be important: 43 out of the original 135 submissions fell into this category and many of them contained good examples of best practices. The “National Land and Property Gazetteer and the National Street Gazetteer in England and Wales” relies on the active participation of nearly 500 local authorities to create databases to a common set of standards and provides a consistent platform for local authorities to develop a wide range of thematic applications. The French “SIG Pyrenées” SDI provides specific solutions for five groups of users from agriculture, forestry, climate, economy and spatial planning respectively using open source software and content management systems platforms such as Joomla! as well as conventional GIS software. The Danish Spatial Planning System focuses on local plans and centralises these plans from 98 municipalities in Denmark. Digital Norway, finally, is a nation-wide program that enhances the availability and use of quality geographic information among a broad range of users, primarily in the public sector.

There are further SDIs that are not strictly thematic SDIs but that focus on certain applications or sectors. The “Centre Regional de l’Information Geographique” for the region Provence-Alpes-Côte d’Azur (CRIGE-PACA) emphasises the tourism sector, the “Infrastruttura per l’Informazione Territoriale della Regione Lombardia” in Italy is strongly driven by spatial planning considerations, and the “X Border GDI” demonstrates particular reference to emergency management and spatial planning in a densely populated border region.

CONCLUSIONS

The selection and ranking of SDIs by the project “eSDI-net+” followed strictly the assessment criteria. This assessment was rather easy for the better developed SDIs in Western Europe. In South-East Europe, SDIs rely still more on the use of GIS and essential features of SDIs lack; therefore the assessment criteria were more difficult to apply and showed many gaps. Many of the conclusions of the workshop in South-East Europe comply nevertheless with those drawn from the assessment of all European SDIs that had been selected as best practice cases.

Important is the question of the leadership in SDI development. Both the Croatian national SDI as also IDEC in Spain for example would not be possible without a strong leadership that however has to be linked to a right position making it possible to influence the developments. This cannot be dissociated from understanding and awareness of SDIs, which creates the necessary stakeholders who drive and implement SDIs. This has exactly been the goal of the “eSDI-net+” project, to disseminate knowledge about SDIs.

Thematic SDIs turned out to be important, more than originally assumed. Thematic SDIs are essentially user driven SDIs and the role of the user of geospatial data becomes an important driving element. The consequence is that awareness creation should not only be directed at specialists creating SDIs but at those people who are potential users of geospatial data and will have to formulate their needs for such data.

Truly working SDIs are based on collaboration and openness. This was demonstrated by most of the selected SDIs at the Turin conference, and was on the other hand perceived as a difficult topic in South-East Europe. Here, various obstacles to collaboration were recognized. Collaboration requires the use of standards and rules, more than technical standards. Rules

are required to define how to work together, how to create transparency. This is defined in many specifications of the Open Geospatial Consortium, and also in the INSPIRE rules for data and services sharing.

The results of the “eSDI-net+” project are the starting point for further awareness creation as one important step forward, not only in the community of specialists of GIS or cartography, but also amongst user of geospatial data. Creation of awareness will generate more demand for geospatial data that in turn will prompt the availability of more data via SDIs. This can be seen in relation to the proliferation of easy to use web applications such as Google Earth, Google maps, Microsoft Bing maps and others that become also available on mobile phones and bring geospatial data to the laymen users.

Next steps aim at the promotion of the good practices in order to improve the overall knowledge about SDIs and to encourage local collaboration and setting up innovative solutions. The lessons learnt along with the examples of successful SDI developments are published on the project website and presented in national and regional workshops to build up further awareness about needs and opportunities for the development of Spatial Data Infrastructures in the future on the regional, national and European level. The links with INSPIRE and other relevant initiatives will support this process of promotion.

Beyond only promoting the experience and the results of the project, the partners envisage to establish a formal network, likely in strong connection with EUROGI, the European Umbrella Organization for Geographic Information. This can be of interest not only for SDI developers and users of sub-national, national or regional SDIs in Europe, but also for the dialogue in other regions of the world, working on similar developments, to strengthen the international dimension. In the region of South-East Europe, the partner in this network is the “Association for Geospatial Information in South-East Europe”, AGISEE. Their role is to promote the use of geospatial data and the creation of SDIs in the region, in using the results obtained by the “eSDI-net+” project. AGISEE is pushing forward awareness of SDIs and their establishment.

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