INTERACTION IN GEOSCIENCES EDUCATION AND SPATIAL DATA INFRASTRUCTURE DEVELOPMENT – EXAMPLE WESTERN BALKANS – ISSUES, IMPACT AND PROJECTS

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ABSTRACT

Rapid development of GIS application in the last decade highlights two problems in the efficient usage of GIS technologies, entailing the usage of spatial data in general. The first problem was the lack of the concept in organizing the spatial data and the other problem lies in the fact that the subjects and the users didn't and still do not have enough knowledge about GIS and how to organize spatial data. Development of Spatial Data Infrastructure (SDI) concept can be understood as a response of society on the first problem, the growing demand for spatial information, respectively growing relevancy of spatial information for everyday's functioning of states, business and citizens. In Europe frame for development of national and European SDI's is given by European Union INSPIRE Directive, regardless to fact is some country member of European Union or not. This is also valid for seven countries in the region of Western Balkans, which have joined their efforts to solve the issues and develop their national SDI's in line with INSPIRE through the execution of number of national and today regional INSPIRATION project. Mentioned activities and projects are also dealing with second problem, the lacking knowledge about GIS, SDI, other modern technologies and managerial skills necessary for NSDI development. But, in the field of education there is no clear guidance, like INSPIRE directive regarding legislative and technical issues, so therefore the differences in approaches are bigger and issues requesting responses and solutions even more visible and critical.

Past decade in development of modern government administrations supported with GIS based and SDI organized public spatial information in the region has shown that many issues are relevant for it. Those issues, structured in legislative, technical and educational segment, should be well balanced and interconnected to achieve synergy between them. In the segment of (geosciences) education there are several critical areas which require attention. Promoters of SDI development lack on information about stakeholders and users level of technical and educational preparation and their perception of SDI, stakeholders and users need support and additional education to become able to participate in SDI development, educational institutions need to participate in SDI development to be able to define curricula's and courses for all SDI involved groups, etc. Dealing with mentioned issues, this paper presents the current situation in the education referring to GIS and IPP, and describes the activities carried

out for the purpose of creating the environment that would provide quicker and more efficient implementation of NSDI based on better information given to the subjects and users in the region of Western Balkans with emphasis on Croatia.

Keywords: education, SDI, Western Balkan

INTRODUCTION

Formal establishment of national SDI in seven countries geographical located in South-East Europe and politically described by European Union as Western Balkans, started at the same time as in most of the European Union countries. Due to readiness of digital data, institutions, knowledge and financial resources, development and implementation of SDI was not so fast. Of course, the fact that they were not obliged by INSPIRE Directive deadlines was also relevant. But, nevertheless, need and interest for SDI establishment was present resulting today in fact that six out of eight responsible parliaments (Bosnia and Herzegovina has two entities and two parliaments responsible for SDI legislation), have adopted either full independent SDI legislation (Albania and Croatia) or have formalized it in another, usually cadastre, legislation as a chapter in it (Macedonia, Montenegro, Serbia and Republic Srpska in Bosnia and Herzegovina).

In accordance with adopted legislation, countries in the region have established formal organizational structures manly in a form of key stakeholders Councils (assembled of governmental institutions and professional association's representatives), with or without subordinated operational body and usually named NSDI Boards and several working groups. In the same time as the NSDI structures have been put in place the national mapping and cadastre authorities (NMCA's) as main promoters of NSDI have established basic NSDI services, geoportals and metadata services [1]. So today, either NMCA's or national geoportal is functional in all countries of the region and most of them released some kind of metadata service.

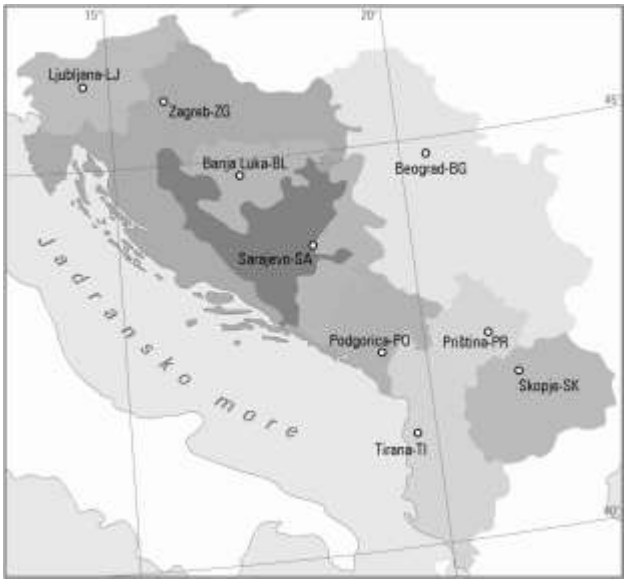

Figure 1: Western Balkans Region & Regional cooperation on cadastre and SDI countries – areas of institutional responsibility [1]

Mentioned legislative, organizational and technical activities were for NMCA's in the region, as in any country, demanding task, having in mind that they were at the same time tasked with comprehensive reform and modernization of land administration system. Therefore, international support was used starting with execution of numerous bilateral technical aid projects with donor countries and followed by various European Union funds and programs (CARDS, Phare, IPA,…) and the World Bank loans. Very soon has been recognized that practical knowledge in implementation of NSDI activities in specific regional environment is missing resulting in cross border regional cooperation. This cooperation has been launched by State Geodetic Administration (SGA) of Croatia in 2008, when first regional conference on cadastre has been organized in Opatija, Croatia. Recognizing the importance of SDI in 2010 conference changed name in to regional conference on cadastre and SDI and formal bodies (Management Board and Technical Committee) have been established. Today, eight countries are participating in this regional cooperation, see figure 1.

INTRODUCING SDI TO SOCIETIES

Parallel to above mentioned legislative, organizational and technical activities, raising awareness and knowledge about SDI and all aspects important for its establishment was and still is demanding complex task without clear guidance and easy measurable results. At the very beginning of NSDI establishment, introducing SDI concept as such was the main task since it was completely unknown, for waste majority of stakeholders and GI and geomatics professionals. Therefore, raising public awareness had higher importance than education itself and because of that appropriate forms of activities have been undertaken by NMCA's in the region. On the example of Croatia, starting first in the region with such activities this meant conducting number of activities:

- courses for SGA executives and staff provided by sister organizations from donor countries (Statens kartverk from Norway and Lantmäeriet from Sweden for example),
- international workshops for GI staff from SGA, other governmental institutions, academia and GI and surveying professionals introducing NSDI models from other countries (Canada, Germany, Sweden and Norway),
- launching in 2010 annual Croatian NSDI conference called "NSDI & INSPIRE day" bringing together over 200 participants annually, see figure 2,
- releasing brochures and leaflets about NSDI and launching official NSDI web page www.nipp.hr, see figure 3.

Similar activities have been conducted by all NMCA's in the region. Those efforts resulted in better understanding of SDI among the stakeholders and professionals, meaning that this knowledge was distributed to rather limited circle of people. For general users, which do not have to know much about SDI, much bigger relevancy have established browsers and geoportals and especially performance of those services. Number of data sets available, accessibility, speed, pricing policy, friendliness and good visualization are key criteria for their usage and indirectly spreading information about national SDI system.

Figure 2: 1. NSDI and INSPIRE Day poster

Figure 3: Croatian official NSDI web-page cover page

SDI EDUCATION

All activities mentioned in the previous chapter, beside their introductory character serve to inform society about SDI and promote activities on its establishment. Systematic and formal education on SDI requires other forms of education. To define content, volume and forms of education necessary to certain professions and grades it was necessary to investigate several aspects about SDI and related topics:

- stakeholders vision and expectation of speed, intensity and extension of SDI implementation,
- employers understanding of SDI and business expectations,
- current academia curricula for several professions involved in SDI as active (builder) or passive (user) participants,
- current high school curricula for several technical profiles and
- to find out present level of knowledge and expectation on SDI of those different groups of stakeholders.

Numbers of activities related to SDI education have been conducted at the Faculty of geodesy at the University of Zagreb and through the work of official SDI Capacity building workgroup. Those activities were also versatile, including analysis of curricula for high school geodetic technician profile and Bachelor and Master in surveying and geoinformation at the Faculty of geodesy [3], or conducting survey by mean of filling the questionnaire among high school students and teachers as well as university students and governmental institutions – stakeholders of SDI.

The results from survey were very valuable and were analyzed and interpreted from various angles. They show, speaking about SDI education that we have to consider broader picture on spatial information education and perception of students and teachers and first then can focus ourselves on specific SDI issues, see figure 4 and 5.

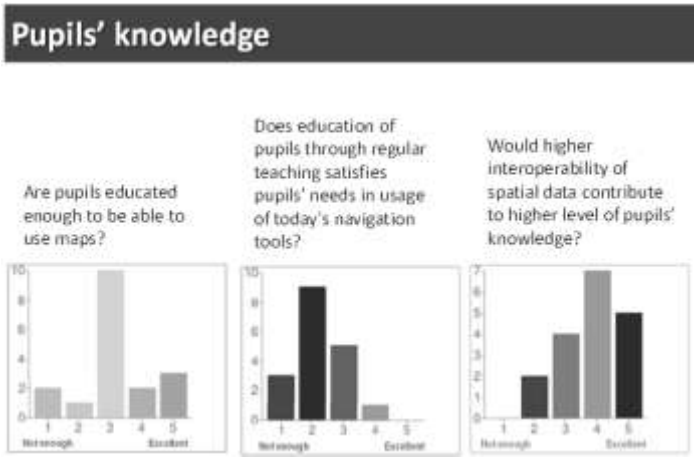

Figure 4: Example of Geodetic technician High school student's survey replies [4]

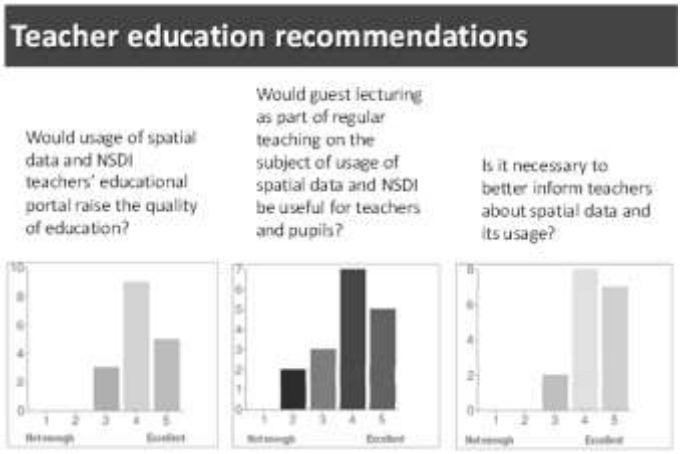

Figure 5: Example of Geodetic technician High school teacher's survey replies [4]

Findings from conducted analysis and survey's have been systematized in clear statements [6]:

- there is need for formal education on SDI,
- there is need for streamlined and standardized education on GIS,
- GIS & SDI education should include practical education and involvement in real projects,
- formal education itself is not enough, especially for present stakeholders and professionals (who might or might not be aware of their role) and

- GIS & SDI are interdisciplinary and approach to education should also be interdisciplinary,
- GIS & SDI education is long-lasting activity and therefore has to be defined and guided by clearly defined SDI strategies.

But at the same time findings raised a number of questions [6]:

- do we have sufficient number of specialists to teach teachers and students,
- do we have structures capable to educate all levels of stakeholders and in all levels of knowledge and
- how and who should carry communication with stakeholders and users to promote SDI and education?

As stated in findings, since formal education itself is not enough, forms of informal education, also known as a long-life learning implementation forms, have been analyzed, especially because of the fact that this form of education is applicable to present active professionals developing and implementing SDI today. As presented in [6] such informal education today is:

- recognized and accepted as a form of education,
- voluntary long-life learning activity,
- motivated by personal or professional reasons,
- today found as necessary for life and work in modern society and
- complementary to expansion of higher education (widening participation).

Additionally, since Croatia has implemented licensing system for technical professions (Chambers), which has institutionalized need for long-life learning and established model for it, there is structure already in place which can be used also for education on SDI.

Regarding Croatia, certain proposals about inclusion of SDI education in high school and university curricula have been made, for example in [2] and [5] but there are further steps and investigations to be made to become able to define SDI in mentioned curricula. While this work is progressing, focus has been made on long-life learning, especially using mentioned structure established for licensed technical professions. For example in annual permanent education plan of Croatian chamber of licensed surveyors several courses on SDI and related topics have been proposed.

Listed activities on SDI education in Croatia have recently been incorporated in regional activity conducted in frame of European Union financed project “INSPIRATION – the SDI solution for Western Balkans”, and disseminated to other countries (NMCA’s) in the region, as well as the other countries have shared their experience. This exchange of knowledge and experience as well as good practices should accelerate implementation of SDI in the region and especially communication, promotion and education about SDI. In perspective to present project there are expectations for its continuation and regional incentives like centre of excellence are considered.

CONCLUSION

Development and implementation of NSDI is complex and demanding task and education about SDI and related topics has same importance as adoption of proper legislation, establishment of good organization and building proper technical environment. Therefore special attention has to be made to education of SDI but always as a part of broader picture of education about spatial information, GIS and related topics. Following development in modern education, beside formal education, variety of educational forms are implementable in case of SDI. At the same time, at present, education is still highly correlated with communication and promotion of SDI and all those activities have high relevancy in raising awareness of GI & SDI.

Therefore it is clear that not only development and implementation of SDI is a long-lasting and complex activity, but also education, communication and promotion of SDI and therefore comprehensive strategy and implementation plan are needed to ensure success of those activities!

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