

**OVERVIEW OF THE STATUS OF THE GEOSPATIAL INFORMATICS
ACTIVITIES IN THE FORMER YUGOSLAV REPUBLIC OF
MACEDONIA**

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1. INTRODUCTION

The Agency for Real Estate Cadastre (AREC) is an independent governmental agency established for performance of works for establishment and maintenance of the real estate cadastre, management of the geodetic-cadastre information system, as well as the establishment, maintenance and public access to the National Spatial Data Infrastructure – NSDI (Law on REC 2008). Considering the significance, the value and the importance of the geospatial information which lay in the basis of the decision making in the field of politics, spatial planning, research, implementation and analysis of various projects on national and local level, there is an increasing need of coordinating the activities related to the NSDI. The Agency for REC, with financial supporting from the Netherlands Government during 2011 and 2012 and in cooperation with multiple state institutions has successfully worked on the project for development of NSDI Strategy in The former Yugoslav Republic of Macedonia. The project was completed in March 2012 by holding a NSDI Forum where the strategy was presented. Additionally, a workshop was organized on the subject of “INSPIRE network services”. Considering the fact that the geospatial information activities have a significant role in the Strategy, subject of this report will be the NSDI Strategy and the results from the research conducted within the Strategy.

2. NSDI STRATEGY

The final draft version of the Strategy is a summary of the 37 produced documents, organized in seven units (picture 1) and represents a significant act/guidepost on the basis of which the NSDI in The former Yugoslav Republic of Macedonia will be built. The Strategy has analyzed the costs and the benefits of the NSDI and has identified the main areas where the infrastructure would have to be implemented as well as the manner of management of the infrastructure.

There is no doubt that the NSDI is based on technology which means a standardized approach in management of spatial data which will enable discovery of the data, followed by a simple transfer across the internet via the web-services. Such approach should be coordinated on a national level and it is equally important to be connected with the government strategies for interoperability and E-government, as well as to be integrated in the legal framework.

The complete documentation from the NSDI Strategy of The former Yugoslav Republic of Macedonia, in Macedonian and English language, is available at the following web-page of the Agency for REC: <http://www.katastar.gov.mk/en/Def.aspx?Id=432&m=1555>



Picture 1

3. VISION, MISSION AND OBJECTIVES OF THE MACEDONIAN NSDI

The basic idea in the strategic document is presented via the vision which clearly shows the direction in which we are heading: „*The Macedonian NSDI will facilitate the access, sharing, use and distribution of standardised spatial data/services in an efficient, effective and harmonised way in order to fulfil the needs of the private/public sectors as well as citizens, contributing to economic growth and sustainable development in the country*“.

The need for NSDI is presented within the mission, which indicates that there is a need “*To establish a technological, institutional, legal and administrative framework for inter-organisational collaboration that will*”:

- support the E-Government,
- integrate geoinformation from different sources into one network,
- avoid repeating the proces of collecting spatial data,
- be in compliance with INSPIRE,
- establish effective business processes,
- meet the needs of the participants,
- promote the approach, sharing, use and distribution of the spatial data.

The objectives of the Macedonian SDI are to:

- ✓ Enable collecting, safe-keeping and maintaining the fundamental sets of spatial data as well as establishment of directions to increase their value;
- ✓ Facilitate the access, the sharing, the distribution and the use of the standardized spatial data, with the objective to service the public and private participants/users on all levels;
- ✓ Raise the awareness for the understanding of the vision, the concepts and the benefits of the Macedonian NSDI;
- ✓ Guarantee that the spatial data and services are compatible with the adopted standards and specifications ;
- ✓ Establishing a metadata catalogue;
- ✓ Establishment of management structure required to optimize the benefits from the spatial data and services;
- ✓ Quality control of the spatial data and services in compliance with the approved standard and specifications ;
- ✓ Decrease the expenditures for collecting data;
- ✓ Support the national economic development and encourage the sustainability of the environment.

4. BUSINESS CONCEPT

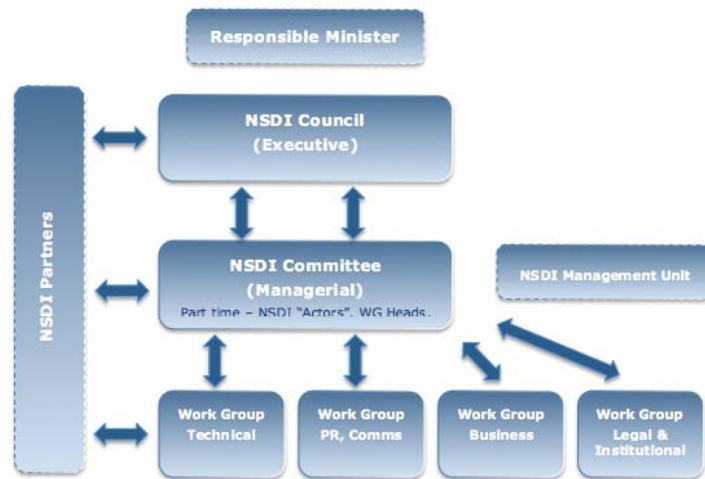
The business conditions according to which the NSDI will be established refer to the changes of the working activities and practices which have the objective to assist the achieving of the set NSDI goals. In that context, the attention was aimed towards a wide range of participants, politicians, government officers and representatives from the private sector. Thru discussions and feedback generated from the questionnaire, we came to the conclusion that the business-demands indicate a need for existence of:

- An NSDI, thru which interoperability data that mutually fit-in will be used via web-pages from different sources and via the general IT architecture and standards;
- An NSDI which includes the INSPIRE, developed in compliance with the principles of INSPIRE and the EU legislative;
- an NSDI which eases the access and maximizes the use of spatial data, facilitated as much as possible thru technology, standards, requirements and conditions of the used business model;
- Management structure which can efficiently run the NSDI, with adequate legal responsibilities;
- Attention to capacity building, with the objective to have enough trained staff in order to maximize the benefits executed via the new technologies as well as to have a sustainable development.

5. INSTITUTIONAL FRAMEWORK

The institutional framework encompasses the elements which refer to the management and organizational aspects. The Management model defines the management and institutional framework of the NSDI in The former Yugoslav Republic of Macedonia and it is planned for the same to be elaborated in details in the Law on NSDI.

The main components of the management structure are shown in the following diagram:



The plan is to establish a management hierarchy on four levels:

I. The Responsible Minister will have the role of a supporter of the work of the NSDI Council and is to provide two-way communication between the NSDI Council and the Government.

II. NSDI Council will be appointed by the Government and will have an executive role in the management frame. The council will be comprised of 19 members from different institutions and the Council is to provide leadership and strategic directions for the establishment of the NSDI, as well as execution of the activities related to the INSPIRE EU directive. The Council is to be comprised of representatives from the following relevant stakeholders:

1. Agency for Real Estate Cadastre
2. Agency for Spatial Planning
3. Central Registry
4. Centre for Crisis Management
5. City of Skopje
6. Ministry of Agriculture, Forestry and Water Supply
7. Ministry of Culture
8. Ministry of Defence
9. Ministry of Economic Development
10. Ministry of Environment and Physical Planning
11. Ministry of Information Society and administration
12. Ministry of Interior

13. Ministry of Self Government
14. Ministry of Transport and Communications
15. State Statistical Office
16. Representative from the academic sector
17. Representative body for Public Utilities (such as: electricity company, water supply company)
18. Representative from the private sector (e.g. software vendors, data/service providers, and value adding companies)
19. Association of Local Self Government Units

III. NSDI COMMITTEE

The NSDI Committee is to carry out the policy for establishment of the NSDI identified by the Council and to carry out the activities and tasks delegated by the NSDI Council, to coordinate and monitor the work of the Working Groups, to report to the NSDI Council and its entities of the progress made. The Committee is comprised of: the chairpersons of the four working groups, the AREC representatives and two representatives from the Council. The members of the committee are appointed by the Council.

IV. WORKING GROUPS

The working groups are to contribute towards researching and drafting proposals, as well as offer expertise and recommendations to the NSDI Committee and Council. The plan is to establish four working groups for:

- Institutional and legal issues;
- Technological issues;
- Public relations, communications and capacity building; and
- Business model.

The Working Group for institutional and legal issues will work on developing the legal basis for NSDI, the rules for cooperation and signing contracts for share/use of data. The Group will be responsible for providing advices for coordination, preparing mechanisms and licenses for sharing spatial data as well as proposing solutions related to institutional and legal issues.

The Working Group for technological issues will concentrate on the standards, the metadata, services, information technology, network architecture and application as well as on data interoperability according to the INSPIRE rules, the interoperability of the information technology, network technology, hardware and software .

The Working Group for public relations, communications and capacity building will focus on the NSDI public awareness campaigns, stakeholder's communication, raising awareness, as well as planning trainings in the field of NSDI. Also, the group is to be responsible for newsletters, the web-page, national and international workshops and promotional materials.

The Working Group for the business model will concentrate on developing the business model for sustainable networks and business networks, the fee model and control of the quality .

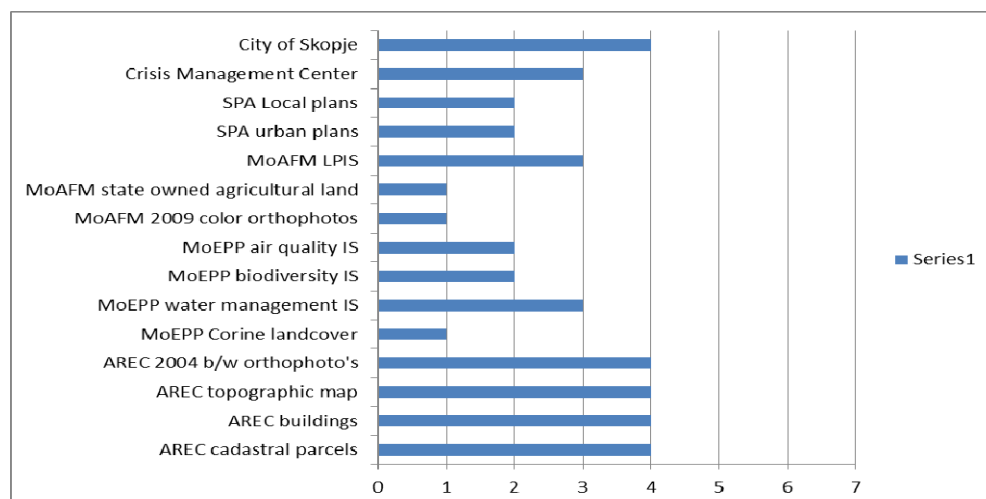
V. The NSDI Management Unit is to be established with the objective to enable successful implementation of the NSDI. The Unit will be comprised of professional individuals responsible to carry out daily activities which are necessary for the establishment and maintenance of the NSDI and will play the role of a Secretariat.

6. INTEROPERABILITY INFRASTRUCTURE

Within the NSDI Strategy, AREC and the stakeholders reviewed the current status of the main providers of data i.e. their capacity for ICT and the progress of the institutions regarding the availability of spatial data. Nine institutions have submitted information within the Study, thus contributing towards creating a clear picture of the current capacities. The Study followed the stages thru which one organization needs to go thru in order to become more sophisticated during the use and the distribution of spatial. The progress of the institutions may be monitored with the assistance of the following seven general phases:

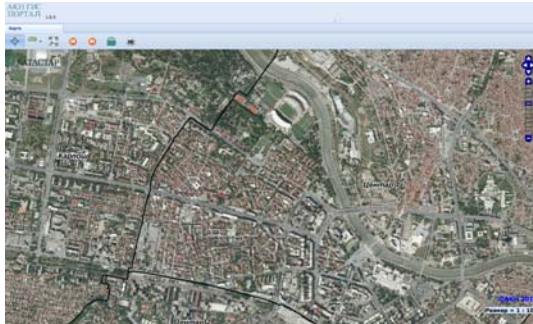
1. The spatial data are created and safe kept on the local computer;
2. Spatial data can be access only GIS users within the institution which produces the data;
3. Spatial data are kept in the central database within the institution;
4. Spatial data are available via the internet on the web-page;
5. The institution creates metadata for the dataset and for the services via the set is published;
6. There is a service for data discovery, which makes it easier to find the data; and
7. The data and the services are synchronized with the INSPIRE EU Directive.

In reference to the above stated, the status of the data has been identified for fifteen types of data from six institutions (The city of Skopje, the Agency for Spatial Planning, Ministry of Agriculture, Ministry of environment and spatial planning and the Agency for REC). The results are graphically illustrated in the following diagram:

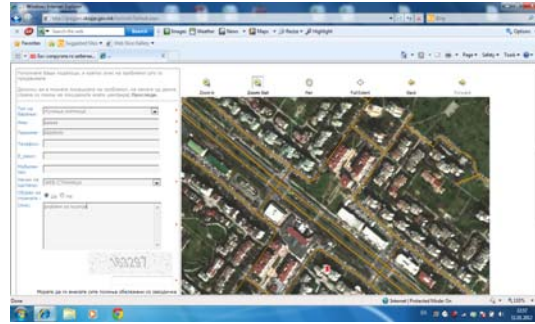


Stages of use and distribution of data

The Study shows that some institutions i.e. organizations are in a much advanced stage while some other are still falling back. Also, it is quite clear that the metadata need more attention. In general, the conclusion is that the analyzed six institutions are well equipped and organized when it comes to the general IT infrastructure within the institution. However, when it comes to the functioning of the NSDI, the infrastructure needs to be based on web-services and in that sense most of the data producers have a long way ahead. There are significant differences between the institutions, and yet none of them have an SDI which is in compliance with the INSPIRE specifications. Still, it is encouraging that there are institutions which already have functional web-pages, enabling access to spatial data and even other services.



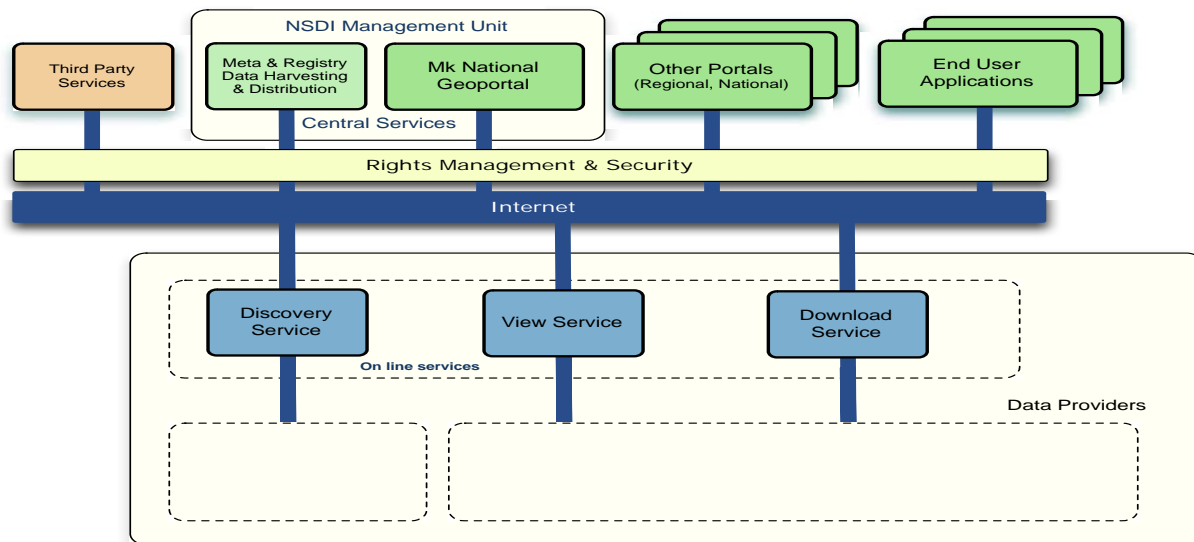
AREC Geo-Portal



City of Skopje: Citizen's Initiative – „Report a Problem“

7. INFORMATION-COMMUNICATION INFRASTRUCTURE

The implementation of the NSDI depends on the technology and mainly encompasses the general ICT infrastructure necessary for efficient functioning of the NSDI, as well as the standards which are required for the system for efficiently operate. For this purpose, it is needed to establish a system based on web-based services, according to the INSPIRE architecture for network services on the generally designed model, shown in the following diagram:



Architecture of the Macedonian NSDI

After the creation and the acceptance of the final design of the model and the standards, all providers of spatial data will need to apply the same, while the data and the services will have to be provided with the application of the adopted standards. The general principles of the design and the application of the ICT architecture for the Macedonian NSDI are:

- to provide applications and services which are required in order to meet the criteria according to the INSPIRE directive and its operational model,
- The spatial data providers will be obliged to introduce the following services for their data:
 - Discovery services,
 - Browsing services,
 - Downloading services,
 - Loading services, and
 - Transformation services.
- The NSDI Management Unit will provide a central set of services which are to support the spatial data providers in their distribution.
- The NSDI Council under consultations with the relevant stakeholders needs to reach an agreement on which data providers need to provide spatial services. The providers will be supported by the NSDI Management Unit.
- The central services provided by the NSDI Management Unit mean hosting of spatial information from a technical point of view.

The Metadata Central Registry for all spatial data will be executed via the national geo-portal. The bigger institutions will be able to establish their own registry from which they can pull out information in service of the central registry.

8. STANDARDS

The Macedonian NSDI shall be carried out with the application of open standards and protocols, which will make the NSDI independent of any special technology for support. The NSDI will be based on inter-connected sets of technical standards:

- ISO/OGS spatial data standards
- EU Directive INSPIRE and implementation rules which define the web-services architecture.

The Macedonian ICT architecture for NSDI will adopt the INSPIRE rules which refer to:

- Metadata discovery;
- Data specifications and additional guidelines for data specifications ;
- Data sharing (rights for access and use); and
- Network services.

9. NATIONAL GEO-PORTAL

The National geo-Portal of The former Yugoslav Republic of Macedonia will have a general purpose and will be used for searching, browsing and downloading of datasets. The Portal is to operate as a joint platform where the data providers will be able to publish the metadata for their datasets. The institutions can establish and maintain their own geo-portals, but the national geo-portal is to have the possibility to collect all metadata records, with the objective to operate as central registry. User group, within the first stage of the national geo-portal would be:

- Ministries;
- Agencies;
- Central Registry; and
- The Municipalities.

Although not possible at the beginning, the design and the establishment of the NSDI should aim towards gradual integration of the approach of inter-connected data.

10. RAISING AWARENESS AND CAPACITY BUILDING

One of the equally important elements in the overall NSDI environment is the promotion of the NSDI to the wider society and passing down the NSDI message. In this direction, the work is to be streamed towards drafting a plan whose objectives are to include:

- Finding and promoting initiatives which are compatible with the NSDI;
- Finding and identifying the best practices successful to the NSDI development;
- Transferring the importance of the spatial data to the wider society as well as educating all parties which are to gain benefits from the NSDI;
- Promoting the advancement of the NSDI in The former Yugoslav Republic of Macedonia in other countries.

11. CONCLUSION

In March 2012, the Agency for REC and the City of Skopje organized the first NSDI Forum where the NSDI Strategy was promoted. The Forum was attended by 72 participants from several ministries, state institutions, the academic sector and the private sector. The participants unanimously adopted the NSDI Declaration of The former Yugoslav Republic of Macedonia.



The following step is closely connected with the adoption of the NSDI Strategy by the Government of The former Yugoslav Republic of Macedonia which at the same time would mean a broader support to the future development and implementation of the NSDI Strategy.

The main pre-condition for implementation of the stated in the Report are the financial resources needed to carry out the digitalization and standardization of the geospatial data as well as creating web-services. In line with the before mentioned, when it comes to NSDI, it is clear that the NSDI represents an overall area in which the need of including experts should be emphasized. The experts will have an important role and contribution in the success and in the enactment of the expert opinions and viewpoints which are to reflect on all stakeholders in the NSDI. With the intention to sustain the continuity in the area of spatial data infrastructure, the plan is to establish an inter-ministerial working group for the purpose of drafting a Law on NSDI, to be participated by representatives from several key institutions. The Law is to be synchronized with the European Directive INSPIRE (DIRECTIVE 2007/2/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, of 14 March 2007, establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)).