



Spatial Data Infrastructures in FYROM: State of play 2011



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This document does neither represent the position of the Member States and countries under study.

Executive summary

This report presents the status of the NSDI and INSPIRE in the Former Yugoslav Republic of Macedonia for 2011.

The Former Yugoslav Republic of Macedonia does not have a developed NSDI yet. The government of the Former Yugoslav Republic of Macedonia has indicated its commitment to the creation of a NSDI with the passing of the Law on Real Estate Cadastre in March 2008 which includes provision for the establishment and maintenance of an NSDI. One of the key points of attention is the development of a strategy for implementing NSDI in the Former Yugoslav Republic of Macedonia. This strategy includes governance, funding, legal, technological NSDI-issues as well as a roadmap. The strategy and its implementation are funded with a donation from The Netherlands and a loan from the World Bank. Although there is not yet a specific coordination body for the INSPIRE implementation in place, it seems that Agency for Real Estate Cadastre will be strongly involved in the coordination. A strategic plan of the AREC 2009 – 2013 is available. The existing spatial data that might be included in the NSDI do not encompass with all the data themes in the Annexes to the INSPIRE directive. Examples of these datasets are geographical names, administrative units, cadastral parcels, protected sites, elevation, land cover, orthophotos, and geology. Finally, no national geoportal or metadata catalogues are available online.

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Abbreviations and acronyms

AREC	Agency for Real Estate Cadastre
ASP	Agency for Spatial Planning
CT	Core Thematic Data
FIR	Further Investigation Required
FYR	Former Yugoslav Republic
GI	Geographical Information
GINIE	Geographic Information Network in Europe
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
ISCGM	International Steering Committee for Global Mapping
JICA	Japanese International Development Agency
MAFWM	Ministry of Agriculture, Forestry and Water supply
MAKPOS	Macedonian Positioning System
MOEPP	Ministry of Environmental and Physical Planning
NIA	No Information Available
NMA	National Mapping Agency
NSDI	National Spatial Data Infrastructures
OPIS	Operational Program – Information Society
PPP	Public-Private Partnerships
PSI	Policy and legislation on access to public sector information
REC	Real Estate Cadastre
REF	Reference data
SAGW	State Authority for Geodetic Works
SDI	Spatial Data Infrastructures
WFD	Water Framework Directive
ZELS	Local Self Government Units

1. GENERAL INFORMATION

1.1 Method

This report summarises the review of the Former Yugoslav Republic of Macedonian SDI in 2011, and reflects the degree to which the SDI situation in this country is similar to the ideas set out in the INSPIRE position papers and in the more recent INSPIRE-implementation papers.

In comparison with the previous country report, this report has been updated to the situation of Spring 2011. In order to achieve this, expert knowledge (of Dimo Todorovski and Sonja Dimova), literature and websites are used to describe the current situation of SDI-development and INSPIRE-implementation in the Former Yugoslav Republic of Macedonia.

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

1.2 *The NSDI-Scene in the Former Yugoslav Republic of Macedonia*

1.2.1 National Spatial Data Infrastructure of the Former Yugoslav Republic of Macedonia

The Former Yugoslav Republic of Macedonia is currently working on a strategy plan for implementing its NSDI. This strategy plan will be achieved by a donation of the Dutch government, meanwhile the implementation will be financed with a loan of the World Bank. The strategy plan includes the vision, objectives, business, governance, funding, legislation, technical infrastructure, and the road map of the NSDI-implementation. The strategy plan has full political support and will be ready February 2012.

The Former Yugoslav Republic of Macedonia's NSDI vision statement is: "The 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 mission statement within the strategy for National Spatial Data Infrastructure of the Former Yugoslav Republic of Macedonia is: "To establish the technological, institutional, legal and administrative framework for inter-organisational collaboration aiming to: support e-Government; to integrate geo-information from different sources in

one network; to avoid duplication of spatial data acquisition; to be in line with INSPIRE; to establish effective business processes; to meet the needs of the stakeholders; and to promote the access, sharing, use and distribution of spatial data”.

The (detailed) objectives of the National Spatial Data Infrastructure of the Former Yugoslav Republic of Macedonia is to ensure the capture, preservation and maintenance of fundamental spatial datasets and to set guidelines in order to increase their value; to facilitate the access, exchange, sharing and use of standardised spatial data to serve the public and private stakeholders/users at all levels; to increase the awareness and understanding of the vision, concepts and benefits of NSDI; to ensure that spatial data and services are compatible with the adopted standards and specifications; to establish metadata catalogue; to establish the governance structure required to optimise the benefits from spatial data and services; to control the quality of spatial data and services according to the approved standards and specifications; to reduce costs for data acquisition; to support the national economic development; and to foster the environmental sustainability.

According to the Law for real estate cadastre the Agency for Real Estate Cadastre (AREC) is appointed as the responsible authority for development of NSDI in the Former Yugoslav Republic of Macedonia. One of the eminent goals is the appointment of a task force, which will support the NSDI-strategy development of NSDI elaborate all required actions. This task force consists of the following NSDI-stakeholders: Agency for Real Estate Cadastre; Agency for Spatial Planning; Authority for Legal and Property Affairs; Central Registry; Centre for Crisis Management; Centre for Regional Development; Chamber of the Authorised Surveyors; City of Skopje; Ministry of Agriculture, Forestry and Water Supply; Ministry of Culture; Ministry of Defence; Ministry of Economic Development; Ministry of Environment and Physical Planning; Ministry of Finance; Ministry of Interior; Ministry of Justice; Ministry of Self –Government; Association of Local Self Government Units (ZELS); Ministry of Transport and Communications; State Statistical Office; and State University Skopje – Faculty of Civil Engineering.

1.2.2 Other SDI initiatives

The Ministry of Information Society is currently leading an interoperability project linking five public entities: AREC, Customs service, Ministry of Interior Affairs, Tax Office, and Central Registry. This interoperability project started in 2009 and follows the guidelines of the pan-European Interoperability Framework version 2.0, but does not include any spatial component.

In terms of the Government’s approach to IT, the main policy targets for Information Technology development and e-Government were to be found in the IT and the e-Society Government Programme (2006-2010). The national government’s e-Government Project team implemented a public awareness campaign to inform potential users of the functionalities of an e-Tax system. These achievements demonstrated that e-Government software applications can be successfully implemented in low internet penetration environments (such as the Former Yugoslav Republic of Macedonia), and the benefits

augur well for an eventual public access e-Cadastre system, although with the current financial environment this appears quite a long way away. Recently, the Ministry of Information Society published the National Strategy for e-Government (2010-2012). In addition to this strategy, the Ministry of Transport and Communication just published the National Strategy for the Development of e-Communication and Information Technology.

For AREC its recent ICT strategy has been documented in the 2007 and then revised in the 2008 ICT strategic document. ICT underpins most of AREC's work whether it is in terms of assisting production or in terms of data distribution. In the immediate future it is the focus of the roll out of the e-Kat system internally and for the Insight system for users. For the development of the NSDI it is essential that the AREC staff liaise closely with the Ministry of Information Society staff responsible for e-Government activities in order to ensure that these two key initiatives are developed together.

2 Details of NSDI of the Former Yugoslav Republic of Macedonia

2.1 Introduction

This chapter presents the status of the different components regarding the NSDI of the Former Yugoslav Republic (FYR) of Macedonia in more detail. The components be presented are: 1) Coordination and organisational issues (Section 2.2); 2) Legal framework and funding (Section 2.3); 3) Data for themes of the INSPIRE annexes (Section 2.4); 4) Metadata (Section 2.5); 5) Network services (Section 2.6); 6) Environmental themes and activities (Section 2.7); and 7) Standards (Section 2.8). Finally, the use and efficiency of the NSDI is briefly presented (Section 2.9).

2.2 Component 1: Coordination and organizational issues

The government of FYR Macedonia has indicated its commitment to the creation of a NSDI with the passing of the Law on Real Estate Cadastre in March 2008 which includes provision for the establishment and maintenance of an NSDI.

The INSPIRE directive implementation is seen as a future activity. FYR Macedonia is currently establishing the NSDI strategy that will provide the development directions, as well as the directions for changing the legal regulations. The strategy and its implementation are financed with a donation of the Dutch government and a loan from the World Bank. Although there is not yet a specific coordination body for the INSPIRE implementation the Law on Real Estate Cadastre (March 2008) mentions that AREC is responsible for the establishment and maintenance of the National Spatial Data Infrastructure (NSDI) in the FYR Macedonia. It seems that AREC will be most likely to take the lead.

AREC was established for the purposes of performing the works for establishment and maintenance of the real estate cadastre, the management of the geodetic-cadastre information system, as well as for establishment, maintenance and public access to the National Spatial Data Infrastructure. AREC acts in the capacity of a legal person with its rights, liabilities and responsibilities as stipulated by the Law on Real Estate Cadastre and it reports to the Government of the FYR Macedonia. It is managed by a Steering Board, comprised of five members, each representing the Ministry of Finance, Ministry for Transport and Communication, the Ministry of Environment and Spatial Planning and the Ministry for Agriculture, Forestry and Water Supply.

AREC's main responsibilities are the establishment and management of geodetic-cadastre information system, performance of basic geodetic works, real estate survey, registration of real estate rights, establishment and maintenance of real estate cadastre, geodetic works for special purposes of significance to the FYR Macedonia as defined by the national government, production of state topographic maps, administration of a spatial units register, establishment, maintenance and public access to the National Spatial Data Infrastructure, supervision over the work of the sole proprietors–authorized surveyors and trade companies for geodetic works.

The responsibilities and the duration of the INSPIRE implementation are intended for the member countries of the European Union, but as a candidate country, the FYR Macedonia has decided to follow the establishment of its NSDI according the planned time table of a candidate country. The NSDI is defined according the Directive 2007/2/EC from the European Parliament dated March 14th, 2007, which foresees an establishment of National Spatial Data Infrastructure within the European Union. The EU Directive has been enacted on May 15, 2007. With the Law on Real Estate Cadastre from 2008, AREC is responsible for coordination of the state and public institutions in the FYR Macedonia for establishment of the NSDI.

Some of the INSPIRE regulations, which precisely define the obligations, responsibilities and standards of the NSDI are still being drafted, i.e. the larger part of the regulations are still under discussions on a EU level, which will have an impact on precise planning of the coordination activities for establishment of the NSDI by AREC.

In order to have a strong strategy plan for the NSDI-implementation, a task force is formed with representatives of the following public entities: Agency for Real Estate Cadastre; Agency for Spatial Planning; Authority for Legal and Property Affairs; Central Registry; Centre for Crisis Management; Centre for Regional Development; Chamber of the Authorised Surveyors; City of Skopje; Ministry of Agriculture, Forestry and Water Supply; Ministry of Culture; Ministry of Defence; Ministry of Economic Development; Ministry of Environment and Physical Planning; Ministry of Finance; Ministry of Interior; Ministry of Justice; Ministry of Self –Government; Association of Local Self Government Units (ZELS); Ministry of Transport and Communications; State Statistical Office; and State University Skopje – Faculty of Civil Engineering. These entities can be considered as producers and/or users of spatial data. The main tasks of this task force are

to provide input about NSDI key issues, to provide feedback on (intermediate) results, and to validate the (intermediate) results.

2.2.1 Conclusions of Component 1

The NSDI and INSPIRE approach in the FYR Macedonia is truly national. However the FYR Macedonia does not have a developed NSDI yet. Within the law for real estate cadastre (2008) the Agency for Real Estate Cadastre (AREC) is appointed as the responsible authority for development of NSDI in the FYR Macedonia. AREC can be considered as the National Data Provider. A national GI-Association does still not exist in the FYR Macedonia. In order to have a strong strategy plan for the NSDI-implementation, a task force is formed consisting only of public sector actors that are producing and/or using spatial data. Based on these conclusions, we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national (Yes)
- One or more components of the SDI have reached a significant level of operationality (No)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (Yes)
- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users (No)
- An organisation of the type ‘national GI-association’ is involved in the coordination of the SDI (No)
- Producers and users of spatial data are participating in the SDI (Yes)
- Only public sector actors are participating in the SDI (Yes)

2.3 Component 2: Legal framework and funding

2.3.1 Legal framework

The 2008 Law for Real Estate Cadastre (Official Gazette of the FYR Macedonia #40/08) contains a number of provisions on the FYR Macedonian NSDI. The NSDI is defined as “a set of activities that enable quality collection, administration, sharing and use of geo-referenced spatial data” (article 2).

Under the Law, AREC is required to prepare a strategic plan of the NSDI for a period of 5 years and an annual programme for implementing the strategic plan. The plan has to be adopted by the government of the FYR Macedonia, and the annual programme has to be

endorsed. Both documents have to determine the type and the scope of the activities and the resources necessary for implementing these activities (article 4).

Other laws and regulations that are important for the FYR Macedonian NSDI include:

- Law on Survey and Land Cadastre (Official Gazette of the FYR Macedonia #34/72 and 13/78);
- Regulation for the establishment of the real estate cadastre (Official Gazette of the FYR Macedonia # 118/08) and amendments;
- Regulation for maintenance of the real estate cadastre (Official Gazette of the FYR Macedonia #118/08) and amendments;
- Regulation for survey, processing and editing of survey data (Official Gazette of the FYR Macedonia #118/08) and amendments;
- Regulation for the manner of use, distribution, access, issuance, safeguarding and protection of data from the geodetic cadastre information system and the manner of issuance of data from the real estate cadastre (Official Gazette of the FYR Macedonia #118/08)
- AREC-Regulation for the manner and procedure of exercising the right to a free access to public information (no. 01-3563/1, date 27.03.2007).

2.3.2 Public-private partnerships (PPPs)

No information was found.

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

Article 16 of the FYR Macedonian constitution guarantees the freedom of access to information and the freedom of reception and transmission of information. The Law on Free Access to Information of Public Character was adopted on 25 January 2006 and is applicable from September 2006. Under the law, any natural or legal person has the right to obtain information from public authorities by filing a request. The request can be oral, in writing or by electronic means (see <http://www.legislationline.org/topics/country/31/topic/3>). The Regulation for the manner and procedure of exercising the right to a free access to public information (no. 01-3563/1, date 27.03.2007) regulates the access to information from the cadastre (see <http://www.katastar.gov.mk/en/Page.aspx?Id=216&m=1490>).

2.3.4 Legal protection of GI by intellectual property rights

Article 47 of the Constitution guarantees the rights that stem from scientific, artistic or other intellectual works. The Law on Copyright and Related Rights dates from 1996 and has been amended to harmonise it with the European legislation on copyright and related rights, including the 1996 database directive (see <http://portal.unesco.org/culture/en/files/>

[37874/12221743541FYROM_english%5B1%5D.pdf/FYROM_english%5B1%5D.pdf](#)).

In 2009, preparations started for a new draft legislation on copyright (Ministry of Economy, Strategy for Intellectual Property of the FYR Macedonia 2009-2012).

The law protects individual and intellectual creations in the field of literature, science, arts and the domains of creation, regardless of the type, manner and form of expression. Explicit mention is made of photographic works and cartographic works, plans, sketches, technical drawings, projects, tables, plastic works and other works of identical or similar character in domain of geography, topography, architecture or other scientific, educational, technical or artistic nature (article 12).

Official texts from the legislative, executive or judicial sphere and their translations, when published as an official text, are not protected (article 16).

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

Article 18 of the Constitution of the FYR Macedonia guarantees the security and confidentiality of personal information and the protection of citizens from any violation of their personal integrity deriving from the registration of personal information through data processing.

The Law on the Protection of Personal Data was adopted in 1994 and amended in 2002 to implement some of the provisions of directive 95/46/EC on the processing of personal data. Based on recommendations from the European Community, a new law was adopted in January 2005 (Official Gazette of the FYR Macedonia # 07/05, see <http://www.ceecprivacy.org/main.php?s=2&k=macedonia>) and 2010 (124/2010).

2.3.6 Licensing framework

For obtaining data from AREC, an application form has to be filled out and submitted personally, via regular mail, fax or e-mail. Professional clients can register and obtain access to a separate part of the website.

2.3.7 Funding model for SDI and pricing policy

Funding

The strategy of the FYR Macedonian NSDI is financed with a donation of the Dutch government and its implementation will be financed with a loan of the World Bank.

Pricing policy

According to article 37 and article 38 of the Law for Real Estate Cadastre, data from the Cadastre shall be charged for, except when they are issued for the needs of the ministries. The level of charging depends on the actual expenses for their preparation, form and

scope. The Steering Board of AREC has to determine the charges, with prior endorsement of the Government. This has been done in the Tariff list on fees for use of data from the survey and the real estate cadastre (Official Gazette of the FYR Macedonia # 153 from 23.12.2009).

Fees for maps and data are also clearly indicated on the AREC's website. For instance, a fixed fee is charged for topographic maps, while other vector data the fees may be charged per office hour (<http://www.katastar.gov.mk/en/Page.aspx?Id=221&m=1493>).

2.3.8 Conclusions of Component 2

The AREC is charged with the development of the NSDI. The NSDI is defined as a set of activities that enable quality collection, administration, sharing and use of geo-referenced spatial data (article 2). Under the Law, AREC is required to prepare a strategic plan for a period of 5 years and an annual programme for implementing the strategic plan. The plan has to be adopted by the government of the FYR Macedonia, and the annual programme has to be endorsed. Article 16 of the FYR Macedonian constitution guarantees the freedom of access to information and the freedom of reception and transmission of information. The law protects individual and intellectual creations in the field of literature, science, arts and other domains of creation, regardless of the type, manner and form of expression. Explicit mention is made of photographic works and cartographic works, plans, sketches, technical drawings, projects, tables, plastic works and other works of identical or similar character in domain of geography, topography, architecture or other scientific, educational, technical or artistic nature (article 4). For obtaining a topographic map from AREC, an application form has to be filled out and submitted personally, via regular mail, fax or e-mail. The development of the FYR Macedonian NSDI is financed with a donation of the Dutch government and its implementation will be financed with a loan of the World Bank. Data from AREC shall be charged for, except when they are issued for the needs of the ministries. The level of charging depends on the actual expenses for their preparation, form and scope. Finally, fees for maps and data are clearly indicated on AREC's website.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or – development (Partially)
- There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects (No)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (Yes)
- GI can specifically be protected by copyright (Yes)

- Privacy laws are actively being taken into account by the holders of GI (Yes)
- There is a framework or policy for sharing GI between public institutions (In Preparation)
- There are simplified and standardised licences for personal use (In Preparation)
- The long-term financial security of the SDI-initiative is secured (Partially)
- There is a pricing framework for trading, using and/or commercialising GI (In Preparation)

2.4 Component 3: Data for themes of the INSPIRE annexes

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

Regarding the three INSPIRE annexes addressing the spatial data themes, the FYR Macedonia is providing the following digital data sets:

- Cadastral parcels at scales 1:500 to 1:5000. Supplier: AREC.
- Geographical names at scales 1:25,000 and 1:1,000,000. Supplier: AREC.
- Addresses. Suppliers: Central registry and City Skopje.
- Administrative units at scales 1:1000, 2500, 5000, 1,000,000. Supplier: AREC.
- Transport networks at scales 1:25,000 and 1:1,000,000. Supplier: AREC.
- Hydrography at scales 1:25,000 and 1:1,000,000. Supplier: AREC.
- Protected sites at scales 1:25,000. Suppliers: Ministry of Environment and Physical Planning and Ministry of Culture.
- Elevation with different resolutions. Suppliers are AREC, Ministry of Environment and Physical Planning, Ministry of Agriculture, Forestry and Water Management, and Agency for spatial planning.
- Land cover at scales 1:25,000 and 1:1,000,000. Suppliers: AREC, Ministry of Environment and Physical Planning.
- Ortho-imagery with different resolutions. Suppliers are AREC, Ministry of Environment and Physical Planning, and Ministry of Agriculture, Forestry and Water Management.
- Geology at scales 1:50,000, 1:200,000, 1:250,000. Suppliers: AREC, Agency for spatial planning, and Ministry of Economy.
- Statistical units at scales 1:1000, 1:2500 and statistical unit levels. Suppliers: AREC and State Statistics Office.
- Buildings at scales 1:500, 1:5000, 1:25,000 and 1:50,000. Supplier: AREC.

- Soil at scale 1:5000. Supplier: AREC.
- Land use at scale 1:25,000. Supplier: AREC.
- Utility and governmental services at scales: 1:1000, 1:2500, 1:25,000. Suppliers: EVN Macedonia, Water Supply Enterprise.
- Environmental monitoring facilities at scale 1:25,000. Supplier: Ministry of Environment and Physical Planning.
- Production and industrial facilities at scale 1:25,000. Supplier: AREC.
- Population distribution demography. Producer: State Statistics Office.
- Area management/Restrictions/Regulation zones/Reporting units at scales 1:50,000, 1:100,000. Supplier: Agency for Spatial Planning.
- Natural risk zones at scale 1:25,000. Supplier: Centre for Crisis Management.
- Meteorological Geographical features at 2x2 km resolution. Supplier: Hydro-meteorological Institute.
- Bio-geographical regions at scale 1:25,000. Supplier: Ministry of Environment and Physical Planning
- Habitats and biotopes at scale 1:25,000. Supplier: Ministry of Environment and Physical Planning
- Species distribution at scale 1:25,000. Supplier: Ministry of Environment and Physical Planning

2.4.2 Geodetic reference systems and projections

The Spatial reference system and projection information is the following

Name of Reference System	State co-ordinate System (Bessel)
Name of Ellipsoid	Bessel
Semi-major axis	6377397.155
InverseFlattening	299.1528128156
Name of Reference System in Hight	n/a (Geoid model for estimation of orthometric height was generated with comparison of existing trig point and photosignal points)
Projection System	Gauss-Kruger
Scale Factor at Origin	0.9999
Meridian of Origin	21°00'00" East of Greenwich
Latitude of Origin	Equator
False Easting	500.000.00m
False Northing	0.00m
Unit of Measurement	Meter <input type="checkbox"/> Two Places of decimals <input type="checkbox"/>
Transformation Method (WGS1984 -> Bessel)	Versa-wolf
Transformation Parameter	dx =-521.7476m, dy =-229.4892m, dz =-590.9207m rx =4.02878", ry =4.48836", rz =-15.52067" s =9.7803ppm
Dimension of co-ordinateSystem	3

2.4.3 Quality of data

Issues related to the degree of data quality that the suppliers are providing are covered within laws and sub-laws AREC and Ministry of Environment and Physical Planning do systematically control the quality of their datasets. They control the data quality on: completeness, accuracy, up-to-dateness, and apply national standards for data creation types and formats as well as protocols for archiving and data storage.

2.4.4 Interoperability and harmonisation of data

The Interoperability project led by the Ministry of Information Society deals with the interoperability and harmonisation of data that are not spatial. AREC defines rules for graphics and attributes for data creation. Initially graphic data is created in DGN-format followed by topology checks resulting in Coverage data sets. From this data-format any other conversions, like in DWG or DXF, can be performed. AREC initiated recently a project for the creation and design of AREC's overall data model focussing on the interoperability and harmonisation of their spatial data sets.

2.4.5 Language and culture

Data sets, services and supporting documents are mainly written in Macedonian using Cyrillic and Latin characters. In a few occasions, the English language is also applied.

2.4.6 Conclusions of Component 3

Several data sets exist at different resolutions and scales covering most of the INSPIRE themes. AREC can be considered as the main supplier of spatial data, while the Ministry of Environment and Physical Planning is also very important. The geodetic reference system and projection systems are standardised, documented and interconvertible with other systems. Procedures for data quality control exist at a few public entities. The issue of spatial data interoperability is just starting with support of several internally funded projects and these project consider interoperability beyond conversion between different data formats. The Macedonian language is the operational language, but some data sets and documents are written in English. Based on these conclusions, we score the indicators as follows:

- Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components (Yes)
- The geodetic reference system and projection systems are standardised, documented and interconvertible (Yes)
- There is a documented data quality control procedure applied at the level of the SDI (Partially)
- Concern for interoperability goes beyond conversion between different data formats (Partially)
- The national language is the operational language of the SDI (Yes)
- English is used as secondary language (Partially)

2.5 Component 4: Metadata

2.5.1 Availability of metadata

Metadata is almost not available. Several project focus on the metadata issue. For example, the NSDI-strategy plan and its implementation (funded by the Dutch donation and the loan of the World Bank) focus strongly on the metadata issue. Another project Metadata project is funded by SIDA. This project focuses on metadata courses and implementation activities at AREC.

2.5.2 Metadata catalogues

No metadata catalogue exists in the FYR Macedonia

2.5.3 Metadata implementation

AREC is recently focussing on metadata creation, maintenance, catalogues and quality control with support of various international projects (SIDA, World Bank and Dutch government).

2.5.4 Conclusions of Component 4

The issue of metadata is just starting with support of various internationally funded projects. Metadata are still not produced at a large scale, and no metadata catalogue exists. AREC is assumed to take the lead as coordinating authority. However this has not been confirmed. Based on these conclusions, we score the indicators as follows:

- Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes (No)
- One or more standardised metadata catalogues are available covering more than one data producing agency (No)
- There is a coordinating authority for metadata implementation at the level of the SDI (No)

2.6 Component 5: Network Services

2.6.1 Geoportal(s)

The NSDI-strategy plan and its implementation financed by a donation of the Dutch government and a loan of the World Bank include the establishment of a national geoportal of the FYR Macedonia. So far, no geoportal is established.

2.6.2 Network services

The NSDI-strategy plan and its implementation financed by a donation of the Dutch government and a loan of the World Bank include the development of several network services. At this moment, no discovery, viewing, download, transformation, and invoking services are developed.

2.6.2.1 Discovery services

No Discovery services are established in the FYR Macedonia.

2.6.2.2 Viewing services

No Viewing services are established in the FYR Macedonia.

2.6.2.3 Download services

No Download services are established in the FYR Macedonia.

2.6.2.4 Transformation services

No Transformation services are established in the FYR Macedonia.

2.6.2.5 Invoking services

No Invoking services are established in the FYR Macedonia.

2.6.3 Spatial Data Services and other services

AREC offers services (only in Macedonian language) such as:

- Property list
- Searching facilities for property list by applying addresses
- MAKPOS (Macedonian positioning system)

Furthermore, the website of AREC refers to a number of links for certificates registration, cadastre map copies, etc. (<http://www.katastar.gov.mk/en/Def.aspx?Id=212>)

Web Processing Services, Authentication services, payment services and gazetteer services do still not exist.

2.6.4 Use of Software

Software of ESRI is frequently used as the GIS-software. The application of open source software within the public sector is low. In addition, there is a low level of awareness about various open source packages.

2.6.5 Conclusions of Component 5

The FYR Macedonia is aware of the development of network services as part of the NSDI. The emphasis of the NSDI-strategy plan and its implementation is high. However, the current status is that no geoportal and no network services are established. AREC has developed several spatial data services (in Macedonian language) focussing on property list and MAKPOS (Macedonian positioning system). Finally, software of ESRI is the most common GIS-software, and the application of open source software is still low in the public sector.

Based on these conclusions we score the indicators as follows:

- There are one or more discovery services making it possible to search for data and services through metadata (No)
- There are one or more view services available for to visualise data from the themes of the INSPIRE annexes (No)
- There are one ore more on-line download services enabling (parts of) copies of datasets (No)
- There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability (No)
- There are middleware services allowing data services to be invoked (No)

2.7 Component 6: Environmental themes and activities

The Ministry of Environmental and Physical Planning (MoEPP) has initiated several projects and applications related to the environment. Examples are the Bio-diversity and Air Quality projects

- In the Bio-diversity project funded by UNDP project a web based service has been established showing bio-diversity content. The structure and operating system is rather complete and content is being gradually added. Three levels of users are recognised: citizens, professionals and administrators.
- In the Air Quality project funded by Finnish Twinning, a web portal will be established. This portal will focus on two items (Air Quality and Bio-Mass) that are just the first ones, eventually the web portal includes all aspects of Environment and Physical Planning.

At the moment, the information systems managed by MOEPP are used for internal applications only.

Other relevant initiatives take place at the Crisis Management Center. Their GIS-Application offers a simple and fast data input interface, a dynamic extension of ESRI geo-database with new attributes allowing better description of the events, resources, consequences, categories of aid etc. This application for spatial and attribute data input along with the Web viewer of events and resources are efficient tools for tracking resources and potentially dangerous (environment) events.

2.7.1 Conclusions of Component 6

Several initiatives, projects, and applications regarding the environment exist. However, the level of these activities is still rather low. The NSDI-strategy plan and its

implementation covers several thematic environmental data. Based on the information provided just above, we score the indicator as follows:

- Thematic environmental data are covered by the described SDI-initiative or there is an independent thematic environmental SDI (Partially)

2.8 Standards

The FYR Macedonia has initiated several projects focussing on the development and application of standards. Ministry of Information Society is currently leading an interoperability project linking five specific public entities together: AREC, Customs, Ministry of Interior Affairs, Tax Office, and Central Registry. This interoperability project started in 2009 and follows the guidelines of the Pan European Interoperability Framework version 2.0, but does not include any spatial component. AREC has initiated a project to develop datamodels for its data sets based on INSPIRE data specifications and GML. This project is financed with a loan of the World Bank. AREC has also launched a project focussing on metadata. The aim of this project funded by SIDA is to apply the standards related to metadata (ISO 19115, 19119 and ISO 19139). Finally, the NSDI-strategy plan and its implementation take also into account the common standards of ISO/TC211 and OGC (WMS, WFS, WCS, CSW, WPS). So far, no national standard profiles are developed.

2.8.1 Conclusions of Component 7

Several projects have been recently set up to apply standards. These standards projects focus on standards related to data and data specifications, metadata, and network services. However, the application of these standards is still in its infancy. Based on the information provided above we score the single standards indicator as follows:

- The SDI-initiative is devoting significant attention to standardisation issues (Partially)

2.9 Use and efficiency of the NSDI

The FYR Macedonia is currently working on a NSDI-strategy plan for its implementation. Since no NSDI still exist, no examples of the use of the infrastructure can be given.

3 Annexes

3.1 List of SDI addresses / contacts for the Former Yugoslav Republic of Macedonia

Table: SDI contact list			
	Web address	Organisational mailing address	Overall contact person: tel./ fax/ e-mail
National			
Agency for Real Estate in Macedonia (AREC)	http://www.katastar.gov.mk/en/Default.aspx	Trifun HadziJanev 4 1000 Skopje	Ljupco Georgievski Telephone: +389 (02) 3204 800 Fax:+389(02)3171668 e-mail: office@katastar.gov.mk info@katastar.gov.mk

3.2 List of references for the Former Yugoslav Republic of Macedonia

Table: list of references used to compile the Country Report	
Web sites:	
	http://www.cartography-gis.com/pdf/8_Boes_Lapaine_Cetl_paper.pdf
	http://zgate.gsi.go.jp/jmp/JMP20.xsd
	http://www.katastar.gov.mk/en/Def.aspx?Id=212
	http://www.katastar.gov.mk/en/Page.aspx?Id=274&m=1541

Publications:	
	U., Boes, M., Lapaine, and V., Cetl, 2010. Learning from others – capacity building for GIS and SDI in South East Europe. 3rd international conference on cartography and gis, 15-20 June, 2010, Nessebar, Bulgaria.
	Crompvoets, J., Vandenbroucke, D., Nedović-Budić, Z., and Todorovski, D., 2010. Detailed Survey concerning INSPIRE – Coordination, Funding and Sharing Measures in South-East Europe. In proceedings of International Conference on Spatial Data Infrastructures 2010. Skopje, FYR Macedonia, 15-17 September 2010, pp. 1-16.
	K., Yamada and K., Tsuda, 2006. Activities towards dissemination of geographic information in Macedonia. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Science, XXXVI, Part 6, Tokyo Japan.

	D., Todorovski, 2009. Spatial Data – the Fundament for the National Spatial Data Infrastructure of the Republic of Macedonia. 7 th FIG Regional conference, Hanoi, Vietnam, 19-22 October 2009.
	S. Dimova, 2010. The role of the Agency for Real Estate Cadastre in the establishment of the national spatial data infrastructure. International conference on spatial data infrastructures 2010. 15-17 September 2010, FON University, Skopje, FYR Macedonia.
	D., Todorovski and J., Cromptvoets, 2010. Comparing and Assessing the Republic of Macedonia SDI Development (2005/2010) – Solid base for its strategy development. International conference on spatial data infrastructures 2010. 15-17 September 2010, FON University, Skopje, FYR Macedonia.