# INSPIRE IN CONTEXT OF NON-EU-MEMBER STATES NSDI: CASE STUDY OF MACEDONIA

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VLATKO DIMOVSKI Enschede, The Netherlands, March, 2015

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### ABSTRACT

The Non-EU Member States from the Western Balkan region, recognizing the benefits of establishing operational SDI, have taken in consideration the INSPIRE Directive while establishing their NSDIs, even though it is intended only for EUMS. This Directive is an example of a social/institutional intervention to support a cross-national SDI, whose aim is environmental protection. This research addresses the issue of assessing the impact/influence and extent of one external SDI policy (EU) on one internal SDI policy (Macedonia). The aim was to identify the link between the INSPIRE Directive and the NSDIs of the N-EUMS in order to understand why, how and to which extent does INSPIRE influence the N-EUMS NSDIs development and implementation, through the perspective of the NMCA. Narrowed down as case study for Republic of Macedonia, and its NMCA as responsible organization for NSDI establishment, the research is based on qualitative data analysis method using semi-structured interviews and grey literature. This assessment is complemented with findings from the analysis of similarity/conformity between the two policies, considering the theory of policy convergence and is made based on defined framework of SDI aspects and indicators. The impact is classified as direct which is related to external factors of influences coming from EU and the region and indirect that originates from domestic factors such as the influence emerging from country's needs and priorities. The direct impact is identified in more aspects than the indirect impact. The possible extent of compliance of the Macedonian NMCA and the NSDI in general with INSPIRE could be classified as partly in compliance, where most of the aspects can fully be made in compliance. The enforcement as part of the EU SDI is not yet reachable, yet the SDI crossborder cooperation may lead to possible development of new regional SDI initiative based on INSPIRE principles. The applied methodology has proven to be suitable for this assessment. The identified impact of INSPIRE in relation the Macedonian NSDI has medium to high degree of influence. The external factors of influence are considered stronger. This shows that the application of a one Information Infrastructure outside of its planned borders can clearly make change on national level, and may also create new initiative on regional level.

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### LIST OF ABBREVIATIONS

AREC - Agency for Real Estate Cadastre ASP - Agency for Spatial Planning BiH - Bosnia and Herzegovina DB – Data Base DTM - Digital Terrain Model EC - European Commission EEA – European Environmental Agency **EN-English** ESTAT – Eurostat ETRS - European Terrestrial Reference System EU - European Union EUMS - European Union Member States EUSDI - European Union Spatial Data Infrastructure GCM - Generic Conceptual Model GI-Geo-Information GIS - Geo-Information Systems GNSS - Global Navigation Satellite System IA – Impact Assessment IBRD - International Bank for Reconstruction and Development ICT - Information and Communication Technology II – Information Infrastructure INSPIRE - Infrastructure for Spatial Information in the European Community IPA - Instrument for Pre-Accession Assistance IR - Implementing Rules ISO - International Organization for Standardization JRC - Joint Research Centre LA - Land Administration LAS - Land Administration System NDP - National Data Producers N-EUMS - Non-European Union Member States NGO - Non - Governmental Organization NSDI - National Spatial Data Infrastructure NMA - National Mapping Agency NMCA - National Mapping and Cadastral Agency OGC - Open Geospatial Consortium PPP - Public-Private Partnership PSI - European legislation on reuse of public sector information SAGW - State Authority for Geodetic Works SDI - Spatial Data Infrastructure SGA - State Geodetic Administration SIDA - Swedish International Development Cooperation Agency TS - Technical specifications

## 1. INTRODUCTION

#### 1.1. Background and Justification

Establishing an operational Spatial Data Infrastructure (SDI) is deemed important for informed decision making on sustainable development. Initially, the need of SDI development is recognized worldwide. As a consequence there are many countries that started defining and developing their SDI country-concepts. However there are concepts that evolved from national to regional level. One of these initiatives is the European Union SDI (EUSDI) – INSPIRE. INSPIRE is a community SDI initiative for establishing an infrastructure for spatial information by the 25 (now 28) Member States of the EU. The EU Member States must comply with the INSPIRE Directive (Directive 2007/2/EC) which aims to set up an SDI and to simplify access to spatial data and spatial data services in Europe as stated by Badowski (2009).

In relation to this initiative, there is interesting phenomenon occurring in the past few years where INSPIRE has become more than a standard intended only for EU Member States. A certain perspective on the SDI and the INSPIRE Directive on a global level can be found in the article by Tonchovska & Adlington (2011). This can be seen from the fact that more and more Non-EU Member States (N-EUMS) are taking into consideration this Directive as part of their National Spatial Data Infrastructure (NSDI) when it comes to developing strategy and policy formulation. This extents the socio-organizational dimension where even the technical dimension i.e. Implementing Rules (IR) are considered. The reasons for doing that are different for different countries. This questions why some of these N-EUMS would impose these standards into their NSDI even when they are not obliged to do that.

As one of the countries where this phenomenon can be recognized is the Republic of Macedonia. Republic of Macedonia is a N-EUMS that is on the beginning of its NSDI establishment. The first real initiative regarding the development of NSDI is stated in the NSDI Strategy developed by the Agency for Real Estate Cadaster (2012) where the INSPIRE Directive is taken in consideration. The aim of this strategy is to serve as a basis for the future steps needed to come in relation to policy formulation and future implementation as well as to provide NSDI in compliance to the INSPIRE Directive. There are few assumptions which could be the reason for this. Some of them are that Macedonia is an EU Candidate Member State. Another is due to intended or not intended suggestions of external factors such as Word Bank and EU. Some reasoning is due to absence, for long time, of national standards in relation to spatial data and services or as a naturally evolving from the reforms in the Macedonian Land Administration System (LAS). However, since the process of building a NSDI should be based on clear and long term decisions that will direct the future development and implementation process there is a need to understand this phenomenon.

In order to understand this phenomenon there is a need to assess the impact (marked effect of influence) and extent of INSPIRE in relation to NSDI in this N-EUMS. The literature review reveals several practices from previous studies that can be taken into consideration, such as the INSPIRE State of Play (Vandenbroucke, 2011) the EuroSDR Project Atlas of INSPIRE (Vries et al., 2011). "Atlas of INSPIRE has evaluated the SDI development through inventory of INSPIRE experiences of the European National Mapping Agencies by making an inventory of experiences when implementing INSPIRE, under the assumption that these experiences implicitly develop the SDI" (Vries et al., 2011). As stated by Vries et al. (2011) the focus on research of the Atlas of INSPIRE is based on the NMAs, and their practices of INSPIRE implementation activities. With

respect to this view the NMCAs can be considered as relevant sources to derive information regarding the SDI development and implementation progress. However all this projects consider the implementation status in the EUMS, and there are not many research publications related to the considered phenomena occurring in the N-EUMS in relation to the INSPIRE Directive. In this context there is a need to first consider the gap of identifying the influence of INSPIRE in relation to the N-EUMS and the reasons and possible extent to which this Directive can be enforced or complied to.

Therefore, the current research concerns why, how and to which extent does the INSPIRE influence the development and implementation in Non-EU Member States taken through the perspective of the NMCA: Case study of Macedonia. This research contributes the knowledge on how this Directive that is developed for EU countries "not intentionally" is taken in consideration in other regions/countries that are not part of the EU. This can prove that one infrastructure through time is "developing" in a way that its "usage" is spreading influence outside of its predicted boundaries and may have wider application than originally is foreseen. This question points to the relevance for better understanding of the cross border information infrastructure. The outcome can provide certain views on which the Macedonian NSDI should be based, regardless of the trends and influences in and outside of the country. In the end, the relevance of this research lies in a better decision making in the future concerning the NSDI not only in Macedonian context but also in other N-EUMS country context.

#### 1.2. SDI and Policy impact/influence assessment

The context of the overall scientific literature for this research can be structured as knowledge on these particular concepts: SDI, INSPIRE Directive, Policy and Strategy, NMCA, EUMS and N-EUMS, and Assessment (methods/approaches). The literature review shows the perspectives or views on which these concepts are presented in the current research based on review of prior works.

The *SDI* is mentioned throughout the whole research therefore a short definition, its components and the benefits of establishing an SDI according to the literature review is covered. Here is considered definition used by Nebert (2004), describing the term "Spatial Data Infrastructure" (SDI) and its application and use. The presentation of SDI as a combination of socio-technical dimensions is also considered as described by Georgiadou et al. (2006). More detailed descriptions are given in *Chapter 2*.

This research in big part considers the *INSPIRE Directive* as main point of policy convergence. The INSPIRE Directive (European Parliament and the Council of the European Union, 2007) is the "heart" of the European Union SDI. The Directive here is considered thought the institutional, legal, organizational and technical aspects of SDI. A certain perspective on the SDI and the INSPIRE Directive on a global level is the main focus. This perspective is pointed out in the article by Tonchovska & Adlington (2011) in which several countries in the World Bank ECA region are also considered. In *Chapter 2* is made a short summary of what this Directive is according to the literature; and what its essential components for implementation are.

In context of this research the relation between the *NMCA and SDI* plays important role of providing important information on which conclusions are made regarding the research problem. Here is considered the role and responsibilities of the NMCA in relation to the NSDI that cannot be denied. This relation is clearly pointed out by Bačić (2009) providing focus on the Balkan region countries as well by Kok (2009) and Masser (2007) providing the importance of NMCA to NSDI from legal and organizational perspective. In *Chapter 2* the NMCAs are seen in relation to the SDI and its role in establishing NSDI according the found literature.

There is not much literature presenting the picture of INSPRE Directive outside the EU Community such as the case of *N*-EUMS relations to INSPIRE. Most of the existing literature relates to the developing of NSDIs in EUMS while none of this related works really focuses on the INSPIRE Directive impact, reasons and possible extent or compliance of INSPIRE in N-EUMS. However some information can be found in certain literatures such as the State of Play report made by Crompvoets et al. (2010), and an overview of the status of NSDI development including the NMCAs and the efforts towards implementation of INSPIRE in the Balkan countries given by Cetl et al. (2013). Here also are considered the reports of performance analysis of SDI legislation and alignment with the INSPIRE Directive in the Balkan countries is presented in *Chapter 2*. Also here is considered the current status of implementation of INSPIRE in two EUMS which provides a glimpse on how these countries are implementing the INSPIRE Directive.

#### 1.2.1. Policy impact, influence and assessment

This research reveals the need to identify the impact or the marked effect of influence from the external policy (INSPIRE) on the internal policy (Macedonian NSDI) considering not just the similarities in the legislations but also the policy implementation actions such as the organization, interpretation, and application. In relation to this, the perception on policy impact/influence is considered through the definitions given by Forrester et al. (2009) as well as Start & Ingie (2004). A certain perspective of the policy impact assessment (IA) as defined by Larouche & Cserne (2013) is given. However the focus is the policy convergence as defined according to Holzinger et al. (2008), which is used to identify the impact/influence from the external policy on the internal policy. A summary of literature review on policy impact, policy influence and its assessment are given in *Chapter 2*.

The *SDI Assessment (methods/approaches)* represents a tool as part of the policy impact assessment approach. The literature reveals few methods and approaches for SDI assessments which are presented in *Chapter 2*. Here are presented existing frameworks which are proposed to assess SDI such as the State of Play as described by Grus et al. (2007) as well as the currently used method to assess the implementation of INSPIRE Directive in the EUMS pointed out by Vandenbroucke et al. (2008). The main idea behind these frameworks is that it covers all three purposes of assessing SDI: accountability, knowledge and development. As stated by Grus et al. (2007) the proposed assessment methods can be qualitative and quantitative. In relation to this research, part of this aspects and indicators can be used to see the Macedonian NSDI in relation to the INSPIRE Directive and identify the elements that reflect the impact/influence onto the Macedonian case.

#### 1.3. Research problem

While there is enough knowledge on the influence and the impact of INSPIRE on EUMS there is insufficient knowledge on this influence and impact outside of the EU borders. In relation to this, there is a lack of information and understanding why and how some N-EUMS are considering the INSPIRE Directive as part of their NSDI. In order to understand this gap, there is a need to identify the link of the INSPIRE Directive in relation to development and implementation of NSDI in this N-EUMS.

Therefore, the research problem concerns why, how and to which extent does INSPIRE influence the development and implementation on the N-EUMS NSDI taken through the perspective of the NMCAs.

This question is interesting because it addresses the issue of assessing the influence and impact of one external SDI policy (EU) on one internal SDI policy (Macedonia) in order to better understand the cross border information infrastructure.

In this research NMCAs are taken as a relevant source of information based on which the assessment will be made. Although this research is addressing a certain group of N-EUMS, in order to assess the influence of the INSPIRE Directive the research problem is narrowed down for in-depth study to a country case for Republic of Macedonia. The current research will assess the impact and extent of the INSPIRE Directive in relation to development and implementation of the Macedonian NSDI through the perspective of the NMCA i.e. AREC. Here are considered the reasons that define the influence and the actions of policy implementation that defines the impact such as the organization, interpretation and additionally application to a certain small level.

#### 1.4. Research objectives and research questions

#### 1.4.1. Main objective

To assess the impact (marked effect of influence) and extent of the INSPIRE Directive in relation to development and implementation of the Macedonian NSDI through the perspective of the NMCA i.e. AREC.

Sub objectives	Questions
Sub objective 1 To define policy impact (external on internal policy) and define impact assessment steps and indicators framework	<ul> <li>How can be defined the impact (marked effect of influence) of external policy (INSPIRE Directive) on internal (NSDI) policy and which assessment steps should be considered/define</li> <li>Which framework of aspects and indicators is suitable to identify the policy elements and relations between INSPIRE Directive and NSDI2</li> </ul>
Sub objective 2 To identify the reasons and define the relations of the Macedonian NSDI policy in relation to INSPIRE	<ul> <li>What are the elements of the INSPIRE Directive in relation to the framework of aspects/indicators?</li> <li>What are the elements and relations (indicators) of the Macedonian NSDI strategy/policy in relation to the INSPIRE Directive?</li> <li>What are the possible reasons to consider developing a Macedonian NSDI in compliance with the INSPIRE Directive?</li> </ul>
Sub objective 3 To identify the role, actions and the possible extent of compliance of the Macedonian NMCA in relation to NSDI and INSPIRE	<ul> <li>What is the role of the NMCAs in N-EUMS and in particular in Macedonia in relation to the NSDI?</li> <li>What is the scale/scope of actions affected by the INSPIRE Directive in the Macedonian NMCA?</li> <li>How should the NMCA in Macedonia comply to the INSPIRE Directive and what is the possible extent to which it can be enforced or complied with INSPIRE?</li> </ul>

1.4.2.	Sub obie	ctives and	research	auestions

Table 1: Sub-objectives and research questions

#### 1.4.3. Descriptive diagram

As presented in *Figure 1*, this diagram describes the main elements and relations in regards to the research objectives and research questions. This is specific because it reviews the implementation of the INSPIRE Directive in EU SDI context and addresses the influence of the same Directive in N-EUMS in relation to development and implementation of NSDI. The linkage is reviewed over the interrelation of the NMCAs.



Figure 1: Descriptive diagram

#### 1.5. Research design

#### 1.5.1. Operational plan

The research is carried out in three phases: pre-fieldwork, fieldwork and post-fieldwork phase as shown in *Figure 2*. These three phases are covering the empirical work that focuses on finding the actual values of each of the elements and arrows of the Macedonian NSDI context in the INSPIRE Directive and the relation of the NMCA.

#### 1.5.1.1. Pre-fieldwork phase

The pre-fieldwork phase covers the definition of steps for the process of assessment, SDI aspects, review of certain documentation (INSPIRE Directive, existing EUMS practices, Macedonian NSDI policy, SDI concepts). In this phase, as part of the desk study, using the existing theory and SDI assessing frameworks is defined a framework of policy aspects and indicators needed to identify the elements and relations of the Macedonian NSDI context and the INSPIRE Directive through which the impact is defined.

Secondly, in this phase a definition of case study area is made. Namely the case study area is specified for the NMCA i.e. the Agency for Real Estate Cadaster of Republic of Macedonia, however other organizations are considered also.

In this phase all the necessary fieldwork preparations are made, such as establishment of communication with relevant organizations, definition of needed data and specification of the sources from where they are obtained. The interview questions are prepared and structured according to specific target groups, type of interview and selection of respondents for interviews is carried out.

The interviews are carried out with top-level and project managers from AREC, concerning the policy and strategy formulation, and middle level management and technical staff involved in the policy implementation process. The interviews are semi-structured, meaning that include open and close questions.

#### 1.5.1.2. Research framework



Figure 2: Research framework

#### 1.5.1.3. Fieldwork phase

The fieldwork phase covers the data collection, structuring and processing. The data sources are structured as primary and secondary data. The data collected on fieldwork is defined as primary data and it applies to the specified case study in Republic of Macedonia. The primary collected data is based on semi-structured interviews that include questions related to the sub-objectives i.e. the research questions. The

data is structured according to specific target groups and departments/organizations from where the data is obtained. The gathered data is qualitative.

The secondary data is collected based on desk study research and it applies to grey literature and country reports related to the case study in Republic of Macedonia. The grey literature mainly refers to documentations, laws, regulations, rulebooks and all the possible documentation that can provide certain information in the Macedonian NSDI context. Here is also considered grey and theory literature concerning the EUMS, N-EUMS and their relation to INSPIRE in general. The methods of data collection, processing and analysing are considered carefully in relation to the research questions defined in *Appendix 1 - Table 6*.

The data collected on fieldwork can additionally be divided as primary and secondary in relevance of the organizations from where the data is obtained. The main primary data source is the NMCA i.e. AREC in Macedonia covering the most important departments that are involved in NSDI establishing. Since these departments and manager staff is not so numerous the secondary data source also covers certain governmental organizations and public agencies, private sector and academics. However the relevant outcome of this research is focused on the NMCA.

#### 1.5.1.4. Post-fieldwork phase

The post-fieldwork phase covers the data analysis and interpretation. In this phase is processed primary and secondary data collected in the fieldwork phase. The concept of this phase covers the results and the outcome of the analysis based on which the impact of INSPIRE Directive in relation to the Macedonian NSDI is assessed. Based on the theory and the output analysis, discussions are made. At the end, based on these discussions certain conclusion and recommendations are presented.

#### 1.5.2. Approach and methods used in data collection, data processing and data analysis

The current research can be classified as a relational or impact research where the method is tested by empirical research. The research is based on case study methodology. The case study method embraces the full set of procedures needed to do case study research. "These tasks include designing a case study, collecting the study's data, analysing the data, and presenting and reporting the results" (Yin, 2012). However the overall concept of research can be explained using two perspectives, one wider perspective, covering certain types of aspects and their interrelations and second narrow, where they relate to in-depth research concerning the case study for the Macedonian NSDI which is the focus of this thesis.

The basic approach for primary data collection is based on qualitative methods. The qualitative method has an in-depth approach to understand the "why and how" of the studied problem. The gathering of answers for this method is done through interviews. The data is processed based on structured/organized data, coding the data, decrypting the patterns and themes of the data (interpretation). For the secondary data sources a desk study research method is based on summary of collected grey literature. This method covers the summary, collation, synthesis of existing previous research results and related literature. The secondary source data is already analysed and as such it represents information that is ready to use or that can be used to define certain perspectives or to formulate certain indicators. The data from the secondary sources is structured according to specific aspects related to this research which is also used in the process of qualitative data analysis.

The data analysis includes data decryption, structure, coding, and categorizing, defining relations and representation in a form of findings from where it will be interpreted. Based on these results the outcome is discussed and conclusions are derived.

#### 1.6. Thesis structure

The thesis contains 6 chapters. At the beginning of this thesis, before the start of *Chapter 1* are placed the following content: Title, Abstract, Acknowledgments, Table of contents, List of figures, List of Tables and List of Abbreviations.

#### Chapter 1: Introduction

*Chapter 1* represents an introductory part which gives the background and justification of the research problem, introduction to SDI and Policy impact/influence assessment, then covering the research objectives for the main objective and the sub objectives along with the corresponding research questions. Additionally the descriptive framework and the research design, which refer to the used research methodology, are presented. At the end of this chapter the structure of the thesis is presented.

#### Chapter 2: Synthesis of SDI and INSPIRE

This chapter covers the literature review on which the whole research is based and should provide the basic understanding of the concepts that take part in this research. Here are considered the need of SDI development on national level, the INPIRE Directive concept, existing views and perspectives in N-EUMS, methods of implementation assessment of this Directive in EUMS that can be used to assess the impact/influence as well as the role of the NMCAs in relation to SDI.

#### Chapter 3: Methodology to study the NMCA

*Chapter 3* reflects the research design considering the methods for primary and secondary data collection, processing and analysing. Here is defined the study area with all the data sources, types of respondents and respectively the type of interviews.

#### Chapter 4: Empirical data on NMCA

This chapter presents the data collected on the fieldwork and related to the case for Macedonian NMCA including the other agencies/organizations. Here are also presented the processed results of the collected data. The processed data is used for analysis and interpretation in the next defined chapter.

#### Chapter 5: The impact/influence of the INSPIRE Directive on N-EUMS

*Chapter 5* covers the analyses, interpretation and discussion of the data collected and presented in *Chapter 4*. The analysis is based on the applied framework of aspects and indicators and the qualitative data analysis. The interpretation rounds off the final results from the overall analysis. By considering the interpreted results and the concepts covered in *Chapter 2* discussion on the impact/influence and the possible extent of compliance is guided. Here certain discussions are made defining the relation of the Macedonian NSDI concept, the impact/influence and the possible extent of enforcement or compliance with the INSPIRE Directive. The outcome formulates generic aspects and provides certain views how this influence can be scaled up to a higher level.

#### Chapter 6: Conclusion and recommendations

This chapter summarizes the conclusion drawn from the research in this thesis by answering the research sub-objectives that address the main research objective. Here based on the outcome of the conclusion certain recommendations are given for further research concerning the influence of INSPIRE in relation to SDI establishment in Non-EU-Member States and specifically for the case study of Macedonia.

## 2. SYNTHESIS OF SDI AND INSPIRE

#### 2.1. Introduction

The first step towards establishing an SDI is developing an SDI policy. This policy describes the way how the SDI can or should be implemented. In order to define the impact and extent of one policy on another policy first we need to understand the concepts of those policies and the way they can be related and represented in a unique framework. This provides the knowledge on how the impact can be defined, which tools can be used to represent and apply in order to define the relations between these policies. This is the starting point towards assessing the impact of one environmental policy on a NSDI policy based on the theory and the actions done in the NMCAs.

#### 2.2. SDI

Since SDI is the starting concept represented in the both policies, a clear definition has to be provided that points out the main SDI components in which these policies can be recognized. "The term "Spatial Data Infrastructure" (SDI) is often used to denote the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data. The SDI provides a basis for spatial data discovery, evaluation, and application for users and providers within all levels of government, the commercial sector, the non-profit sector, and access in general" (Nebert, 2004). The technologies of SDI include metadata, services, interoperability etc. i.e. "it hosts geographic data and attributes, metadata, a means to discover, visualize, and evaluate the data, and some method to provide access to the geographic data" (Nebert, 2004), while the organization of SDI refers to coordination, administrations etc. i.e. – "to coordinate and administer that data on a local, regional, national, and or trans-national scale" (Nebert, 2004). "In the heart of the SDI lie five core, but dynamic, components – people, access network, policy, standards and data" (Rajabifard, 2012).



Figure 3: Nature and dynamics of SDI components (Rajabifard, 2008)

These *SDI components* can be pointed out thought several *SDI related aspects*. The SDI concepts are related to the following aspect:

*People* refers to the SDI participants or stakeholders, such as producers and users of spatial data that are participating in the SDI as stated by Warnest et al. (2002). They are data suppliers, managers (service administrators), end-users and as well as the driving force behind the development of SDI as stated by Crompvoets et al. (2004).

Access Network (Technology) is a technical SDI component that is used to facilitate and simplify the access to spatial data and spatial data services. This component concerns the development and implementation of network services and Geo-Portals as well as the ICT behind that.

*Policy (Institutional Arrangements)* relates to the institutional arrangements such as organizations, administration and coordination, legislation and funding of SDI. The policy as a component describes the spatial data access and agreements, pricing, funding, spatial data transfer, data ownership, metadata and standards.

*Standards* as stated by Warnest et al. (2002) are needed to support the sharing, integration and distribution of spatial data. *"They are needed to ensure interoperability amongst the datasets and access mechanisms defined by an SDP"* (Crompvoets et al., 2004). Standards can be applied at many different levels within an SDI.

*Data* is the core component which represents the fundament of SDI. Spatial data as described in the INSPIRE Directive refers to "any data with a direct or indirect reference to a specific location or geographical area" while spatial data set refers to an "identifiable collection of spatial data" (European Parliament and the Council of the European Union, 2007).

The assumed benefits of establishing an SDI, in the literature are:

- "social: helping citizens, saving people's lives, increasing governments' transparency, improving decision-making processes etc." (Tonchovska & Adlington, 2011)
- "economic: reducing duplication, increasing, competition, creating jobs and improving information accessibility" (Tonchovska & Adlington, 2011)
- time effective allows to find data in shorter period of time as stated by Tonchovska & Adlington (2011)
- allows data reusability and data synchronization (standardized) as stated by Kraak et al. (2009)
- allows data availability and sharing of data at different levels as stated by Rajabifard & Williamson (2001)

In the end the term SDI refers to a particular socio-technical intervention which is assumed to lead to particular benefits such as the ones mentioned above in the text.

#### 2.3. INSPIRE Directive

The INSPIRE Directive is a cross-national guideline aimed for the development of a cross-national SDI. INSPIRE is a specific example of a social/institutional intervention which aims at a particular benefit, namely environmental protection. "The Infrastructure for Spatial Information in the European Union (INSPIRE) is a EU regulation that aims to create European SDI, to facilitate the sharing and access to environmental spatial information across Europe and also should assist policy-making in relation to policies and activities that may have a direct or indirect impact on the environment across boundaries" (European Commission, 2014). "INSPIRE is based on the infrastructures for spatial information established and operated by the 28 EU Member States" (European Commission, 2014). This Directive represents a legal framework that addresses the technical and non-technical issues and defines Implementing Rules in several specific areas.

The initial idea for creation of INSPIRE was to make a legal framework where the SDI's of each of the Member States will be standardized and their information will be made available for cross-border use and exchange which will create an European Spatial Data infrastructure (EU SDI), with all the SDI's benefits that were already mentioned in *Section 2.2*. However behind this is the history of the Directive which starts from cooperation between Environment Directorate (ENV), Eurostat (ESTAT) and Joint Research Centre (JRC), to later be based on the cooperation of the DG Environment, the JRC and the European Environmental Agency (EEA) pointing at the environmental protection. Even through this concept was maintained, the Directive has defined other reason for recognition and that is their functionality and main principles. INSPIRE common principles<sup>1</sup> provide that data should be collected only once and kept where

<sup>&</sup>lt;sup>1</sup> The common principles of INSPIRE can be found on <u>http://inspire.ec.europa.eu/index.cfm/pageid/48</u>

it can be maintained most effectively, there should be data sharing between all levels and all parties, easy and transparent access to data so this data could be used for better policy-making in different sectors: environmental, agricultural, transport etc.

To implement this Directive, the Member States should follow the <u>Implementing rules</u><sup>2</sup> (IR) which are set to ensure that all Member State's SDIs are compatible and usable in trans-boundary context. These rules are given for Metadata; Data Specifications; Network services; Data and service sharing; and Monitoring and reporting. "*The INSPIRE directive legally binds public institutions which hold or own data related to the <u>34 spatial</u> <u>annex themes</u><sup>3</sup> to make their data accessible in accordance with the INSPIRE specifications" (Europen Commission et al., 2013). The main beneficiaries of the INSPIRE Directive are the Governments and the public sector, the private sector, the academics and researchers and other organizations like environmental NGO's etc.* 

This Directive has become widely known and is starting to be considered as part of some N-EUMS NSDIs. There is not much literature presenting the picture of INSPRE Directive outside the EU Community and even less or none on the INSPIRE Directive impact, reasons and possible extent or compliance of INSPIRE in N-EUMS which opens a new perspective of INSPIRE in general.

#### 2.4. SDI and NMCA

The relation SDI – NMCA is proven as a relevant link based on many examples from EUMS and now in N-EUMS. "Common for all NMCAs is that their national interest, with often a clear function in the national public administration, provides them influence in national policy making and other public administrative organizations. Their practices therefore clearly affect the dominating public views and activities for SDI development, and provide a good representative sample of national public sector practices relevant for SDI development" (Vries et al., 2011).

The responsible NMCA for the LAS in a country is inevitably linked to the development of SDI. This relation especially can be recognized in the Balkan countries. This gives a certain attention on the role of the NMCAs in these countries. Bačić (2009) gives an interesting review of the framework for establishment of the Croatian SDI and their State Geodetic Administration (SGA) important role. The importance of NMCA to NSDI from legal and organizational point of view is pointed out by Kok (2009) who concludes that they are becoming more and more responsible for the creation, coordination and implementation of their SDIs on national and international levels.

"This purpose of NMCA's takes the importance of cadastral information beyond the land administration framework by enlarging its capacity to service other essential functions of government, including emergency management, economic management, effective administration, community services, and many more functions" (Williamson et al., 2010).

#### 2.5. EUMS NSDI and INSPIRE Directive

In order to understand how INSPIRE is considered as part of the implementation process of an SDI, a short analysis of two EU Member state countries Slovenia and Croatia is given. These countries are chosen because they are part of the Balkan region and have many similarities to the other Balkan countries that are still outside the EU. Having in mind their obligation to fully implement the INSPIRE Directive, from *Table 7* presented in *Appendix 2* the current situation can be seen. For Slovenia are considered little bit older data form the State of Play report 2011 in order to see the process of development of its NSDI. For Croatia are used data from State of Play report as well as newer data from web-pages, laws, conference proceedings, to shown the as-is situation.

The responsible organization for the NSDI in both countries is an NMCA. Slovenia is ahead with the implementation of INSPIRE given the fact that it is an EU Member state longer than Croatia. Although

<sup>&</sup>lt;sup>2</sup> The details of the Implementing rules of INSPIRE can be found on <u>http://inspire.ec.europa.eu/index.cfm/pageid/47</u>

<sup>&</sup>lt;sup>3</sup> The 34 Annex themes of INSPIRE with descriptions can be found on <u>http://inspire.ec.europa.eu/index.cfm/pageid/2/list/7</u>

Croatia joined the EU in 2013 can be seen that it has been influenced by the INSPIRE Directive much earlier through the INSPIRATION and IMPULSE projects. They both have established metadata system, Geo-Portals with network services according to INSPIRE (transformation and invoke service are not yet established). However some bottlenecks are detected in both countries during this process of implementation.

#### 2.6. N-EUMS NSDI and INSPIRE Directive

The following N-EUMS decided to consider the INSPIRE Directive as part of theirs SDIs: Albania, Serbia, Montenegro, BiH, Kosovo and Turkey and their connection to the Directive. A short analysis is made showing the NSDI status in these N-EUMS countries in order to complement the discussion on the findings drawn from the case study of Republic of Macedonia.

The information in *Appendix 3 - Table 8* is drawn from INSPIRATION web-site, State of Play reports, official web-sites and laws, conference presentations etc. The columns depict that the respective N-EUMS countries have started the implementation of the NSDI (except for BiH) and they all are on a similar level with it. They have all recognized the importance of cross-border cooperation and through the participation in the INSPIRATION and IMPULSE projects they are taking into consideration and tend towards the INSPIRE Directive while establishing their NSDIs. Almost in every country responsible body for NSDI co-ordination and implementation is an NMCA, except for Turkey as well as BiH where a NSDI legal framework is absent thus a responsible body does not exist and Montenegro where responsible body was not specified in the law. Through their NMCAs they also are spreading the benefits, the good experiences and the bottlenecks they are facing during this process of NSDI establishment.

#### 2.7. Policy impact, influence and convergence

#### 2.7.1. SDI policy

In order to define the impact of INSPIRE on SDIs outside of the EU the whole cycle of SDI policy must be considered. This is the second step in the assessment. "Policy is a plan or course of action, from a government, political party, or business, intended to influence and determine decisions, actions, and other matters" (Van Loenen, 2006). As described by Van Loenen, (2006) policies may exist in several contexts such as covering the technological or human resource issues of a single organization or the legal or political environment. In relation to SDI Van Loenen (2006) states that policies exist at every stage of SDI development and that these are related to the needs of the community for whom they are made. This means that no policy is the same, even though they may have similar features or be based on similar values. According to Van Loenen (2006) the problems pressing on the system, the accumulation of knowledge and new technology which can bring new insights and policy innovation, and the major political events that can have impact on the political agenda are the main driving forces which influence SDI development.

#### 2.7.2. Policy impact/influence and the policy cycle

Impact is constructed describing the influence of a policy. However, there is not a clear difference between policy impact and/or policy influence definition in the literature. Forrester et al. (2009) argue that in order to understand the policy impact, there is a need to understand the policy cycle which concerns how policy decisions are made and what may have an impact on those decisions. In this sense the policy impact can be seen as part of the whole cycle process. Therefore I define the policy impact as the "observed change in the public policy process" and associated content, which is the "result of the knowledge that is supplied (or co-generated)" alongside the policy (Forrester et al., 2009). In contrast, I use policy influence and associated advocacy as the "intervention intended to catalyse, stimulate or otherwise seed some form of change through different forms of persuasion" (Tsui et al., 2014). Policy impact can be understood as the change occurring in the policy

cycle whereas policy influence can be understood as the action of influencing by someone or something on the policy decision making. Based on this perception, the impact of an external policy on an internal policy can be viewed as the marked effect of influence on the internal policy. This effect does not necessary need to be direct or formal, it does not have to be understood only as external influence and it does not have to be measurable in a quantitative sense, sometimes it is most important to be identified.

#### 2.7.3. Influence/Impact of EU policy on domestic policies

In relation to the previous, this gives a more clear perception in the context of this research, by considering the Influence/Impact of EU policy on domestic policies. According to Holzinger et al. (2008) the international factor is one very important actor for cross-national policy convergence where the factors are referring to the extent to which countries are institutionally interlinked. Concerning the fact that here the research problem is considering a specific policy field such as SDI and the cross-border information infrastructure, this view cannot be only seen from an institutional perspective.

Börzel (2003) states that the European policy process viewed in the perspective of the EUMS can be considered as a mutual affiliation concerning the political discussions at the domestic and the European level. This is quite different in the process of Europeanisation which is considered by N-EUMS and which relates to adaptation of a number of European features including the SDI policy such as INSPIRE in which case there is no mutual affiliation concerning the political discussions on the domestic policies.

Nevertheless, Holzinger et al. (2008) classify three theories on how, when and why policies converge: The first explanation concerns international harmonization. Following international cooperation policy convergence occurs on the bases of obligation to adapt national policies in line with international ones. The second theory considers policy convergence as an effect of non-formal trans-national communication and information exchange. Even within institutionalized networks obligatory agreements are not the only way in which cross-national policies converge. However in this case the cross-national policy convergence is not always guided by the efficiency goals. Instead, it may have to do with fulfilling a certain aspect that can eventually lead to certain similarity of policies. The third theory points to the potential influence of domestic factors. The similarity in domestic problems might trigger similar political responses and as a consequence derive policy convergence.

#### 2.7.4. Policy (impact/influence) assessment

Since the perception of policy impact is defined, it also needs to be known if there is an impact of INSPIRE on the N-EUMS NSDIs and how it can be assessed. According to Adelle & Weiland (2012) policy assessment attempts to inform the involved stakeholder by predicting and evaluating the potential impact of the policy's course of action. Adelle & Weiland (2012) state that there are many variations in terms of how it is practiced, reached and the views or perspectives that are supported. The impact assessment (IA) is a process aimed at structuring and supporting the development of policies and at the same time identifies the options for realization of objectives and their impact on the economy, environment and society as stated by Larouche & Cserne (2013).

#### 2.7.5. Policy convergence and convergence assessment

A concept explaining the relation between external policy and internal policy influence and impact is policy convergence. Policy convergence is the *"increase of the similarity between one or more characteristics of a single policy"* or the increase of *"similarity in the policy repertoire of a certain field across political jurisdictions"*, such as states, *"over a given period of time"* (Holzinger et al. 2008). Translating this concept to this research it can be said that the increase of similarities of the Macedonian NSDI policy compared to the INSPIRE Directive may be qualified as policy convergence. Hence, the main analytical tool of the research is used to qualify, quantify and explain the degree of policy convergence.

The reasons and differences for policy convergence, as defined by Knill (2005), in many cases arise from policy problems the countries are facing, imposition of other countries or international organizations that

force other countries to adopt certain policies using their political or economic power or the countries do harmonization of national policies to comply with international rules agreed in multilateral negotiations. However this can also be caused by the regulatory competition emerging from the increasing economic integration of European and global markets or the cross national policy convergence can simply be caused by trans-national communication as pointed out by Knill (2005). Further in this research are discussed the probable reasons of policy convergence of the Macedonian NSDI and the INSPIRE Directive.

Holzinger (2006) states that when we point out the cross-national policy convergence, we are generally discussing about a specific policy field or a single policy measure in a certain policy area for which the question is whether it has become more similar in the observed countries and time period. In relation to this, according to Holzinger et al. (2008), in order to measure the degree of convergence one, needs first to analyse the convergence with regard to the presence of policies and second to measure the similarities of individual policies. "*Thus, to assess policy similarity, one can compare not only the policy repertoire of a country but also the presence of certain policies, the instruments used, and sometimes the exact metrical setting of the policy*" (Holzinger, 2006).

#### 2.8. Policy components, aspects and framework of relation indicators

According to Holzinger (2006) in order to assess the similarity of policy fields, some form of aggregation of single policy measures is needed where the policy measures should be combined in certain dimensions useful for similarity assessment or analysis. In relation to this it is useful to consider the existing SDI assessment or evaluation frameworks that are related to INSPIRE Directive.

#### 2.8.1. Existing SDI assessment or evaluation frameworks

These frameworks offer variety of assessment methods, approaches and indicators that can be adjusted and adapted to fit the purpose of this research. Grus et al. (2007) are proposing the multi-view framework covering multiple approaches to assess SDI. The main idea behind the framework is that SDI can be treated as a Complex Adaptive System and that the assessment should include strategies for evaluating those kinds of systems. Basically as stated by Grus et al. (2007) this framework covers all three purposes of assessing SDI: accountability, knowledge and development and it acknowledges the multifaceted character of SDIs.

As one of the suitable approaches offered in this multi-view framework is the State of Play that is originally used to describe, monitor and analyse activities related to NSDIs in the EUMS. From the 30 indicators as stated by Vandenbroucke et al. (2008), 7 describe the organizational aspects; 9 describe the legal framework and funding, 6 relate to reference and thematic data, 3 to metadata, 3 to access services and 1 to standards and environmental issues respectively. "The State of Play is based on three levels of typology which serves a tool to recognize the different types of SDI for assessment and their potential contribution to developing and implementing a successful European SDI" (Vandenbroucke et al., 2008). The typology makes distinction between those NSDIs that were led by National Data Producers (NDP) and those led by an important user or users association, the involvement of the users and the degree to which the SDI is operational as stated by Vandenbroucke et al. (2008). Grus et al. (2007) also states that this approach and method can be used as a component of the multi-view framework, also in regions of the world outside of Europe.

Another suitable approach under this framework is given by Vandenbroucke et al. (2008) who describe the current method used to monitor and assess the impact of implementation of the INSPIRE Directive in the EUMS. "*The mechanism assesses progress as compared to the rules and requirements set out in the Directive and its Implementing Rules (IR)*" (Vandenbroucke et al., 2008). As base of these specific requirements to monitor the implementation are the given 14 indicators established and based on an analysis of the requirements of the INSPIRE Directive or more specifically the objectives that should be fulfilled. The given indicators should provide the current existing components of the infrastructure in the EUMS in relation to data sets, metadata and network services, to measure the compliance of the existing infrastructure in relation to the IR of the INSPIRE Directive, the use and performance of the infrastructure as well as describe the components of the infrastructure related to data sharing, coordination and cooperation.

#### 2.8.2. Indicators

In relation to the previous, the considered frameworks are intended to assess the progress and compliance in relation to INSPIRE. For that reason the indicators from these frameworks have to be adapted in order to fit the purpose of this research, specifically to assess the impact based on convergence/similarity. In order to adapt these indicators must be seen how indicators are defined. Some of the useful definitions are covered by Radaelli & Meuwese (2008) which define the indicator as pieces or parts of information that can be said to synopsize the property or elements of one system and emphasizes what is happening there. Vandenbroucke et al. (2008) gives overview of the indicators used in the INSPIRE principles of monitoring where the SMART criteria or goals are used. This means when some indicator is developed it needs to be specific, measurable, achievable, and relevant and time bound.

There are different typologies of indicators which are based on different types of indicators classified as: "quantitative and objective indicators which are directly measurable; qualitative and objective indicators that are used to detect if the policy proposal has led to a legislative intervention and an act has been being adopted; qualitative and subjective indicators which are perception-based; referring to an assessment or an opinion, e.g. whether an LA has sufficiently taken into account the results of a consultation" (Radaelli & Meuwese, 2008).

#### 2.9. Definition of policy aspects and development of relational indicators framework

The aim of this framework is first to re-present the considered policies in a unified way so they can be used for relating the elements of the policies and secondly to perform the assessment of the impact/influence. The framework consists of aspects and indicators. Based on this framework, firstly the elements of INSPIRE Directive in relation to the given aspects are defined. Secondly, the elements and relations of the Macedonian NSDI policy are defined in relation to INSPIRE. By achieving this, the two policies are defined in the same framework which allows the comparison using the given indicators. The output should provide the influence and the impact of the INSPIRE Directive. Additionally it should provide the information needed further in the research.

The defined framework consists of components of SDI, aspects in which can be perceived SDI policies and several indicators per aspect. The indicators are defined based on the existing methods for assessing and evaluating SDI that are used in the State of Play and the Monitoring and Reporting methods. However the indicators do not fully comply with these methods since they intend to measure primarily the existence and similarity between the external EU policy and the internal (domestic) NSDI policy. Considered through this case study they intend to measure the existence and similarity between the INSPIRE Directive and the Macedonian NSDI policy and the impact/influence of the INSPIRE Directive on the Macedonian NSDI policy. For each of the indicators are defined and explained the measurable variables that are used to assess the output.

#### 2.9.1. Impact/influence and extent of compliance measuring variables

The measuring of the impact/influence and the extent of compliance is based on two complementary approaches.

The first approach is based on the analysis of the similarity/conformity of the Macedonian NSDI policy and the INSPIRE Directive where the measurable indictors are related to existence of the concepts in the both policies, then comparison of the "coverage" of that concept by identifying the relation. The considered elements of the INSPIRE Directive in relation to the framework of aspects and indicators are recognized through the defined SDI aspects, while the relations are providing the linkage between the policies based on which the assessment of the impact/influence is performed. Next the degree of similarity/conformity (low, medium, high) is assessed according to the definition, meaning, semantics and concepts of use in the INSPIRE Directive. Finally the impact/influence is classified based on the type of impact (marked effect of influence) of INSPIRE which is either:

- direct, if the policy directly refers or specifies certain INPIRE or IR provision and strive to achieve the same objective
- indirect, if the policy has some degree of similarity to certain INPIRE or IR provision, yet does
  not directly refers to it and/or strive to achieve the same objective

The whole framework with the defined concepts, aspect and indicators is presented in *Appendix 8 – Table 19-23*. It must be noted that the impact/influence and extent of compliance is measured based on comparison of two policies and for that reason a model is used that can be explained as:

- Policy A relation to framework  $C \rightarrow AC$
- Policy B relation to framework  $C \rightarrow BC$
- Comparison of  $AC BC \rightarrow AB$

The second approach is based on the interpretation on the qualitative data analysis from the collected data. Here the impact and extent are defined based on the opinion of the interviewees, which is backed up with the existing grey literature as part of the qualitative data analysis. This is mainly focused on the actions (past, current and future) and current situation of policy development and implementation (de facto) and how they were, are or should be considered. Based on the codes and categories the relations and patterns needed to answer the research questions as are the reasoning and the possible extend of the impact/influence are defined.

As input data for the overall analysis are taken the legislations (de jure) as legal documents in which these policies are defined, and the past, current and future actions (de facto) related to the policy development and implementation which are based on documented evidences and interviewees perceptions. Both of the considered approaches are complementing each other, allowing strong interaction that is needed to define the overall impact/influence and extent of compliance.

#### 2.10. Summary

This chapter has derived the basic definitions of SDI, policy impact, policy influence and policy convergence. These definitions are used to assess the policy impact of INSPIRE on SDI developments in N-EUMS. The insight in the existing situation of the EUMS and N-EUMS can provide certain direction and define the reasons of considering the INSPIRE Directive as part of the N-EUMS SDIs and additionally clarify the role of the NMCA in relation to SDI which is considered as case study for this research.

## 3. METHODOLOGY TO STUDY THE NMCA

#### 3.1. Introduction

This chapter describes how the relation of the NMCA with SDI can be studied as part of a defined case study. This takes also the relations of concepts into account which should be used in order to assess the impact of the INSPIRE Directive. Hence, this chapter describes the methodology of actual assessment steps in a given case study, including the methods of data collection, processing, analysing and interpretation. Additionally here is explained how this methodology is applied in the process of data collection as part of the fieldwork phase.

#### 3.2. Study area

The NMCA i.e. the Agency for Real Estate Cadaster of Republic of Macedonia is the leading organization in establishing, maintenance and providing public access to the NSDI in Macedonia. "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 for its operation reports to the Government of R. Macedonia" (Agency for Real Estate Cadaster, 2014). AREC among other responsibilities<sup>4</sup> is also responsible for "establishment, maintenance and public access to the National Spatial Data Infrastructure" (Agency for Real Estate Cadaster, 2014). Most of the spatial data sets related to NSDI that can be considered as fundamental data that are produced and owned by AREC.

AREC is a member of the NSDI Council of Republic of Macedonia. AREC's other responsibilities related to the NSDI are to provide "*public access to the NSDI Geoportal, maintenance of metadata services, registry of metadata and associated trainings*" (The Parliament of Republic of Macedonia, 2014). Additionally the Agency should perform work related to publish decisions, bylaws, fee lists, annual work plans, implementation reports and other documents and information of relevance to the NSDI and adopt a decision for linking/connecting the third party to the NSDI that are previously approved by the NSDI Council. As part of AREC functions an organizational unit for administrative and technical support of the NSDI is set up.

Since SDI cannot be clearly defined according to the perception of only one Agency several other "secondary" organizations are considered. This is done in order to get a clearer picture of the Macedonian NSDI as well as their relation to the primary organization – AREC.

Part of the NSDI Council organizations/agencies such as the City of Skopje, the Agency for Spatial Planning, the Ministry of Environment and Spatial Planning, the Ministry of Information Society and Administration, the Ministry of Agriculture, Forestry and Water Economy are also included as part of the case study. The Public Agencies and the Ministries, have certain responsibility in particular fields among which spatial planning, protection and improvement of environment and nature, etc.

As third parties that are not directly included as part of the NSDI Council are considered the academia – the Faculty of Civil Engineering - Department of Geodesy that is related to NSDI as well as the private sector company, as external stakeholders in relation to the Macedonian NSDI.

<sup>&</sup>lt;sup>4</sup> All responsibilities of AREC can be found on <u>http://www.katastar.gov.mk/en/Page.aspx?Id=222&m=1477</u>

#### 3.3. Definition of impact/influence assessment steps

In order to define the impact (marked effect of influence) of external policy (INSPIRE Directive) on internal (NSDI) policy certain assessment steps should be defined that are related to the first sub-objective of this research. The aim of these steps is to define a method of assessing the influence of one policy onto another concerning not just the policy itself but also the existing actions reflected by that policy. Simply said, the policy is the initial stage of development of SDI so first the two policies need to be presented in a similar manner. For this a framework is defend which is based on the existing SDI assessment frameworks that were covered in *Chapter 2*, yet the indicators are defined in order to measure the convergence and type of impact of the external onto the internal policy. This provides insight in the impact/influence and defines a certain structure on the policies. The second step is the SDI implementation which is based on the defined policy. The actions of implementation are assessed based on the perceived actions considered through the opinions on the interviewed people which provide answers to the 2nd and 3rd sub-objectives. Based on this, the relation of the de jure and de facto evidence is made, by representing the outcome in relation to the given framework and the codes and categories defined from the qualitative data analysis. This completes the concept of assessing the impact/influence and extent of compliance. The defined steps are explained in *Figure 4. Impact assessment steps* where the defined outputs should be:

Output 1: Organization and description of elements of INSPIRE Directive according to the given framework

Output 2: Direct/indirect impact/influence and degree of impact/influence based on the similarity/conformity of the elements of the considered policies

Output 3: Reasons of influence (external/internal) and reasons to comply to INSPIRE

Output 4: Actions of policy implementation in the NMCA that are affected by INSPIRE Directive

Output 5: How the NMCA in relation to the given aspects comply or should comply in the process of compliance to the Directive

Output 6: Possible extent of compliance to the Directive

#### 3.4. Method of data collection

This research is based on primary data (semi-structured interviews) and secondary data - largely based on grey literature.

#### 3.4.1. Primary data collection

The collected data are based on semi-structured interviews that included questions related to the research questions. The data collected through the interviews referred to information concerning the reasons of considering INSPIRE, the roles of the organizations, the actions done there and the actions that were planned, as well as the possible extent of compliance to INSPIRE in AREC above everything. A semi-structured interview is suitable to employ in this type of research since its aim is to derive certain conclusions on views of interviewees in relation to INSPIRE and the possible policy convergence of the NSDI with the INSPIRE objectives and the research questions in general. For that reason the interviews included open and close questions. Prior to each interview definitions and terms were clarified. Each interview was guided by an interview protocol.

The interviews were structured according to specific target groups and departments/organizations from where the data is obtained. The collected data is qualitative. The focus is on the departments and individuals that are included in policy making, establishment of the NSDI, data production, data and services providers and standardization.

In order to get a clearer picture of the Macedonian NSDI as well the relation to the primary organization – AREC, additional interviews were carried out with professionals from other government organizations, public agencies, private sector and academic staff that are familiar and involved in the NSDI.



Figure 4: Impact assessment steps

Here are provided some general information on the organizations that are visited for the fieldwork activity, the number of people that are interviewed there as well as some information on the interviewee.

The following agencies/organizations are covered:

- The Agency for Real Estate Cadastre (AREC) 5 top management, 4 middle management and technical staff. These 9 interviewees are marked as key persons.
- City of Skopje 1 the top management staff

- Agency for Spatial Planning 1 the top management staff
- The Ministry of Agriculture, Forestry and Water Economy 1 middle management/technical staff
- Ministry of Environment and Spatial Planning 1 middle management/technical staff
- Ministry of Information Society and Administration 3 middle management/technical staff
- Faculty of Civil Engineering Department for Geodesy 2 professors and 1 assistant lecturer
- GIS private sector company (production of spatial data and solutions for NSDI) 2 top management staff

The following chart presents the position of the interviews on their organization. The list of respondents is presented in *Appendix 6 – Table 10*.



Figure 5: Position and function of the interviewee

Most of the interviews are collected in one primary organization – AREC. The other interviews are carried out in secondary organizations. The interviews are divided in five types covering the:

- Top management staff from AREC
- Middle level management and technical staff in AREC
- Management staff from the City of Skopje and the Agency for Spatial Planning; Management and technical staff from the included Ministries
- Academic staff from the Faculty of Civil Engineering Department for Geodesy
- Top management staff from a representative company of the private sector

#### 3.4.2. Secondary collected data

The *secondary data* was collected based on desk study research synthesising grey literature related to Republic of Macedonia and the INPSIRE Directive. This included project documentation, links to online available documents, laws, regulations, rulebooks and all possible documentation that can provide certain information in the Macedonian NSDI context.

#### 3.5. Method of data processing

The collected data can be categorized as raw data. In order to gain the required information from this data, it must be processed and presented in a most appropriate way for further analysis. The processing approach on the primary data consists of several steps including translation, transcription of the recorded interviews and notes that are collected, and then data sorting and arranging in tables according to specific grouping such as interviewee group. The following steps include summarization of the most important parts of the answers i.e. the substance of the answers and presentation of the collected data using a form of descriptive statistics. The processing approach on the secondary data includes structuring of data by

categories defined according to specific topics such as projects documents, legislation etc. The information on the collected data is summarized and presented in a table shown in *Appendix* 7 - Table 11-18.

#### 3.6. Method of data analyzing

The interview transcriptions as well as the collected documentation i.e. grey literature are classified as qualitative data. In order for this data to be useful and to enable the extraction of useful information these data are analysed. For that a qualitative data analysis method is used. Qualitative data analysis is described by Taylor-Powell & Renner (2003) as a process which seeks relationships between various themes that have been identified, or relate behaviour between certain characteristics of the respondents. This is all based on the data generated by interviews, observations and documentation that needs to be described and summarized. The outcome of the findings is used to draw certain conclusions. Computer-Assisted Qualitative Data Analyses is a simplified way used in the process of analysing qualitative data. There are many benefits of using CAQDA which are noted by Schutt (2011) such as that it allows to speed up the analysis process.

This method for qualitative data analysis was mostly followed by the approach based on the steps defined by Schutt (2011) and Taylor-Powell & Renner (2003) that includes several important steps such as documentation and preparation; then conceptualization, coding and categorizing; examining patterns and relationships; displaying data, interpretation and summarizing. The conceptualization, coding, and categorizing are one of the important steps. The conceptualization is in a way forming concepts i.e. interpretation on the provided data. For each of the data, including the transcripts from the five groups of interviews and the documentation, a coding list is defined. The coding or indexes as explained by Lacey & Luff (2009) is a process in which thematic structure to the data is applied, which can be a numerical or textual codes in order to detect detailed fragments of data which match to certain defined themes. Categorizing means to "organize them into coherent categories that summarize and bring meaning to the text" (Powell & Renner, 2003). Defining the relations is also an important step. Here the concepts and the codes are linked in order to define certain patterns, similarities or some kind of connections caused by a certain effect of one category on another category. The interpretation is the final step in the analysis. "*Here the themes and connections are used to form the findings which can be compared as attaching meaning and significance to the analysis*" (Powell & Renner, 2003).

#### 3.7. Process of data collection

The process of data collection explains the activities that were performed during the fieldwork phase, including all the relevant information related to the whole process. The process includes communication with the respondents and collection of two related data types. First the semi-structured interviews and secondly the documentation which complements the information that are given in the interviews.

As part of the fieldwork preparation, the organizations were contacted and the people to be interviewed were defined. Those are people that were involved or somehow related to NSDI in Macedonia. Even though the snowball approach of achieving contact with people that have knowledge in this domain was not originally planned, it came as a natural idea to cover as much as possible of professional staff and organizations. This was primarily achieved for three Ministries that were visited and part of the staff in AREC. In the end from the planned number of interviews of 15 to 20 it resulted with 21 respondents which are listed in *Appendix 6 – Table 10*.

The process of taking interviews was done systematically, following the already prepared questions for the semi-structured interviews and the previously defined protocol involving short introduction of the aim of this research, permission to record the interview, very short introduction of the questions and in the end

interviewing the respondent. At the end of every interview the respondents were asked if they have something else to add and then were taken the metadata of the respondents.

The interviews were different in variations of questions and time, since the interviewees had different background and working positions. The variation in length of the answers is different. However an interview took between 25 and 60 min. Approximately there was one interview per day for the whole fieldwork period. Two of the interviews were double interviews. Notes of the interviews, that were not allowed to be recorded from personal of professional reasons such as the politics of the organization, were taken. During or at the end of the interviews for some of the organizations such as AREC, it was asked whether there are any documents and data or links of that documents that were mentioned or referred in the interviews.

The next step as part of the data processing and structuring was the translation of the transcripts and notes from the semi-structured interviews. The translation was done from Macedonian to English language, since the interviews were done in Macedonian language. This was one of the most time-consuming processes. The notes were also presented in the same form as the transcripts made from the recordings.

In order to make the process of data collection more transparent and to check for inconsistencies or gaps in logic, the interviewees were asked to review the prepared transcripts. From 21 interviewees, 13 responded of which 2 had some small remarks. After the data was processed, a summary table is made, containing a short summary of each of the answers that were given in the interview.

As already mentioned in the process of data collections were included related documents that were previously known or assumed to exist, or documents that are mentioned or referred to during the interviews. Most of the documents are collected online, while some of the documents are collected onsite. Not all of the documents are public, however they can be only used a relevant source of information.

#### 3.8. Summary

This chapter presents the most important characteristics of the case study area, such as the role and responsibilities and the way it is organized. In order to define the impact and extent of compliance to the INSPIRE Directive through the perspective of the NMCA i.e. AREC, impact/influence assessment steps are defined that are based on suitable methodology to collect, process and analyse data that fits the purpose of the study – a qualitative method is chosen. This method is in line with the above defined steps which provide answers to the defined research questions.

## 4. EMPIRICAL DATA ON NMCA

#### 4.1. Introduction

This chapter summarizes and presents the collected fieldwork data and the results from the assessment of the similarity/conformity and impact/influence on the considered case study. The aim is to present what is the real situation through the collected semi-structured interviews and the defined framework of aspects and indicators using the methodology explained in the previous *Chapter 3*.

#### 4.2. Results from the assessment of the similarity/conformity and impact/influence

The derived results from the assessment of the similarity/conformity and impact/influence are presented in *Table 2-5: Assessment of the similarity/conformity and impact/influence*. The applied analysis is based on the framework of aspects and indicators defined according to the first approach used to measure the impact/influence and the extent of compliance between the considered policies. This approach is specified in *Section 2.9.1* while the defined framework is presented in *Appendix 8*. The output of the analysis is presented in *Column: Results* as part of *Table 2-5*. The results specify the existence of the elements in the both policies, comparison of the "coverage" of those elements by identifying the relation between them. Based on the linkage between the policies, the assessment of the impact/influence is defining the degree of similarity as well as the type of impact of the external policy onto the internal policy.

#### 4.3. Presentation of data collected from the interviews

The collected raw data from the interviews is processed as transcripts made from the recordings and notes, and summarised in a short table. In order to get a clearer picture of the variations of the collected data, categorization by topics on the interview answers is applied. This is necessary because there are 5 different interview types for 5 different groups of interviewees. The categorization reflects the topics of the research questions presented in *Table1: Sub-objectives and research questions*. The provided answers on the defined interview questions are presented with sample answers reflecting the content of the answers that have similar meaning.

# Elements and relations of the Macedonian NSDI strategy/policy in relation to the INSPIRE Directive

The elements and relations of the Macedonian NSDI policy in relation to the INSPIRE Directive can be recognized by defining the NSDI concept and the main similarities and differences of this concept in relation to the INSPIRE Directive.

In relation to this, from 14 interviewees 11 have used related words such as collect data, publish and share data in terms of "To publish and share spatial data which are in responsibility of few different institutions" (int13), "Make integration where the government/public institution will share data, which will give benefits to the citizens and other parties to be able to view, review and use the web services" (int13) etc. The word INSPIRE and environment are used by 9 respondents in terms of "Also for certain policy making (protection of the environment, crisis management etc.]" (int13), "The idea is based on the Annexes that are given in INSPIRE" (int20) etc. and even as contradiction such as "The priority is not the protection of the environment" (int9) etc. The words broader concept and economy/economic is used by 7 respondents in terms of "Economic focus, because we are a country in development" (int13), "Broader scope concept - economic benefits, of environmental policies and actions that are similar to the INSPIRE Directive, improved emergency response, improved planning, policy implementation and monitoring" (int10; int11; int12) etc.

			Similarity/conformity between Macedonian (N)SDI strat	egy and policy and the I	EU INSPIRE Directive	
Component	Aspect		Indicator	Measurable variable	Description of the measurable variable	Results
			The Macedonian (N)SDI policy is covering the existence of stakeholders/participants	Yes/No	There are defined stakeholders/participants in the Macedonian (N)SDI policy	Yes
		Existence of (N)SDI stakeholders	Existence of stakeholders/participants in relation to the INSPIRE Directive	Yes /No	There are defined stakeholders/participants in the Macedonian (N)SDI policy that are also defined in the INSPIRE Directive (relation)	Yes
əlqo		Similarity of stakeholders	The degree of similarity of stakeholders roles in relation to INSDBF Directive	ow/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning commutics and concent of use in the INSDIRF Directive	HaiH
₽d					The import/influence is considered direct if the policy refers directly to	-9
					Interinpact/initioence is considered or each in the poincy refers an each to achieving the same objectives and points to it directly, else the existing	
	Stated Sector (Bastic	INSDIRF influence on stakeholders	The two of immart (marked affert of influence) of		isimilarity can be considered as indirect impac Note: This indiretor will be additionally confirmed with the oninion of the	
	stakenoluers/ Particupants		INSPIRE in relation to (N)SDI stakeholders	Direct/Indirect	interviewees	Indirect
(۸			The Macedonian (N)SDI policy is covering the		The construction of the second sec	Vac
30			Existence of spatial data services is solation to the		There are defined spatial data services in the Macedonian (NJSMI policy There are defined exatial data continue in the Macedonian (NISMI notice to the t	163
olon			Existence of spatial data services in relation to the	Yes/No	intere are demned spanar data services in the Macedoman (NJSOF poncy that are also defined in the INSPIRE Directive (relation)	Yes
ıyə			Existence of network services standards/criteria in		There are defined networ services standards/criteria in the Macedonian (N)SDI	
)9]			relation to INSPIRE Directive	Yes/No	policy that is also defined in the INSPIRE Directive (relation)	No
_) א		Evittoren of constict data conviced	Existence of network services standards/criteria in	Acc (N)	There are defined network services standards/criteria in the Macedonian (N)SC	0 Yes (mointed)
101			The descence of civilentia (Conformity in relation to the	100/100	pulley triatis also utilitied in the INSPINE DIFECTIVE (Feldului) The device of circularity for defined according to the definition	
wte		Similarity of spatial data services	ine degree of similarity/comormity in relation to the spatial data services in INSPIRE Directive	low/Medium/High	The degree of similarity/comormity is defined according to the definition, meaning semantics and concept of use in the INSPIRE Directive	High
۶N					The impact/influence is considered direct if the policy refers directly to	
\$\$					achieving the same objectives and points to it directly, else the existing	
;ə:					similarity can be considered as indirect impac	
))A		<b>INSPIRE influence on spatial data</b>	The type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the	
'	Services	services	INSPIRE in relation to spatial data services	Direct/Indirect	interviewees	Direct
			The Macedonian (N)SDI policy is covering the existence of organizational structure in relation to			
			the Macedonian (N)SDI policy	Yes/No	There is defined organizational structure in the Macedonian (N)SDI policy	Yes
(s		Existence of (N)SDI coordination			There is defined coordination body in the Macedonian (N)SDI policy that are	
stu		body	Existence of coordination body in relation to INSPIRE	Yes/No	also defined in the INSPIRE Directive (relation)	Yes
əu			Degree of similarity/conformity on the roles and			
ger		Similarity of (N)SDI coordination	responsibility of the coordination bodies in relation	/ow/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning commutics and concent of use in the INSDIRE Directive	Medium
ue	Organization	INCOLDE influence no (NICOL	Truco of immode (morehood officet of influence) of		The import influence is considered direct if the policy refers to it directly also	
, rrs	Coordination	coordination body	INSPIRE in relation to (N)SDI stakeholders	Direct/Indirect	the existing similarity can be considered as indirect impact	Indirect
4 le			The Macedonian (N)SDI policy is covering the			
uo			existence of quality assurance procedures in	Voc /No	There is defined OA assessed uses in the Massedonian (N)CD1 notice.	ON No
iti		Evictores of another second	דיוביניניניטון וט נוופ ואומרפעטווומון (ואןסטו סטווכץ ביובינימיניס מיניסויניי בביניימיניס מיניסימייניס		There is defined QA procedures in the Macedonian (NJSPI poincy There is defined QA associatives in the Macedonian (NISDI policy that are also	NO
ıtit		Existence of quality assurance procedures	existence of quality assurance procedures in relation to INSPIRE	Yes/No	Intere is defined up procedures in the Macedonian (N)out poincy that are also defined in the INSPIRE Directive (relation)	No
su			Degree of similarity/conformity on the guality			
4) A		Similarity of quality assurance	assurance procedures in relation to INSPIRE	da [11] and 100 A)	The degree of similarity/conformity is defined according to the definition,	1
ɔil		proceaures	חו ברוו אב	LOW/ IVIEULUTI/ TIBI		LOW
од					Interimpactymmetric is considered anrecting the pointy releasion excity to achieving the same objectives and points to it directly, else the existing	
					'similarity can be considered as indirect impac	
	Organization -	INSPIRE influence to quality	Type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the	tosipa
	Quainy assurance	assur arre procedures	איז	חונהרו/ווומווהרו	III IEU NEWEES	Innii cu

			Similarity/conformity between Macedonian (N)SDI stra	tegy and policy and the	EU INSPIRE Directive	
Component	Aspect		Indicator	Measurable variable	Description of the measurable variable	Results
			The Macedonian (N)SDI policy is covering the existence of monitoring body	Yes/No	There is defined monitoring body in the Macedonian (N)SDI policy	Yes
			The Macedonian (N)SDI policy is covering the existence of monitoring standards	Yes/No	There are defined monitoring standards in the Macedonian (N)SDI policy	Yes
		Existence of monitoring body and	Existence of monitoring body and standards in	Voc /No	There are defined monitoring standards body in the Macedonian (N)SDI policy	Vac
		Similarity of monitoring body and	The degree of similarity/conformity of the monitoring body and standards in relation to	100/100	ore can be derived on the manufacture of cancer. I can be definition. The deervee of similarity/conformity is defined according to the definition.	2
		standards	INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive	Medium
					The impact/influence is considered direct if the policy refers directly to a chieving the same objectives and noints to it directly else the existing	
	Organization -		The type of immart (marked effect of influence) of		sometric can be considered as indirect more of a construction of the considered as indirect more of the considered as indirect more of the consistence of the consist	
	Monitoring	INSPIRE influence on monitoring	INSPIRE in relation to (N)SDI monitoring	Direct/Indirect	interviewees	Direct
			The Macedonian (N)SDI policy is covering the existence of data sharing arrangements between		There are defined data sharing arrangements between public authorities in the	
			public authorities	Yes/No	Macedonian (N)SDI policy	Yes
(s:		Existence of data sharing arrangements between public authorities	Existence of data sharing arrangements between public authorities in relation to INSPIRE Directive	Yes/No	There are defined data sharing arrangements between public authorities in the Macedonian (N)SDI policy that are also defined in the INSPIRE Directive (relation)	Yes
tuəu		Similarity of data sharing arrangements between public	The degree of similarity/conformity of the public authority data sharing arrangements in relation to		The degree of similarity/conformity is defined according to the definition.	
uəž		authorities	INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive	Medium
}rran§			The Macedonian (N)SDI policy is covering the existence of data sharing arrangements between	Voc (No.	There are defined data sharing arrangements between public authorities and	C N
1		-		res/ INU		NO
euo		Existence of data sharing arrangements between public	Existence of data sharing arrangements between public authorities and third parities in relation to		There are defined data data sharing arrangements between public authorities and third parities in the Macedonian (N)SDI policy that are also defined in the	
oitu		authorities and third parities	INSPIRE Directive	Yes/No	INSPIRE Directive (relation)	Yes (possible)
ntitenl		Similarity of data sharing arrangements between public authorities and third parities	The degree of similarity/conformity of data sharing arrangements between public authorities and third parities in relation to INSPIRE Directive	low/Medium/High	The degree of similarity/conformity is defined according to the definition, maaring semantics and concent of use in the NSDIRF Directive	MO
)						LUW
ΡοΙίςγ			Tro true of inneret (northod officet of influence) of		The impact/influence is considered direct if the policy refers directly to achieving the same objectives and points to it directly, else the existing similarity can be considered as indirect impact MANC This indirection will be additionally confirmed with the consistence theory and the considered as indirect impact.	
	arrangements	INSPIRE influence on data sharing	INSPIRE in relation to data sharing arrangements	Direct/Indirect	וסטפי. וווא וווטוכאנטי שיוו שב מטמיניטוואוין כטוווווווופט שינוו נווב טעווווטון טי נווב interviewees	Direct
			The Macedonian (N)SDI policy is covering the existence of PPP in relation to the Macedonian (N)SDI policy	Yes/No	There is defined PPP in the Macedonian (N)SDI policy	Yes
			The Macedonian (N)SDI policy is covering the existence of model and mechanisms between public			
			and private sector bodies with respect to the development and operation of the SDI-related projects	Yes/No	There are defined model and mechanisms of PPP in the Macedonian (NJSDI policy	Yes
		Existence of monitoring body and monitoring standards	Existence of PPD from in relation to INSPIRE Directive	Ves/No	There is defined PPP in the Macedonian (N)SDI policy that are also defined in the INSPIRE Directive (relation)	No
		Similarity of PPP	The degree of similarity/conformity of the PPP arrangements in relation to INSPIRE Directive	Low/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning, semantics and concept of use in the INSPIRE Directive	Low
					The impact/influence is considered direct if the policy refers directly to	
	-		الم الم المانية والم المحالمات المحالمات المحالمات المحالمات المحالية المحالمات المحالمات المحالمات المحالمات ا		active vide and source objectives and points to rearready, as care and consumption in the source of	
	Legal - Public-private partnerships (PPP)	<b>INSPIRE influence on PPP</b>	Instype of impact (marked effect of immerice) of INSPIRE in relation to PPP	Direct/Indirect	וסטב: וווא וווטובמטו אווו טב פטטונוטומון לטווווווופט אינו גווב טעווווטו טו גווב interviewees	Indirect
			Similarity/conformity between Macedonian (N)SDI strat	egy and policy and the	EU INSPIRE Directive	
-----------	--	---	--	------------------------	--	---------------
Component	Aspect		Indicat or	Measurable variable	Description of the measurable variable	Results
			The Macedonian (NJSDI policy is covering the existence of metadata standards/criteria for spatial data sets	Yes/No	There is defined metadata standards/criteria for spatial data sets in the Macedonian (NJSDI policy	Yes
		Existence of metadata standards/criteria for spatial data sets	Existence of metadata standards/criteria for spatial data sets in relation to INSPIRE Directive	Yes/No	There is defined metadata standards/criteria for spatial data sets in the Macedonian (NJSDI policy that is also defined in the INSPIRE Directive (relation)	Yes
:		Similarity of metadata standards/criteria for spatial data sets	Degree of similarity of metadata standards/criteria definition for spatial data sets in relation to INSPIRE Directive	Low/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning, semantics and concept of use in the INSPIRE Directive	High
sbrel			The Macedonian (N)SDI policy is covering the existence of metadata specifications	Yes/No	There is defined metadata standards/criteria for spatial data services in the Macedonian (NJSDI policy	No
onst2		Existence of metadata specifications	Existence of metadata specifications in relation to INSPIRE Directive	Yes/No	There is defined metadata standards/criteria for spatial data services in the Macedonian (NJSDI policy that is also defined in the INSPIRE Directive (relation)	Yes (pointed)
		Similarity of metadata standards/criteria for spatial data services	The degree of similarity of metadata standards/criteria definition for spatial data services in relation to INSPIRE Directive	Low/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning, semantics and concept of use in the INSPIRE Directive	High
	Metadata	INSPIRE influence on metadata standards/oriteria	The type of impact (marked effect of influence) of INSPIRE in relation to metadata	Direct/Indirect	The impact/influence is considered direct if the policy refers directly to achieving the same objectives and points to it directly, else the existing similarity can be considered as indirect impact Note: This indicator will be additionally confirmed with the opinion of the interviewees	Direct
			The Macedonian (NJSDI policy is covering the existence of technical arrangements for interoperability in relation to the Macedonian (NJSDI policy	Yes/No	There is defined technical arrangements for interoperability in the Macedoniar (N)SDI policy	Yes
sbret		Existence of technical arrangements for interoperability	Existence of technical arrangements for interoperability in relation to INSPIRE Directive	Yes/No	There is defined technical arrangements for interoperability in the Macedoniar (NJSDI policy that is also defined in the INSPIRE Directive (relation)	Yes
oneti		Similarity of technical arrangements for interoperability	The degree of similarity of technical arrangements for interoperability in relation to INSPIRE Directive	Low/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning, semantics and concept of use in the INSPIRE Directive	High
5	Interoperability of spatial data sets and services	INSPIRE influence on technical arrangements for interoperability	The type of impact (marked effect of influence) of INSPIRE in relation to technical arrangements for Interoperability	Direct/Indirect	The impact/influence is considered direct if the policy refers directly to achieving the same objectives and points to it directly, else the existing similarity can be considered as indirect impact Note: This indicator will be additionally confirmed with the opinion of the interviewees	Direct
			The Macedonian (NJSDI policy is covering the existence of spatial data themes Existence of spatial data themes in relation to the	Yes/No	There are spatial data themes defined in the Macedonian (N)SDI policy. There are spatial data themes defined in the Macedonian (N)SDI policy that are	Yes
eti			The Macedinau (NJSDI policy is covering the existence of data set standards/criteria Existence of data sets standards/criteria for spatial	Yes/No	Three is defined metadata standards/criteria for spatial data services in the Macedonian (NJSDI policy Three are defined data standards/criteria in the Macedonian (NJSDI policy Three are defined data set standards/criteria in the Macedonian (NJSDI policy	No No
۶D		Existence of usual specifications Similarity of spatial data themes	The degree of similarity/conformity in relation to the spatial data themes in INSPIRE Directive	Low/Medium/High	The server restored in the more concerned on the concerned on the server (near concerned on the server	Medium
		IN SDIRF influence on snatial data	The hun a of immact (macked effect of influence) of		The impact/influence is considered direct if the policy refers directly to achieving the same objectives and points to it directly, else the existing similarity can be considered as indirect impact Mone "The indir abre will be additionally confirmed with the noision of the	
	Data Sets	themes	INSPIRE in relation to spatial data themes	Direct/Indirect	interviewees	Direct

Table 5: Assessment of the similarity/conformity and impact/influence 4<sup>th</sup> part

Based on the answers given by the interviewees related to the concepts similarities and differences, from 14 interviewees all provided answers that relate the similarities of the concepts in terms of "INSPIRE is fully considered in the Law" (int2), "As basis - INSPIRE Directive (adapted for our circumstances)" (int7), "Don't have many differences" (int14; int15) etc. while in relation to the differences 8 respondents have provided answers such as "Differences in the domain of use - much broader than INSPIRE" (int1), "INSPIRE - certain data sets we are far away from achieving, yet for certain data sets we are close" (int13), "Sets that we have and sets that we need to produce - taken what fits our conditions" (int9), "Main differences are not in the concept - in the way in which it should be implemented (to fit the circumstances)" (int10; int11; int12) etc. Here are visible certain variations in the answers related to the possible differences. Even though the reasons for influence as well as the type of influence and the considered benefits, is reflected as part of the elements and relations they are described as part of the next paragraph concerning the reasons of compliance.

### Reasons to consider developing a Macedonian NSDI in compliance with the INSPIRE Directive

There can be defined several views from the answers of several interview questions that can reflect the reasons of considering to develop a Macedonian NSDI in compliance with the INSPIRE Directive.

From 15 interviewees 5 have used the word standard in terms of "The first step of opening of the infrastructure is definition and respect of same standards" (int20), "Main problem – absence of national geospatial standards" (int2), "Existence of standards that are working for the EUMS" (int1) etc. The word EU or Europe was used by 12 out of 15 interviewees in terms of "EU pretensions" (int7), "Used for all purposes and for creation of the European policy" (int13), "EU funds" (int9), "Political will to do this (harmonize our legislation with the European legislation?" (int18), "Existence of standards that are working for the EUMS" (int1) etc. The word data is used by 7 interviewees in relation to "There is no unified standard or way of sharing and communication of data" (int5), "Incompatibility in relation to the part that is covering the data sharing" (int14; int15), "Duplication of data which is produced by different organizations" (int14; int15), "Need of INSPIRE rules for data sharing arrangements" (int2) etc. Two of the interviewed pointed out that INSPIRE is "Good example that is already functioning" (int5) as well as "Good example of functional and operational SDIP" (int7). There are also other given answers which point to the possible variations which exist in terms of the possible reasons.

As a reason to develop NSDI in line with INSPIRE are also provided three variations. On the questions "Does this reasons come from internal influence such as problems with data standardization, external factor involvement or something else?" and "Are these reasons mainly initiated from internal of external influence?". From 15 interviewees 5 pointed to the existence of internal and external influence in terms of "Internal and external exists" (int1), "Both, internal and external factor is included" (int18) etc. The word internal is used by 7 out of 15 and the word external by 7 out of 15 respondents as for example "External factor is considered much stronger" (int1). There is also some overlap in the opinions between the respondents and other related answers such as "All the countries in the region are countries in development - funding projects from EU" (int13), "NO problem with data standardization! (very high standards exist)" (int19), "Are these standards in line with the EU standards (Going in some direction such as EU standardization)" (int19) etc.

The answers regarding how the influence is considered or are the reasons directly or indirectly influenced by the INSPIRE Directive where from 15 interviewees 6 were using the word indirect in terms of "Indirectly it is started based on that Directive" (int14; int15), "Indirect" (int7), "Indirect (only as a plus of what we already have]" (int19) etc. while direct was used by 9 of the respondents in terms of "Direct influence - for all the data sets that we don't have we are guided by the Directive" (int13) etc. There are also 2 respondents that have opposite answers such as "Direct influence of INSPIRE on Law and Strategy" (int20) and "Indirect - is the power on national level to recognize and accept a good idea" (int20) as well as other answers such as "Directive is literally translated and are seen examples from other EU countries" (int13) and "We choose what fits for us that is standardized so later we could put them in the information flow throughout EU" (int13).

The benefits and bottlenecks and expectations of complying to INSPRE also provide certain view of this reasoning. On the question "Are there considered possible benefits and bottlenecks of complying to INSPIRE?" and the expectations and the opinions on developing a NSDI in line with INSPIRE were collected the following results. From 8 respondents all have provided answers such as "Benefits are a lot (INSPIRE will only provide a better standardization)" (int19), "Benefits: Updated and relevant information in one place upon which you can make better decisions, No duplication in data collection, Greater cooperation between institutions in Macedonia..." (int21), "Benefits - easier access, sharing, use and distribution of standardized spatial data/services in an efficient, effective and coordinated manner in the country (nationwide) and between the countries of the region" (int17) etc. Regarding the answers for bottlenecks are also provided 6 out of 8 answers such as "Bottleneck - working by some our own standard being closed on national level only without baving insight on the standardization on European level" (int13), "Main bottleneck is the business interests of the institutions; lack of financial or technical condition" (int20), "Problems: Data is not updated, Data of poor quality, Lack of accurate information about who owns what and to what it has authority" (int21) etc. In relation to the bottlenecks it can be seen that there are several variation in the answers.

The expectations and opinions on developing an SDI in line with INSPIRE has also provided several answers from 2 interviewees such as: both of them said that the SDI should be developed in line with INSPIRE while the expectations "There is an experience on how it could function but it is early to function on INSPIRE level" (int5) as well as "There are some initiatives, however it's slowly going" (int6) and "The expectation to harmonize the data until 2020 would be unreal" (int6).

The final relation of the reasoning is found in the actors that took part in the development of the NSDI policy in Macedonia. From 12 interviewees the words external, expert and consultant (all together) are used by 11 respondents in terms such as "The Dutch team - included as external actors" (int9), "External actors were included in the creation of the Macedonian NSDI (brought experience)" (int13) etc. From 12 interviewees the term NSDI stakeholders, members and NSDI Council was used by 7 of the respondents in terms of "Participants in the NSDI Council, NSDI Committee and the working groups" (int2), "NSDI Council organizations participation - defined in the Law for NSDI" (int17), as well in terms of "Membership in the Euro Geographic-constantly speaking of INSPIRE Directive, data harmonization etc." (int14; int15).

#### Role of the Macedonian NMCA (AREC) in relation to the NSDI

The role of the Macedonian NMCA i.e. AREC in relation to the NSDI is covered with several interview questions, from which some are directly and some indirectly referring to it. As a direct question on the role of AREC out of 8 interviewees 2 answered "As described in the Law and the Strategy" (int13), 3 provided answers such as "The NSDI and the Strategy are initiated by AREC" (int16), 5 of the 8 respondents have defined the role as "Organization, cooperation, developing of technical conditions such as Geo-Portal, staff is included in preparing the law and bylaws" (int3), "Responsible for establishing, maintaining and providing public access to NSDI Geoportal, maintenance services metadata, metadata registry and trainings associated with them etc. (as defined in the Law)" (int17) etc. and 1 answer covering only the data i.e. "Actively working on spatial data production" (int8).

On the question "What spatial data sets does AREC provides or owns that are also considered as part of the INSPIRE Annexes?" out of 3 interviewees 2 have used the words cadastral and topographic data in terms of "Most of the fundamental data sets according to INSPIRE (cadastral and topographic data)" (int3) while one answer was more detail such as "Cadastral parcel, Administrative boundaries, Buildings, DTM – Elevation, Transportation network, Hydrography etc." (int8).

The similarities between the countries in the region and their leading organizations have been pointed out by 3 out of 3 respondents which were using the word same system in terms of "*These countries come from a* same system (communication, production of data...everything is based on same legality, same habits)" (int20), NMCA was used by 2 respondents in terms of "*Data sets and NMCA as leading organizations for NSDP*" (int1) and "NMCA in the past had much more influence and even now they have a great influence in relation to SDI" (int19). There are some other answers such as "INSPIRATION project has shown that there are similarities" (int20) etc.

### Scale/scope of actions affected by the INSPIRE Directive in the Macedonian NMCA - How the NMCA in Macedonia should comply to the INSPIRE Directive

The current actions affected primarily in terms of developing and implementation of the NSDI in Macedonia was posed as a question to 15 interviews from which the term (National) Geo-Portal was used by 12 of the respondents in terms of "Development and implementation of software solution for the National Geoportal" (int17), "Development of INSPIRE compliant Geo-Portal" (int21) while 8 respondents have used the word metadata in terms of "Metadata editor is developed (translated)" (int14; int15), "Working on metadata" (int16), "Metadata for topographic maps is done, now we are working on other data sets" (int16). The word data (excluded from metadata) is also used by 8 of the respondents in term of "Preparation of data sets for transposition to INPIRE (this is done by a private company) and publishing on the Geo-Portal" (int3), "Standardization of data and administrative DTM units under INSPIRE technical specifications" (int17) etc. The word INSPIRE is used by 3 of the respondents as "In accordance with INSPIRE - in the biggest part" (int13), "Action plan et al. "No current actions, however planned actions are to produce new digital data sets….develop a web services which eventually will be linked with the NSDI Geo-Portal" (int18), "Action plan - the actions are given there" (int9) etc. where other possible questions were also collected.

On the question "According to your information and experience are there enforcement actions for these aspects (organizational and legal)" out of 7 interviewees 3 have used the words not in the moment (variations) in terms of "At this moment no; Should start with the definition of the NSDI bodies, see how this will be made available who owns what, to be made as more accessible as it's possible" (int18) and 3 respondents have provided answers such as "Next that follows is the adaptation of bylaws; In relation to the organization, the key people are defined (NSDI Council)" (int10; int11; int12) while 1 responded have provided answer concerning the "Straightening of capacities; Developing/upgrading the ICT" (int7).

The arrangements for Data and Service sharing and the opinion of how that can be made compliant where the interviewees were asked the following question "Are there existing arrangements for Data and Service Sharing between AREC (or other public organizations) and other public organizations (or AREC) or third parties?" out of 14 interviews 9 used the word yes and exists in terms of "Data sharing arrangements exists" (int3), "Data is not given, only information" (int5), "There is Memorandum for data sharing" (int9) etc. while the words no and exist was used by 4 of the respondents in terms of "No, there aren't any" (int20), "No, the Ministries should not have exchange agreements" (int10; int11; int12), "Not at this moment" (int2). There are answers where arrangements are used yet they relate to "Good cooperation - based on a memorandum for cooperation, which defines the knowledge sharing, support, education etc." (int19), "Yes, however there is still no shared any data yet" (int9) etc.

The relation and enforcement of the arrangements is covered with several answers here where different variations can be met, such as "AREC is charging their data; City of Skopje is giving the data without charging, even they have cost for collecting and managing the data" (int9), "Agreements are made between the public agencies and the third parties that are involved in the NSDI" (int10; int11; int12) and "It's according to the legal limitations as well as following the property of data that are defined in the Directive" (int8), "Currently not technically according to INSPIRE" (int8), "Free access to the MAKPOS system (web service)" (int19) etc. In relation to the opinions or the answers on how should this arrangements be done or are they already according to INSPIRE, from the interviews 7 have provided answers from which 4 are using the word web service in terms of "In the future - possible through theirs Geo-Portal using web services" (int19), while the rest of the answers relates to "What institution is responsible for issuance of official data" (int6), "Up-to data and legitimacy of data is important" (int6) etc.

The knowledge and information on the AREC staff on INSPIRE, was based on the answer on 3 technical staff and 3 academics staff from where were obtained answers such as "*Basic knowledge which is not enough*" (int8), "*Certain group of people participating in all the NSDI activities*" (int16) and "Use experience from the private sector for preparation of other data sets" (int16) while also was pointed to the knowledge coming from abroad based on consultants and SDI experts.

On the questions "According to your information and experience, are there any technical standards defined according to the Macedonian NSDI policy?" all 3 responded as "Current data is according to AREC" (int3), "The current actions are done according to INSPIRE standardization" (int8), "Currently working on regulation (things will be specified and defined]" (int16) while the existence of ICT 1 respondent has answered "AREC has ICT that provides access to spatial data and services" (int3) and 2 answered that they don't have particular knowledge on the ICT Architecture and they have all used the words no knowledge or no information in relation to how it should be made compliant to INSPIRE.

On the existence of Geo-Portal in AREC and the other organizations as well of existence of National Geo-Portal out of 7 interviewees, 5 have used the words yes and exist in relation to Geo-Portal in terms of "Yes, AREC has Geo-Portal" (int3), "Yes, Geo-Portal is available (only preview service is available)" (int18) while 2 have used the word no in the same sense such as "No geo-portal" (int7) and "Planned in the future to develop an ASP geo-portal that will publish web services on the National Geo-Portal" (int2). In relation to the National Geo-Portal out of 3 respondents that have used the words develop or/and construction have provided answers such as "It is under construction" (int3), "Yes, there will be (it's in phase of development)" (int8), "It's in a development phase" (int16). In AREC out of 3 interviewees 3 have used the words should be or would be in relation to the National Geo-Portal to INSPIRE and also they have used the words should be made compliant to INSPIRE?" were provided 7 from which 5 answers such as "There is a need of technical preconditions (software and platforms that are INSPIRE compliant)" (int3), "We have the data model; Needs to be adjust the data according to that model" (int16) and "The Geo-Portal will be offering services through the National Geo-Portal that will include search, preview, download, transformation as well as e-commerce" (int9) etc.

The existence of data sets, network services as well as metadata, and whether they are according to INSPIRE and how they should be made according to INSPIRE was covered with 10 interviewees. Out of 10 interviewees 4 have used the word no in relation to "No there are not; Data produced according to internal standards that are used in the Ministry" (int7) or "No; There are data that are made according to INSPIRE specifications for Euro Geographics" (int8) while only one respondent answered using the word yes in terms of "Yes; The state boundary, the administrative boundaries and the populated areas; The elevation data should also start with transposing" (int3). There were other answers such as 'The data that is created i.e. produced here is according to the LPIS specifications..." (int18) and "No, the Ministry doesn't have any data that is related to the NSDI, neither to INSPIRE" (int10; int11; int12). Out of 3 respondents 3 have given answers related to network services by using the word service from which 3 have provided answers such as "The preview service and the download are functioning; there is no e-commerce ... " (int3) while also all 3 were using the word INSPIRE in relation to answers such as "No, they are not according to INSPIRE" (int16). For existence and compatibility of metadata out of 7 respondents 4 have used the word yes in term of "Yes; Around 100 spatial data sets" (int3) while 2 have used answers in terms of "No metadata" (int7) while 1 answer was that "It's started working on metadata" (int9). In relation to the compliance 6 of the respondents have used the word INSPIRE from which 5 in terms of "Follow the INSPIRE Specifications, however they should be considered in the bylaws first" (int2) and "It will follow the schema provided by AREC (which is INSPIRE compliant)" (int9) while 1 answers was "Not according to INSPIRE" (int18). The last provided answer is "Metadata should be developed according to the metadata editor provided by the AREC' (int7).

The academic sector answers on the possible actions that AREC should take in order to comply to INSPIRE, 3 out of 3 respondents have used the words strategy and law in terms of "Follow the strategy which complies to INSPIRE" (int1) and "Follow the Law" (int19) while 2 of the respondents also provide answers such as "Consider good examples" (int1) and "Follow the best practices of achieving the requirements" (int19).

On the question of the inclusion or the role of the private sector and their opinion on PPP the following answer were collected out of 2 respondents. In relation to the first question both of the respondents provide answer such as "*Initiative; Most experience considering this matter*" (int5; int6) while in relation on the PPP they both said that "*Don't know any example of realization of PPP*" (int5) yet and answers such as "*The Law provides possibility for PPP*" (int5), "*Public institution that has no capacities - Sign agreement with some private company that has the needed resources*" (int5) and "*The private company appears as investor in the activity*" (int5).

# Possible extent of the Macedonian NMCA and the NSDI to which can be enforced or complied with INSPIRE

By considering the current actions of development and policy implementation the answers related with the possible extent of enforcement or compliance with INSPIRE are next. Out of 8 respondents all 8 provided answers using the words possibility as well as data in sense of "There is a possibility, especially for the simpler data sets to be made 100% INSPIRE compliant" (int3), "Most of the data sets will be able to comply in large scale with INSPIRE; Legislation is already half made" (int8) etc., however there are also 4 answers provided with certain percentage such as "AREC can harmonize its data - maybe not 100% but it can reach very high level of compliance regarding the spatial data" (int13), "65% of the INSPIRE Directive is transposed into the Macedonian NSDI Law" (int17), "Large degree of compliance to INSPRE, yet not 100%" (int8) etc. Some unspecified answers given by 4 of the respondents are also provided such as "Need of time and partial approach to the data preparation" (int3), "Everything can be done if there are funds" (int16), "It depends on the resources (human resources above all)" (int14; int15), "What is written in the Strategy it has to be feasible to implement" (int14; int15) etc. Here can sense the different variations given in the answers.

Outside of AREC the other organizations have also provided certain answers were out of 7 interviewees the following answers were collected "Generally it should be fully implemented in the Agency" (int2), "As percent of compliance I would say 60-70%" (int7), "No coming back from INSPIRE because we accept those standards; Possible full implementation" (int9), "Technical part could be done; Fully changing the legislation and processes can be really demanding" (int18), "Formal and legal the compliance should be fully implemented; The technical part is yet to be seen" (int10; int11; int12) etc. Here also can be sense the different variations given in the answers.

The answers regarding the question on the current stage of development and implementation from 2 out of 2 respondents was presented as "Medium stage" (int5), "In relation to neighbouring countries - advanced phase" (int5) and "Institutions are on different level" (int6) and "Geo-Portal development may increase the activity" (int6). The current cross-border cooperation and the possible inclusion of the Macedonian NSDI were provided by several interviewees. In relation to the first, out of 5 respondents 3 have used the word yes providing explanation such as "IMPULSE is a project which aims at establishing a regional platform for SDI which should be based on INSPIRE" (int14; int15) and "Project INSPIRATION (to promote the SDI, and coordinate its implementation in the Western Balkans)" (int21) while 2 of the respondents have provided answers such as "Very little cross-border SDI cooperation at the moment (unofficial cooperation)" (int13) and "Not for now, but is expected in future" (int17). Secondly out of 8 respondents 4 have used the words possible or yes in terms of "Possibility exist – in regional and as part of INPSPIRE" (int1), "Definitely possible (INSPIRATION project) - to make a more closer relation trough defining same standards which eventually will help to make a better regional SDI?" (int19) while 6 have used the word project in terms of "Possible in regional project" (int17) and "Part of the IMPULSE project which is aiming to develop a regional SDI?" (int14; int15) while 2 of the respondents also provided answers such as "Existence of technical readiness, political readiness and open concept for communication

outside of Macedonia" (int20) and "Condition - data and services should be made according to the Implementing Rules of the INSPIRE Directive" (int17).

### 4.4. Presentation of collected documents

In order to present the general information of the collected documents, they will be categorized in several topics. Part of the list of the collected grey literature is provided in *Appendix 7 - Table 11-18: List of collected grey literature*.

### INSPIRATION Project for Spatial Data Infrastructure in the Western Balkans

The materials are collected in digital form mainly from an online source on the projects website <u>http://www.inspiration-westernbalkans.eu/</u>. Two of them are online information provided by AREC as further Information on the SDI in the Western Balkans – Project INSPIRATION and the general overview of the project. Additionally a promotion material "*Cooperation on space for cooperation - INSPIRE and SDI in Macedonia*" by the Europen Commission et al., (2013) that is part of the same project activity 3 - Awareness raising and communication.

The other materials on the project INSPIRATION refer to general information and activity information such as "Activity 1 - Policy, institutional and legislative framework analyses", "Activity 2 - Capacity building and knowledge transfer" and "Activity 3 - Awareness raising and communication". For all the activities are also included documented reports. As part of the INSPIRATION project also are provided some general documents such as scientific papers related to Spatial Data Infrastructure as the "Regional SDI Cooperation – SEE Inspiration in South-Eastern Europe" by Ž. Bačić & Obradović (2010). From the INSPIRATION project a recommendation reports are provided for the three activities that are mentioned upper in the text. Here are collected documents such as the National Report for Macedonia as well for other countries such as Serbia, Montenegro, Albania and others, "Regional SDI Legislation Framework Analysis and Recommendation Report" by Gjata et al. (2013) and other regional LAS and SDI related reports. Here a total of 23 documents are collected.

### IMPULSE Project

The materials on the project IMPULSE are collected from the AREC's website <u>http://www.katastar.gov.mk/en/Default.aspx</u>. The materials refer to general information and Project Proposal Final Draft, v 1.4 – IMPULSE which was collected from the Agency itself. The materials provide information related to the project aim which is "*to support national agencies for cadastre and geodesy in the countries of the region in the process of implementation of the INSPIRE Directive i.e. the establishment of a National Spatial Data Infrastructure NSDP*" (Agency for Real Estate Cadastre, 2014) as well the activities that should follow with the project. Here a total of 3 documents are collected.

### INSPIRE

All the INSPIRE related documents such as the "INSPIRE Directive" by the European Parliament and the Council of the European Union (2007) and other legislations as the "INSPIRE Metadata Regulation" by the European Parliament and the Council of the European Union (2008), "Regulation on INSPIRE Data and Service Sharing" by the European Parliament and the Council of the European Union (2010) etc. were collected from the INSPIRE website on the European Commission, <u>http://inspire.ec.europa.eu/</u>. Here a total of 8 documents are collected without the technical specifications.

### NSDI Strategy and Laws/Legislation

The NSDI strategy as the most referred document in the interviews has several annexes related to definition of strategic mission and vision, creating a business concept, definition of government structures (institutional framework), legal framework, interoperable infrastructure, awareness raising and capacity

building as well as the implementation plan. Here total of 38 documents are collected from the AREC's website <u>http://www.katastar.gov.mk/en/Default.aspx</u>.

As separate document in hard copy was collected the action plan that contains the planned activities by all involved (IN)SDI stakeholders for the period of 2014-2018.

The second most referred document in the interviews is the "Law on NSDP" by the Parliament of Republic of Macedonia (2014). However here are also pointed out some other laws such as the "Law on Electronic Management" by the Parliament of Republic of Macedonia (2009) and the "Law to obtain and exchange of evidence and data in line of duty" by the Parliament of Republic of Macedonia (2013) which mainly concerns the arrangements for data sharing and exchange. Here a total of 6 documents are collected.

### ICT and National Geo-Portal

The documents collected here refer to the "Technical requirements for Procurement of Development and Implementation of National Geoportal of the Republic of Macedonia" and internal AREC documents on development an application for metadata creation and maintenance. Here a total of 6 documents are collected directly from AREC.

### AREC Data Model and Standards for NSDI

The final collected documents are obtained directly from AREC as a digital copy. The documents provide i.e. "give guidance in developing data models. Data Modelling Guidance will enable development of interoperable data models according to INSPIRE Directive." (Geofoto d.o.o., 2011) as described in the AREC framework data standard – Data modelling guidance. Here are collected documents such as AREC data model, including conceptual and logical schema etc. Also several presentations from a workshop are provided concerning this topic. Here a total of 23 documents are collected directly from AREC.

### 4.4.1. Legislation related to the Macedonian NSDI context

The Macedonian NSDI Strategy and the Law on NSDI are legislation that defines the Macedonian NSDI context. Here is given a short overview on the same, complemented with Macedonia's participation in some SDI related projects.

The notion of NSDI in Macedonia first appeared in the Law on Real Estate Cadastre in 2008, where SDI was defined consisting of "*spatial data, administered in electronic form for the entire territory of the Republic Macedonia*" (The Parliament of Republic of Macedonia, 2011). Than SDI was just a term written on paper and the actual creation of an NSDI was stagnating. In 2010, AREC as part of the bilateral cooperation as Candidate Member state of EU, received a grant from the Dutch Government to develop an implementation Strategy for an NSDI.

Aware of the benefits that the establishment an NSDI can provide in a long run, the Republic of Macedonia has adopted the Strategy for NSDI in 2012. According to the Strategy, the purpose of the Macedonian NSDI is "to establish a technological, institutional, legal and administrative framework for interorganizational collaboration that will: support e-Government, integrate geo-information from different sources in one network, avoid duplication of spatial data acquisition, be in line with INSPIRE, establish effective business processes, meet the needs of the stakeholders, promote the access, sharing, use and distribution of spatial data" (Agency for Real Estate Cadaster, 2012). The Macedonian NSDI has the same principles as the <u>INSPIRE common principles</u><sup>5</sup>, namely "it needs to be aligned with other European spatial data initiatives, to be well described, allowing users to understand their suitability for particular applications" (Agency for Real Estate Cadaster, 2012).

Almost two years after the adoption of the NSDI Strategy, in 2014, was adopted the Macedonian Law on NSDI (further the Law), organizing the establishment, the organizational structure, the maintenance and the management of the NSDI of Republic of Macedonia. According the Law, responsible organization for

<sup>&</sup>lt;sup>5</sup> The common principles of INSPIRE can be found on <u>http://inspire.ec.europa.eu/index.cfm/pageid/48</u>

NSDI with coordinating role is the Agency for Real-Estate Cadastre while the other defined bodies are: NSDI Council, NSDI Committee, NSDI working groups. The Macedonian NSDI Law defines Metadata; Interoperability of the spatial data sets and services; Network Services; Data Sharing; and Monitoring almost in the same manner as in the INSPIRE <u>Implementing rules</u><sup>6</sup>. It has defined 32 spatial data themes, same as the ones defined in the <u>three Annexes</u><sup>7</sup> of the INSPIRE Directive with the only difference that 2 themes, concerning the oceanographic geographical features and sea regions, are omitted, having in mind Macedonia's geographic position.

Aside from the activities related to the NSDI legislation, Macedonia also, as some other Western Balkans countries, participates in two regional SDI projects - INSPIRATION and IMPULSE, which in general are promoting the INSPIRE concept as a guideline for developing NSDIs in the region.

### 4.5. Unexpected overall findings

The unexpected overall findings are mainly perceived trough few aspect. Firstly the SDI initiation that has arisen by the NMCAs in the region based on the previous LAS cross-border cooperation and the recognition of the need to develop NSDI. The "natural" step of continuing with the LAS reforms made by the NMCA with support from the WB based on ideas from abroad. Even that INSPIRE is considered as a main aim, it is not excluded that it may not be fully implemented ever. However, INSPIRE is useful even without full implementation since the benefits that are gained of partial implementation are more than enough to reform the internal spatial data related circumstances. The most unexpected finding is related to the IMPULSE regional SDI project which aims to develop regional SDI based on the INSPIRE concepts. This gives a new direction in the overall picture. The next interesting thing is related to absence of bylaws and specifications. The current on-going actions of implementation show that the INSPIRE Directive and the IR including the TS are directly considered in the implementation process even the Law on NSDI defines that this aspects will be defined with bylaws that should specified the details related to this concepts. The decision to comply with INSPIRE may be based on the political will, however except the NMCA the other involved stakeholder at this stage have not defined the needed resources nor have predicted possible implications on theirs actions, data and business processes in general. The constant inclusion of the external actors as part of the taken actions and the WB and EU funds in each phase of the SDI establishment can be perceived as inevitable and with a high degree of influence.

#### 4.6. Summary

In this chapter are presented the results that define the elements and relation between the considered policies, the perceptions of the interviews, their consistency and variance of provided answers as well as the documentation that was known or was referred to during the interview process. The data obtained from the interview transcripts is divided into groups concerning the defined research questions. The same is done with the collected documentation that are used to supplement, clarify and also aim to support the data obtained as part of the interviews.

<sup>&</sup>lt;sup>6</sup> The details of the Implementing rules of INSPIRE can be found on http://inspire.ec.europa.eu/index.cfm/pageid/47

<sup>&</sup>lt;sup>7</sup> The 34 data themes of INSPIRE incl. descriptions can be found on http://inspire.ec.europa.eu/index.cfm/pageid/2/list/7

### 5. THE IMPACT/INFLUENCE OF THE INSPIRE DIRECTIVE ON N-EUMS

### 5.1. Introduction

The interpretation of the analysed results presented in *Chapter 4* outlines the existence and reasoning of the impact/influence and the possible extent of compliance by answering the defined research questions. Based on the influence and the synthesis of concepts covered in *Chapter 2* a discussion is made. The main aim of the discussion is to clarify the reasons of the impact/influence and to consider the possible extent of compliance of the NMCA in relation to the INSPIRE Directive. Here the generic aspects are defined and presented on regional level.

### 5.2. Interpretation on impact/influence assessment of the Macedonian NSDI policy in relation to the EU INSPIRE Directive

The interpretation of results reveals the existence of impact/influence and clarifies where the impact/influence is identified. Here are pointed out certain interventions that made change on certain policy elements. The interpretation is based on the performed analysis using the applied framework of aspects and indicators defined in *Section 2.9* and the identified patterns and connections within and between the codes and categories that are defined from the performed qualitative data analysis of the collected semi-structured interviews transcripts and grey literature. The tables related to this assessment as defined in *Section 2.9.1* are presented in *Appendix 8*, presenting the defined framework of aspects and indicators and *Table 2-5* from *Section 4.2* presenting the results from the analysis specified in column "results". These views are complementing each other and they are presented as a whole, providing answers on the defined research questions.

The preformed assessment defines the level of similarity/conformity of the Macedonian NSDI policy and the INSPIRE Directive and identifies where and what type of impact/influence is perceived. This assessment is firstly based on de jure evidence i.e. existing legislations that represent the two policies. Secondary is based on documented evidences i.e. the actions/activities that were done during the development of the Macedonian NSDI policy, that are on-going and that are planned. The presented interpreted results are combined per research questions as already defined concept in the previous chapter.

## Elements and relations of the Macedonian NSDI strategy/policy in relation to the INSPIRE Directive

The elements and relations are derived based on the applied framework of aspects and indicators where the impact is defined using the classification in *Section 2.9.1* as direct and indirect impact and identified in the Macedonian NSDI concept. This is complemented based on the perceived influence on the Macedonian NSDI concept which is visible through several aspects.

The *direct impact* that comes from the INSPIRE Directive and IR is identified in several aspects. These aspects are classified as existing or directly related elements between the two policies meaning that the policy refers directly to certain INSPIRE provision, specification or rule which has the same objective, however the similarity/conformity level is different for different aspects.

The *high level of conformity* is recognizable as part of the SDI component Access Network (Technology) concerning the aspect *Network Services*, where de jure are covered the INSPIRE required web services and

de facto is seen how this focus is strictly following the IR and TS as part of the ongoing solution for developing National-Geo Portal. In general the INSPIRE ICT architecture is considered as a proposed framework for technology and standards used as part of the NSDI. This also is clearly visible as part of the *Interoperability* aspect under the Standards component where is perceived the use of INSPIRE Data Specifications for harmonization of the current data sets as well as the IR and TS as part of the *Metadata* aspect. This is used by AREC in order to develop INSPIRE compliant metadata profile that should be defined as metadata standards on national level.

The medium level of conformity is recognizable as part of the component Policy concerning the aspect of Organization - Monitoring where the existence of monitoring body is covered and the proposed model for monitoring includes indicators that are based on the INSPIRE IR for monitoring and reporting. However since the NSDI concept is broader than INSPIRE and since this is not a EUMS, it is a country in development the objectives that should be monitored are also broader then whether it is achieved or not. This monitoring method is visible from the de facto actions considered during the development where the implementation of the INSPIRE Directive is used as a leading objective. The direct impact is recognized as part of the Data Sharing, the Ownership/Legal protection of GI intellectual property rights and the Limitations and Restrictions Access to Spatial Data and Services aspects which all are based on already harmonized laws under the EU legislations which de jure is considered as part of the Law on NSDI. Even though the legislation exist the Data Sharing Arrangements are partly followed according the INSPIRE concept, meaning that there is a gap between the provision and the actions which are considered differently. For example the non-environmental data is mainly charged, the use of web services for this purpose is at very low level which points to the need of applying EU directives for this domains. As example, certain public sector organisation such as City of Skopje provides free information while AREC charges them, however this also depends on the business concept of the organisation. The unclear rules and overlap of jurisdiction are also considered, which points to the need of application of fully functional harmonized policy for Ownership and Protection of GI rights. The same goes for the Limitations and Restrictions aspect where the technical limitations and the licensing models are not yet applicable and are developed to fit the current circumstances. Important is that the dissemination of environmental information to the public is not yet applicable or is at very low level and this is one of the INSPIRE objectives. The medium level of conformity also concerns the Data Sets aspect where the application of the Data Standards and the INSPIRE GCM is clearly visible especially for data themes that don't exist in Republic of Macedonia. However the harmonized datasets and services are not straightforward for some of the INSPIRE Annex themes in Macedonia and they are adapted to fit the current circumstances.

Above were defined the elements that are directly related to INSPIRE. The *indirect impact* that is pointing to the INSPIRE Directive and IR is revealing elements which are defined, yet not directly related elements between the two policies, meaning that the policy is perceived indirectly and has the same objective yet not specifies certain INPIRE provision, specification or rule. They are also identified in several aspects. Here the similarity/conformity level is different for different aspects.

The *high level of conformity* is identified as part of the aspect *Stakeholders/Participants* considered under the SDI component People covering the INSPIRE Directive provision on public authority and third parties, yet the stakeholders structure is mainly developed towards the public sector based on regional and country circumstances, where most of the responsibilities falls under the NMCA as a leading organization.

The *medium level of conformity* is recognizable as part of the component Policy concerning the aspect of *Organization – Coordination* and the aspect *Data Licensing*. The impact is visible in both of the aspects, defining the licensee models which even though are not yet official are developed based on the INSPIRE license terms. This is not different for the coordination structure which is defined to function on national level while the cross-border cooperation is not considered. This structure is currently functional on higher level which is partly fulfilling the INSPIRE requirements for definition of coordination structure, yet on

lower level needs to be defined. However, de facto most or all of the current SDI actions are done by and thought the NMCA which is defined as leading organizations for NSDI. This shows that the objectives are generally covered, yet they are only applicable to certain national level and developed to fit the current circumstances.

At the end, the *non-existence of impact* is identified in several aspects. These aspects are classified as nonexisting meaning that there are no related elements between the two policies. The *low/no level of conformity* impact is identified as part of the component Policy firstly concerning the aspect of *PPP* and secondly the *Organization - Quality Assurance*. Even the provisions are in a certain way covered by defining possibility which includes third parties for the first aspect and the need of defining measures for quality assurance, they are not really considered. A PPP model exist, yet there are no examples of PPP because the NSDI concept is mainly directed towards the public sector, while the quality assurance procedures are only applicable in the NMCA however not for NSDI related data and services. This point out that both of the aspects are not sufficiently developed and there is no relation to INSPIRE Directive at this moment.

Considering the concepts similarities and differences, the defined elements and relations as part of the Macedonian NSDI concept are recognized the common INSPIRE principles as well as the main aim of INSPIRE which is to support environmental policies and actions. Practically all the data themes except the ones that are covering the oceans and seas are considered. This is clearly visible based on the decision to comply to INSPIRE as one of the NSDI objectives which points out the strongest relation between these two policies. However there are certain differences such as the main focus which is pointing onto economic growth and sustainable development in the country. This is due to the country's context and the current circumstances. The Macedonian NSDI concept also has a much broader use of SDI application compared to INSPIRE. In the end, there are certain factors that cannot be easily changed such as some existing mechanisms for data sharing, business concepts as well as certain data themes.

### Reasons to consider developing a Macedonian NSDI in compliance with the INSPIRE Directive

These reasons in this research are perceived in several aspects. The identified impact reveals the roots of influence. The influences are presented as *internal and external factors of influence*. The impact based on the external factors influences is *direct impact* while the *indirect impact* is based on the needs and interests in the Macedonian NSDI context.

The findings for the *internal factors* derived from the qualitative data analysis and based on the collected raw data which is presented in *Chapter 4*, and reflect the political will of Macedonia to be compatible with EU since the main aim is to become a EUMS. This clearly affects the need of harmonization of the domestic legislation with the EU legislation. There are several bottlenecks that can be considered as reasons to develop the Macedonian NSDI in line with INSPIRE. Some of them are: absence of bylaws and specification that define standards; need of reforms in organizational and technical sense as part of the involved NSDI stakeholders; analogue data formats, data duplication, no clear jurisdiction or definition of data responsibility, data inconsistence; lack of proper mechanism to share data. Here can be identified that most of the technical aspects directly rely and are influenced by the INSPIRE Directive and IR. There are also bottlenecks related to absence of human resources with relevant knowledge and lack of public sector funds. Certain internal impact of course comes from the NMCA as a leading NSDI organization and main beneficiary where can be recognized certain views and interests of the Agency itself. The considered benefits of developing NSDI in line with INSPIRE for the NMCA are also reflected by the internal factor influences such as good educated staff, raised awareness which can contribute to publish data for public interests and better data management.

The *external factors* are related to the reasoning of EU policy influence which insists on regionalization. This is achieved through EU funds which are necessary to develop the Macedonian NSDI. This is mainly done

through a regional SDI related projects. However INSPIRE is very demanding. If INSPIRE is forcing certain standards to be adopted at any cost it could present a problem since there are data, circumstances and systems in the country that needs to be changed which can be considered as bottleneck. Yet, the benefits are obvious since the EU funds are currently the main funding source which of course imposes high influence. Even though the Macedonian NSDI funding model includes possibility to get governmental funds and funds from the private sector, de facto is not the case for now. The funding model is different for every country and cannot be applied the same way as the EUMS which are funded by EU. However, the EU funds are also initiative for cross-border cooperation in order to gain EU funds. Other reasons are the knowledge and information that is coming from EU, as part of some SDI related congresses and seminars, or through a cooperation with external actors i.e. SDI experts and consultants. Of course here are considered the examples and experiences as opportunities to learn from each other.

In general the recognition of the need for cross-border cooperation in service of risk protection and crisis management is backed up by both the *internal and external factors*, since the need is recognized from both sides. This points out that INSPIRE is a good example which can be copied to a certain level in order to achieve these goals. However, based on the analysis in this research it can be concluded that the external influence is considered stronger.

### Role of the Macedonian NMCA (AREC) in relation to the NSDI

The role of the Macedonian NMCA i.e. AREC reveals the NMCA's relation to NSDI, the role and responsibility, the impact/influence on the NMCA, how this influence is transferred on the other NSDI stakeholder as well the NMCA cross-border communication and SDI cooperation.

The NMCA is the main actor, developer and engine of the NSDI. The NMCA as in Macedonia so in the region are the main data producers/providers for the majority of spatial data sets related to Annex I and II of INSPIRE themes. The AREC's data standards for years are widely accepted on national level, yet not used by all organizations. After the reorganization and modernization, AREC has initiated the idea of establishing an NSDI where are accepted the INSPIRE values as a guideline for developing NSDI. This provides new wider application of the NMCA's spatial data. AREC as part of the NSDI Council of Republic of Macedonia is included and is responsible for every legal, technical and organizational aspects of the NSDI on national level where even the policy arrangements i.e. decisions making are included.

AREC's impact/influence related to NSDI establishment is perceived through the actions taken during the development and implementation process where most of the data, metadata, network services, interoperability and coordination aspects can be recognized. This impact is based on internal factors such as defining better standards, data sharing arrangement etc. and external factor as is the support from EU and the WB and participation in the EU/World organizations related to LAS and SDI. This support is provided through funds and offering consultations from experts mostly through the regional SDI projects. In relation to this, the NMCA also represents the link for cross-border cooperation on regional level. The cross-border cooperation between the regional NMCAs is based on LAS reforms, and now continues with SDI. The main beneficiaries of these regional SDI projects are the NMCAs. This cooperation has an impact on several aspects, yet the organization of the NMCA and in general the NSDI coordination structure can be clearly pointed out as a good example.

The way in which people perceive the impact from the past and in the current NSDI, regardless of whether it is originated from the Agency itself or whether it has been influenced, is directly transferred on the other NSDI stakeholders on national level and as an experience and example on regional level. A good example of this perception is the way in which AREC defines the metadata schema under the INSPIRE and OGS requirements.

### Scale/scope of actions affected by the INSPIRE Directive in the Macedonian NMCA

The scale/scope of actions refer to action done during the development of the NSDI policy, actions that are in phase of implementation or planned actions that needs to be done in future. Most of the considered actions from the made analysis, refer to the public sector in general with focus on the NMCA, the external actors and regional SDI projects, since there are not much actions related to the private and the academic sector at this stage.

The affected actions of influence trough which is defined the impact of the INSPIRE Directive on the NMCA are visible though several aspects. The affected actions as part of the development of the NSDI policy are mainly related to the definition of legal and organizational NSDI framework. The actions related to legislation included development of Strategy. After the Strategy development followed the adoption of the Law on NSDI. The NSDI law resembles the INSPIRE Directive. The Strategy also resembles part of the PSI related directives. Therefore, one can infer that there is a strong relation between the current NMCA strategy and the INSPIRE Directive. This process included constant coordination and negotiations of the involved parties, study of these EU legislations and consider good examples provided by experts from EUMS. This, of course is related to the organization and definition of coordination structure, stakeholders/participants structure which is mostly based on the country context yet examples from the region and abroad are considered. The ideas, such as the pyramidal organisation structure starting from the highest Governmental level which clearly has effect on the funding, the use of INSPIRE ICT Architecture so that the linkage could be done more easily in the future, the advertisements for raising awareness among citizens and institutions etc., given by the external actors are accepted to the highest Governmental structure. While the actions related to the legal aspect can be categorized as direct, the influence on the organization is mainly coming from good examples, however done based on the country context.

The affected actions as part of the on-going NSDI policy activities relate to data, metadata and services as well as interoperability preconditions definition and development in technical sense. The development of National Geo-Portal under the INSPIRE IR and TS, the metadata creation based on the INSPIRE profile, data based on the INSPIRE Data Models are just several examples of influence. These are mainly done through a SDI workshops and provided experts specifications, while developed by third parties. The activities such as definition of working groups, which are precondition needed to formulate bylaws and specifications, are in a starting phase.

As part of the future actions that should be taken, the impact is visible through the definition of bylaws and specification which should be mostly based on the INSPIRE IR, since the current activities such as metadata creation, services etc. where available, are directly based on the INSPIRE Directive as well as the IR. However based on the considered results, it can be recognized that within all aspects of SDI, AREC seeks to fully comply with the INSPIRE Directive.

The cross-border cooperation and the SDI related projects refer to actions which have been done and which should be undertaken by the NMCA. These actions refer to support of regional NSDIs which includes project management and administration, development and adoption of data sharing policy and regulations, data harmonization, metadata creating and quality evaluation, development of services and portal as well as application of use cases. The coordination as well as experience and knowledge transfer between the NMCAs in the region is of course considered as one of the most important actions taken. This is also an on-going action needed in order to provide eligible human resources that are capable to answer the challenges of INSPIRE implementation. Of course here are inevitable the examples offered by external consultants in relation to that. Later should follow the more technical aspects as well as the application of the NSDI in INSPIRE related goals.

### How the NMCA in Macedonia should comply to the INSPIRE Directive

The development of the NSDI in Macedonia concerns how the NMCA comply or should comply to INSPIRE and how this impact is or should be perceived as part of the NSDI. Here are given certain perceptions that were encountered in this research on the possible directions for development.

AREC's expectations for complying to INSPIRE are guided by the aim to achieve standardized data that will be easy to share and access by using INSPIRE compliant services and arrangements for data sharing. This will improve the national situations by harmonization according to the INSPIRE requirements and EU legislations which eventually should provide full implementation of INSPIRE. Based on the considered actions there are several approaches that are followed. Firstly the NSDI Strategy and the Law on NSDI which are mostly based on the Directive, however because there is absence of bylaws and specifications on national level, the INSPIRE Directive and IR is directly considered. This is clearly visible based on the made analysis where can be seen that all the aspects that are yet not implemented are taken from INSPIRE while the others are adapted or based on the current circumstances. Secondly, the constant inclusion of external actors and cross-border communication provides opportunities to consider good examples from EUMS and the region.

There are several actions related to the organizational, legal and technical aspects that need to be considered by the NMCA. The scaling down to the basic implementation bodies as well as consideration of organizational structure that should work on regional level is crucial for INSPIRE implementation and cross-border application. The harmonization of INSPIRE standards and EUMS practices on national level should be considered as part of the adoption of bylaws and specifications process. The ICT development has already considered the INSPIRE network architecture while the metadata creation is based on INSPIRE compliant profile as well as definition of fit for purpose data sharing model. The inclusion of the capacities and knowledge from the private sectors, even though is not on high level, shows that it is of crucial importance mainly in the development of the technical aspect.

## Possible extent of the Macedonian NMCA and the NSDI to which can be enforced or complied with INSPIRE

The possible extent of the Macedonian NMCA and the NSDI to which can be enforced or complied with INSPIRE in general depends on many factors, both internal and external including political decisions.

The current phase of development and implementation can be defined as medium to high level of development and low level of implementation. Due to the fact that the legislation embraces 65% of the INSPIRE Directive, the national extent of compliance could be classified as partly in compliance. However here must be considered the reasons explained in the bottlenecks. This cannot be taken separately for the organizations because not all involved organizations are on the same level of development.

In the case for the NMCA the aim is to fully implement INSPIRE. The legislation will be the guidance. Most of the NMCA data sets can be standardized according to INSPIRE specifications, however not all are at 100%. The metadata, services and ICT are in more advanced phase than the other NSDI stakeholders. These aspects should be developed in full compliance to INSPIRE. Other aspects such as organizational and legal aspect clearly depend on the involvement of all the actors. Even though they are guided by the INSPIRE requirements, they are not always easily adapted because of the country's context to which they should fit. These aspects may happen to be partly in compliance. In general the data transposition is not seen as a problem, yet the knowledge and the absence of human resources, the need of INSPIRE compliant ICT and funds are a problem. Those are factors that may limit or slow down the implementation.

Concerning the current situation and the political circumstances related to the EU aspiration, the full implementation and application of INSPIRE in terms of publication of data and services sharing for environmental purpose as part of the EU SDI at this stage is not reachable. However the SDI crossborder cooperation between the NMCAs on regional level is becoming more and more frequent, especially with the support on the EU funded regional SDI projects. This movement is also expected to happen in the private sector on regional level, firstly guided by the personal interests and the open market. However, the projects components show that the development of the NSDIs is going in the direction of regional harmonization which is necessary to answer the risk of environmental protection.

### 5.3. Discussion on the impact/influence of the EU INSPIRE Directive on the Macedonian NSDI policy and the regional NSDIs concept

While the focus in the interpretation of the results is pointing out where the impact/influence is perceived, in this research the discussion, based on the provided interpretation of the result and the synthesis of SDI and INSPIRE is revealing the reasons for the identified changes considering why this influence exist, the possible extent of the impact/influence and how it can be recognized as part of the N-EUMS NSDIs i.e. NMCAs in the region.

# Discussion on the elements and relations of the Macedonian NSDI strategy/policy in relation to the INSPIRE Directive

The elements and relations presented as part of *Section 5.2* clearly reveal the reasons of impact/influence. The influence perceived though the concept "similarity" relates to the direct and external influence. The "similarity" is also perceived from the indirect and internal influence. However, the interviews reveal that this perception is closer to the concept "difference" where are considered reasons related to the country's context, the current needs, interest and circumstances.

In general the influence is categorized based on the sources i.e. factors from which they origin. However the influences are generally related and cannot be seen as separate parts. The defined impact in the considered aspects can be related to the defined reasons of influence on the NSDI policy where the *direct impact* is clearly related with the reasons of influences coming from the external factors while the *indirect impact* as well the cases where is defined *low or no level of impact* are related to internal factors.

The *influences originated from the EU funds, external actors and organizations* are generally perceived from ideas, knowledge and solutions that are coming from the external actors and organizations. This influence is mainly perceived from the workshops and seminars that are supported by external actors and organizations thought examples and experiences from the EUMS, but also through the direct inclusion of consultants and experts as part of the policy developing team as is the case for the Macedonian NSDI. On the other hand the EU funds are the driver of this cooperation. These funds are currently the main NSDI funding source on national as well on regional level.

The *influences originated from the regional cross-border cooperation and SDI related projects* are based on the recognition of the need for cross-border cooperation between the NMCAs in the region as well as based on the above given reasons originated from the EU influence. In both cases the cross-border cooperation is driven by the need of knowledge sharing, providing good examples and experiences in the region which are closer to the country's contexts. However the regional cooperation also considers the applicability under the current circumstances which is clearly different from the EUMS and also takes into account the countries priorities which do not always correspond with the INSPIRE goals. The EU influence insists on regionalization. This is done through regional projects, which aim to shape the NSDIs and develop a new regional SDI initiative under the INSPIRE values. As part of the projects most of the aspects are considered. This clearly influences the NSDI concept since INSPIRE is seen as a common denominator for harmonization which represents a precondition for regional SDI cooperation.

The *influences related to non-functionality and non-existence of internal standards and mechanisms* are mainly perceived from the need of applicable and functional standards and mechanisms for spatial data and services sharing and access. This is the case because the existing standards are not widely accepted and even more important are not applicable outside of the country's borders. The need of rising awareness, the need of clear data jurisdiction, applicable data sharing policy, license models, data standards etc. are clearly recognized from the INSPIRE Directive concept. However they are adapted to fit the current circumstances.

The *influences concerning the recognition of the need of INSPIRE values i.e. the influence of the Directive itself* is clearly visible since it is considered as a framework on which the SDI concept should be build. The absence of bylaws and specifications directly relates to the use of INSPIRE. The non-existing data themes on national level are also directly considered and based on the INSPIRE data annexes. In general most of the legal part is in line with the Directive which is taken as an already functional SDI framework that is capable to be adapted on the country context to a certain degree. In the end the political will to follow EU and strive to become a EUMS is a very important driver related to INSPIRE consideration which can be considered as one of the main reason of influence.

## Discussion on the reasons to consider developing a Macedonian NSDI in compliance with the INSPIRE Directive

Macedonia as well as the other Western Balkan countries are countries in development. They are guided by the need of economic growth and achieving sustainable development. The assumed benefits of establishing an SDI are considered to support these goals. In relation to the previous knowledge, the reasoning on the influence/impact of EU policy on domestic policies according to the convergence theories can be recognized through several theories. The reasons are mainly related and can be generalized on regional level based on the case of the Macedonian NMCA.

The convergence theory explained in *Section 2.7.3* is also a valid explanation for the findings in this study. The theory predicted that domestic factors would also influence policy outcomes. The interview findings on perceived internal influence revealed that the NSDI policy makers reacted to internal aims. The internal factors relate to recognition of the benefits from establishing NSDI under INSPIRE principles which are seen as solution to the non-functional or non-existing legislation, standards and mechanisms related to spatial data and service sharing and access to information that will be used for greater purpose. These bottlenecks are caused by the use of different standards, lack of data and metadata and in the end differences in compatibility of INSPIRE model application, and also are a cause of low level of awareness and poor partnership and cooperation. This concept is adapted to fit the context of the NSDIs in these countries. Of course the countries' similarities offer certain benefits related to how this can be done. The influence coming from the NMCA as a leading NSDI organization is also considered and is mainly based on the already proven role in decision-making and management of spatial data.

The theory predicted further that the cross-national policy convergence initiated by trans-national communication and exchange of information would also influence policy outcomes. These can be perceived thought the EU funds and the SDI related projects which are the main external factors. The funds needed to establish NSDI are the main bottleneck, yet the main source for NSDI funding is EU. The funds inflow may be conducted on national level or through regional SDI related projects. The influence of funds is mainly perceived thought the defined concept of the SDI related project which aims to shape the NSDIs and develop a regional SDI based on the INSPIRE principles and values. This is done based on the ideas, knowledge and solutions offered by the external actors and funding organizations that stands for the INSPIRE concept and spreading the influence of EU.

The third kind of explanation in the convergence theory can also be recognized. As a consequence of the international harmonization related to international cooperation, the adaptation and harmonization of the national SDI policies in line with the EU SDI INSPIRE policy have also predicted influence on the policy outcomes. Most of the considered N-EUMS countries except BiH and Kosovo have status of EU candidate member states. This means that these countries are aiming to become part of the EU. EU insists on regionalization and there is a political will to follow EU which is clearly recognized. However in order to be compatible with EU, the current legislation, standards and procedures related to spatial data access and sharing will have to be transposed under the INSPIRE standards even they are not obligated to do that now. This requires reforms and modernization in the organization on national level and a cross-border cooperation in service of risk protection and crisis management which is clearly recognized by these reforms are also recognized as a follow-up on the LAS reforms made previously by taking new ideas into practice. Related to the given theory these reason have no direct impact since it is not intended for the N-EUMS, yet still have a huge influence in relation to compliance with the INSPIRE Directive.

All this leads to a conclusion that both external and internal factors of influence in these countries are the root for considering INSPIRE as part of the NSDIs. In relation to that, the reasons of influence relate to the assumed benefits where INSPIRE should resolve spatial data related problems on national level, improve the NSDI policy. This means better improved and informed decision making which will serve in risk protection and crisis management, will have a big effect on the economy while contributing to economic development, transparency of ownership and anticorruption processes and eventually contribution to sustainable development both on national and on regional level which will eventually bring these countries closer to EU.

#### Discussion on the role of the Macedonian NMCA (AREC) in relation to the NSDI

The role of the NMCA in Macedonia i.e. AREC as well as the roles of the NMCAs in the region and even EUMS can be defined as one of the main links of the SDI chain. The NMCAs as responsible for the LAS in one country is inevitably linked to the SDI. This relation especially can be recognized in the Balkan countries where based on the made analysis for the EUMS and N-EUMS is confirmed the leading role of the NMCA in relation to the NSDIs. The NMCAs are included in every legal, technical and organizational aspect of the NSDIs. Their importance is also perceived as main data producers/providers for the majority of the Annex I and II INSPIRE themes. The influence of the NMCA as pointed out by Vries et al. (2011) is clearly related to national policy making and influence on other public organizations because their practices affect the dominating public views and activities for SDI development, and provide a good representative sample of national public sector practices relevant for SDI development.

The INSPIRE influence can be recognized trough the perceptions of the interviewees. They relate to the reorganization and modernization process of the NMCA in the Balkan countries. This process was inevitable due to the growing need of the market of real estate, certainly in the appropriate LAS domain. This evolved into a more regular and frequent communication between the NMCAs in the region which aim to establish better cross-border LAS and SDI cooperation. The process in general was supported i.e. influenced by EU/World organizations and was aimed at improving the economy, transparency of ownership and anticorruption processes. The ideas perceived from abroad eventually started to be considered as part of the AREC's development plan which led to initiation of NSDI. These influences that are coming from internal and external factors are transferred on the national policy development and on the practices of the other involved SDI stakeholders/participants as well as on the NSDI concept. This implies that the influence itself is perceived in AREC and from there is transferred on national and regional level.

# Discussion on the scale/scope of actions affected by the INSPIRE Directive in the Macedonian NMCA

Based on the impact identified as part of the Macedonian NSDI policy, the perceived influence is revealed thought the actions that are taken or considered as part of the NSDI development and implementation process. These actions are mostly similar for all the NMCAs on regional level. The affected action can be explained and related to the action of adaptation of a number of European features including the SDI policy such as INSPIRE which is part of the process of Europeanisation as stated by Börzel (2003). In this region it is clearly visible that the international factor is one very important actor for cross-national policy convergence as pointed out by Holzinger et al. (2008). This is clearly visible based on the actions concerning the legal aspects such as harmonization with EU legislative as well as actions related to cross-border cooperation and the SDI related projects. However the organizational aspect evidently relies on good examples that are coming from abroad and is mainly based on regional form of knowledge and experience exchange. This also applies on the ongoing actions related to establish preconditions for technical interoperability and standardization.

The influence in these cases is clearly perceived based on the "knowledge that is supplied (or co-generated)" (Forrester et al., 2009) as well as for the case of the Macedonian NSDI where the "interventions intended to catalyse, stimulate or otherwise seed some form of change through different forms of persuasion" (Start & Hovland, 2004) i.e. trough advocacy originated from the external actors and funding organizations which is identified to the highest level of the Government. This process included constant coordination and negotiations of the involved parties, study of these EU legislations and consider good examples provided by experts from EUMS. The ideas given by the external actors are presented and accepted to the highest Governmental structure. The involvement of external actors clearly relates to the lack of knowledge and educated staff in the field of SDI, so the ideas perceived from these actors are taken as a form of influence that relates to INSPIRE consideration on national as on regional level. This form of persuasion is certainly aided by the financial resources obtained from the EU. However the actions taken can also be identified as part of the internal coordination between the involved stakeholders where the interest of the participants as well the national interests are clearly incorporated as part of the NSDI policy.

### Discussion on how the NMCA in Macedonia should comply to the INSPIRE Directive

The actions and decisions considered as part of the development and implementation processes which are affected by the INSPIRE Directive should define the direction of establishing a INSPIRE compliant NSDI. The Macedonian case of the NMCA can be generalized in sense of reflecting the regional needs and perceptions to establish an NSDI in line with INSPIRE.

The Macedonian NMCA provides a good example by applying a well-conceived approach. Here good examples and practices were considered by including external consultants and experts, and were examined the existing approaches of all INSPIRE related legislation and transposition cases used in the EUMS. Clearly the NSDI Strategy and the Law on NSDI is the resulting framework that the NMCA should follow, however the absence of bylaws and specifications lead to the direct use mainly on the INSPIRE IR and TS. Of course, the approaches applied in EUMS are considered. This indicates that the concept of implementation should be based on combination of these approaches. However above all, the concept should be adopted in order to meet the country needs and interests at the current moment and should be based on the existing capacities in the NMCA and the country in general. This means that the process should be taken step by step, where the implementation is not taken frontally. Certain adaptation is needed, such as the possibility to publish data sets based on the current standards as well as INSPIRE compliant data sets.

The NMCAs must seek applicable standards for harmonization that can fit on regional level, by taking in consideration the countries similarities. This approach can answer the need of interoperability between the involved stakeholders by providing efficient mechanisms for data and service access and sharing. This will set a strong foundation that should eventually lead to implementation of the INSPIRE Directive and application of the INSPIRE aim. Considering this, the compliance of the NMCAs should be generally developed in three ways. Firstly the internal responsibilities of the NMCA should cover the harmonization of INSPIRE compliant data sets that the NMCA is responsible for, secondly is should cover the organization and technical support of the NSDI on national level and third it should participate in a cross-border cooperation on regional level as part of the regional SDI projects and initiatives.

The NMCA should endeavour to transfer knowledge and experience gained from outside on national level. The examples from the EUMS and the region also learn that the inclusion of the third parties, with their knowledge and solutions can contribute and accelerate the process of implementation of the INSPIRE Directive in the NMCAs. On higher level, in relation to achieving the INSPIRE aim the regional SDI projects provides good examples that need to be followed.

### Discussion on the possible extent to which the Macedonian NMCA and the NSDI can be enforced or complied with INSPIRE

The possible extent of the Macedonian as well the NMCAs i.e. NSDIs in the region to which can be enforced or complied with INSPIRE it is really hard to be predicted. This depends of several factors which are pointed out in the analysis. This factors as stated in the interpretation part are originated from internal and external circumstances as well as political decisions as separate perception on the overall finding.

However, first must be considered several facts that have influence on the extent of compliance. INSPIRE is made by EUMS and is intended for EUMS, representing their interests and needs. The INSPIRE Directive is very strict and very demanding. The implementation is a long-term process which requires funds and educated staff in order to be carried out. However, the N-EUMS do not have such resources as the EUMS. The full compliance of the EUMS NSDIs should be achieved in 2020, however based on the small analysis made on the two considered EUMS it has shown that the implementation is always followed by certain bottlenecks and the true cross-border cooperation such as data sharing is not yet reached. Another perception is based on the regional and country priorities which even through are supporting the INSPIRE aim, their NSDI concepts are focused on achieving economic development. This also clearly relates with the preservation of business interests of the NMCAs and other NSDI stakeholders. On the other hand the application of the policy or more exactly the use as part of the EU SDI also depends on political decisions. Even knowing that the political decision is clearly following the same line which can be perceived based on the EU supported regional SDI project, these agreements are only to a certain level since they depend on decisions related to EU expansion. Based on this, from internal perspective this process is considered as adaptation of a number of European features including the SDI policy such as INSPIRE. For most of the countries in the region this means that even there is high degree of NSDI compliance may be a long period to become functional outside of the country borders.

By taking these facts in consideration and the case of the Macedonian NSDI based on the NMCA findings, it is clear that in each stage of the NSDI establishing full implementation of the Directive is sought, yet the possibilities indicate that can be expected only partly implementation on the overall Directive. This is pointed out by the fact that the INSPIRE transposed legislation is partly covered or for certain countries it does not yet exist. The legislation defines the threshold of compliance to INSPIRE,

but the actions can be perceived differently. In relation to the data sets, metadata, network services and ICT for which the NMCA is responsible, even most of them are currently not compliant to INSPIRE data and services specifications. They can be made fully in compliance firstly because these aspects are directly following the INSPIRE IR specifications. Of course there are exceptions for the data sets that are clearly guided by the national interests and that may have impact on the business model on the organizations in general. These overall circumstances are similar in the region so this could be expected also on regional level. In general the consideration of the INSPIRE standards are only a plus for the N-EUMS. They firstly need to answer the internal needs such as to correct the inconsistencies and non-functional aspects to fill the missing parts by applying the INSPIRE Directive based concepts. The examples and experiences from the EUMS provide application of most appropriate approach by already considering the bottlenecks that the EUMS have encountered in the development and implementation process.

Interesting perceptions arise from the SDI cross-border cooperation that is clearly accepted by all the N-EUMS in the region. The related SDI project and the EU funds that are invested lead to possible development of one new regional SDI initiative that will be based on the same values as the EU SDI. This initiative should provide harmonization of the data and standards. However the enforcement of this initiative depends greatly on the EU funds that are supporting these projects.

In the end, even full compliance with the Directive is the main aim of the NSDI, the risk factor that it may never become part of the EU INSPIRE SDI, must be considered. However, the partly compliance with high degree of compliance as in Macedonia so on regional level will only improve what is there. INSPIRE will enable new form of regional SDI cooperation and above all will help the environmental protection and decision making related to environment. The full implementation is not only a vision, because in time the N-EUMS will continue to invest in their NSDIs on national level, yet the possibility of becoming part of some regional SDI initiative is seen as more and more feasible.

#### 5.4. Summary

The elements and relations clearly reveal the connection of the Macedonian and in general the regional NSDIs concept with the INSPIRE Directive. However even the roots of INSPIRE are connected to environmental needs, now the Directive self-standing have influenced the Macedonian context in many different ways. This is de jure and de facto visible from the actions taken in the NMCA as part of the development and implementation process as well as the cross border SDI communication. The reasons clearly reveal the aim to develop INSPIRE compliant NSDIs as they are guided from internal and external factors of influence. The impact is defined as direct and indirect based on the relations that were considered. However the direct impact originated from the external factors of influence can be considered as stronger. This impact/influence is mainly represented by the external actors and organizations as well as the EU funds. Although this influence is perceived mainly from outside, the considered actions define the direction in which the NMCAs and the NSDIs should follow the INSPIRE Directive are mainly guided by internal factors. This clearly complements the perception of the extent to which the NMCA can be compliant to INSPIRE where even the aim is full implementation of new regional SDI initiative is not excluded.

### 6. CONCLUSION AND RECOMMENDATIONS

### 6.1. Introduction

The conclusion presents the overall aim of this research in relation to the defined sub-objectives. These sub-objectives address the main research objective. The conclusion is based on the summary of the interpreted results and discussion made in *Chapter 5*. Further, the conclusion is followed by certain recommendations related to actions and follow-ups considering the defined case study area as well as providing generic perspective of the findings.

### 6.2. Conclusion

This research addressed the issue of assessing the influence and impact of one external SDI policy (EU) on one internal SDI policy (Macedonia) in order to better understand the cross border information infrastructure. The aim was to identify the link of the INSPIRE Directive in relation to development and implementation of NSDI in this N-EUMS and understand why, how and to which extent does INSPIRE influence the development and implementation on the N-EUMS NSDI taken through the perspective of the NMCAs. In order to understand this, the impact/influence and extent of the INSPIRE Directive in relation to development and implementation of the Macedonian NSDI through the perspective of the NMCA i.e. AREC was assessed. This is accomplished by answering the defined sub-objectives i.e. related research questions.

#### Sub objective 1

*Research question 1:* Considering the policy cycle, the consulted literature revealed that the policy impact can be understood as the change occurring in the policy cycle while policy influence and associated advocacy can be understood as the action of influencing, by someone or something, on the policy decision making. Based on this perception, the impact of one external policy on one internal policy can be viewed as a marked effect of influence on the internal policy. This clearly relates to the impact/influence of EU policy on domestic policies where certain driving forces are considered. They are explained through the definition of policy convergence, considering several theories which lead to SDI development. In relation to this research, the increase of similarities of the Macedonian NSDI policy compared to the INSPIRE Directive may be qualified as policy convergence.

The impact assessment (IA) is considered trough a specific policy field i.e. SDI. Clearly, the impact is assessed based on the existence and similarity/compliance in relation to the external policy, while the influence is based on the factors from where and how they are originated. In order to assess the impact/influence between the two policies certain aggregation form of policy measures are defined in form of assessment steps. The aim of these steps was to assess the impact/influence of one policy on other concerning not just the policy itself but also the existing actions reflected by that policy. These steps include definition of framework of SDI aspects and indicators based on which the analysis of similarity/conformity is made. This analysis complements the results from the qualitative analysis of the collected data, which is used to define the perceptions i.e. opinions of the interviewees and the considered grey literature, to detect the patterns and relation between the defined codes and categories by formulating certain findings. This completes the definition of assessment steps needed for assessing the impact/influence and extent of compliance related to the defined research questions in the three sub-objectives.

*Research question 2:* The defined framework of aspects and indicators comprises of 5 SDI components, 13 aspects - several per component and approximately 3-4 indicators per aspect, defined based on consulted scientific literature and existing SDI assessment evaluation frameworks that are used to assess the implementation of the INSPIRE Directive in the EUMS. The indicators and the measurable variables were defined to fit the need of this research in order to measure the existence, convergence and type of impact of the external on the internal policy. They were used to detect if the policy proposal has led to a legislation which is adopted or indicators which are based on perception i.e. opinion related to the qualitative data analysis. The aim of this framework was first to re-present the considered policies in a unified way so they can be used for defining the elements and relations between the policies and secondly to perform the assessment of the impact/influence.

### Sub objective 2

*Research question 3:* Considering the fact that the defined framework is based on the existing INSPIRE assessment evaluation frameworks a full coverage of identified elements from the INSPIRE Directive in relation to the defined SDI aspects (technical, legal and organizational) is detected, excluding the *PPP*.

Research question 4: The elements of the Macedonian NSDI strategy/policy in relation to the INSPIRE Directive are perceived through the policy aspects that are directly related (direct impact) and aspects that are indirectly related (indirect impact). The level of similarity/conformity is different for different aspects due to the fact that the influence is perceived from the driving forces of policy convergence originated from different factors i.e. reasons of influences. In general, the elements where direct impact is identified are based on the external factors of influences, where the elements of high level conformity are related to technical aspects such as the *Network Services, Interoperability* and *Metadata* aspects while the middle level of conformity is related to organizational and legal aspects as the *Organization – Monitoring, Data Sharing, Ownership/Legal protection of GI intellectual property rights, Limitations and Restrictions Access to Spatial Data and Services* and *Data Sets* aspects. On the other hand the elements where is identified indirect impact are based on the subjects to the needs and interests in the Macedonian NSDI context where the elements of high level conformity is related to the *Stakeholders/Participants* aspects. The remaining aspects as *PPP* and *Organization – Quality Assurance* that are defined with low or no level of conformity, have no related elements between the considered policies.

*Research question 5:* The possible reasons of compliance with the INSPIRE Directive are identified based on the considered driving forces of policy convergence which are perceived trough the reasons of influence. The reasons reflect the political will of the Macedonian Government to be compatible with EU and the EU policy influence which insists on regionalization. They are related to the influence that is originated from domestic factors such as the non-functionality and non-existence of internal standards and mechanisms as well as the influence coming from the NMCA itself. The reasons related to cross-national policy convergence caused by trans-national communication and information exchange such as the EU funds, involvement of external actors and organizations, ideas and knowledge exchange, cross-border cooperation and SDI related projects are reasons emerging from external factors. The international harmonization related to requirement for policies adaptation in line with international laws is perceived trough reasons coming from internal factors such as the reforms and modernization in the NMCA, harmonization of legislation, standards and procedures compatible to EU and influences concerning the recognition of the need of INSPIRE values. This theory even if it is not directly concerning the N-EUMS still has a huge influence in relation to compliance with the INSPIRE Directive.

#### Sub objective 3

Research question 6: The NMCA as in the case for Macedonia so in the region represents a relevant example of organization which reflects the development and implementation of the NSDIs in the N-EUMS in regard to the INSPIRE Directive. The NMCA is seen as the main actor and developer of the NSDI and is included in every legal, technical and organizational aspect of the NSDIs including the policy arrangements i.e. decisions making. The NMCA also represents the link for cross-border cooperation on regional level where concerning the regional SDI projects, is the main beneficiary. The NMCA as one of the NSDI stakeholders is clearly influenced by INSPIRE. The influence on the decisions and practices which are reflected as part of the NMCA responsibilities are perceived through the actions taken as part of the NSDI development and implementation process. The influences on the affected action are coming from internal factors such as defining better standards and data sharing arrangements and external factors as support from EU and the WB and participation in the EU/World organizations. However the influence is also coming from the NMCA as an organization, regardless of whether it is originated from the NMCA isself or whether it has been influenced, is directly transferred on the practices of the other NSDI stakeholders on national level and as an experience and example on regional level.

Research question 7: The scale/scope of actions affected by the INSPIRE Directive in the Macedonian NMCA through which the influence is perceived, covers actions related to legislation transposition and definition of organizational structure, establishment of preconditions for technical interoperability and standardization, future actions related to definition of bylaws and specification based on the INSPIRE IR as well as actions related to cross-border cooperation and the SDI related projects, which are generic for all the NMCAs in the region. The influence identified through this actions is related to action of adaptation of a number of European policies including the INSPIRE Directive as part of the process of Europeanisation as well as certain forms of influences such as the knowledge and ideas that are supplied and perceived, coming from international factor as very important actor for cross-national policy convergence perceived thought certain forms of persuasion such as advocacy. The actions are also identified as part of the internal coordination between the involved stakeholders where the interest of the participants as well the national interests are clearly incorporated as part of the NSDI policy.

Research question 8: The actions and decisions that are affected by the INSPIRE Directive define the possible level of compliance to INSPIRE, where the compliance should be generally considered in three ways. The first two, covering the expectations that will have effect on organizational and national level, such as aim to answer the internal needs through defining INSPIRE compliant data standardization and arrangements for data sharing. The third way relates to expectations that will have effect on regional level, such as participation and deepening of the cross-border cooperation on regional level as part of the regional SDI projects and initiatives. The compliance can be achieved through actions that need to be considered by the NMCA, following a combination of several approaches where the concept is adapted based on the country circumstances and the existing capacities of the NMCA. These approaches refer to the NSDI Strategy and the Law on NSDI which should strive to be harmonized with the Directive, direct application of INSPIRE including the IR and TS which will avoid adaptation and enable the use of the set standards. The considered good examples and practices which will provide application of most appropriate approach by already considering the bottlenecks that the EUMS have encountered in the development and implementation process and continue the knowledge and ideas exchange from the region and EUMS as part of the cross-border cooperation which will define applicable standards and processes for harmonization that can fit on regional level, by taking in consideration the country's similarities.

The possible extent to which the Macedonian NSDI can be enforced or complied with INSPIRE depends on several factors and certain facts that have influence on the extent of compliance on national level. These factors, that are originated from internal and external circumstances, the perceived bottlenecks and the political decisions related to the EU aspiration, define the possible extent of the Macedonian NMCA and NSDI as partially in compliance to INSPIRE while considering that the current phase of NSDI development is at medium to high level and low level of implementation. Most of the considered aspects can be fully made in compliance, with exceptions for aspects that are clearly guided by the national interests and priorities and that may have impact on the business model of the organizations in general. The enforcement as part of the EU SDI at this stage is not reachable, yet the enforcement as part of some new regional SDI initiatives is not excluded. This perception is considered through the SDI cross-border cooperation and the SDI projects that are clearly accepted by all the N-EUMS in the region. The possible development of new regional SDI initiative that will be based on the same principles as the EU SDI can provide harmonization of standards and data needed to serve in environmental cases on regional and European level.

### Main objective

The impact of the INSPIRE Directive onto the Macedonian NSDI is clearly identified through the perspective of the NMCA. The impact is perceived as part of the development and implementation process of the Macedonian NSDI through the policy itself but also through the existing actions reflected by that policy. This impact is identified as part of almost every considered institutional, legal, organisational and technical aspect. The impact has medium to high degree of influence onto the Macedonian NSDI policy context. This is related to the factors of influences that are perceived from external and internal reasons of influences i.e. compliance. The external factors of influence that are reflecting the EU involvement as well as the regional cooperation are considered stronger. The identified benefits and bottlenecks of complying to INSPIRE as well as the country's context, needs and priorities at the current moment affects the possible extent of the Macedonian NMCA and NSDI to which can be enforced or complied to INSPIRE. The possible extent is in partial compliance, while the enforcement as part of the EU SDI at this stage is not reachable, yet the enforcement as part of some new regional SDI initiatives is not excluded.

In the end, the impact and influence of the INSPIRE Directive onto the Macedonian NSDI shows that even this EU Directive is not intended for N-EUMS clearly impacts the national SDI polices in the N-EUMS and has effect on the cross-border cooperation and project initiatives. This impact shows that even not being fully implemented and enforced, this Directive has positive effect on national and regional level, contributing to economic growth, sustainable development and above all on the environmental protection in the N-EUMS.

### 6.3. Recommendations

### Recommendations for actions that should be considered

As recommendations for the Macedonian NMCA and NSDI in particular as well as for the other N-EUMS NMCAs and NSDIs from the Western Balkan region based on the current research, several generic actions should be considered.

First, considering the different priorities of the Macedonian NSDI context and the level of compliance, the NMCA in general must understand, fully consider and strive to achieve the main aim of the INSPIRE Directive which is to support environmental policies and actions that may have impact on the environment. By adhering to this goal, these countries will stop being isolated islands and become part of an information infrastructure (II) where the access and data sharing is done for higher purpose.

Second, even when the NSDI Strategy exists the considered actions show that there are certain gaps that need to be defined. The NMCAs should define a long term strategy that will seek compliance to INSPIRE in every stage of development and implementation of their NSDIs. By adhering to this goal, they will

improve their internal mechanisms for access and data sharing and will provide an INSPIRE compliant NSDIs that will be put into operation by the very entry of these countries into the EU.

Third, the findings reveal possibility of developing new regional SDI initiative that will be based on the same values as the EU SDI. Even through the focus is achieving compliance with the INSPIRE Directive this initiative should not be rejected since they may only help in the process of developing NSDI. Therefore an analysis of the regional SDI cooperation based on the practices and processes of the NMCAs in the countries of the Western Balkan region is needed. This will provide best practices and unified approach of implementation of the INSPIRE Directive and consider the possibility of establishing a new regional SDI initiative yet with focus on the regional needs and priorities which needs to be defined. In relation to this the already existing cooperation needs to be deepened.

Forth, considering the exceptions for aspects that are clearly guided by the national interests and knowing that the NMCA compliance to INSPIRE may cause possible implications on the business model and processes in the NMCAs and the LAS in general, an in-depth analysis is needed in order to define the possible implications. Here needs to be considered existing practices and examples from the EUMS which may provide certain solutions that can be used to overcome the possible difficulties related to the impact on the business concept and processes in the NMCA.

Fifth, considering the exceptions for aspects that are clearly guided by the national interests and the role and responsibility of the NMCA, the agencies should firstly focus to improve the existing technical and organizational SDI aspects on organizational and national level and second to deepen the cross-border organizational structure and eventually establish a regional SDI cooperation structure. Considering that the internal influences are mainly guided by the current needs and priorities of the countries, they must be gradually adjusted to fit the INSPIRE concept because if that is not the case, they will eventually need to be redefined.

#### Recommendations for further research

As a contribution of this research several recommendations for further research can be proposed in general referring to the case of the Macedonian NMCA and NSDI as well as the NMCAs and NSDIs from the N-EUMS countries in the Western Balkan region.

First, considering that the impact is assessed trough the defined impact/influence assessments steps which are based on theory of policy convergence, this steps can be applied on other cases for NMCAs in other N-EUMS that have considered INSPIRE as part of their NSDI concept. This will firstly confirm the impact/influence that is emerging from the Directive itself and will secondly provide another example of influences of EU on a domestic policy using this approach. This of course may be also applied for other EU policies that have influence on the NSDI, such as the European legislation on reuse of public sector information (PSI).

Second, since the impact/influence in the case study for the Macedonian NMCA and NSDI in general is considered through the defined assessment steps that are based on the theory of policy convergence a different method can be applied in order to verify the derived results in this research.

Third, the findings show that the inclusion of third parties as NSDI stakeholders is at low level while there is no example of PPP. Therefore in particular for the case of the Macedonian NMCA, an in-depth analysis is needed on the possibility and conditions for establishment of PPP model between the NMCA and the private sector i.e. third parties in relation to achieving INSPIRE compliant NSDI and how the PPP will

impact the NSDI funding model. Here should be considered ways to stimulate the private sector in order to take initiatives and offer data and knowledge needed for establishing an INSPIRE compliant NSDI.

Forth, the main bottlenecks that are identified as part of this research are one of the factors that have influence on the possible extent of compliance to INSPIRE. Therefore possible ways, methods and approaches for overcoming the bottlenecks that are identified during the development and implementation of one NSDI in compliance to the INSPIRE Directive needs to be defined.

Fifth, even it is not the focus of this research, the possible applications of the NSDI on national as on regional level are not clearly defined. Therefore in particular for the case of the Macedonian NMCA, an indepth analysis in form of case-studies is needed where the focus is set on the cost-benefits analysis.

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Sub objectives	Questions	Methods of data collection	Anticipated results
	How can be defined the impact (marked		Dofinition of volicy immost/influence in
	(INSPIRE Directive) on internal (NSDI)	Desk study (Policy. Impact. Influence.	relation on external on interInal policy
	policy and which assessment steps	Convergence, Assement conepts &	impact/influence with close view to
	should be considered/define?	frameworks related theory)	policy convergence
To define policy impact (external on	Which framework of aspects and		Redefinition of SDI assessment
internal policy) and define impact	indicators is suitable to identify the		frmaeworks - aspect and indicators that
assessment steps and indicators	policy elements and relations between	Desk study (Methods of SDI assessment	can be applicable to INSPIRE and the
framework	INSPIRE Directive and NSDI?	Multi Framework – Inspire State of Play)	(N)SDI
	What are the elements of the INSPIRE	Desk study (INSPIRE Directive and	
	Directive in relation to the framework of	supporting documentation in relation to	Elements of INSPIRE Direrce based in
	indicators?	the defined indicator framework)	the indicators framework
	What are the elements and relations		
	(indicators) of the Macedonian NSDI	Desk study/Interviews (semi-structured	Elenemts of the Macedonian (N)SDI
	strategy/policy in relation to the	interviews involving different groups of	strategy and policy that have relation
	INSPIRE Directive?	staff - technical and managerial)	with the INSPIRE Directive
	What are the possible reasons to		
To identify the reasons and define the	consider developing a Macedonian NSDI	Interviews/ Desk study (semi-structured	External and internal reasons to
relations of the Macedonian NSDI policy	in compliance with the INSPIRE	interviews involving top and middle	consider INSPIRE and reasons to comply
in relation to INSPIRE	Directive ?	level managerial staff)	with INSPIRE
	What is the role of the NMCAs in N-		Role of the NMCA in relation to (N)SDI -
	EUMS and in particular in Macedonia in	Desk study/Interviews (semi-structured	(organisations, rules, responsibilities,
	relation to the NSDI?	and involving different groups of staff)	arrangements, processes, data etc.)
			Actions and processes in the NMCA that
	What is the scale/scope of actions	Desk study/Interviews (semi-structured	are related to developing and
	affected by the INSPIRE Directive in the	interviews involving different groups of	implementation of INSPIRE (related to
	Macedonian NMCA?	staff – technical and managerial)	organisation and technilogy)
	How should the NMCA in Macedonia		Current and possible future
To identify the role, actions and the	comply to the INSPIRE Directive and		situation/direction in relation to
possible extent of compliance of the	what is the possible extent to which it	Desk study/Interviews (semi-structured	developing and implementation of
Macedonian NMCA in relation to NSDI	can be enforced or complied with	interviews involving different groups of	INSPIRE, with poslible level of
and INSPIRE	INSPIRE?	staff – technical and managerial)	compilance

### **APPENDIX 1 - RESEARCH MATRIX**

Table 6: Research matrix

### APPENDIX 2 - EUMS NSDI AND INSPIRE

Indicators	Slovenia	<b>Croatia</b> 2014	
EU Membership	2010		
Legislation (trans-position of INSPIRE)	Slovenian Infrastructure for Spatial Information Act	Croatian (N)SDI Act	
Responsible body	The Surveying and Mapping Authority (SMA)	The State Geodetic Administration (SGA)	
Other bodies	Inter-sectorial coordination group- composed of representatives from different ministries and 4 working groups	NSDI-Council, NSDI-Board and 6 working groups	
Data	Metadata system available with description of over 100 data sets. The 2011 Monitoring report has reported 77 datasets 88% of these datasets have metadata, although none are compliant with the implementing rules (Vandenbroucke & Crompyoets 2011)	Until now about 70 spatial data resources and 30 spatial data stakeholders have been registered in the NSDI making and NSDI operational basis (Hećimović et al., 2013). Metadata for Croatian NSDI services available	
Network services	Developed in accordance with the standards of OGC taking into account the ISO/TC211. INSPIRE Geo-portal made in 2011, view and download service available; no information on transformation and invoke service	NSDI Geoportal made in 2013, discovery and view service are available; in relation to the download services users can order data as download prepared files and download them via the Internet. Transformation, invoke and other services are not yet established	
Data sharing	Data sharing agreements on exchange and use of topographical data; using geodetic data and requesting geodesic data for the needs of municipalities (Petek, 2010)	The Agreement in Exchange, Access and Use of Spatial Data and Services in NSDI is in progress and will be basis for developing system of licensing spatial data (Hećimović et al., 2013).	
	No concrete examples of cross-border use of the infrastructure for spatial information. Agreements with neighboring countries on	There is no specific information of the cross-border use of the Croatian infrastructure for spatial data.	
	GNSS stations use (Petek, 2010) Activities on metadata funded by Ministry of Environment and Spatial planning:	INSPIRATION project; IMPULSE project funded by SIDA	
Cost and benefit aspects	Loan of the International Bank for Reconstruction and Development (IBRD) (Vandenbroucke & Crompvoets, 2011)	Development of NSDI Geoportal financed through EU Instrument for Pre Accession assistance project (IPA) (Hećimović et al., 2013).	
Some Detected Bottlenecks	The most common problem in spatial data quality is the high diversity of norms and procedures applied. Therefore, the quality between datasets is sometimes difficult to compare (Vandenbroucke & Crompvoets, 2011).		
	Particular spatial data sets are still of unsatisfactory or undefined quality, they are based on privately-owned geographic information systems and unavailable to the public or other users at local, regional, national and international levels.	The analysis of data, catalogues and services of metadata and network services in Croatia shows that generally speaking, in spite of numerous positive examples, the technical component of (N)SDI establishment falls behind and is a bottleneck in its implementation (e.g.: a part of spatial information included into the (N)SDI topics is not available for user, the catalogues of metadata, with rare exceptions, have not been prepared) (Poslončec-Petrićr, 2013)	
	One of the key barriers to the sharing of spatial data and services between public authorities in Slovenia appears the missing of an efficient cooperation structure (Vandenbroucke & Crompvoets, 2011).		

Table 7: NSDI overview in two EU countries and their relation to INSPIRE

### APPENDIX 3 - N-EUMS NSDI AND INSPIRE

Indicator	Existence of NSDI legislation	Started NSDI develop-ment	Is INSPIRE taken in consider-ation?	Connection to projects for	Is NMCA responsible for NSDI establishment and coordination?
Country	Existence of NSDI legislation	YES/ NO	YES/ NO	LAS or NSDI	YES/ NO
	Adopted : NSDI Strategy			INSPIRATION project	YES The State Authority for
Albania	and Functioning of the National Infrastructure for Geospatial Data	YES	YES	IMPULSE project- SIDA and Lantmateriet	Geospatial Information (ASIG) is responsible for co- ordination of NSDI
				INSPIRATION project	YES
Serbia	Adopted: NSDI Strategy; NSDI Medium term program and NSDI chapter in the Law on State Survey and Cadastre	YES	YES	Support of NSDI project by Statens kartverk, Norwegian Mapping and Cadastre Authority IMPULSE project- SIDA	The Republic Geodetic Authority (RGA) is responsible for co-ordination of NSDI
├			ļ	and Lantmateriet	
Federation of BIH	No NSDI Strategy and non- existence of legal framework	NO	NO	INSPIRATION project Capacity building for improving land administration and procedures in Bosnia and Herzegovina ('CILAP') IMPULSE project-SIDA and Lantmateriet	NO
				- INSPIRATION Project	YES
BiH- Republic of Srpska	No NSDI Strategy but a base for creation of NSDI defined in the Law on Survey and Cadastre	YES	YES	and Lantmateriet Real Estate Registration Project- World Bank Ioan Capacity building for improving land administration and procedures in Bosnia and Herzegovina ('CILAP')	The Bureau for Geodetic and Property Relations (RGURS) is co-ordinating NSDI
Montenegro	No NSDI Strategy but basic notions on NSDI included in the amendments of the Law on State Surveying and Cadastre of Immovable Property	YES	YES	INSPIRATION project- EU Land Administration and Management Project – World Bank Ioan IMPULSE project- SIDA and Lantmateriet	Not specified
				INSPIRATION project	YES
Kosovo	No NSDI Strategy but in the Law on Cadastre is defined the NSDI	YES	YES	Implementation of GIS and map production - Government of Japan Production of orthophoto and elevation data - Norwegian Government and Statens Kartverk Environment and other spatial data - German Agency for International Cooperation (GIZ)	Kosova Cadastral Agency is responsible for NSDI
Turkey	NSDI in Turkey is named as "Act 75" under "Modernization in Public Administration"	YES	YES	Metadata Portal for Maps Continuously Operating Reference Stations Project- Tusaga-Aktif Land Registry and Cadastre Information System project	NO Ministry of Environment & Urbanization trough the General Directorate of GIS plays a coordinating role

Table 8: NSDI overview in the Balkan countries and their relation to INSPIRE
	Sep	otem	her,	2014												Octo	ber,	2014										
Activity		~				Wee	k 1					-	Nee	۲ <b>2</b>					3	eek	~				>	Veek	4	
	27	28	29	30	H _	7	e	4	ŋ	9	~	∞	6	10	11	12	13	14	15	16	17	18	19	20	21 2	2 2	3	4 2
Contacting the agencies / organizations and defining the participants who will be doing the																												
interview	~	~						<b>`</b>	<b>`</b>						<u> </u>	-						~	/					_
Defining the date and time of interview	~	~						/	/						~	~						<b>_</b>	/					_
Data collection - Interviews with respondents	~	~						~	~						~	~						<b>`</b>	~					_
Data collection - Data samples	~	~						~	<b>`</b>						~	~						~	~					<u> </u>
Data structuring	~	~						~	/						~	~						<b>`</b>	~					
Data processing	~	~						<b>`</b>	<b>`</b>						~	~						~	~					<u> </u>
Additional interview (if necessary)																												
Preparing for departure	~	~						<b>`</b>	/						~	~						/	/					/

# APPENDIX 4 - FIELDWORK ACTIVITIES – WORKPLAN

### **APPENDIX 5 - INTERVIEW QUESTIONS**

<u>Interview 1</u> <u>Agency/Organization</u>: Agency for Real Estate Cadaster <u>Group</u>: Top management staff <u>No. of respondent</u>:

Introduction to the issue: When developing SDI it's useful to consider the existing practices and experiences that are present. In that sense when was developed the Macedonian NSDI policy certain internal and external contexts were considered.

1. Question: What is the general concept of the Macedonian NSDI?

**1.1 Sub-question:** What are the main actors involved in policy development? Are there any external actors?

**2.** Question: In your opinion, what are the main similarities and differences in relation to the INSPIRE Directive?

**Introduction to the issue:** There is a certain impact/influence of the INSPIRE Directive which can be seen from the concept of the Macedonian NSDI policy and especially the strategy.

3. Question: In your opinion, what are the possible reasons to comply to INSPIRE?

**3.1 Sub-questions:** Does this reasons comes from internal influence such as problems with data standardization, external factor involvement or something else?

**Addition:** Only certain percent of the impact/influence can be considered as direct while the rest of the impact/influence is indirect. However here the question remains because even considering the impact is indirect there is a really high degree of convergence between the two policies.

**4. Additional question:** According to your opinion and in relation to the given reasons, can the impact that is considered as indirect to be related to the INSPIRE Directive?

**5.** Question: Are there considered possible benefits and bottlenecks of complying to INSPIRE? If yes – what are the expected benefits of establishing an NSDI according to INSPIRE? If no – why is taken in consideration?

**Introduction to the issue:** The aim of INSPIRE is to establish a regional SDI based on the SDIs of the EUMS. However the information infrastructure can exceed the defined borders particularly in favor of environmental protection.

**6. Question:** What is your opinion in relation to possible enforcement of the Macedonian NSDI outside of Macedonia?

Clarification: As part of INSPIRE - as part of EU, or some kind of other regional SDI cooperation?

7. Question: Is there any cross border SDI cooperation in relation to access to spatial data and spatial data services?

7.1 Sub-question: In your opinion, are there certain similarities between the countries i.e. leading organizations in the region based on which this cooperation could be established (even knowledge exchange)?

Introduction to the issue: Macedonia is not part of the EU, and consequently it's not part of INSPIRE.

**8.** Question: By considering one agency such as AREC and the actions of policy implementation done there, to which extent can they be made INSPIRE compliant?

9. Question: What is the role and the responsibilities of AREC in relation to establishing NSDI?

**10. Question:** What are the current actions (of policy implementation) in your organization that are related to NSDI?

**10.1 Sub-question:** Does some of this actions clearly relates to the INSPIRE Directive? How they comply to INSPIRE?

<u>Interview 2</u> <u>Agency/Organization:</u> Agency for Real Estate Cadaster <u>Group:</u> Middle level management and technical staff <u>No. of respondent:</u>

**Introduction to the issue:** The development and implementation of NSDI by itself is a very complex thing. On top of that when considering developing SDI that is in line with the INSPIRE Directive is even more demanding which can be seen from the EUMS experiences.

**1. Question:** In your opinion, is the operational staff familiar enough with the INSPIRE transposition and implementation? If yes – where is this knowledge gained and how it's applied? If no – what should be done in order to become one?

Introduction to the issue: The AREC is the leading organization in relation to development and implementation of the Macedonian NSDI.

2. Question: What is the role and the responsibilities of AREC in relation to establishing NSDI?

3. Question: What are the current AREC actions (of policy implementation) related to NSDI?

3.1 Sub-question: Does some of this actions clearly relates to the INSPIRE Directive?

**4. Question:** Are there existing arrangements for Data and Service Sharing between AREC and other public organizations or third parties? If there, are they functioning and are they according to INSPIRE?

**Introduction to the issue:** According to the Macedonian NSDI policy are defined 32 spatial data themes while according to the INSPIRE Directive on total of 34 spatial data themes categorized into three Annexes.

**5. Question:** What spatial data sets does AREC provides or owns that are also considered as part of the INSPIRE Annexes?

**5.1 Sub-question:** Are there any fully complied data sets according to INSPIRE data models and specifications? If yes – To which specifications they adhere and how can be described the degree of compliance? If no – How should be made compliant to INSPIRE?

**Introduction to the issue:** The Macedonian NSDI as well as the INSPIRE Directive define specifications for Metadata, Network Services, Data Specifications and Data and Service Sharing. It exist a recognizable indirect and direct impact/influence concerning this aspect on the Macedonian NSDI.

**6. Question:** According to your information and experience, are there existing NETWORK Services functioning in AREC? What kind of services are there? Are they according to INSPIRE?

**7. Question:** According to your information and experience is there METADATA for the spatial data sets and services in AREC? If there is, is it according to INSPIRE?

**8.** Question: According to your information and experience, are there any technical standards defined according to the Macedonian NSDI policy? If there are, where are applied?

**9.** Question: According to your information and experience, is there existing ICT that is supporting the access to spatial data and spatial data services?

**9.1 Sub-question:** If yes - Is this system architecture INSPIRE compatible? If no - according to your opinion how should be made compliant to INSPIRE?

**Introduction to the issue:** The access to spatial data and spatial data services should be done through the National Geo-Portal as well as the EU Community INSPIRE Geo-Portal?

10. Question: According to your information and experience, does AREC have a Geo-Portal?

10.1 Sub-question: Is it according to the INSPIRE specifications?

11. Question: According to your information and experience, is there a National Geo-Portal?

11.1 Sub-question: Is it according to the INSPIRE specifications?

**12. Question:** According to your information and experience, are there some published data or services on the EU Community INSPIRE Geo-Portal?

12.1 Sub-question: If no – How should be made compliant to INSPIRE?

**13. Question:** According to your opinion to which extent these actions (of policy implementation) from the Macedonian NSDI policy can be complied in relation to INSPIRE?

<u>Interview 3</u> Agency/Organization: City of Skopje; Agency for spatial planning, Ministries Group: Management staff No. of respondent:

Introduction to the issue: When developing SDI it's useful to consider the existing practices and experiences that are present. In that sense when was developed the Macedonian NSDI policy certain internal and external contexts were considered.

1. Question: What is the general concept of the Macedonian NSDI?

**1.1 Sub-question:** What are the main actors involved in policy development? Are there any external actors?

**2.** Question: In your opinion, what are the main similarities and differences in relation to the INSPIRE Directive?

**Introduction to the issue:** There is a certain impact/influence of the INSPIRE Directive which can be seen from the concept of the Macedonian NSDI policy and especially the strategy.

3. Question: In your opinion, what are the possible reasons to compile to INSPIRE?

**3.1 Sub-questions:** Does this reasons comes from internal influence such as problems with data standardization, external factor involvement or something else?

**Addition:** Only certain percent of the impact/influence can be considered as direct while the rest of the impact/influence is indirect. However here the question remains because even considering the impact is indirect there is a really high degree of convergence between the two policies.

**4. Additional question:** According to your opinion and in relation to the given reasons, can the impact that is considered as indirect be related to the INSPIRE Directive?

**5.** Question: What is the role and the responsibilities of Agency for spatial planning in relation to establishing NSDI?

6. Question: What are the current actions (of policy implementation) in yours organization that are related to NSDI?

6.1 Sub-question: Does some of this actions clearly relates to the INSPIRE Directive?

**7. Question:** Are there existing arrangements for Data and Service Sharing between Agency for spatial planning and other public authorities (such as AREC) or third parties? If there are they functioning and are they according to INSPIRE? If no – How should be made available?

Introduction to the issue: According to the Macedonian NSDI policy there are certain provision concerning the organization aspect (coordination, quality assurance, monitoring) as well as legal aspect (PPP, ownership, limitations, licensing).

**8.** Question: According to your information and experience are there enforcement actions for these aspects. If there are, how are they functioning? If no – How should be made available?

**Introduction to the issue:** The Macedonian NSDI as well as the INSPIRE Directive define specifications for Metadata, Network Services, Data Specifications and Data and Service Sharing. It exist a recognizable indirect and direct impact/influence concerning this aspect on the Macedonian NSDI. Additionally the access to spatial data and spatial data services should be done through the National Geo-Portal as well as the EU Community INSPIRE Geo-Portal.

**9. Question:** Are there any fully complied data sets and services according to INSPIRE data models and specifications? If no – How should be made compliant to INSPIRE?

**10.** Question: According to your information and experience is there METADATA for the spatial data sets and services in ASP? If there is, is it according to INSPIRE? If no – How should be made compliant to INSPIRE?

**11. Question:** According to your information and experience, does your organization has a Geo-Portal, or provides services via other organizations? If yes - is it according to the INSPIRE specifications? If no – According to your opinion, what action needs to be taken in order to comply with INSPIRE?

Introduction to the issue: Macedonia is not part of the EU, and consequently it's not part of INSPIRE.

**12. Question:** By considering one agency such as yours and the actions of policy implementation done, to which extent can all this be made INSPIRE compliant?

Interview 4

Agency/Organization: Faculty of Civil Engineering – Department for Geodesy Group: Academics No. of respondent:

Introduction to the issue: When developing SDI it's useful to consider the existing practices and experiences that are present. In that sense when was developed the Macedonian NSDI policy certain internal and external contexts were considered.

1. Question: What is the general concept of the Macedonian NSDI?

**1.1 Sub-question:** In your opinion, what are the main similarities and differences in relation to the INSPIRE Directive?

**Introduction to the issue:** There is a certain impact/influence of the INSPIRE Directive which can be seen from the concept of the Macedonian NSDI policy and especially the strategy.

2. Question: In your opinion, what are the possible reasons to comply to INSPIRE?

**2.1 Sub-questions:** Does this reasons comes from internal influence such as problems with data standardization, or external factor involvement or something else?

**Addition:** Only certain percent of the impact/influence can be considered as direct while the rest of the impact/influence is indirect. However here the question remains because even considering the impact is indirect there is a really high degree of convergence between the two policies.

**3.** Additional question (*Opinion*): According to your opinion and in relation to the given reasons, can the impact that is considered as indirect be related to the INSPIRE Directive?

**4. Question:** Are there considered possible benefits and bottlenecks of complying to INSPIRE? If yes – what are the expected benefits of establishing an NSDI according to INSPIRE?

**Introduction to the issue:** The aim of INSPIRE is to establish a regional SDI based on the SDIs of the EUMS. However the information infrastructure can exceed the defined borders particularly in favour of environmental protection.

**5. Question:** What is your opinion in relation to possible enforcement of the Macedonian NSDI outside of Macedonia?

Clarification: As part of INSPIRE - as part of EU, or some kind of other regional SDI cooperation?

**5.1 Sub-question:** In your opinion, are there certain similarities between the countries in the region based on which this cooperation could be established (even knowledge exchange)?

**Introduction to the issue:** The concept of Macedonian NSDI is mainly positioned towards the public authorities (NSDI entities), however "third parties" are also taken in consideration.

6. Question: What is the role of the academic sector relation to NSDI?

**6.1 Sub-question:** In your opinion, what can the academic sector contribute to enforcement of the INSPIRE Directive in relation to the Macedonian NSDI?

Introduction to the issue: Macedonia is not part of the EU, and consequently it's not part of INSPIRE.

**7. Question:** By considering one agency such as AREC (as the leading organization for NSDI, to which actions of policy implementation should comply in order to enforce the INSPIRE compliant NSDI?

8. Question: Does the Faculty of Civil Engineering – Department for Geodesy for the purpose of research have reviewed the concept of developing spatial data sets and services that are INSPIRE compliant.

**8.1 Sub question:** Are there any data sharing arrangements between the Academic fella and AREC (or some other public agencies)? If yes, to what they relate and how they are enforced.

#### Interview 5

Agency/Organization: Private Sector Company Group: Top management staff No. of respondent:

**Introduction to the issue:** In the development of the Macedonian NSDI strategy and policy were included many NSDI stakeholders/participants as well internal and external experts. From the given result of the outcome of the strategy and policy can be recognized the influence of the INSPIRE Directive.

1. Question: In your opinion what are the reasons for this influence?

1.1 Sub-question: Are these reasons mainly initiated from internal of external influence?

**2. Question:** According to your information, what is the stage of development and implementation of the Macedonian NSDI?

**2.1 Sub-question:** Do you think that the Macedonian NSDI should be developed in line with the INSPIRE Directive?

**Introduction to the issue:** The concept of Macedonian NSDI is mainly positioned towards the public authorities (NSDI entities), however "third parties" are also taken in consideration. The inclusion of "third parties" in the NSDI is also defined in the INSPIRE Directive with the possibility to publish their spatial data sets and services.

**3.** Question: How the non-governmental NSDI stakeholders/participants and especially the private sector are included in the Macedonian NSDI?

**3.1 Sub-question:** In your opinion does this concept functions in accordance to the INSPIRE Directive? If yes – How does it function? If no – How can be enforced?

**Introduction to the issue:** In the NSDI strategy is described the PPP model. Concerning the fact that the Agency for Real Estate Cadaster is the leading and responsible organization for NSDI in Macedonia which among other competencies adopts the decision for linking/connecting the third party to the NSDI most of the NSDI related actions are directed in AREC.

4. Question: According to your perception and experience, does the PPP model function?

**4.1 Sub-question:** Are there any PPP arrangements between the private sector and AREC (or some other public agencies)? If yes, to what they relate and how they are enforced.

**4.2 Sub-question:** Are there any data sharing arrangements between the private sector and AREC (or some other public agencies)? If yes, to what they relate and how they are enforced. If no, to what should they relate and how should they be enforced.

**Introduction to the issue:** The INSPIRE Directive has defined Implementing Rules which also defines the technical specifications on the concerned areas. The Macedonian NSDI is clearly affected by the impact of the INSPIRE Directive where this even extends to developing standards that are based on the IR. This means that all the spatial data sets and services should be INSPIRE compatible.

**5.** Question: What the private sector has to offer in relation to developing a NSDI in compliance to INSPIRE?

Clarification: In terms of spatial data sets and services as well as technology?

**5.1 Sub-question:** According to your experience, does the private sector offers spatial data sets and services that INSPIRE compliant? If yes - To which specifications they adhere and how can be described the degree of compliance? If no – What actions should be considered to make them compliant?

**6. Question:** According to your opinion, what are the expectations for the private sector of establishing Macedonian NSDI in compliance with the INSPIRE Directive and do they see the possibilities for cross border acting?

1 Interviewe	e Educational backersund	Bocition /Eurotion	Armairation	Data of interview	Time of interview	
1	Geodesy	Assistant MSc.	Faculty of Civil Engineering - Department of Geodesy	03.10.2014	13:00	Record
7	Mechanical	Head of Department	Spatial Planning Agency of Republic of Macedonia	05.10.2014	13:00	Record
m	Geodesy	Technical staff	Agency for Real Estate Cadastre of Republic of Macedonia	06.10.2014	12:00	Record
						The interview was not done. The
- (						interviewee had nothing new to
						supplement than what is alredy
4	Lawyer	Head of Unit	Agency for Real Estate Cadastre of Republic of Macedonia	06.10.2014	10:00	given in the Strategy and the Law.
5	Electro/IT	Manager	GDi GISDATA LLC Macedonia	07.10.2014	12:00	Record
9	Electro/IT	Manager	GDi GISDATA LLC Macedonia	07.10.2015	12:00	Record
2	Geodesy	Head of Unit/ Technical staff	Ministry of Environment of Republic of Macedonia	08.10.2014	10:00	Notes
∞	Geodesy	Head of Unit/ Technical staff	Agency for Real Estate Cadastre of Republic of Macedonia	09.10.2014	13:00	Record
6	LT IT	Head of Department	City of Skopje	10.10.2014	10:00	Record
			Ministry of Information Society and Administration of			
10	IT	Technical staff	Republic of Macedonia	13.10.2014	11:00	Notes
			Ministry of Information Society and Administration of			
11	IT	Technical staff	Republic of Macedonia	13.10.2014	11:00	Notes
			Ministry of Information Society and Administration of			
12	IT	Technical staff	Republic of Macedonia	13.10.2014	11:00	Notes
		State Counselor for				
13	IT	Information Technology	Agency for Real Estate Cadastre of Republic of Macedonia	14.10.2014	10:00	Record
14	Geodesy	Head of Department	Agency for Real Estate Cadastre of Republic of Macedonia	15.10.2014	11:30	Record
		State Counselor for				
		coordination of national and				
		international activities and				
		strategic planning (Project				
15	Lawyer	Manager - IMPULS)	Agency for Real Estate Cadastre of Republic of Macedonia	15.10.2014	11:30	Record
16	Geodesy	Technical staff	Agency for Real Estate Cadastre of Republic of Macedonia	16.10.2014	13:00	Record
		State Counselor for				
		Geomatics (Project Manager -				
17	Geodesy	INSPIRATION)	Agency for Real Estate Cadastre of Republic of Macedonia	17.10.2014	11:30	Notes
L			Ministry of Agriculture, Forestry and Water Economy of			
18	Agricuture	LPIS adviser	Republic of Macedonia	20.10.2014	10:30	Notes
19	Geodesy	Professor. Dr.	Faculty of Civil Engineering - Department of Geodesy	21.10.2014	13:00	Notes
20	Geodesy	Professor. Dr.	Faculty of Civil Engineering - Department of Geodesy	22.10.2014	12:00	Record
21	Geodesy	Head of Department	Agency for Real Estate Cadastre of Republic of Macedonia	16.10.2014	14:30	Notes

## APPENDIX 6 - LIST OF RESPONDENTS (INTERVIEWEES)

List of respo able 10:

Topic	Document	Date/Time framework	Language	Link/ Digital or Hard copy	Source	Organisation/Author	Confidential document
	(Further Information) Spatial Data Infrastructure in the Western Balkans - PROJECT INSPIRATION	2012-2014	MK/EN	http://www.katastar.gov.mk/en/Page.aspx?Id= 496&m=1575	http://www.katastar.gov.mk/en/	AREC	
	INSPIRATION	2012-2014	MK/EN	http://www.katastar.gov.mk/en/Page.aspx?ld= 556&m=1597 http://www.katastar.gov.mk/en/Page.aspx?ld=	http://www.katastar.gov.mk/en/	AREC	
Educational materials on INSPIRE - INSPIRATION Project	Cooperation on space for cooperation - INSPIRE and SDI in Macedonia	2012-2014	MK/EN	http://www.katastar.gov.mk/userfiles/file/INS PIRE%20in%20Macedonia_HQ.pdf	http://www.katastar.gov.mk/en/	AREC	
	General information	2012-2013	EN	http://www.inspiration- h westernbalkans.eu/index.html	http://www.inspiration- westernbalkans.eu/	EU/Project Management Unit - c/o GDi GISDATA	
	Activity 1 - Policy, institutional and legislative framework analyses	2012-2013	EN	westernbalkans.eu/INSPREActivity-1 Policy-institutional-and-legislative-framework- analyses_3591435.html	http://www.inspiration- westernbalkans.eu/	EU/Project Management Unit - c/o GDi GISDATA	
	Activity 1 - Policy, institutional and legislative framework analyses - Text report	2012-2013	EN	http://www.inspiration- westernbalkans.eu/5/8/9/8/5/4/Activity_1_tex  h t_on_report.pdf	http://www.inspiration- westernbalkans.eu/	EU/Project Management Unit - c/o GDi GISDATA	
	Activity 2 - Capacity building and knowledge transfer	2012-2013	EN	http://www.inspiration- westernbalkans.eu/INSPIREActivity-2 b Capacity-building-and-knowledge- transfer_3591443.html v	http://www.inspiration- westernbalkans.eu/	EU/Project Management Unit - c/o GDi GISDATA	
	Activity 2 - Capacity building and knowledge transfer - Text report	2012-2013	EN	http://www.inspiration- westernbalkans.eu/5/8/9/8/5/6/Activity_2_tex  h t_on_report.pdf	http://www.inspiration- westernbalkans.eu/	EU/Project Management Unit - c/o GDi GISDATA	
INSPIRATION - Spatial Data Infrastructure in the Western	Activity 3 - Awareness raising and communication	2012-2013	EN	http://www.inspiration- westernbalkans.eu/INSPIREActivity-3 Awareness-raising-and- communication_3591757.html v	http://www.inspiration- westernbalkans.eu/	EU/Project Management Unit - c/o GDi GISDATA	
Balkans	Activity 3 - Awareness raising and communication - Text report	2012-2013	EN	http://www.inspiration- westernbalkans.eu/5/8/9/3/Activity_3_tex  h t_on_report.pdf	http://www.inspiration- westernbalkans.eu/	EU/Project Management Unit - c/o GDi GISDATA	
General Project and SDI Documents	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)	2007	EN	http://www.inspiration- westernbalkans.eu/5/8/9/9/2/0/INSPIRE_Direct h ve.PDF	http://www.inspiration- westernbalkans.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
	Spatial Data Infrastructure	N/A	EN	nttp://www.inspiration- westernbalkans.eu/5/8/9/9/2/0/Spatial_Data_1 nfrastructure_2.PDF	http://www.inspiration- westernbalkans.eu/	Henri J. G. L. Aalders & Harold Moellering	

### APPENDIX 7 - LIST OF COLLECTED GREY LITERATURE

Table 11: List of collected grey literature -1st part

Topic	Document	Date/ I Ime framework	Language	Link/ Digital or Hard copy	Source	Organisation/Author	Confidential document
				http://www.inspiration- westernbalkans.eu/5/8/9/9/2/0/Spatial Data I	http://www.inspiration-		
	Spatial Data Infrastructure	2003	EN/CR	nfrastructure_1.pdf	westembalkans.eu/	Drazen Tutic	
General Project and SDI	Regional SDI Cooperation – SEE Inspiration			http://www.inspiration- westernbalkans.eu/5/8/9/9/2/0/INSPIRE Proje	http://www.inspiration-	Zeliko Bačić and Zeliko	
Documents	in South-Eastern Europe	2010	EN	cts_in_SEE.PDF	westembalkans.eu/	Obradović	
	Summaries of the National Reports - Policy,			http://www.inspiration-		EU/Project	
<b>INSPIRATION - Recommendation</b>	institutional and legislative framework			westernbalkans.eu/5/8/9/9/0/3/Summaries_of	http://www.inspiration-	Management Unit - c/o	
Reports	analyses	2013	EN	_the_National_Reports.pdf	westembalkans.eu/	gdi gisdata	
				http://www.inspiration-			
				westernbalkans.eu/5/8/9/9/0/3/National_repo	http://www.inspiration-	<b>GFA</b> Consulting Group	
	National Report Macedonia	2013	EN	rt_Macedonia.pdf	westembalkans.eu/	GmbH/ Gjorgjiev Vanco	
				http://www.inspiration-			
				westernbalkans.eu/INSPIREPolicy-			
Policy, institutional and	Other National Reports (Serbia, Montnegro,			institutional-and-legislative-framework-	http://www.inspiration-		
legislative framework analyses	Albania)	2013	EN	analyses_3591797.html	westembalkans.eu/	N/A	
				http://www.inspiration-	:		
	Regional SDI Legislation Framework			westernbalkans.eu/5/8/9/9/0/3/Annex_10_Acti	http://www.inspiration-	GFA Consulting Group	
	Analysis and Recommendation Report	2013	EN	vity_1.1_and_1.2_Report.pdf	westembalkans.eu/	GmbH/ Fritz Kroiss	
	Regional SDI & Land Administration,			http://www.inspiration-			
Capacity building and knowledge	<ul> <li>Capacity and Education Study and</li> </ul>			westernbalkans.eu/5/8/9/9/0/6/Annex_11_Acti	http://www.inspiration-	GFA Consulting Group	
transfer	Recommendation Report	2013	EN	vity_2.1_and_2.2_Report.pdf	westem balkans.eu/	GmbH/ Ivica Skender	
				http://www.inspiration-			
			Multiple	westernbalkans.eu/INSPIREAwareness-	http://www.inspiration-		
	INSPIRE Vide o	2013	languages	raising-and-communication_3591814.html	westembalkans.eu/	N/A	
				http://www.inspiration-			
				westernbalkans.eu/INSPIREAwareness-	http://www.inspiration-		
	INSPIRE Brochures	2013	EN	raising-and-communication_3591814.html	westembalkans.eu/	N/A	
				http://www.inspiration-			
	General Documents	0102 0002	Z	westernbalkans.eu/INSPIREAwareness- raisine-and-communication 3591814 html	http://www.inspiration- westembalkans.eu/	0/V	
				http://www.inspiration-			
Awareness raising and	Regional Studies - Regional Study on			westernbalkans.eu/INSPIREAwareness-	http://www.inspiration-		
communication	Cadastre and Spatial Data Infrastructure	2012, 2013	EN	raising-and-communication_3591814.html	westembalkans.eu/	N/A	
						EU/Project	
				http://www.katastar.gov.mk/en/Page.aspx?ld=		Management Unit - c/o	
Competition of ideas	General information	2012-2013	EN	530&m=1586	http://www.katastar.gov.mk/en/	gdi gisdata	
				http://www.inspiration-		EU/Project	
				westernbalkans.eu/5/9/3/2/0/6/Ideas_Compet		Management Unit - c/o	
	Ideas Competition - Call for applications	2012-2013	EN	ition_Call_For_Applications_v1_3.pdf	http://www.katastar.gov.mk/en/	gdi gisdata	
	Pilot application for the procedure in case of fire	2012-2013	MK/EN	http://nsdi.katastar.gov.mk/emphasis/	http://www.katastar.gov.mk/en/	AREC	

Table 12: List of collected grey literature  $\mbox{-}2^{nd}$  part

	Document	Date/Time framework	Language	Link/ Digital or Hard copy	Source	Organisation/Author	Confidential document
General informatic	u	2014-2018	MK/EN	http://www.katastar.gov.mk/en/Page.aspx?ld= 598&m=1603	http://www.katastar.gov.mk/en/	AREC	
			MK/EN	http://katastar.gov.mk/en/News.aspx?ld=1373	http://www.katastar.gov.mk/en/	AREC	
Project Proposal F	inal Draft, v 1.4- IMPULS	2014	EN	Digital copy	AREC	Kent Nilsson, Anders Rydén, Christina Wasström and Peter Wasström	Yes
Report on the star Balkan countries	tus of INSPIRE in the	2013	EN	http://inspire.ec.europa.eu/documents/INSPIR E_JJRC86293_2013_Report_NSDI_Balkan.pdf	http://inspire.ec.europa.eu/	European Commission/ JRC - Vlado Cetl, Katalin Tóth, Andrej Abramić and Paul Smits	
INSPIRE directive		2007	EN	http://eur-lex.europa.eu/legal- content/EN/TXT/PDF/?uri=CELEX:32007L0002&f rom=EN	http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
INSPIRE Legislati	Б	N/A	EN	http://inspire.ec.europa.eu/index.cfm/pageid/ 3	http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
INSPIRE Metadat	a Regulation	2008	EN	http://eur-lex.europa.eu/legal- content/EN/TXT/PDF/?uri=CELEX:32008R1205&f rom=EN	http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
Interoperability services - Consol	of spatial data sets and iidated text	2013	EN	http://eur-lex.europa.eu/legal- content/EN/TXT/PDF/?uri=CELEX:02010R1089- 20131230&from=EN	http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
Network Service	8	2009	EN	http://eur-lex.europa.eu/legal- content/EN/TXT/PDF/?uri=CELEX:32009R0976&f rom=EN	http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	

 Table 13: List of collected grey literature -3rd part

Topic	Document	Date/Time framework	Language	Link/ Digital or Hard copy	Source	Organisation/Author	Confidential document
Data and Service Sharing	Regulation on INSPIRE Data and Service Sharing	2010	EN	http://eur-lex.europa.eu/legal- content/EN/TXT/PDF/?uri=CELEX:32010R0268&f rom=EN	http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
Monitoring and Reporting	Commission Decision regarding INSPIRE monitoring and reporting	6007	E	http://eur- lex.europa.eu/Lex.UriServ/Lex.UriServ.do?uri=0 J:1.:2009:148:0018:0026:EN:PDF	http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
Technical Specifications			E		http://inspire.ec.europa.eu/	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION - European Commission	
	Draft NSDI Strategy for thr Republic og Macedonia	2012	EN	http://www.katastar.gov.mk/userfiles/file/NS DI_Strategy.pdf	http://www.katastar.gov.mk/en/	AREC	
	NSDI Strategy for thr Republic og Macedonia	2012	MK	http://www.katastar.gov.mk/userfiles/file/NS DI_STRATEGIJA.pdf	http://www.katastar.gov.mk/en/	AREC	
NSDI Strategy	Final Report - Supporting the Development Strategy for NSDI	2012	MK	Digital copy	City of Skopje	Mark Probert	
Macedonian SDI	Defining strategic mission and vision	2012	MK	http://www.katastar.gov.mk/mk/Page.aspx?ld =434&m=1567	http://www.katastar.gov.mk/en/	AREC	
	Analysis European-National Policy-Final 310111_mk	2012	MK	http://www.katastar.gov.mk/userfiles/file/NS DI/D%201_1%20European-National%20Policy- Final%20310111_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
	D 1_2 Vision statements Final 310111_mk	2012	Ж	http://www.katastar.gov.mk/userfiles/file/NS DI/D%201_2%20Vision%20statements%20Final %20310111_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
	D 1_3 Objectives Final 310111_mk	2012	MK	http://www.katastar.gov.mk/userfiles/file/NS DI/D%201_3%200bjectives%20Final%20310111_ mk.pdf	http://www.katastar.gov.mk/en/	AREC	
	D 1_4 Guiding Principles Final 310111_mk	2012	MK	http://www.katastar.gov.mk/userfiles/file/NS DI/D%201_4%20Guiding%20Principles%20Final %20310111_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
Defining strategic mission and vision	D 1_5 List_Key_NSDI-Stakeholders Final 310111_mk	2012	MK	http://www.katastar.gov.mk/userfiles/file/NS DI/D%201_5%20List_Key_NSDI- Stakeholders%20Final%20310111_mk.pdf	http://www.katastar.gov.mk/en/	AREC	

Table 14: List of collected grey literature -4<sup>th</sup> part

Confide ntial document													
Organisation/Author	AREC	AREC	AREC	AREC	AREC	AREC	AREC	AREC	AREC	AREC	AREC	AREC	AREC
Source	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/	http://www.katastar.gov.mk/en/
Link/ Digital or Hard copy	nttp://www.katastar.gov.mk/userfiles/file/NS D//Sozdavanje%20deloven%20koncept/Cost%2 Matrix%20IC230711 mk.pdf	ittp://www.katastar.gov.mk/userfiles/file/NS D//Sozdavanje%20deloven%20koncept/D21%20 Business%20Requirements%20JCMP%20030811 mk.pdf	ritp://www.katastar.gov.mk/userfiles/file/NS DJ/Sozdavanje%20deloven%20koncept/D22%20 3usiness%20Model%20ICMP120811_mk.pdf	rttp://www.katastar.gov.mk/userfiles/file/NS DJ/Sozdavanje%20deloven%20koncept/D23%20 -unding%20mode1%20JC230711_mk.pdf	1ttp://www.katastar.gov.mk/userfiles/file/NS DJ/Sozdavanje%20deloven%20koncept/D24%20 artnering%20model%20lC330711_mk.pdf	1ttp://www.katastar.gov.mk/userfiles/file/NS DJ/Sozdavanje%20deloven%20koncept/D25%20 Cost%20Benefits%20Analysis%20Corrected_mk pdf	rttp://www.katastar.gov.mk/userfiles/file/NS DJ/D3.1%20141111%20Governance%20and%201 1stitutional%20Framework%20FINAL_mk.pdf	http://www.katastar.gov.mk/userfile_/file_/NS D/D3.2%20Draft%20Charter%20Coord%20Body %20Final%20141111_mk.pdf	nttp://www.katastar.gov.mk/userfiles/file/NS DJ/D3.3%20Draft%20Charter%20Working%20Gr Dups%20Final%2014111_mk.pdf	1ttp://www.katastar.gov.mk/userfiles/file/NS DJ/D3.4%20Private%20- %20Public%20Engagement%20v1%20160811_m c.odf	rittp://www.katastar.gov.mk/userfiles/file/NS D/D3.5%20Strategic%20Communications%20PI an%20081210_mk.pdf	1ttp://www.katastar.gov.mk/mk/Page.aspx?ld =504&m=1593	rttp://www.katastar.gov.mk/userfiles/file/NS DJ/Interoperabilna%20infrastruktura/D5.1%20i F-Infrastructure%201.0%20final_mk.pdf
Language		¥	¥	MK	MK	WK		¥	 W	<u> </u>	¥	WK	 WW
Date/Time framework	2012	2012	2012	2012	2012	2012	2012	2012	2012	202	2012	2012	2012
Document	Cost Matrix JC230711 mk	D21 Business Requirements JCMP 030811 mk	D22 Business Model JCMP120811_mk	D23 Funding model JC230711_mk	D24 Partnering model JC230711_mk	D25 Cost Benefits Analysis Corrected_mk	D3.1 141111 Governance and Institutional Framework FINAL mk		D3.3 Draft Charter Working Groups Final 141111_mk	D3.4 Private - Public Engagement v1 160811 mk		Legal frame work	D5.1 IT-Infrastructure 1.0 final_mk
Topic						Creating a business concept					Defining govrnment structures (institutional framework)	Legal framework	Interoperable infrastructure

 Table 15: List of collected grey literature -5th part

Topic	Document	Date/Time framework	Language	Link/ Digital or Hard copy	Source	Organisation/Author	Confidential document
				http://www.katastar.gov.mk/userfiles/file/NS DI/Interoperabilna%20infrastruktura/D5.2%20A	, - , , - , , , , , , , , , , , , , , ,		
	US. Z ANREX I,II,III IVIACEUONIJVS_MK	7107	IVIK	http://www.batactar.cov.mb/weediles/file/NIS	nttp://www.katastar.gov.mk/en/	AKEL	
				DI/Interoperabilna%20infrastruktura/D5.3%20N			
				SDI%20architecture%200.6%20FINAL%20251011			
	D5.3 NSDI architecture 0.6 FINAL 251011_mk	2012	MK	_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS			
				DI/Interoperabilna%20infrastruktura/D5.4%20			
	D5.4 Metadata tools 0.5 251011_mk	2012	MK	Metadata%20tools%200.5%20251011_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/D5.			
	D5.5 NSDI framework 0.3_mk	2012	MK	5%20NSDI%20framework%200.3_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS			
	And final of final sectors of the se	CF0C		DI/Interoperabilna%20infrastruktura/D5.6%20N	I not show your network of the second s		
		7107	IVIN	erwork%zoservices%zou.4%zouma	IIILID:// WWW.Kalastal.gov.IIIK/EII/	AREL	
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				Nittp://www.katastar.gov.mk/usernes/me/NS			
	DE 7 DataShariana Taola O Afinal mh	C10C		ul/III tel operabilita%zul III asuruktura/ مار 2020 مار مار مار 2005 مار 2000 مار 2000 مار 2000 مار 2000 مار	/ o o/ year of a contraction of the second s		
	עסוג איז	7107	IVIN	d dastidar inig % 20 i 0015 % 200.4% 201 iti diiti k. pui b+++/////////////////////////////////	IIILID://www.kalastar.gov.iiik/eii/	AREC	
				DI (Into concord bila of 2000,000 data (Inte) (N3 DI (Into concord bila of 200 afracts (Inte) (DE 800 200			
				U/IIITETOPETADIIITa/2011111aStruktura/ U0.0/820N	//		
	D5.8 Registries 0.5 Tinal_mk	71.07	MK	egistries%200.5%20final_mk.pdf	http://www.katastar.gov.mk/en/	AKEC	
				http://www.katastar.gov.mk/userfiles/file/NS			
				UI/Interoperabilna%20intrastruktura/U%20K			
	D5.9 Requirements for the government			equirements%20for%20the%20government%2			
Interoperable infrastructure	geoportal 0.8 final_mk	2012	MK	0geoportal%200.8%20final_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS			
				DI/Podignuvanje%20na%20svesta%20i%20grad			
				e nj e%20n a%20kapacitetite/D6.3%20N SDI%20us			
	D6.3 NSDI use case 0.1 251011_mk	2012	MK	e %20case %200.1%20251011_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS			
				DI/Podignuvanje%20na%20svesta%20i%20grad			
Awareness raising and capacity				e nje%20na%20kapacitetite/D6.4%20NSDI%20pi			
building	D6.4 NSDI pilot applicaton 0.1 251011_mk	2012	MK	lot%20applicaton%200.1%20251011_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS			
				DI/Plan%20za%20implementacija/D7.1%20Roa			
	D7.1 Road Map V0.2 060212_mk	2012	MK	d%20Map%20V0.2%20060212_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS			
				DI/Plan%20za%20implementacija/D7.2%20Defi			
	D7.2 Definition of Roles and			nition %20of %20Roles%20and%20Responsibiliti			
	Responsibilities 050112_mk	2012	MK	es%20050112_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS			
				DI/Plan%20za%20implementacija/D7.3%20-			
Implementation plan	D7.3 - KPI - v0.3_mk	2012	MK	%20KPI%20-%20v0.3_mk.pdf	http://www.katastar.gov.mk/en/	AREC	

Table 16: List of collected grey literature  $-6^{th}$  part

Topic	Document	Date/Time frame work	Language	Link/ Digital or Hard copy	Source	Organisation/Author	Confidential document
				http://www.katastar.gov.mk/userfiles/file/NS DI/Plan%2028%20implementaciia/D7.4%20Bisk			
	D7.4 Risk Management 231111_mk	2012	MK	%20Management%20231111_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
				http://www.katastar.gov.mk/userfiles/file/NS DI/Plan%202a%20implementaciia/D7.5%20ToR			
Implementation plan	D7.5 ToR National Geoportal v0.3_mk	2012	MK	%20National%20Geoportal%20v0.3_mk.pdf	http://www.katastar.gov.mk/en/	AREC	
Macedonian NSDI - Action Plan	Action plan for implementation of NSDI	2014-2018	MK	Hard copy	AREC	AREC	Yes
				http://www.katastar.gov.mk/userfiles/file/zak			
				on_za_Law_on_NSDI-2014_eng-		Parliament of Republic	
	Law on NSDI	2014	MK/EN	sluzben_vesnik.pdf	http://www.katastar.gov.mk/en/	of Macedonia	
	Law on Real Estate Cadastre ("Official			http://www.katastar.gov.mk/userfiles/file/zak on%20pa%20kn/Law%20on%20Real%20Estate%			
	Gazette of the Republic of Macedonia"			20Cadastre%20published%20in%200fficial%20g		Parliament of Republic	
	No.53/13)	2013	MK/EN	azette.pdf	http://www.katastar.gov.mk/en/	of Macedonia	
				http://www.katastar.gov.mk/userfiles/file/zak			
				on%20za%20kn/Law%20on%20Real%20Estate%			
	Law on Real Estate Cadastre (Consolidatet			20Cadastre_eng-		Parliament of Republic	
	version - with updates)	2012	MK/EN	consolidated%20version%20July%202012.pdf	http://www.katastar.gov.mk/en/	of Macedonia	
				http://www.katastar.gov.mk/userfiles/file/en_			
	Law on Real Estate Cadastre ("Official			propisi/Law%20on%20Real%20Estate%20Cadas			
	Gazette of the Republic of Macedonia"			tre_eng-		Parliament of Republic	
	No.40/08)	2008	MK/EN	consolidated%20version%20July%202011.pdf	http://www.katastar.gov.mk/en/	of Macedonia	
				http://mioa.gov.mk/files/pdf/dokumenti/zako			
				ni/zeu/ZAKON_ZA_ELEKTRONSKO_UPRAVUVA		Parliament of Republic	
	Law on Electronic Management	2009	MK	NJE_SV-105-2009.pdf	http://mioa.gov.mk/	of Macedonia	
				http://www.mio.gov.mk/files/pdf/dokumenti/			
	Law to obtain and exchange of evidence			zakoni/Zakon_za_pribavuvanje_i_razme na_na_		Parliament of Republic	
Laws	and data in line of duty	2013	MK	podtaoci_po_sluzbena_dolznost_sl7913.pdf	http://www.mio.gov.mk/	of Macedonia	
	AREC Geo-Portal (current)	2014	MK/EN	http://gis.katastar.gov.mk/arec	http://www.katastar.gov.mk/en/	AREC	
Geo-Portals	AREC Geo-Portal (old)	2011	MK/EN	http://webgis.katastar.gov.mk/arec/	http://www.katastar.gov.mk/en/	AREC	
	ELF International Boundaries	2013	EN	Digital copy	Geoinformatics Department - AREC	EuroGeographichs	
	Technical Producer Guide	2013	EN	Digital copy	Geoinformatics Department - AREC	EuroGeographichs	
	Specification and Data Catalogue						
	for Data Production	2013	EN	Digital copy	Geoinformatics Department - AREC	EuroGeographichs	
	Specification and Data Catalogue for Data						
EuroGeographics	Production	2013	EN	Digital copy	Geoinformatics Department - AREC	EuroGeographichs	
	Development and Implementation of						
	National Geoportal of the Republic of						
	Macedonia	2014	EN	Digital copy	Geoinformatics Department - AREC	AREC	Yes
ICT and National GeoPortal	Technical Requirements	N/A	EN	Digital copy	Geoinformatics Department - AREC	AREC	Yes

Table 17: List of collected grey literature -7th part

CONNECTION WITH THE WEB MAPS       Instructions for using the GeoMAK and Geoserver       Instructions for using the GeoMAK and Geoserver       and creating metadata       Instructions for creating layers on Instructions for creating medatata for Instructions for creating medatata for topographic maps in scale 1:2500       GeoNetwork     topographic maps in scale 1:2500       AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT       Instructions for creating medatata for topographic maps in scale 1:2500       AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT       AREC DATA MODEL – CONCEPTUAL       AREC DATA MODEL – CONCEPTUAL       AREC FRAMEWORK DATA STANDARD – D/INDELING GUIDANDE       AREC FRAMEWORK DATA STANDARD – D/INDELING GUIDANDE			ыпку ывнаног пага сору	source	Organisation/Autrior	document
Instructions for using the GeoMAK and Geoserver and creating metadata Instructions for creating layers on Geoserver Instructions for creating medatdata for Geoserver Instructions for creating medatdata for Instructions for creating area AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (including Annex 1 - 9) AREC DATA MODEL – CONCEPTUAL AREC DATA MODEL – CONCEPTUAL AREC DATA MODEL – LOGICAL AREC DATA MODEL – LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD –	N/A	EN	Digital copy	Geoinformatics Department - AREC	AREC	res
Geoserver       and creating metadata       Instructions for creating layers on Geoserver       Instructions for creating medatdata for Instructions for creating medatdata for instructions for creating medatdata for Oppographic maps in scale 1:25000       GeoNetwork     topographic maps in scale 1:25000       AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (including Annex 1 - 9)       AREC DATA MODEL     AREC DATA MODEL       AREC DATA MODEL     AREC PARWORK DATA STANDARD – D/ MODELING GUIDANCE       AREC FRAMEWORK DATA STANDARD –						
and creating metadata       Instructions for creating layers on Instructions for creating layers on Geoserver       Instructions for creating medatdata for Instructions for creating medatdata for topographic maps in scale 1:25000       AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (including Annex 1 - 9)       AREC DATA MODEL – CONCEPTUAL       AREC DATA MODEL – CONCEPTUAL       AREC DATA MODEL – LOBICL       AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE       AREC FRAMEWORK DATA STANDARD –						
Instructions for creating layers on Geoserver Geoserver Instructions for creating medatdata for Instructions for creating medatdata for Instructions for creating medatdata for AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (including Annex 1 - 9) AREC DATA MODEL – CONCEPTUAL AREC DATA MODEL – LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE	201	3 EN	Digital copy	Geoinformatics Department - AREC	AREC	res (
Geoserver       Instructions for creating medatdata for Instructions for creating medatdata for AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (including Annex 1 - 9) AREC DATA MODEL AREC DATA MODEL AREC DATA MODEL - LOGICAL AREC DATA MODEL - LOGICAL AREC CATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD - D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -						
Instructions for creating medatdata for GeoNetwork topographic maps in scale 1:25000 AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (Including Annex 1 - 9) AREC DATA MODEL AREC DATA MODEL - CONCEPTUAL AREC DATA MODEL - LOGICAL AREC DATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	N/A	EN	Digital copy	Geoinformatics Department - AREC	AREC	res (
Geonetwork     topographic maps in scale 1:25000       AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (including Annex 1 - 9)       AREC DATA MODEL       AREC FRAMEWORK LATA STANDARD       AREC FRAMEWORK DATA STANDARD – D/       MODELUG GUIDANCE       AREC FRAMEWORK DATA STANDARD – D/						
AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLANCE ASSESSMENT (Including Annex 1 - 9) AREC DATA MODEL AREC DATA MODEL - CONCEPTUAL AREC DATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	N/A	EN	Hard copy	Geomatics Department AREC	AREC	res
AREC DATA MODEL – SCHEMA EXPLANATI INSPIRE COMPLIANCE ASSESSMENT (Including Annex 1 - 9) AREC DATA MODEL AREC DATA MODEL - CONCEPTUAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -						
INSPIRE COMPLIANCE ASSESSMENT (including Annex 1 - 9) AREC DATA MODEL AREC DATA MODEL - CONCEPTUAL AREC DATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	ATION 201	1 EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	res (
(including Annex 1 - 9) AREC DATA MODEL AREC DATA MODEL - CONCEPTUAL AREC DATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD - D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -						
AREC DATA MODEL AREC DATA MODEL - CONCEPTUAL AREC DATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	201	1 EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	ŕes
AREC DATA MODEL - CONCEPTUAL AREC DATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	201	3 EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	res (
AREC DATA MODEL - LOGICAL AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	201	2 EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	ŕes
AREC FRAMEWORK DATA STANDARD – D/ MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	201	2 EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	ŕes
MODELING GUIDANCE AREC FRAMEWORK DATA STANDARD -	-DATA					
AREC FRAMEWORK DATA STANDARD -	201	1 EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	res (
REPORT	201	1 EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	res (
AREC SOURCE TO DESTINATION MODEL	T I					
MAPPING	N/A	EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	res (
AUDIT AREC POSTOJEĆIH PODATAKA I						
Developing of AREC Data Model STANDARDA	201	1 CRO	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	res (
and Standards for NSDI ToR for Implementation of WebGIS	201	1 EN	Hard copy	AREC	GEOFOTO d.o.o.	ŕes
AREC_Data_Frame work	2011-2012	EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	ŕes
AREC_Data_migration	2011-2012	EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	ŕes
AREC_Metadata	2011-2012	EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	ŕes
Workshop presentations AREC_NSDI_workflow	2011-2012	EN	Digital copy	Geoinformatics Department - AREC	GEOFOTO d.o.o.	res

Table 18: List of collected grey literature -8th part

		Similarit	y/conformity between Macedonian (N)SDI strategy and	I policy and the EU INSPI	RE Directive
Component	Aspect		Indicator	Measurable variable	Description of the measurable variable
			The Macedonian (N)SDI policy is covering the existence of stakeholders/participants	Yes/No	There are defined stakeholders/participants in the Macedonian (N)SDI policy
		Existence of (N)SDI stakeholders	Existence of stakeholders/participants in relation to the INSPIRE Directive	Yes/No	There are defined stakeholders/participants in the Macedonian (NJSDI policy that are also defined in the INSPIRE Directive (relation)
əlqoə		Similarity of stakeholders	The degree of similarity of stakeholders roles in relation to INSPIRE Directive	Low/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning, semantics and concept of use in the INSPIRE Directive
d					The impact/influence is considered direct if the policy refers directly to achieving the same objectives and points to it directly, else the existing similarity can be considered as indirect impac
	Stake holders/Partici pants	INSPIRE influence on stakeholders roles	The type of impact (marked effect of influence) of INSPIRE in relation to (N)SDI stakeholders	Direct/Indirect	Note: This indicator will be additionally confirmed with the opinion of the interviewees
(٨			The Macedonian (N)SDI policy is covering the existence of snatial data services	VN SeV	There are defined cnatial data services in the Macedonian (N)SDI nolicv
3010			Existence of spatial data services in relation to the		There are defined spatial data services in the Macedonian (N)SDI policy that
ouy			INSPIRE Directive Evistanca of natwork samiras standards /critaria in	Yes/No	are also defined in the INSPIRE Directive (relation) There are defined network early case thand ands ( Ariteria in the Manedonian ( NISD)
<u>э</u> ә_			relation to INSPIRE Directive	Yes/No	policy that is a lso defined in the INSPIRE Directive (relation)
L) >			Existence of network services standards/criteria in		There are defined network services standards/criteria in the Macedonian (N)SDI
- L		Existence of spatial data services	relation to INSPIRE Directive	Yes/No	policy that is also defined in the INSPIRE Directive (relation)
)W			The degree of similarity/conformity in relation to the		The degree of similarity/conformity is defined according to the definition,
ţə		Similarity of spatial data services	spatial data services in INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
N S					The impact/influence is considered direct if the policy refers directly to actioning the come objectives and points to it directly also the objective
sə					actineving the same objectives and points to run ecuty, else the existing similarity can be considered as indirect impac
221		INSPIRE influence on spatial data	The type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the
4	Services	services	INSPIRE in relation to spatial data services	Direct/Indirect	interviewees
			The Macedonian (N)SDI policy is covering the existence of organizational structure in relation to		
			the Macedonian (N)SDI policy	Yes/No	There is defined organizational structure in the Macedonian (N)SDI policy
(s		Existence of (N)SDI coordination			There is defined coordination body in the Macedonian (N)SDI policy that are
stu		body	Existence of coordination body in relation to INSPIRE	yes/No	also defined in the INSPIRE Directive (relation)
ıəu			Degree of similarity/conformity on the roles and		
n98ı		Similarity of (N)SDI coordination body	responsibility of the coordination bodies in relation to INSPIRE Directive	Low/Medium/High	The degree of similarity/conformity is defined according to the definition, meaning, semantics and concept of use in the INSPIRE Directive
ue.	Organization -	INSPIRE influence nn (N)SDI	Type of impact (marked effect of influence) of		The impact/influence is considered direct if the policy refers to it directly, else
J.	Coordination	coordination body	INSPIRE in relation to (N)SDI stakehol ders	Direct/Indirect	the existing similarity can be considered as indirect impact
, le			The Macedonian (N)SDI policy is covering the		
uo			existence of quality assurance procedures in relation to the Macedonian (NISDI noticy	Vec /NO	There is defined 04 proceedines in the Macedonian (NISD) policy
itu		Evictoria of anality accuration	Evictance of guality accurate procedures in		There is defined OA procedures in the Macedonian (N)20 poincy There is defined OA procedures in the Macedonian (N)SOI policy that are also
ıtit		procedures	Existence of quarty assurance procedures III relation to INSPIRE	Yes/No	defined in the INSPIRE Directive (relation)
sul)		ومسويا محمد فالماسة فم بالأسماء ساو	Degree of similarity/conformity on the quality		The descent of a site / configuration is a defined a second set of the definition
٨ɔ		ommany or quanty assurance procedures	assurance processions in relation to mornal.	Low/Medium/High	me users or summarry/ comorting is demiced according to the demicion, meaning, semantics and concept of use in the INSPIRE Directive
iloq					The impact/influence is considered direct if the policy refers directly to
					active vity can be considered as indirect impac
-	Organization -	INSPIRE influence to quality	Type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the
	Quality assurance	assurance procedures	INSPIRE in relation to (N)SDI stakeholders	Direct/Indirect	interviewees

Table 19: Aspects and indicators framework-1st part

**APPENDIX 8 - ASPECTS AND INDICATORS FRAMEWORK** 

		Similarit	ty/conformity between Macedonian (N)SDI strategy and	policy and the EU INSPI	RE Directive
Component	Aspect	Indicator		Measurable variable	Description of the measurable variable
			The Macedonian (N)SDI policy is covering the existence of monitoring body	Yes/No	There is defined monitoring body in the Macedonian (N)SDI policy
			The Macedonian (N)SDI policy is covering the		
			existence of monitoring standards	Yes/No	There are defined monitoring standards in the Macedonian (N)SDI policy
		Existence of monitoring body and	Existence of monitoring body and standards in		There are defined monitoring standards body in the Macedonian (N)SDI policy
		monitoring standards	relation to the INSPIRE Directive	Yes/No	that are also defined in the INSPIRE Directive (relation)
			The degree of similarity/conformity of the		
		Similarity of monitoring body and	monitoring body and standards in relation to		The degree of similarity/conformity is defined according to the definition,
		standards	INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
					The impact/influence is considered direct if the policy refers directly to
(!					achieving the same objectives and points to it directly, else the existing
str					similarity can be considered as indirect impac
191	Organization -		The type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the
wa	Monitoring	<b>INSPIRE influence on monitoring</b>	INSPIRE in relation to (N)SDI monitoring	Direct/Indirect	interviewees
981			The Macedonian (N)SDI policy is covering the		
Je.			existence of data sharing arrangements between		There are defined data sharing arrangements between public authorities in the
/rr			public authorities	Yes/No	Macedonian (N)SDI policy
4 I		Existence of data sharing			There are defined data sharing arrangements between public authorities in the
eu		arrangements between public	Existence of data sharing arrangements between		Macedonian (N)SDI policy that are also defined in the INSPIRE Directive
oi		authorities	public authorities in relation to INSPIRE Directive	Yes/No	(relation) (relation)
1n:		Similarity of data sharing	The degree of similarity/conformity of the public		
ij		arrangements between public	authority data sharing arrangements in relation to		The degree of similarity/conformity is defined according to the definition,
su		authorities	INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
I) /			The Macedonian (N)SDI policy is covering the		
() j			existence of data sharing arrangements between		There are defined data sharing arrangements between public authorities and
lo			public authorities and third parities	Yes/No	third parities in the Macedonian (N)SDI policy
Ь		Existence of data sharing	Existence of data sharing arrangements between		There are defined data data sharing arrangements between public authorities
		arrangements between public	public authorities and third parities in relation to		and third parities in the Macedonian (N)SDI policy that are also defined in the
		authorities and third parities	I NSPI RE Di rective	Yes/No	INSPIRE Directive (relation)
		Similarity of data sharing	The degree of similarity/conformity of data sharing		
		arrangements between public	arrangements between public authorities and third		The degree of similarity/conformity is defined according to the definition,
		authorities and third parities	parities in relation to INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
					The impact/influence is considered direct if the policy refers directly to
					achieving the same objectives and points to it directly, else the existing
					similarity can be considered as indirect impac
	Legal - Data sharing		The type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the
	arrangements	INSPIRE influence on data sharing	INSPIRE in relation to data sharing arrangements	Direct/Indirect	interviewees

 Table 20: Aspects and indicators framework - 2<sup>nd</sup> part

		Similarit	y/conformity between Macedonian (N)SDI strategy and I	policy and the EU INSPII	RE Directive
Component	Aspect	Indicator		Measurable variable	Description of the measurable variable
			The Macedonian (N)SDI policy is covering the existence of PPP in relation to the Macedonian MARCH action	on los	there is defined DDD in the Macedon (N)(CD1 notice
			The Macedonian (N)SDI policy is covering the	04/651	וווברב וז מבווובת דרד זון עוב ואמככבטטוומון (וע)סט סטורץ
			existence of model and mechanisms between public		
			and private sector bodies with respect to the		
			devel opment and operation of the SDI-related		There are defined model and mechanisms of PPP in the Macedonian (N)SDI
			projects	res/No	policy
		Existence of monitoring body and			There is defined PPP in the Macedonian (N)SDI policy that are also defined in
		monitoring standards	Existence of PPP from in relation to INSPIRE Directive	res/No	the INSPIRE Directive (relation)
			The degree of similarity/conformity of the PPP		The degree of similarity/conformity is defined according to the definition,
		Similarity of PPP	arrangements in relation to INSPIRE Directive	-ow/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
					The impact/influence is considered direct if the policy refers directly to
(					achieving the same objectives and points to it directly, else the existing
str					similarity can be considered as indirect impac
ıəu	Legal - Public-private	INSPIRE influence on DDD	The type of impact (marked effect of influence) of	Direct/Indirect	Note: This indicator will be additionally confirmed with the opinion of the interviewees
19			The Macadonian (MICDI and and and a conscione the		
ชินเ			ine Macedonian (N)sul policy is covering the existence of legal protection of GI intellectual		
e1			property rights in relation to the Macedonian (N)SDI		There are defined legal protection of GI intellectual property rights in the
٦A			property rights in relation to the matcalon and rights	/es/Nn	Maredonian (N)SDI notice
le					There are defined legal protection of GI intellectual property rights in the
uc		Evistence of legal protection of G	Evistence of legal protection of GL intellectual		Maredonian (NISDI noticy that are also defined in the INSDIRF Directive
bit		intellectual property rights	property rights in relation to INCDIRE	dec /No	ואמכנסטוומון (ה)סטן אסווטץ נומנימוב מוסס מכווונים וו מוכיווטן וווב סווכנמיני (relation)
.n:				153/100	ויכומוטוו/
tit			The degree of similarity/conformity of legal		
.su		Similarity of legal protection of GI	protection of GI intellectual property rights in		The degree of similarity/conformity is defined according to the definition,
чI)		intellectual property rights	relation to INSPIRE Directive	_ow/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
c۸	Legal -				The impact/influence is considered direct if the policy refers directly to
oile	Ownership/Legal				achieving the same objectives and points to it directly, else the existing
Ъ	protection of GI		The type of impact (marked effect of influence) of		similarity can be considered as indirect impac
	intellectual property	<b>INSPIRE legal protection of GI</b>	INSPIRE in relation to legal protection of GI		Note: This indicator will be additionally confirmed with the opinion of the
	rights	intellectual property rights influence	intellectual property rights	Direct/Indirect	interviewees
			The Macedonian (N)SDI policy is covering the		
			existence of data licensing in relation to the		
			Macedonian (N)SDI policy	res/No	There is defined data licensing in the Macedonian (N)SDI policy
			Existence of data licensing in relation to INSPIRE		There is defined data licensing in the Macedonian (N)SDI policy that is also
		Existence of data licensing	Directive	res/No	defined in the INSPIRE Directive (relation)
			The degree of similarity/conformity of data licensing		The degree of similarity/conformity is defined according to the definition,
		Similarity of data licensing	in relation to INSPIRE Directive	-ow/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
					The impact/influence is considered direct if the policy refers directly to
					achieving the same objectives and points to it directly, else the existing
					similarity can be considered as indirect impac
			The type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the
	Legal - Data licensing	INSPIRE influence on data licensing	INSPIRE in relation to data licensing	Direct/Indirect	interviewees

		Similarity	//conformity between Macedonian (N)SDI strategy and	policy and the EU INSPI	RE Directive
Component	Aspect	Indicator		Measurable variable	Description of the measurable variable
			The Macedonian (N)SDI policy is covering the		
			existence of regarizing the unit of the services and reserved access to spatial data and services in relation to the		There is defined legal limitations and restrictions access to spatial data and
lei			Macedonian (N)SDI policy	Yes/No	services in the Macedonian (N)SDI policy
uo (si			Existence of legal limitations and restrictions access		There is defined legal limitations and restrictions access to spatial data and
itu İtu		Existence of restrictions access to	to spatial data and services in relation to INSPIRE		services in the Macedonian (N)SDI policy that is also defined in the INSPIRE
iti: em		spatial data and services	Directive	Yes/No	Directive (relation)
i95 Jsr			Degree of similarity/conformity of legal limitations		
}u ≀I)		Similarity of restrictions access to	and restrictions access to spatial data and services		The degree of similarity/conformity is defined according to the definition,
Y: SY		spatial data and services	in relation to INSPIRE Directive	Low/Medi um/High	meaning, semantics and concept of use in the INSPIRE Directive
bilo 1A					The impact/influence is considered direct if the policy refers directly to
ЪЧ	Legal - Limitations				achieving the same objectives and points to it directly, else the existing
-	and restrictions		Type of impact (marked effect of influence) of		similarity can be considered as indirect impac
-	access to spatial	<b>INSPIRE influence on restrictions</b>	INSPIRE in relation to (N)SDI restrictions access to		Note: This indicator will be additionally confirmed with the opinion of the
	data and services	access to spatial data and services	spatial data and services	Direct/Indirect	interviewees
			The Macedonian (N)SDI policy is covering the		
			existence of metadata standards/criteria for spatial		There is defined metadata standards/criteria for spatial data sets in the
			data sets	Yes/No	Macedonian (N)SDI policy
		Existence of metadata			
		standards/criteria for spatial data	Existence of metadata standards/criteria for spatial		There is defined metadata standards/criteria for spatial data sets in the
		sets	data sets in relation to INSPIRE Directive	Yes/No	Macedonian (N)SDI policy that is also defined in the INSPIRE Directive (relation)
		Similarity of metadata	Degree of similarity of metadata standards/criteria		
-		standards/criteria for spatial data	definition for spatial data sets in relation to INSPIRE		The degree of similarity/conformity is defined according to the definition,
S		sets	Directive	Low/Medi um/High	meaning, semantics and concept of use in the INSPIRE Directive
:b1			The Macedonian (N)SDI policy is covering the		There is defined metadata standards/criteria for spatial data services in the
ep			existence of metadata specifications	Yes/No	Macedonian (N)SDI policy
oue					
÷15			Existence of metadata specifications in relation to		There is defined metadata standards/criteria for spatial data services in the
5		Existence of metadata specifications	INSPIRE Directive	Yes/No	Macedonian (N)SDI policy that is also defined in the INSPIRE Directive (relation)
		Similarity of metadata	The degree of similarity of metadata		
		standards/criteria for spatial data	standards/criteria definition for spatial data		The degree of similarity/conformity is defined according to the definition,
-		services	services in relation to INSPIRE Directive	Low/Medi um/High	meaning, semantics and concept of use in the INSPIRE Directive
					The impact/influence is considered direct if the policy refers directly to
_					achieving the same objectives and points to it directly, else the existing
			7		similarity can be considered as indirect impact Noto: This is also to the saddimentity confirmed with the said is a first
	Metadata	IN SPIKE INTIUENCE ON METADATA standards/critaria	The type of Tmpact (marked effect of Influence) of INSDIRF in relation to metadata	Direct/Indirect	Note: This indicator will be additionally confirmed with the opinion of the interviewees
	INIELGUALA				

Table 22: Aspects and indicators framework -  $4^{th}\ part$ 

Component         Applet         Description of the measurable variable         Description of the measurable variable           Image: Section of the measurable variable         The measurable variable         Description of the measurable variable           Image: Section of the measurable variable         Existence of technical arrangements for interoperability in relation to the Macedonian (NSO) policy.         There is defined technical arrangements for interoperability in relation to NSON RE Directive         NSON Directive interoperability of technical arrangements for interoperability of teconical (technical arrang			Similarit	y/conformity between Macedonian (N)SDI strategy and	policy and the EU INSPI	RE Directive
Distance         Construction         Model	Component	Aspect		Indicator	Measurable variable	Description of the measurable variable
Data         Contract of technical arrangements for interoperability in relation to the Macedonian (NSD) policy.         The resist defined technical arrangements for interoperability in relation to the Macedonian (NSD) policy.         The resist defined technical arrangements for interoperability.         The resist defined technical arrangements for interoperability.           Interoperability in the policy.         Existence of technical arrangements for interoperability.         The resist defined technical arrangements for interoperability.         The resist defined technical arrangements for interoperability.           Interoperability of policy.         The repe of impact (mathem policy.         The repe of impact (mathem policy.         The repe of impact (mathem policy.           Interoperability of policy.         The repe of impact (mathem policy.         The repe of impact (mathem policy.         The repe of impact (mathem policy.           Interoperability of policy.         The repe of impact (mathem policy.         The repe of impact (mathem policy.         The repe of impact (mathem policy.           Interoperability of policy.         The repe of impact (mathem policy.         The repe of impact (mathem policy.         The reperiod policy.           Interoperability of policy.         The reperiod policy.         The reperiod policy.         The reperiod policy.           Interoperability of policy.         The reperiod policy.         The reperiod policy.         The reperiod policy.           Interoperability of policy.         The rep				The Macedonian (N)SDI policy is covering the		
District of the control of t				existence of technical arrangements for		
Distance         Dolicy.         Visi/No         (NSD) policy.           Existence of technical arrangements         Existence of technical arrangements for intercoperability in relation to INSPIRE Directive         Ves/No         (NSD) policy.           Existence of technical arrangements         Existence of technical arrangements for intercoperability of similarity of comments         Existence of technical arrangements for intercoperability of similarity of comments         Distribution           Existence of technical arrangements         Existence of technical similarity of comments         Existence of technical arrangements for intercoperability in relation to INSPIRE Directive for intercoperability of spatial data sets and arrangements for intercoperability in relation to Existence of intercoperability in relation to Existence of Similarity (Conformity is defined arcoming sements con- station of the impact/Immact/Immact/Immact/Immact/Immact/Immact/Immact/Immact/Immact           Intercoperability in the instant for intercoperability in relation to Existence of spatial data themes         Existence of spatial data themes           Intercoperability in the instant for intercoperability in relation to Existence of spatial data themes         Existence of spatial data themes of intercoperability in the instant for intercoperability in the instant for intercoperability in the instant for intercoperability in the instant i				interoperability in relation to the Macedonian (N)SDI		There is defined technical arrangements for interoperability in the Macedonian
Existence of technical arrangements         Existence of technical arrangements <thexistence< th="">         Existence of technical arrangements&lt;</thexistence<>				policy	Yes/No	(N)SDI policy
Data         Data         Destinent         Existence of ethnical arrangements for free intercoperability, in relation to INSPIRE Directive services         Existence of ethnical arrangements for for intercoperability of services         Intercoperability of for intercoperability of services         Display (arrangements for intercoperability (arrangement far arrangements for intercoperability (arrangement far arrangement far arrang	s					
Data         Interoperability for interoperability for interoperability of similarity of technical arrangements         The degree of similarity of technical arrangements in interoperability of for interoperability of services         (NISD III) point value in the INSPIRE Directive concept of user in the INSPIRE Directive interoperability of services         The degree of similarity of technical interoperability of services         (NISD III) interviewee interoperability of services         (NISD III) interviewee interoperability of services         (NISD III) interviewee interoperability of services         (NISD III) interviewee interviewee interviewee interviewee         (NISD III) interviewee interviewee interviewee interviewee         (NISD III) interviewee interviewee interviewee interviewee         (NISD III) interviewee interviewee interviewee interviewee         (NISD III) interviewee interviewee interviewee         (NISD III) interviewee interviewee interviewee interviewee         (NISD III) interviewee interviewee interviewee interviewee interviewee interviewee interviewee         (NISD III) interviewee	rd		Existence of technical arrangements	Existence of technical arrangements for		There is defined technical arrangements for interoperability in the Macedonian
Staniarity of technical arrangements         The degree of similarity of technical arrangements         The degree of similarity conformity is defined according to the degree of similarity of technical arrangements         The degree of similarity conformity is defined according to the degree of similarity of technical arrangements         The impact/influence is considered of user in the MSPRE Directive is considered at indications         The impact/influence is considered of user in the MSPRE Directive is considered at indications         The impact/influence is considered at indicative similarity of the same objectives and points to it directly, effective is considered at indications         The impact indicative similarity considered at indicative similarity conformative is considered at indicative similarity conformative similarity conformative is considered at indicative similarity conformative is considered at indicative indicative is considered at indicative indicative similarity conformative is considered at indicative indicative indicative indicative similarity conformative is considered at indicative similarity conformative is considered at indicative similarity conformative is considered at indicative similarity conformative indicative similarity conformative indicative is considered at indicative indicative indicative indicative indicative similarity conformative indicative indicative is considered at i	let		for interoperability	interoperability in relation to INSPIRE Directive	Yes/No	(N)SDI policy that is also defined in the INSPIRE Directive (relation)
Construction         Construction<	bui		Similarity of technical arrangements	The degree of similarity of technical arrangements		The degree of similarity/conformity is defined according to the definition,
Data	eta		for interoperability	for interoperability in relation to INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
Interoperability of spatial data sets and spatial data sets and arrangements for interoperability spatial data sets and arrangements for interoperability services       The type of impact (marked effect of influence) of interoperability services       Interoperability interoperability beneficient on the interoperability interoperability       The set of interoperability interoperability       Interoperability interoperability       Interoperability interoperability       Interoperability interoperability       Interoperability interoperability       Interoperability interoperability       Interoperability interoperability       Interoperability interoperability       Interoperability interoperability       Interoperability       Interoperability interoperability       Interoperability       Interoperabity       Interoperability	5					The impact/influence is considered direct if the policy refers directly to
Interoperability of spatial data sets and services         Interoperability of services         Interoperability interoperability interoperability         Interoperability interoperability           Revices         arrangements for interoperability         Interoperability interoperability         Interoperability interviewees         Interviewee services           Revices         services         Spatial data themes         Interviewees         Interviewees           Revices         Reviewees         Interviewees         Interviewees         Interviewees           Reviewees         Reviewees         Reviewees         Interviewees         Interviewee           Reviewee         Reviewees         Reviewees         Reviewees         Interviewee           Reviewee         Reviewees         Reviewees         Reviewees         Interviewee           Reviewee         Reviewees         Reviewees         Reviewee         Reviewee           Reviewee         Reviewee         Reviewee         Reviewee         Reviewee           Reviewee         Reviewee         Reviewee         Reviewee         Reviewee						achieving the same objectives and points to it directly, else the existing
Spatial data sets and services       INSPIRE influence on technical interoperability       Inscription of the model interoperability       Interoperability       Interoperability         services       arrangements for interoperability       Interoperability       Interoperability       Interoperability         services       arrangements for interoperability       Interoperability       Interoperability       Interoperability         services       arrangements for interoperability       Interoperability       Interoverballity       Interoverballity         Stratence of spatial data themes       INSPIRE Directive       Yes/No       There are spatial data themes defined in the Macedonian (NJSD) p         Existence of spatial data themes       INSPIRE Directive       Yes/No       There are spatial data themes defined in the Macedonian (NJSD) p         Existence of spatial data themes       Instrument of the mace of data sets standards/criteria       Yes/No       Interviewees         Existence of data set standards/criteria       Yes/No       Interviewees       Interviewees       Interviewees         Existence of data set standards/criteria       Yes/No       Interviewees       Interviewee       Interviewee         Existence of data set standards/criteria       Yes/No       Interviewee       Interviewees       Interviewee         Existence of data set standards/criteria       Yes/No		Interoperability of		The type of impact (marked effect of influence) of		similarity can be considered as indirect impact
services         arrangements for interoperability         Interoperation         INSDID         Interoperation         INSDID         Interoperation         INSDID         Interoperation         INSDID         Interviewees         Interodonian (V)SDI policy         Interviewees		spatial data sets and	INSPIRE influence on technical	INSPIRE in relation to technical arrangements for		Note: This indicator will be additionally confirmed with the opinion of the
Date         The Macedonian (N)SDI policy is covering the service of spatial data themes.         (N)SDI policy is covering the service of spatial data themes.           Existence of spatial data themes.         NSPIRE Directive         There are spatial data themes defined in the Macedonian (N)SDI policy.           Existence of spatial data themes.         NSPIRE Directive         There are spatial data themes defined in the Macedonian (N)SDI policy.           Existence of spatial data themes.         NSPIRE Directive         Ves/No         There is defined and at a standards/criteria in the Macedonian (N)SDI policy.           Existence of data specifications         data in relation to INSDI policy.         Ves/No         Macedonian (N)SDI policy.           Existence of data specifications         data in relation to INSDI RD Directive         Nes/No         Inter are defined at a standards/criteria in the Macedonian (N)SDI policy.           Existence of data sets standards/criteria for spatial         Ves/No         There are defined at a standards/criteria in the Macedonian (N)SDI policy.           Existence of data sets standards/criteria for spatial         Ves/No         There are defined at a standards/criteria in the Macedonian (N)SDI policy.           Existence of data sets standards/criteria for spatial data themes in NSPIRE Directive         Inter is defined at a set standards/criteria in the Macedonian (N)SDI policy.           Existence of data themes in NSPIRE Directive         Low/Medium/High         The degree of simplarity confirmed value of inplar		services	arrangements for interoperability	interopera bility	Direct/Indirect	interviewees
Data       Existence of spatial data themes       Insplite Directive       Ves/No       There are spatial data themes defined in the Macedonian (NJSDI policy is covering the ves/No       Mere are spatial data themes defined in the Macedonian (NJSDI policy is covering the ves/No       Mere are spatial data themes defined in the Macedonian (NJSDI policy is covering the ves/No       Mere are spatial data themes defined in the Macedonian (NJSDI policy is covering the ves/No       Mere are spatial data themes defined in the Macedonian (NJSDI policy is covering the ves/No       Mere are spatial data themes defined in the Macedonian (NJSDI policy is covering the ves/No       Mere are spatial data themes defined in the Macedonian (NJSDI policy is covering the ves/No       Mere are spatial data standards/criteria for spatial data servertive (reliation)         Existence of data specifications       The degree of similarity/conformity in relation to the ves/No       Mere are defined in the INSPIRE Directive (reliation)         Existence of data specifications       The degree of similarity/conformity in relation to the ves/No       Mere data standards/criteria in the Macedonian (NSDI policy is defined in the INSPIRE Directive (reliation)         Similarity of spatial data themes       Interestion (Institution to the macing, semantics and concept of use in the INSPIRE Directive is considered direct if the policy refers directive is considered direct if the policy refers directive is considered direct if the policy refers directive is reliaving the same objectives and points to it directive is considered direct if the policy refers directive is reliaving the same objectives and points to it directive is reliaving the same objectines and contine is reaving the same objectives				The Macedonian (N)SDI policy is covering the		
Data       Existence of spatial data themes       Existence of spatial data themes       InSPIRE Directive       There are spatial data themes defined in the Macedonian (NJSDI policy) is covering the ves/No       defined in the INSPIRE Directive (relation)         Existence of spatial data themes       The Macedonian (NJSDI policy) is covering the ves/No       defined in the INSPIRE Directive (relation)         Existence of data specifications       The Macedonian (NSDI policy) is covering the ves/No       Macedonian (NJSDI policy)         Existence of data specifications       The degree of similarity/conformity in relation to the ves/No       Macedonian (NJSDI policy)         Existence of data specifications       The degree of similarity/conformity in relation to the ves/No       Macedonian (NJSDI policy)         Existence of data specifications       The degree of similarity/conformity in relation to the ves/No       Macedonian (NJSDI policy)         Existence of data specifications       The degree of similarity/conformity in relation to the ves/No       Macedonian (NJSDI policy)         Existence of data specifications       The degree of similarity/conformity in relation to the maning, semantics and concept of use in the NSPIRE Directive is considered direct if the policy refers directis is interving the same objectives and points				existence of spatial data themes	Yes/No	There are spatial data themes defined in the Macedonian (N)SDI policy
Existence of spatial data themes         INSPIRE Directive         Yes/No         defined in the INSPIRE Directive (relation)           Existence of spatial data themes         The Macedonian (N)SDI policy is covering the existence of data sets standards/criteria         Yes/No         Macedonian (N)SDI policy           Existence of data sets standards/criteria         Yes/No         Macedonian (N)SDI policy           Existence of data sets standards/criteria         Yes/No         Macedonian (N)SDI policy           Existence of data sets standards/criteria         Yes/No         Macedonian (N)SDI policy           Existence of data specifications         data in relation to INSPIRE Directive         Inte degree of similarity/conformity is defined according to the del data in relation to the           Similarity of spatial data themes         spatial data themes         spatial data themes in INSPIRE Directive         Inte degree of similarity/conformity is defined according to the del data in the type of impact (metked effect of influence) of           Instrike influence on spatial data         The type of impact (marked effect of influence) of         No         No         Interctive set and oncide to influence of influence of influence) of           Instrike influence on spatial data         The type of impact (marked effect of influence) of         Interving the same objectives and points to it directly. else the existence of data themes				Existence of spatial data themes in relation to the		There are spatial data themes defined in the Macedonian (N)SDI policy that are
Date       The meric of data set standards/criteria       Ves/No       There is defined metadata standards/criteria for spatial data servence of data set standards/criteria       Ves/No       Macedonian (N/SDI policy         Existence of data set standards/criteria       Ves/No       Macedonian (N/SDI policy       Existenderds/criteria for spatial data set standards/criteria         Existence of data set standards/criteria       Ves/No       Macedonian (N/SDI policy       Existenderds/criteria for spatial data set standards/criteria         Existence of data specifications       data in relation to INSPIRE Directive       Ves/No       the degree of similarity/conformity is defined according to the deleted in the INSPIRE Directive         Similarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       The impact/Influence is considered direct if the policy refers direct in the impact/Influence is considered direct.         INSPIRE influence on spatial data themes       Intervine the meaning, semantics and concept of instent inpact (metal need intent) inpact (metal need intent) inpact (metal need intent), else the existing the same objectives and points to it directly, else the existing the same objective as indirect inpact (metal need intent), else the existing intent inpact (marked effect of influence) of inpact (metal need intent) in out on the inpact/Influence is considered as indirect inpact (metal need intent), else the existing the same objectives and points to it directly, else the existing the same objective intent inpact (metal need intent), else the existing the meaning set on intent neinpact (metal need intent) inpactinect inpact (metal nei			Existence of spatial data themes	INSPIRE Directive	Yes/No	defined in the INSPIRE Directive (relation)
Existence of data set standards/criteria     Yes/No     Macedonian (NJSDI policy       Existence of data specifications     Existence of data set standards/criteria for spatial     Macedonian (NJSDI policy       Existence of data specifications     data in relation to INSPIRE Directive     Intere are defined in the INSPIRE Directive (relation)       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Interestive       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High       Image: Similarity of spatial data themes<				The Macedonian (N)SDI policy is covering the		There is defined metadata standards/criteria for spatial data services in the
Existence of data specifications       Existence of data sets standards/criteria for spatial       There are defined data set standards/criteria in the Macedonian (I         Existence of data specifications       data in relation to INSPIRE Directive       yes/No       that is also defined in the INSPIRE Directive (relation)         Imaliarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       that is also defined in the INSPIRE Directive relation         Imaliarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       meaning, semantics and concept of use in the NSPIRE Directive relation         Imaliarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       meaning, semantics and concept of use in the PNIC refers direct         Imaliarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       meaning, semantics and concept of use in the PNIC refers direct         Imaliarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       meaning, semantics and concept of use in the PNIC refers direct directive         Imaliarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       meaning, semantics and concept of use in the PNIC refers directive         Imaliarity of spatial data       The type of impact (marked effect of influence) of       No       similarity can be considered as indirect t				existence of data set standards/criteria	Yes/No	Macedonian (N)SDI policy
Existence of data specifications     data in relation to INSPIRE Directive     Yes/No     that is also defined in the INSPIRE Directive (relation)       Existence of data specifications     data in relation to INSPIRE Directive     the degree of similarity/conformity is defined according to the del       Similarity of spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High     meaning, semantics and concept of use in the INSPIRE Directive       Instruction     The impact/influence is considered direct if the policy refers direct     achieving the same objectives and points to it directly, else the exist       INSPIRE influence on spatial data     The type of impact (marked effect of influence) of     infliarity can be considered as indirect if the policy refers direct       INSPIRE influence on spatial data     The type of impact (marked effect of influence) of     Interving the same objectives and points to it directly, else the exist	e			Existence of data sets standards/criteria for spatial		There are defined data set standards/criteria in the Macedonian (N)SDI policy
D       The degree of similarity/conformity in relation to the       The degree of similarity/conformity is defined according to the def         Similarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       The impact/influence is considered direct if the policy refers direct         Similarity of spatial data themes       spatial data themes in INSPIRE Directive       Low/Medium/High       meaning, semantics and concept of use in the INSPIRE Directive         Inspective       The impact/influence is considered direct if the policy refers direct       achieving the same objectives and points to it directly, else the exist         INSPIRE influence on spatial data       The type of impact (marked effect of influence) of       Note: This indicator will be additionally confirmed with the opint	te		Existence of data specifications	data in relation to INSPIRE Directive	Yes/No	that is also defined in the INSPIRE Directive (relation)
Similarity of spatial data themes     spatial data themes     spatial data themes in INSPIRE Directive     Low/Medium/High     meaning, semantics and concept of use in the INSPIRE Directive       Similarity of spatial data themes     spatial data themes     low/Medium/High     meaning, semantics and concept of use in the INSPIRE Directive       Inspect/Influence is considered direct if the policy refers direct     achieving the same objectives and points to it directly, else the exist       INSPIRE influence on spatial data     The type of impact (marked effect of influence) of     Note: This indicator will be additionally confirmed with the opinic hemose	٥			The degree of similarity/conformity in relation to the		The degree of similarity/conformity is defined according to the definition,
The impact/influence is considered direct if the policy refers direct in the policy refers direct if the policy refers direct in the policy refs direct in the policy refs direct in the policy ref			Similarity of spatial data themes	spatial data themes in INSPIRE Directive	Low/Medium/High	meaning, semantics and concept of use in the INSPIRE Directive
INSPIRE influence on spatial data The type of impact (marked effect of influence) of Note: This indicator will be additionally confirmed with the opinic themes Interviewe in the new interviewe inter						The impact/influence is considered direct if the policy refers directly to
INSPIRE influence on spatial data The type of impact (marked effect of influence) of Note: This indicator will be additionally confirmed with the opinic the mase interviewes.						achieving the same objectives and points to it directly, else the existing
INSPIRE influence on spatial data The type of impact (marked effect of influence) of Note: This indicator will be additionally confirmed with the opinic the mase the						similarity can be considered as indirect impact
Intert/Indirect Interviewees			<b>INSPIRE influence on spatial data</b>	The type of impact (marked effect of influence) of		Note: This indicator will be additionally confirmed with the opinion of the
		Data Sets	themes	INSPIRE in relation to spatial data themes	Direct/Indirect	interviewees

Table 23: Aspects and indicators framework -  $5^{th}\ part$