



Spatial Data Infrastructures in Europe: State of play spring 2010

D4.1 - Summary report regarding the
results of the European Assessment of
34 NSDI (first year)



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

1. EXECUTIVE SUMMARY

The current INSPIRE and NSDI State of Play study builds further upon the study which was initiated in 2002. It takes place for the sixth time after a break of two years (2007-2009). The update for spring 2010 which is the topic of this report is taking place at the moment that Member States of the EU have or are in the process of transposing the INSPIRE Directive into national legislation. With the implementing rules which are becoming available step-by-step, countries started implementing (parts of) the required INSPIRE components, mostly as part of the countries' overall NSDI.

As for previous years, the **objective** of the current study is to describe, analyze and assess the status of INSPIRE and NSDI implementation in 32 countries in Europe: 27 Member States, 4 EFTA countries and 1 Candidate Country. It was decided to prepare a country report for FYROM and Croatia as well. The assessment for both countries has been done only partially, but will be fully integrated in the summary report of 2010-2011. The **overall approach** has not been changed, but reviewed to integrate the latest INSPIRE developments. After a one-day workshop in May 2009 with a team of international SDI experts, it was decided to keep the original 32 indicators to assess the 32 NSDI. The results from the 8 indicators from the INSPIRE Monitoring & Reporting are assessed separately and they are used to underpin the scoring of some of the State of Play indicators. A real mapping and full integration was deemed not to be possible, neither desirable (see also D1.1 – Report on Methodology). The indicators that both the State of Play and INSPIRE Monitoring & Reporting have (to a certain extent) in common relate to metadata existence, spatial data availability and existence of network services. The indicators from the State of Play were scored – as in previous State of Play studies – on the basis of the information in the country reports which was collected through a desktop study (using documents, information from websites, input from experts, etc.). In addition, a detailed survey on coordinating, funding and sharing measures was organized between November 2009 and April 2010 to collect detailed qualitative information regarding these particular aspects of INSPIRE & NSDI implementation. Three countries – France, Poland and Norway – were visited to validate the findings. The results of the study were discussed during a two-day workshop in Krakow prior to the INSPIRE conference. The workshop was attended by 13 international SDI experts and 33 representatives from 21 countries.

From the **detailed survey** we can learn that the majority of the EU member states have transposed or are on their way to transposition. It appeared that, besides other activities necessary for the transposition, the establishment of coordination structures and arrangements have caused many problems. Many countries have no funding policy established. In the long-term, this could cause problems regarding maintenance of the created infrastructure. The minority of countries have an explicit strategic or implementation plan. It seems that countries are “just implementing the Directive and the rules” as they become available. From the answers, it appears that there is a high diversity in INSPIRE implementation

strategies. This confirms no single best solution or recipe exists since the context of each country is unique on its own. For coordination and implementing INSPIRE, the national level is crucial. Other levels may not necessarily be equal partners in the exercise. There is high diversity in coordination/cooperation structures and arrangements across Europe. Mapping agencies, ministries and environment agencies are the most active organizations for implementing INSPIRE. There does not appear to be much happening at local level (yet). With respect to data and service sharing, there is both unrestricted access and selective access in many countries. Numerous reasons exist across Europe for limiting public data access (in particular confidentiality of personal data (privacy) is often used as a reason). In order to promote access to spatial data, many countries set up standard agreements/licenses for all group of stakeholders. National Geo-portals as one of the possible building blocks for INSPIRE implementation still needs to be established in many countries. The uncertainties for the future of INSPIRE implementation are diverse. Financial resources, technological INSPIRE-issues, human resources, time planning, etc., are all considered to be uncertainties. The implementation of INSPIRE has mainly achieved so far the increase of the awareness of spatial data use, improved data sharing conditions, and capacity building. As said before, the findings from the survey have been integrated in the country reports and taken into account for assessing the status in Europe.

From the **desktop study**, as well as the INSPIRE MR results, it becomes clear that most countries are very active in developing the different components of their NSDI. Although many countries have metadata for a considerable part of their data sets, it seems that in the past, it was overestimated for some countries. While in the State of Play we have 20 countries with more than 50% of the data sets having metadata, 11 countries in the INSPIRE MR have less than 50% metadata for the reported data sets. View services are very well developed and download services really start to emerge now. Also discovery services start to become available for most of the countries – 21 out of the 34 have them - although there are less of them, (which is normal). Transformation and invoking services are rather the exception. The level to which metadata – and thus their related data sets or services – can be discovered is very variable, but in general terms still very low. Only 7 countries score 50% or more. And data sets that can be both viewed and downloaded is even lower: only 3 countries reach the 50% mark. This might not be surprising since 5 countries even do not have an operational catalog. In general terms, there is more and more focus on interoperability issues, and geo-standardization to reach this interoperability. This is often underpinned by specific standardization bodies and/or particular projects to develop country profiles. Countries that are active in the geo-standardization process (OGC, ISO, CEN) are also advanced in the application of existing standards/IR/guidelines. Finally it should be noted that in several countries the NSDI is broader than INSPIRE, while other countries put more or less everything under the INSPIRE umbrella. From the analysis of the current state of play, we can also see the shift in the way countries are working: more and more the users – typically the major Ministries¹ – are involved in coordination, while GI associations are now more in a supporting role and National Mapping Agencies or similar organizations are playing the role of executive office (taking the technical lead). These

¹ The users might also include local and regional user entities. However this information is only partially captured through the INSPIRE & NSDI SoP, while eSDI-Net+ is collecting this type information more systematically (now under the umbrella of EUROGI).

developments caused some shifts in the results of the **typology** which is partially based on these characteristics. In general, the NSDI are becoming more mature and more operational. Almost everywhere in Europe, we can detect 'Good Practices' which can be showcases for other countries. Those 'Good Practices' do not only relate to the development of NSDI components like geoportals, access services, standardization, but also to the link with eGovernment, the development of cross-border initiatives, environmental applications and technological innovation.

From what we learn from the European assessment, we can derive some **recommendations** for the further INSPIRE and NSDI implementation. With regard to the approach, it seems that the combination of information collected through a desktop study, a detailed survey and the official results from the INSPIRE MR provides interesting insights in the status of INSPIRE & NSDI development. There are no major contradictions, although the status of e.g. metadata development is probably worse than originally estimated. Based on the experience it is advisable to continue integrating the different sources of information to perform assessments at the European level. Additional efforts to analyze the detailed results from the INSPIRE MR and to cross-tabulate the different resources of information could provide new insights. The analysis of the INSPIRE MR led us also to some possible improvements for the INSPIRE MR Guidelines.

As we said before, the local level is still far from being integrated in the INSPIRE implementation process. This will need particular attention in the coming years. It is therefore worthwhile to use and support initiatives that are focusing on this sub-national level. There is also an overall need to work more on capacity building, to create better awareness, and to train more experts to support the often complex tasks of INSPIRE and NSDI implementation. The organization of a good INSPIRE e-learning offer at the European level by relevant European stakeholders and the exchange of experts among NSDI, should be envisaged. A good strategic and/or implementation plan can make a big difference. It is proposed to build a central repository, e.g. on the INSPIRE website, of existing plans to help countries that do not have (yet) such plans. Sustainable funding seems to be an important issue as well. While it is probably not feasible to have an overall funding program for INSPIRE at the European level, the more systematic usage of existing budget lines or the creation of specific activity lines in existing programs would be a good solution (combined with mobilization of own funds and business models in the respective countries). On the technological side, countries and individual technological stakeholders should be stimulated to become active members of (some of) the standardization organizations like OGC and the ISO & CEN committees. It will help them to implement INSPIRE faster and smoother. The usage of registries for supporting (and as part of) the infrastructure is promising, while the metadata for services are still in the initial stage of development and deserves particular attention. And although there are more and more network services available throughout Europe, it is not always clear how they perform and whether they are conformant. This might be further investigated since this will become a critical factor as well. Over the last few years, and confirmed by the country reports, many efforts have been done on the issue of harmonization and interoperability of spatial data. Several European projects have been carried out or are still continuing. Those experiences should be more systematically documented in view of selecting good practices and problems that were overcome.

The report is giving more detailed results, and summarizes the 'Good Practices', conclusions and recommendations.

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ABBREVIATIONS AND ACRONYMS

The following list presents the abbreviations and acronyms used in this report. Abbreviations and acronyms used in the annexed country reports are listed in those reports.

AOPK	Agency for Nature Conservation and Landscape Protection
API	Application Programming Interface
BfN	Federal Agency for Nature Conservation (Germany)
BRGM	Bureau de Recherches Géologiques et Minières (France)
BTA	Base Topogràfica Armonizada
CAGI	Czech Association for Geomatics
CC	Candidate Country
CCSS	Czech Centre for Science and Society
CDV	Transport Research Centre
CEN	Comité Européen de Normalisation (European Committee for Standardization)
CGS	Czech Geological Survey
COGIS	Coordination Geo-Information and Services Division from Swiss-topo
CRS	Coordinate Reference Systems
CSO	Czech Statistical Office
CSW	Catalogue Services for the Web
DGME	Direction Générale de la Modernisation de l'Etat
DT	Drafting Team
DT DSS	Drafting Team on Data and Service Sharing
DT MR	Drafting Team on monitoring and reporting
EC	European Commission
EEA	European Environmental Agency
EEA	European Economic Area
EFTA	European Free Trade Association
ESTAT	Statistical Office of the European Communities
EU	European Union
EUROGI	European Umbrella Organisation for Geographic Information
EuroSDR	European Spatial Data Research Network
FOI	Freedom of Information
FTP	Fast (file) Transfer Protocol

GI	Geographical Information
GIGAS	GEOSS, INSPIRE and GMES an Action in Support
GII	Geographical Information Infrastructure
GIS	Geographic Information System
GMES	Global Monitoring of Environment and Sustainability
GML	Geography Markup Language
GSDI	Global Spatial Data Infrastructure
IDEE	Spanish SDI
INSPIRE	Infrastructure for Spatial Information in Europe
INSPIRE MR	INSPIRE Monitoring and Reporting
ISO	International Standards Organisation
JRC	Joint Research Centre of the European Commission
KML	Keyhole Markup Language
LM	Lantmäteriet (National Land Survey of Sweden)
LSDI	Local Spatial Data Infrastructure
MoE	Ministry of Environment
Mol	Ministry of Informatics
MoU	Memorandum of Understanding
MS	Member State
NA	Not Applicable
NCP	National Contact Point
NDP	National Data Producer
NMA	National Mapping Agency
NGO	Non Governmental Organisation
NIA	No Information Available
(N)SDI	(National) Spatial Data Infrastructure
PNOA	National Plan for Aerial Orthophoto
PPP	Public-Private Partnership
PSI	Public Sector Information
QCP	Quality Control Procedure
RSDI	Regional (sub-national) Spatial Data Infrastructure
SEIS	Shared Environmental Information System
SIOSE	Land Cover and Land Use Information System of Spain
SIS	Swedish Standardisation Institute
SOA	Service Orientated Architecture
SoP	State of Play
TEIEN	Turkish Environmental Information Exchange Network
TEN	Trans European Network
TSDI	Thematic Spatial Data Infrastructure

UBA	German Federal Environment Agency (Umweltbundesamt)
VESTA-GIS	Vocational Education and Sectoral Training Network on GIS & GI Applications domains
VROM	Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (Netherlands)
WCS	Web Coverage Service
WCTS	Web Coordinate Transformation Service
WFS	Web Feature Service
WMS	Web Mapping Service
XML	Extensible Markup Language

2. INTRODUCTION

In 2001, the European Commission launched the INSPIRE initiative. It was based on the observation that the accessibility, interoperability and affordability of spatial data and information systems were limited. It was generally recognised that this situation prevents society to fully benefit from the potential of the technology to improve the relevancy, accuracy, impact and public control of territorial policies and related decisions at all scales and to involve citizens, businesses, non governmental and research organisations in a participatory information society.

With the INSPIRE initiative, the European Union – in collaboration with all the relevant stakeholders - intends to establish an infrastructure for spatial information in Europe that will allow the public sector users at the European, national, regional and local levels to share spatial data from a wide range of sources in an interoperable way for the execution of a variety of public tasks at conditions which do not restrain its use. Moreover, users in private, research and NGO-environments and the citizen will be offered services to discover, view, download and when necessary transform and invoke these spatial data sources. Environmental policies, for which the spatial dimension constitutes an important component, have been chosen as the starting point to establish this spatial infrastructure.

To reach these objectives, the European Commissioners of Environment, Economic and Monetary affairs and Research agreed in 2002 about a Memorandum of Understanding, not only recognising the problem but also indicating the steps to be taken to develop such an infrastructure. One of the key elements in the MoU was the need for a legislative framework. In order to develop the INSPIRE legislation, all GI stakeholders were mobilised in relevant working groups in order to prepare the drafting process of the proposed Directive. Mid 2004, the proposal for a Directive of the European Parliament and of the Council - *Establishing an infrastructure for spatial information in the Community (INSPIRE)* - saw light.

Between then and autumn 2006, several readings took place by the Parliament and the Council which resulted - after a conciliation phase during which final amendments were made - in the agreement on the final text of the Directive on November 21st 2006. On 18 January 2007, a joint text of the European Parliament and the Council was approved by the Conciliation Committee. *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)* was published in the Official Journal of the EU on 25 April 2007 and entered into force on 15 May 2007. Before 15 May 2009 Member States were then obliged to transpose the Directive into national (and eventually sub-national) legislation.

From 2005 onwards, and in parallel with the activities to prepare the INSPIRE Directive several Drafting Teams started to elaborate Implementing Rules defining the way the different aspects of the Directive must be implemented by the

individual Member States. Five teams were working on the five major chapters of the Directive: 1) metadata; 2) interoperability of spatial data sets and services; 3) network services; 4) data and service sharing and 5) monitoring and reporting. In addition, several Thematic Working Groups are elaborating data specification for the different themes of the three annexes of the Directive since 2008. All the Implementing Rules take the form of a Decision or Regulation and must be implemented by the individual Member States once they are published.

The EC, the INSPIRE expert group (which was active between 2002 and 2007) and all the (N)SDI stakeholders recognised from the very beginning that the building blocks for a European spatial information infrastructure consist of the operational or emerging national, regional and local SDI. However, in 2002, the Commission had only a partial view of what was going on in Europe.

Therefore, the EC launched a study, *“Status of the National Spatial Data Infrastructures in Europe, a State of Play”* covering the period mid 2002- mid 2005 (later extended with new studies for 2006 and 2007), to describe, monitor and analyse the activities related to the national spatial data infrastructures in 32 European countries: 27 EU Member States², 1 Candidate Country and 4 EFTA countries. The major activity of this study was to collect and structure all the relevant information on the status of the 5 components which form together an SDI: organization, legal framework and funding, reference data and core thematic data, metadata, access and other services, and standards (see also Nebert, 2000; 2004). The Cookbook was used as a kind of baseline. It was decided to study a sixth component, i.e. thematic environmental data. This study resulted in 32 annual country reports describing the status of the (N)SDI between 2003 and 2007, as well as in summary reports assessing the overall status in Europe. In all those reports, focus was on the state of play of the general purpose SDI-efforts which were ongoing or planned at the national public sector level.

In the meantime, the implementation of INSPIRE started also in practice with specific measures and activities carried out in different areas by the Member States (as well as Candidate Countries and countries from the European Economic Area or EEA). Therefore, it was decided by DG ESTAT to have a new study to assess the status of INSPIRE & NSDI implementation for two consecutive years, i.e. 2009-2010 and 2010-2011, also because the results from the INSPIRE Monitoring & Reporting are reports and monitoring results from individual countries only, without a European wide assessment.

The current report is one of the deliverables – i.e. *“D4.1 - Summary report regarding the results of the European Assessment of 34 NSDI (first year)”* within the framework of Activity 4 of the *“INSPIRE and NSDI implementation state of play (INSPIRE & NSDI SoP)”* project which is carried out by the Katholieke Universiteit Leuven together with a group of International Experts (contract n° 50502 2008.001-2008.833). This report describes the results of the first assessment at the European level covering the period January – June (or spring) 2010. It complements and is based on the 32 country reports³ which describe the status of INSPIRE & NSDI implementation in the 32 individual countries studied. It is also

² At the time the study started, there were 15 Member States, 10 Accession Countries, 3 Candidate Countries and 4 EFTA countries. Note also that Croatia is not in the list of 32 countries studied.

³ In addition to the 32 country assessed in this summary report, we also collected information for FYROM and Croatia. S, there are a total of 34 country report of which 32 are taken into account in the current assessment.

based on and complements the results of the fine-tuning of the methodology as described in the report *“INSPIRE & NSDI State of Play: D1.1 – Report on the Methodology”* which was elaborated on the basis of the workshop on this topic, held in Leuven in May 2009, and on the detailed survey which was conducted between November 2009 and April 2010 and which is described in the report *“INSPIRE & NSDI State of Play: D3.1 - Detailed survey concerning Coordination, Funding and Sharing Measures”*.

The Tender Specifications defined the goals for this activity and related deliverable: *The overall progress of the NSDI development in the 32 countries will be assessed against the baseline of an ideal "SDI" as well as against the baseline as defined in the INSPIRE directive and related (draft) implementing rules. Comparative tables should be elaborated, presenting the progress (status phase 1⁴, status phase 2, changes phase 1 – 2007, changes phase 1 – phase 2). The overall progress will also be described in more qualitative terms indicating the major areas of progress and examples of good practice. Based on this analysis recommendations should be made with regard to the implementation of the directive and the general development of the NSDI and INSPIRE.*

The report contains following chapters and sections:

- The next (third) chapter summarizes the objectives and assumptions of the current INSPIRE and NSDI State of Play study of which this report is a deliverable;
- The fourth chapter describes the approach ('materials and methods') for this study briefly with focus on the fine-tuning of methodology and how the study was carried out in several steps. It complements the report: *“INSPIRE & NSDI State of Play: D1.1 – Report on the Methodology”*.
- The results for the state of play in 2010 are summarized in chapter five. This is the main chapter of the report. It gives an overview of the assessment. It summarizes the results of the survey carried out between November 2009 and April 2010. The survey focused on the organizational aspects of the INSPIRE & NSDI implementation. The detailed results of this survey can be found in the deliverable *“INSPIRE & NSDI State of Play: D3.1 - Detailed survey concerning Coordination, Funding and Sharing Measures”*. In the same chapter we give also an overview of the first results of the INSPIRE Monitoring & Reporting based on the material that was sent to the Commission within the framework of the Monitoring & Reporting obligations of the Member States. This chapter provides also – in line with previous years - an assessment table of the state of play of the NSDI for each of the 32 countries⁵ for spring 2010. It includes a matrix highlighting changes which occurred between 2007 and 2010 (the last year the assessment was done), and between 2003 and 2010 (the first year the assessment was done). Also the classification of the 32 countries according to the typology developed in 2003 was done for 2010 and

⁴ Phase 1 goes from September 2009 – August 2010, while phase 2 goes from September 2010 to November 2011.

⁵ Although a country report was prepared for Croatia and FYROM, the assessment for those countries based on the 32 indicators was not yet integrated in the overall assessment at the European level. This will be done in the second year (2010-2011), including their status for the period 2009-2010.

compared with the one elaborated in previous years. Finally this chapter ends highlighting some interesting and good practices in different countries across Europe.

- Chapter six describes some conclusions and recommendations to take into account during the further implementation process of INSPIRE.
- In separate volumes, annexed to this report, 34 country reports are presented.
- An executive summary, which can also be read in terms of a number of conclusions of the study, is available as the first chapter.

3. OBJECTIVES AND ASSUMPTIONS

3.1 Objectives

The objective of the original study launched in 2002 was to identify, describe and compare the status of the NSDI in the different Member States of the EU, in the Accession and Candidate Countries, and the EFTA Countries. Since INSPIRE wanted to build upon existing or emerging (N)SDI, the aim of the State of Play was in this first period to assess and better understand the status of (N)SDI in Europe in order to help preparing the INSPIRE Directive and its implementation.

The objectives of the current INSPIRE & NSDI State of Play is building further on what has been achieved so far. There are three objectives defined (see also Terms of Reference):

1. Review of the methodology used in previous State of the Play Studies (carried out from 2002 onwards) in order to bring it more in line with the development of INSPIRE and the work carried out by the INSPIRE drafting teams.
2. Preparation of an annual State of Play study for two phases (2 periods of 12 months), with the work done in the previous State of the Play studies as a starting point.
3. Carrying out an in depth study of 2 aspects that have emerged as being important within the development of INSPIRE, going beyond the legal compliance, to better grasp some key issues on successful implementation and best practice.

The aim of the review of the methodology (first objective) is to bring the INSPIRE Monitoring & Reporting and the INSPIRE State of Play together in order to make a better assessment of the developing SDIs. Secondly to prepare country reports and an assessment report comparable with previous versions, but taking into account the new requirements and particularities of the INSPIRE implementation (second objective). In order to have a better view and in depth insight in the NSDI developments, the surveys will provide quantitative and/or qualitative information on particular aspects (objective 3).

3.2 Assumptions

Throughout all activities of this study, the emphasis is on general purpose SDI-initiatives, i.e. SDIs for which the promotion of the sharing and/or re-use of spatial reference and thematic data is the core activity. In all countries this type of SDIs is developed mainly by public sector players, in many cases in collaboration with the private sector. SDIs focusing on thematic environmental data have also been considered but other types of thematic SDI have only been mentioned. Secondly,

attention was focused on initiatives focusing on the national scale, i.e. NSDI, rather than lower level initiatives.

However, when a national SDI is clearly lacking or when regional SDIs are strongly developed (or make an important contribution to the national level), these were also described, i.e. either the most important or best developed, or the most representative lower level SDI in that country. Especially in decentralized countries sub-national SDI are often pertinently present. Comparison of NSDI is done for the national level only in order to guarantee comparability. In the current study, even Belgium is assessed as a whole. This was different in previous years because no clear national initiative existed at that time. This changed with the INSPIRE Directive.

We are aware that the country reports give only a partial view of the rich reality in those and other countries. In particular, the development of the regional and thematic SDI has been important, also over the last year, even if INSPIRE addresses in the first place the national level (in a direct way). Only freely accessible resources and known contacts are used to describe the state of play 2010.

4. APPROACH & METHODOLOGY

This chapter summarizes the approach and methodology in the State of Play study. It complements the report *“INSPIRE & NSDI State of Play: D1.1 – Report on the Methodology”* in which details can be found regarding the overall approach and how the methodology was fine-tuned in order to bring it more in line with recent INSPIRE developments. In order to decide what to review and how, a one day workshop was organised in Leuven on 28 May 2009 with the Core Project Team (5 experts), the International Board of Experts (10 experts) and representatives from ESTAT to discuss the 'old' INSPIRE State of Play approach, the approach applied within the INSPIRE Drafting Team on Monitoring and Reporting (DT MR) and the way both could (or could not) be integrated. The findings of this workshop were integrated in the above mentioned report on methodology. One of the major conclusions from the workshop was that the overall approach of the INSPIRE should not be changed in order to keep comparability over time and to continue monitoring aspects which are not monitored through the INSPIRE MR. A second important conclusion was that information from INSPIRE MR could be used to cross-check and improve some of the State of Play indicators, mainly those related to data, metadata and network services.

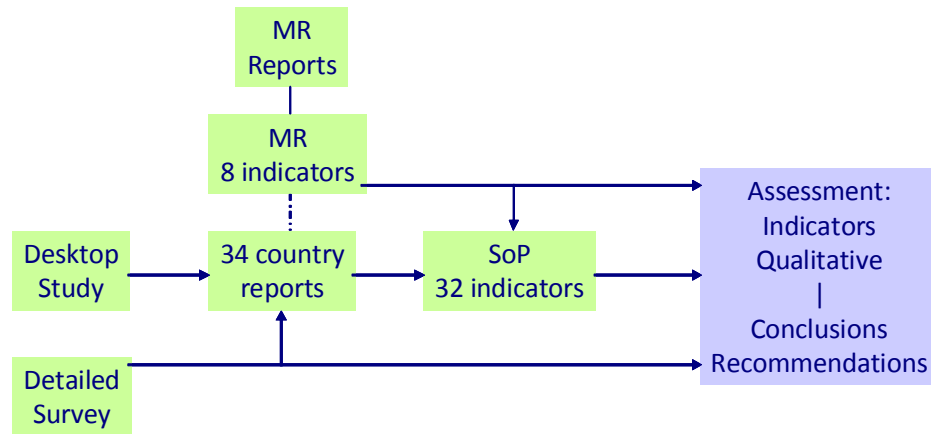
The general approach of the State of Play is a step-by-step approach:

- In a **first step** the topics for which to collect information in the country reports were revisited. This resulted in a so-called check-list based on which the relevant elements could be extracted from the consulted information sources. After rearranging, the list was used as the new template for the description of the NSDI in the country reports. Of course the list and the template remain in line with the different indicators to be scored in the assessment phase. They are based on the five building blocks of a 'good' SDI: Organizational, legal and funding issues, data, metadata, access services and standards. A separate building block regarding environmental data and activities reflects the initial focus of INSPIRE on environmental issues.
- In the **second step**, based on this topic list, an extensive list of information resources was established based on existing knowledge within K.U.Leuven and the INSPIRE community: geo-portals and other NSDI portals, other websites, strategic documents, presentations during workshops and conferences, etc. In parallel, a survey was conducted – already prepared in November 2009 – to collect more detailed information about coordination, funding and sharing aspects. The results of this detailed survey are described in depth in a separate report *“INSPIRE & NSDI State of Play: D3.1 - Detailed survey concerning Coordination, Funding and Sharing Measures”*. The survey was an important source of information for the country reports as well. Another important source of information was the result from the INSPIRE MR which became (partially) available from 15 May 2010 onwards.

- In the **third step** draft country reports were compiled based on the consultation of these resources. Most resources were gathered from the internet. Between January 2010 and July 2010 32 country reports were re-compiled in that way, and two new reports for FYROM and Croatia were elaborated. During the compilation special attention was paid to 'clean' the previous version of the country reports (2007) which were used as a starting point. This 'cleaning' was mainly focused on the elimination of 'obsolete' information, i.e. time-bound information. The 'cleaning' was less obvious than expected. The distinction between historical information and information on existing or planned components was not always clear from web or other sources. As said before, relevant information from the survey was integrated in the reports, as well as some of the results from the INSPIRE MR.
- Through the visits to three countries (**fourth step**) some extra information could be collected which, where relevant, was added to the respective country reports during the summer. The primary focus of the visits this time was, besides the collection of additional information, the validation of the findings in the draft report and the detection of points of attention when reviewing/finalizing all the other country reports. The selection of the three countries was done in consultation with ESTAT. The selected countries had to be countries where a lot of activities took place over the last couple of years, including some bigger countries and with a good distribution throughout Europe. Norway, France and Poland were selected and visited between May and July 2010. Information from the visits was integrated in new versions of the three country reports. Some other country reports were revisited as well and modified where appropriate.
- In the **fifth step** all the draft reports were sent to the NCPs for feedback. This was done in July-September 2010. This version of the report did not yet include the scoring for the 32 indicators. By 20th September, 12 countries gave feedback. The comments were integrated in a final version of these 12 country reports.
- The information from the country reports was then 'translated' into the indicators (**sixth step**). This 'translation' was done based on the answers to a series of questions (sometimes using certain thresholds) which resulted in a 'score' for each indicator in terms of whether it is (1) in full agreement with the statement, (2) in partial agreement, (3) not in agreement or (4) whether not sufficient information is available for assessing the level of agreement. The initial assessment started in May 2010 - based on the first versions of the available country reports - with discussions amongst the members of the project team, using score cards to organize the information. Results of the scoring for 9 countries were discussed with the international experts during the workshop prior to the INSPIRE conference in Krakow. Based on those discussions, the assessment was reviewed for those countries in a later stage, while the other assessments were performed as well. Because of the delays in preparing the country reports and because receiving feedback took also some time, the assessment continued until end of September. After that, the results were integrated in a new version of the country reports.

Figure 1 gives a schematic overview of the approach.

Figure 1: Schematic overview of the INSPIRE & NSDI State of Play approach



In order to better understand the way the assessment was carried out, we give here the complete list of indicators and the way they were scored. To support this process separate scoring cards were prepared per building block for each country, including the previous scoring from 2007 as a starting point. In those scoring cards the reasons for changing a score, or oppositely the underpinning of existing scores were added as well.

Table 1: 32 indicators and their scoring method for the six building blocks of a NSDI

I. Organisational issues		
Level of SDI	1	<p>The approach and territorial coverage of the SDI is truly national</p> <p>Relevance: the indicator does not question the importance of sub-national initiatives, but reflects the existence (or not) of a national initiative. In the beginning stage this was not obvious in some countries (e.g. BE, ES).</p> <p>Assessment:</p> <p>A - If there is a clear initiative with a name, structure or organisation responsible and or legislation/strategy at the national level</p> <p>N - If no such initiative can be detected - e.g. if only national GI organisations exist but no clear coordination amongst them, or if regions develop their initiatives independently.</p> <p>P - If there are efforts to bring together stakeholders, but it has not (yet) been formalised.</p>
Degree of operability	2	<p>One or more components of the SDI have reached a significant level of operability</p> <p>Relevance: the indicator gives an overall idea of the degree of development. In the original indicator it was enough to have one of the building blocks to be in place, to score the indicator as "in agreement". E.g., it was enough to have a lot of metadata and a catalogue in place to be "in agreement". This remained after 2006 onwards but we gave an additional figure: 1 point for each.</p> <p>Assessment:</p> <p>Following indicators are taken into account: I8-I16; I17-I22; I23-I25; I26-I30; I31; I32</p> <p>A - when for at least one of the building blocks the majority of the</p>

		<p>indicators are agreed with; for I31 and I32 the indicator should have a score "in agreement".</p> <p>P - when for several building blocks several (but less than half) indicators' score is "in agreement"; for I31 and I32 the indicators should be with a score "partially in agreement"</p> <p>N - in all other cases</p>
Coordination	3	The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (Cadastral or Land Survey Agency, i.e. a major producer of GI)
	4	The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users
	5	An organisation of the type 'national GI-association' is involved in the coordination of the SDI
		<p>Relevance: at the time of the set-up of the study, indicator I3 and I4 were meant to see who was/is taking the lead. This information is used mainly for the typology, and does not aim to 'evaluate' the way the coordination is done. I5 explicitly asks for the involvement in the coordination of an association (which in most cases includes universities, private sector).</p> <p>Assessment:</p> <p>A - It is a simple Y - e.g. I3 - in Flanders there is a formal structure in which the users are represented; at the national level in BE, it is the NGI who is taking the lead.</p> <p>N - It is a simple N</p> <p>P - is applied when it is not so clear (e.g. ES: in the beginning, the role of IGN was not so clear).</p> <p>I3 and I4 can't be Y at the same time. But one can be Y and the other P since the indicators are assessed separately. It would have been better to assess them together⁶.</p> <p>Information can be found in the general description section of the country reports.</p> <p>Changes:</p> <p>It is proposed to add an indicator stating: The coordinating body is controlled by both users and producers.</p>
Participants	6	Producers and users of spatial data are participating in the SDI
	7	Only public sector actors are participating in the SDI
		<p>Relevance: I6 is meant to capture whether the SDI initiative actively involves (= participation, not necessarily coordination) the users (e.g. Ministries) or not; I7 tries to capture if also private sector, universities, or other stakeholders are involved. This information is not used in the assessment itself, nor in the typology.</p> <p>A - If answer is Y</p> <p>N - if answer is N</p> <p>P - if unclear, if there are elements that hints to agreement, others to no agreement.</p>

⁶ This was a comment formulated during the workshop. However, it was decided that the indicator remains 'as is' in order to keep backward comparability.

II. Legal issues and funding		
Legal framework	8	There is a legal instrument or framework determining the SDI-strategy or -development
		<p>Relevance: This indicator wants to capture whether there is a clear document that defines this. So the key is the document.</p> <p>Assessment:</p> <p>A: when the document could be verified</p> <p>P: when it is said that such strategy exists but there is no proof; or when the document does not really provide a strategy; or when legislation or such a document is under preparation</p> <p>N: in all other cases</p>
Public-private partnerships (PPP)	9	There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects
		<p>Relevance:</p> <p>This was thought to be one of the mechanisms to solve the problem of funding for the SDI.</p> <p>A: if Yes</p> <p>N: if No</p> <p>P: if not so clear</p> <p>This information is explicitly described in the corresponding section of the country report.</p>
Policy and legislation on access to public sector information (PSI)	10	There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector
		<p>Relevance: not directly for SDI and INSPIRE; but useful information on related legislation.</p> <p>A: if Yes</p> <p>N: if No</p> <p>P: if in preparation</p> <p>This information is explicitly described in the corresponding section of the country report.</p> <p>Change;</p> <p>Rephrase towards access and re-use</p>
Legal protection of GI by intellectual property rights	11	GI can specifically be protected by copyright
		<p>Relevance: not directly for SDI and INSPIRE; but useful information on related legislation.</p> <p>A: if Yes</p> <p>N: if No</p> <p>P: if in preparation</p> <p>This information is explicitly described in the corresponding section of the country report.</p>
Restricted access to GI further to the legal protection of	12	Privacy laws are actively being taken into account by the holders of GI
		<p>Relevance: not directly for SDI and INSPIRE; but useful information on related legislation.</p>

privacy		<p>A: if Yes</p> <p>N: if No</p> <p>P: if in preparation</p> <p>This information is explicitly described in the corresponding section of the country report.</p>
Data licensing	13	There is a framework or policy for sharing GI between public institutions
	14	There are simplified and standardised licences for personal use
		<p>Relevance: these indicators say something on whether there is a data policy or not and whether there is a simple licensing mechanism for use other than in public or private sector (citizen). This information was often not available.</p> <p>A: if Yes</p> <p>N: if No</p> <p>P: if in preparation</p> <p>This information is explicitly described in the corresponding section of the country report.</p> <p>Question: add indicator on commercial use?⁷</p>
Funding model for the SDI and pricing policy	15	The long-term financial security of the SDI-initiative is secured
	16	There is a pricing framework for trading, using and/or commercialising GI
		<p>Relevance: funding is seen as a key issue for a sustainable SDI; the second indicator shows whether there is a pricing policy or not.</p> <p>A: if Yes; it means e.g. that there are specific budgets foreseen for the SDI, and they are coming back annually</p> <p>N: if No</p> <p>P: if in preparation or e.g. if the SDI can rely systematically on funding from large projects.</p> <p>This information is explicitly described in the corresponding section of the country report.</p>

III. Data for the themes of the INSPIRE annexes

Scale and resolution	17	Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components
		<p>Relevance: geo-datasets are the core for any SDI; for EU policies and cross-border environmental applications they should not only exist / be specific for a given country / region, but rather at European level.</p> <p>A: For almost all the themes mentioned in the data set table, data sets</p>

⁷ It was not decided yet to do this, but to pay attention to this during the desktop study.

		<p>are identified. Especially all the 'core reference data themes should be covered.</p> <p>P: There are many data sets, but important themes are missing (e.g. addresses, cadastral parcels)</p> <p>N: If only a few data themes are covered.</p>
Geodetic reference systems and projections	18	<p>The geodetic reference system and projection systems are standardised, documented and interconvertable</p>
		<p>Relevance: standardisation is important at the national level, but even more so for European and cross-border applications (they should be interconvertable, i.e. all necessary parameters should be known).</p> <p>A: If the answer on all sub-questions is yes: i.e. all the necessary parameters are known, documented (and publicly available).</p> <p>P: if there exist such systems, but the parameters are not publicly known.</p> <p>N: In all other cases.</p>
Quality of reference data & core thematic data	19	<p>There is a documented data quality control procedure applied at the level of the SDI</p>
		<p>Relevance: data quality is a key issue in any SDI. It is not enough to have data and data access; data should match to certain quality standards. Quality is referring to positional accuracy/precision, logical consistency, completeness, ...; the inclusion of user perspective/feedback; testing procedures for quality (QC); update cycles, ...</p> <p>A: If there is a clearly described procedure (e.g. application of standard); and there is attention for almost all aspects in the QC process.</p> <p>P: If there is attention for some aspects; or if QC procedures are only happening at the level of individual data providers.</p> <p>N: If there is no such QC procedure; or if there is no attention given to this aspect.</p>
Interoperability	20	<p>Concern for interoperability goes beyond conversion between different data formats</p>
		<p>Relevance: interoperability is the overall goal of the set-up of a SDI - having access to spatial data needed; be able to use the data readily in environmental and related policies. Therefore, data and technology must be able to interoperate. This issue has for a long time been limited to the aspect of data formats. However it is much more.</p> <p>A: If the SDI focus is clearly on technical and semantic interoperability</p> <p>P: If focus is only on data exchange formats</p> <p>N: If little attention is given (e.g., focus is only on the use of the same software)</p>
Language and culture	21	<p>The national language is the operational language of the SDI</p>
	22	<p>English is used as secondary language</p>
		<p>Relevance: the national language is important for making access for local users easier; English is important in the European context. Mostly, we look to the language of the geo- and related portals.</p> <p>A: If the answer is clearly yes</p> <p>P: if unclear</p>

		<p>N: if the answer is clearly no</p> <p>Note: in some countries there are several languages needed; also languages from neighbouring countries could be relevant.</p>
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IV. Metadata for the data of the themes of the INSPIRE annexes		
Availability of metadata	23	<p>Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes</p> <p>Relevance: metadata for data is a key issue in any SDI in order to discover, evaluate and use the data. The information was gathered through tables</p> <p>A: If metadata exist for more than half of the described data sets (table).</p> <p>P: If metadata exists for less than half of the data sets.</p> <p>N: If there are no metadata (or only occasionally), or if the metadata are not following any standard (e.g. some descriptions in readme file).</p>
Metadata catalogue availability + standard	24	<p>One or more standardised metadata catalogues are available covering more than one data producing agency</p> <p>Relevance: a metadata catalogue / clearinghouse is key for making data discoverable; the fact that it does not cover only the data from one data provider but from several is even more important (bringing resources from different stakeholders together).</p> <p>A: If at least one such catalogue could be identified / named and/or described.</p> <p>P: If there are one or more catalogues, but only from one data provider.</p> <p>N: In all other cases</p>
Metadata implementation	25	<p>There is a coordinating authority for metadata implementation at the level of the SDI</p> <p>Relevance: it was thought at the time of the start-up of the INSPIRE process that the coordination / centralisation could help to trigger the attention for metadata, key issue (but often a weak point at that time) for the SDI. Question is if this still relevant; and especially if this is the only / best organisational model to guarantee high quality metadata (e.g. why not distributed). In only a few cases this model has been applied.</p> <p>A: If there is clearly an authority indicated.</p> <p>P: If it is not so clear or if several organisations are involved.</p> <p>N: In all other cases (entirely distributed)</p> <p>Note: the indicator is kept, but not used in the assessment.</p>

V. Access and other services for data and their metadata		
Discovery Services	26	<p>There are one or more discovery services making it possible to search for data and services through metadata</p> <p>Relevance: requirement INSPIRE Directive</p> <p>A: When at least one standard service is identified / described</p> <p>P: When it is not so clear; or when there is a similar mechanism (but e.g. not using standards)</p>

		<p>N: All other cases</p> <p>Note: information also collected by MS under INSPIRE MR</p>
View Services	27	<p>There are one or more view services available for to visualise data from the themes of the INSPIRE annexes</p> <p>Relevance: requirement INSPIRE Directive</p> <p>A: When at least one standard service is identified / described</p> <p>P: When it is not so clear; or when there is a similar mechanism (but e.g. not using standards)</p> <p>N: All other cases</p> <p>Note: before 2006, there were only 3 access services described (I26-I28), and they were named differently.</p> <p>Note 2: information also collected by MS under INSPIRE MR</p> <p>Note 3: one viewing service can work on one data set or part of a data set or even on several data sets. This is the issue of service granularity.</p>
Download Services	28	<p>There are one ore more on-line download services enabling (parts of) copies of datasets</p> <p>Relevance: requirement INSPIRE Directive</p> <p>A: When at least one standard service is identified / described</p> <p>P: When it is not so clear; or when there is a similar mechanism (but e.g. not using standards)</p> <p>N: All other cases</p> <p>Note 1: information also collected by MS under INSPIRE MR</p> <p>Note 2: this does not say anything about which part of the data can be downloaded.</p>
Transformation Services	29	<p>There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability</p> <p>Relevance: requirement INSPIRE Directive</p> <p>A: When at least one standard service is identified / described</p> <p>P: When it is not so clear; or when there is a similar mechanism (but e.g. not using standards)</p> <p>N: All other cases</p> <p>Note: further collect this information through a template?</p>
Middleware (invoking) Service	30	<p>There are one or more middleware services allowing data services to be invoked</p> <p>Relevance: requirement INSPIRE Directive</p> <p>A: When at least one standard service is identified / described</p> <p>P: When it is not so clear; or when there is a similar mechanism (but e.g. not using standards)</p> <p>N: All other cases</p> <p>Note: further collect this information through a template?</p>

VI. Standards		
Standards	31	The SDI-initiative is devoting significant attention to standardisation issues
		<p>Relevance: this is also key to a good functioning SDI; standards are making it possible that the technological components work together and are the basis to reach interoperability. Standards relate to the data (semantics), the metadata and the services.</p> <p>A: when there is a standardisation policy/strategy document; when standards in both the fields of data (semantics, data exchange), metadata and services are applied.</p> <p>P: when there is only attention for e.g. the metadata standard or a specific exchange format.</p> <p>N: when there is only attention for the software used.</p> <p>Note: from 2006 onwards, the chapter was removed from the country reports; standardisation issues were described rather in the different technological chapters.</p>

VII. Thematic environmental data		
Thematic Environmental data	32	Thematic environmental data are covered by the described SDI-initiative or there is an independent thematic environmental SDI
		<p>Relevance: since INSPIRE is focusing on environmental policy or policies with a direct or indirect impact on the environment, special attention was given to the activities in the thematic field: environmental data (what correspond now mostly to annex II and III data (+ theme 9), specific portals or GI projects in the field of GI.</p> <p>A: When there are data sets for most (more than half) of the mentioned environmental themes (separate table); or when there is a specific SDI on one or more environmental sectors.</p> <p>P: When there are some data sets for the environmental themes (but less than half); or when there are several GI projects in the field</p> <p>N: In all other cases</p>

5. STATE OF PLAY SPRING 2010

5.1 Introduction

The work on the INSPIRE & NSDI State of Play for 2010 started in October 2009 and continued until October 2010. Therefore, the results as described in the country reports and in this summary report refer to the status of the (N)SDI in Spring 2010. However, information from the indicators from INSPIRE MR always refers to the status by end of 2009, even if this information was released after 15 May 2010.

In the following sections we summarize the findings of the survey (section 5.2), the results from the INSPIRE MR, i.e. the 8 indicators (section 5.3), the most important conclusions from the assessment itself taking into account the information from the survey and INSPIRE MR (section 5.4), and we highlight some good practices in several European countries as well (section 5.5).

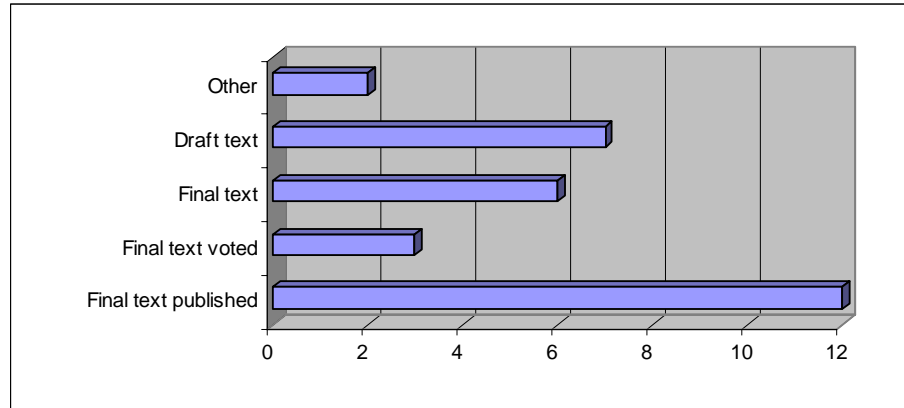
5.2 Summary of the results from the survey

In this section we summarize the specific results of the survey carried out between November 2009 and April 2010. The survey focused on the organizational aspects of INSPIRE & NSDI implementation. A questionnaire with open and closed questions was used to collect the information on five topics: 1) Transposition status of INSPIRE, 2) Implementation strategy, 3) Coordination and Cooperation, 4) Measures taken to improve data and service sharing, and 5) Other issues (mainly regarding the geoportal). The results of this survey are described in detail in a separate report: *“INSPIRE & NSDI State of Play: D3.1 - Detailed survey concerning Coordination, Funding and Sharing Measures”*. We will not repeat all the details of the different findings here, but highlight some of the most pertinent conclusions and striking results. The survey was sent to 34 countries (the 32 countries studied in the previous years and FYROM & Croatia). From those, 30 countries provided a response. However, not all countries replied on all the questions.

At the time of drafting the specific report (D3.1), i.e. June 2010, a high diversity exists regarding the transposition status across Europe. The majority of the EU member states are on the way to transposition: some of them having a final text published (12), or voted (3), or at least ready (6). Figure 2 gives an overview of the transposition status for 30 countries. Even some countries not (yet) belonging to the EU are preparing INSPIRE or similar legislation. It appeared that, besides other activities necessary for the transposition, the establishment of coordination structures and arrangements have caused many problems. Another important problem is that INSPIRE itself is conceived as a technical and not a particular hot topic for governments, so it gets a low priority. Most of the EU member states had

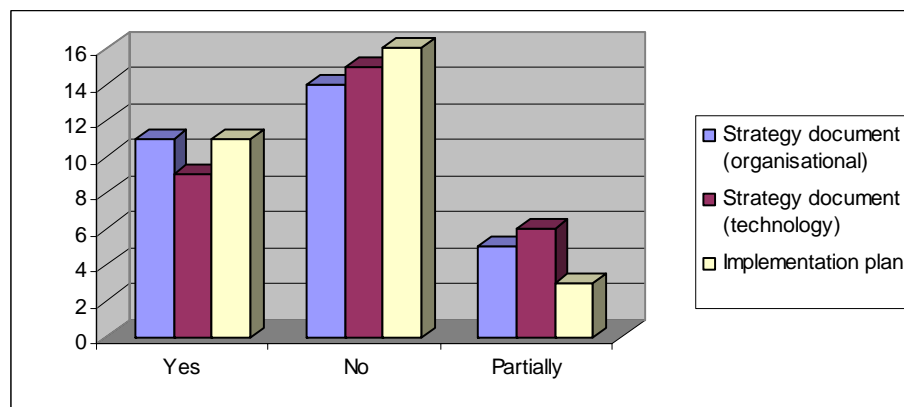
to enact new legislation to transpose the INSPIRE Directive. However, there might be concern whether countries who dealt with transposition through existing legislation, were able to adequately deal with the detailed provision of the Directive.

Figure 2: Transposition status INSPIRE (30 countries)



Many countries have no funding policy established. In the long-term, this could cause problems regarding maintenance of the created infrastructure. Well-thought strategic documents and implementation plans are crucial for the long-term development. Such plan includes the identification of the artifacts of the spatial data infrastructure, the responsibilities, the task allocations, the key milestones, and a proper timeframe. There are however few such plans in Europe. It seems that many countries are “just implementing the Directive and the rules” without any particular guidance. The majority of the countries have no strategic plans, nor implementation plans, or they have them only to a certain extent (see figure 3). Countries that developed such strategic documents and implementation plans often have them all, i.e. an organizational and technological strategy, as well as an implementation plan; other countries have none of them.

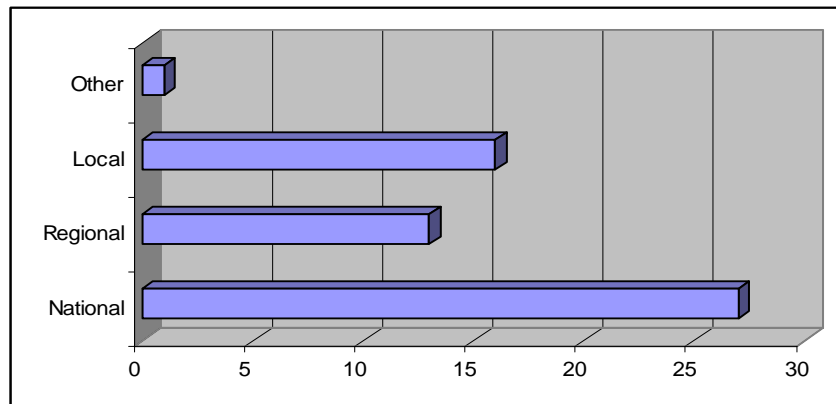
Figure 3: Existence of strategic documents and implementation plans (30 countries)



The survey also revealed that the national level is crucial for coordinating and implementing INSPIRE (see figure 4). Other levels may not necessarily be equal partners in the exercise. There is high diversity in coordination/cooperation structures and arrangements across Europe. Since these coordination/cooperation structures and arrangements are created within

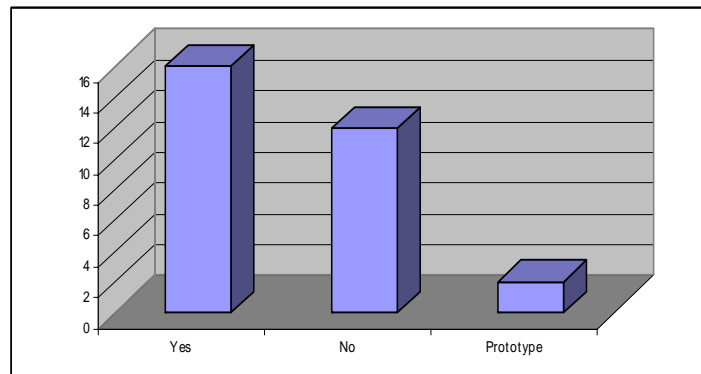
different national contexts, it is not possible to assess the quality of coordination/cooperation. Mapping agencies, ministries and environmental agencies are the most active organizations for implementing INSPIRE. This could mean that these types of organizations are the main stakeholders for INSPIRE. There does not appear to be much happening at the local level (yet). In many countries, the local level is involved, but only in a few countries organizations at local level are really active. It also seems that the implementation of INSPIRE at local level is still ineffective. Therefore, the INSPIRE implementation in local governments might need particular attention.

Figure 4: Levels of Public Authorities involved in INSPIRE implementation (30 countries)



Regarding data sharing, it seems that there is both unrestricted access and selective access in many countries with respect to different types of data. Numerous reasons exist across Europe for limiting public data access: in particular confidentiality of personal data (privacy) is often mentioned as a reason⁸. In order to promote access to spatial data, many countries set up standard agreements/licenses for all groups of stakeholders. The document that has been produced by the Drafting Team on Data and Service Sharing contains a lot of very useful examples of good practice. A number of new problems may be emerging as a result of the merging of data sets that may lead to breaches in personal privacy. The differences of PSI awareness between member states may be important with respect to the extent to which they promote access.

Figure 5: Countries with national geo-portals (30 countries)



⁸ During the workshop with country representatives in Krakow other reasons were mentioned as well, e.g. the restriction of bathymetric data for military reasons in certain Scandinavian countries.

National Geo-portals as one of the possible building blocks for INSPIRE implementation have still to be established in many countries. Although it is not a legal obligation, 16 countries developed such a portal, while 2 have a prototype in place (see figure 5). The number of data sets that can be discovered and viewed is very diverse throughout Europe and in general still in its initial phase⁹.

The uncertainties for the future of INSPIRE implementation are diverse. For example, financial resources, technological INSPIRE-issues, human resources, time planning, etc., are all considered as uncertainties. All these issues need one way or another attention. The implementation of INSPIRE has mainly achieved so far the increase of the awareness of spatial data use, improved data sharing conditions, and capacity building. From the answers, it appears that there is a high diversity in INSPIRE implementation strategies. This confirms no single best solution or recipe exists since the context of each country is unique. However, recommendations could support coordinators and policy makers in the development of successful strategies for implementing INSPIRE. These recommendations are elaborated in chapter 6.

According to the surveyed countries, the most important strategies for the implementation of INSPIRE are the ones related to the coordination (e.g. coordinating body concerning all stakeholders and relevant sectors, coordination of main data providers) and capacity building (e.g. INSPIRE-awareness, political will creation, showing best practices, organizing of workshops, creating good communication channels). For example, it appears to be important to clarify how coordination is looked at, such as having a single organization leading the development or having a clear division of tasks, and to perform a concise cost/benefit analysis as part of the implementation plan in order to secure funding.

From the answers, it appears to be very hard to compare the degree of SDI-implementation among member states. It is likely that not all countries have interpreted the meanings of the used terminologies (such as 'involvement', 'stakeholders', 'data set') in the same way. It appears also that it is difficult to use a term that has the same meaning for the different countries. Therefore, it is very likely that the related answers are not very comparable / compatible as a result. This should not pose a problem as such since the aim of the survey is not mainly to compare countries, rather to understand practices at country level. Also different perceptions that we detect on the same topic might reveal differences and different approaches of those countries. There is an additional challenge for the National Contact Points (NCP), i.e. their ability to know the rich practice in their country and represent/formulate the national point of view. There is a question mark over how well National Contact Points can get a complete picture of all the stakeholders involved and the diverse work of the agencies that are providing the national spatial data and services.

More detailed studies on specific topics raised in the questionnaire could provide more insight in order to understand the meaning of certain answers better. Examples of questions that pop-up when analyzing the results of the survey are:

- What were the decisions that led to the key strategies?
- What are the best strategies to convince decision makers?

⁹ For more details we refer to section 5.3 and 5.4.

- In which ways local organizations are involved, although they might not be very active?
- Is the dominant role of the mapping agencies changing over time?
- What could the European Commission do to streamline further INSPIRE implementation?

In addition, it is likely that cross-tabulation of the results might provide very interesting results. For example, cross-linking the status of transposition with coordination or legal issues might deliver important information useful for the implementation of INSPIRE. This cross-tabulation might be further elaborated in the second year of the study.

5.3 Results from the INSPIRE MR

The aim is not to analyze in depth all the results from the official INSPIRE Monitoring & Reporting results. The official INSPIRE reports are available, but most of them only in the national language. The results from the 8 indicators as described in the Implementing Rules for Monitoring and Reporting is analyzed in view of our findings in the desktop study. The indicators and figures from this monitoring are therefore only used to better understand the status in the respective countries and to underpin the scoring for some indicators. If some results contradict what we found through the desktop study or what has been described in the country reports in the previous years (but is still valid), it is mentioned as point of attention, but it is not used to rescore the State of Play indicators (see section 5.4). All the Member States of the European Union provided results for the INSPIRE MR indicators except Italy, Cyprus and Malta (so 24 countries). In addition, also Norway applied the INSPIRE monitoring scheme and provided results for the 8 indicators.

Figure 8 gives an overview of 7 of the 8 indicators from INSPIRE MR. The indicator on usage of network services and the respective specific indicators are not discussed at this stage. The survey of the second year of the INSPIRE & NSDI State of Play will focus on these aspects, including the changes regarding usage of services between 2009 and 2010. In the following sections, we make some observations that should be taken into account when assessing the European INSPIRE & NSDI state of play. For many indicators, the value is '0', which in general means that no information is provided. Therefore we have omitted certain indicators from the analysis for those countries that did not score them. At this stage we assume that a '0' means no score although it might in some case also indicate a value of 0.

5.3.1 Metadata

There are 11 countries which have 50% or less data sets and services with metadata as compared to all the reported data sets and services. The situation is in fact worse than expected (based on previous State of Plays). This figure includes both data sets and services. However, it should be taken into account that countries often do not (yet) monitor services (9 countries). And when countries

report metadata for services, the number of services with metadata tends to be lower. Also, data sets falling under annex III usually have less metadata.

Six countries do not give information on the conformity of the metadata for data sets and services, or have at least put this to 0. Here it is difficult to evaluate whether the 0% is due to non-scoring or due to non-conformity of all the metadata for data sets and services. Only very few countries reach a conformity of 50% or more (3 countries). For metadata for data sets of annex I, this is a little bit better (5 countries score 50% or more). Figure 6 and 7 give an overview of the existence and conformity of metadata for data sets and services.

Figure 6: % of data sets with metadata as compared to the reported data sets

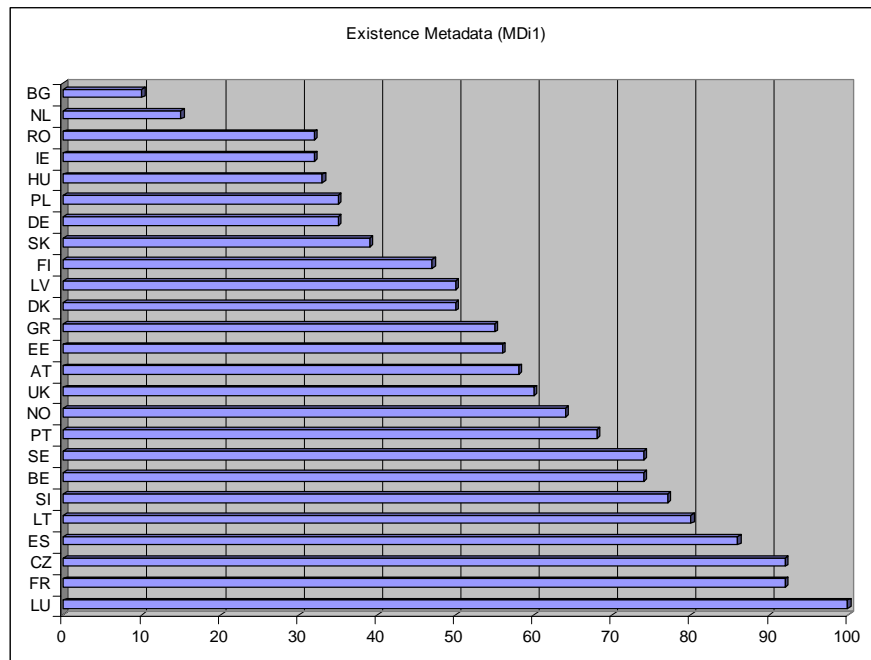


Figure 7: % of data sets with conformant metadata as compared to the reported data sets

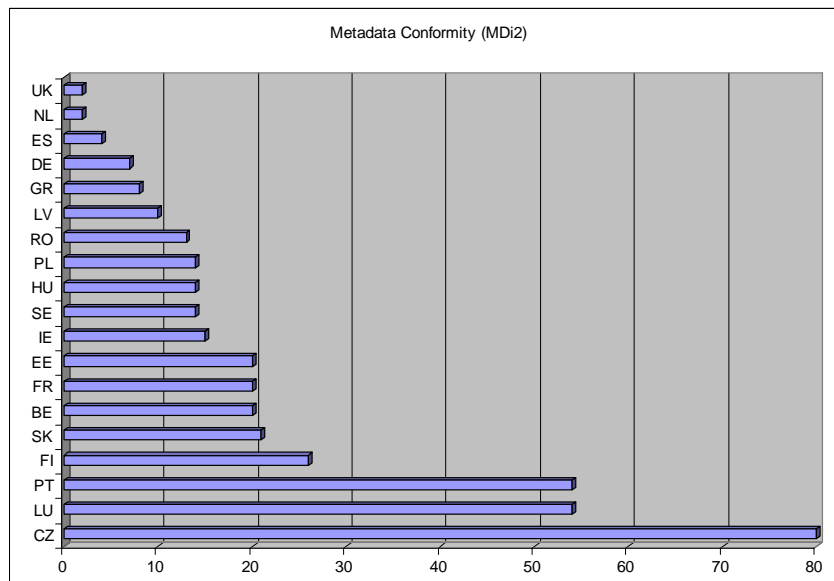
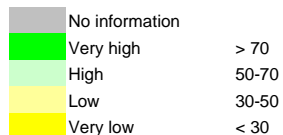


Figure 8: Results for 7 indicators of INSPIRE Monitoring & Reporting (2009)

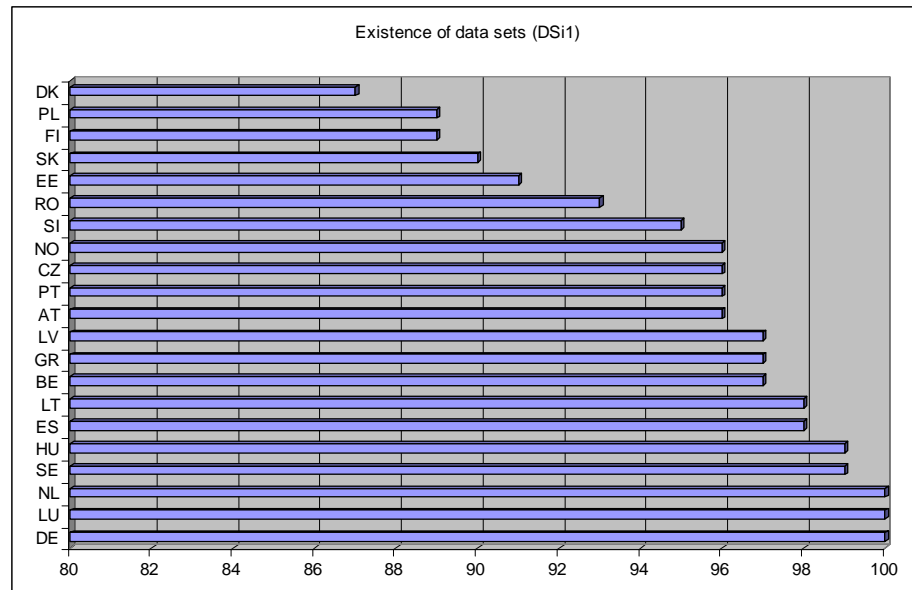
	MD Existence				MD Conformity				DS Existence				DS Conformity				NS accessibility metadata			NS accessibility view & download			NS conformity												
	MDi1	MDi11	MDi12	MDi13	MDi14	MDi2	MDi21	MDi22	MDi23	MDi24	DSi1	DSi11	DSi12	DSi13	DSi2	DSi21	DSi22	DSi23	NSi1	NSi11	NSi12	NSi2	NSi21	NSi22	NSi4	NSi41	NSi42	NSi43	NSi44	NSi45					
AT	58	68	62	47	0	0	0	0	0	0	96	99	93	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
BE	74	73	77	71	100	20	27	20	14	0	97	92	99	99	0	1	0	0	34	31	100	19	38	22	0	0	0	0	0	0					
DE	35	53	0	0	0	7	11	0	0	0	100	100	0	0	0	0	0	0	18	28	0	6	44	8	0	0	0	0	0	0					
DK	50	52	0	0	74	0	0	0	0	0	87	87	0	0	0	0	0	0	13	10	15	27			0	0	0	0	0	0					
ES	86	94	89	77	60	4	2	3	2	17	98	99	96	98	0	0	0	0	74	77	37	61	78	64	74	76	72	80	67	100					
FI	47	86	56	44	0	26	55	30	23	0	89	98	100	78	0	0	0	0	13	16	0	0	21	2	11	0	17	0	0	0					
FR	92	100	100	100	77	20	51	98	13	1	0	0	0	0	0	0	0	0	67	100	0	16	16	16	1	100	1	0	0	0					
GR	55	71	43	62	15	8	16	10	6	0	97	98	88	98	3	0	0	4	27	31	0	22	35	27	0	0	0	0	0	0					
IE	32	29	93	25	0	15	6	89	8	0	0	0	0	0	0	0	0	0	19	19	0	0	0	0	0	0	0	0	0	0					
IT																																			
LU	100	100	100	100	100	54	100	100	100	0	100	100	100	100	0	0	0	0	96	100	91	100	100	100	0	0	0	0	0	0	0				
NL	15	20			1	2	3			0	100	100	0	0	0	0	0	0	8		0	9		10	0	0	0	0	0	0	0				
PT	68	67	73	67	65	54	58	46	52	65	96	98	96	95	0	0	0	0	51	50	58	19	38	19	0	0	0	0	0	0	0				
SE	74	94	75	68	76	14	33	50	3	5	99	100	91	99	0	0	0	0	28	18	66	5			9	100	3	0	0	0	0				
UK	60	77	75	40	0	2	2	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
CY																																			
CZ	92	94	100	80	87	80	83	100	80	67	96	97	100	75	1	0	7	0	65	70	53	12	72	25	7	0	9	0	0	0	0				
EE	56	71	75	80	27	20	24	38	13	15	91	99	59	99	0	0	0	0	0	0	0	5	63	5	0	0	0	0	0	0	0				
HU	33	9	100	3	62	14	0	56	0	27	99	98	100	100	0	0	0	0	20	18	24	6			26	11	39	20	0	0	0				
LT	80	87	91	67	0	0	0	0	0	0	98	100	100	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
LV	50	65	56	44	35	10	9	8	15	0	97	96	95	99	0	0	0	0	8	8	10	2	60	5	0	0	0	0	0	0	0	0			
MT																																			
PL	35	42	67	4	58	14	8	40	0	17	89	83	100	84	2	8	0	0	29	22	58	7			8	20	0	0	0	0	0	0			
SI	77	97	100	79	0	0	0	0	0	0	95	97	100	93	0	0	0	0	74	84	0	69	70	42	0	0	0	0	0	0	0	0			
SK	39	72	21	38	43	21	10	19	23	38	90	79	95	83	8	14	4	15	24	25	19	5	38	5	29	43	17	50	0	0	0	0			
BG	10	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
RO	32	32	46	39	0	13	19	31	6	0	93	97	95	90	0	0	3	0	5	5	0	1	16	4	44	40	61	0	0	0	0	0			
TR																																			
CH																																			
IS																																			
LI																																			
NO	64	87	79	50	62	0	0	0	0	0	96	98	91	96	0	0	0	0	63	63	61	42	62	70	0	0	0	0	0	0	0	0	0	0	



5.3.2 Data sets

The existence of data sets is measured by comparing for all the reported data sets the coverage of the relevant area of the country (e.g. for data sets related to the theme sea, only the relevant sea area is taken into account). All the data sets of the different data themes of the three annexes taken together, between 87% (DK) and 100% (DE, LU, NL) of the relevant area to be covered, is covered (see figure 9).

Figure 9: Coverage for the reported data sets (% of the area to be covered by the data set)



What seems strange at first sight is that the situation is not better for data sets from annex I, or vice versa the situation for data sets under annex III is not worse. Most countries did not monitor the conformity of the reported data sets (19). Three countries (BE, PL, SK) monitor the conformity of data sets from annex I, while three countries (CZ, SK, RO) do this for data sets from annex II and two countries (GR, SK) even for annex III data sets. While this is in principle possible for data sets from annex I (draft data specs were ready in 2009), this is not possible at all for data sets from annex II and III as there are no draft implementing rules available for these 2 annexes..

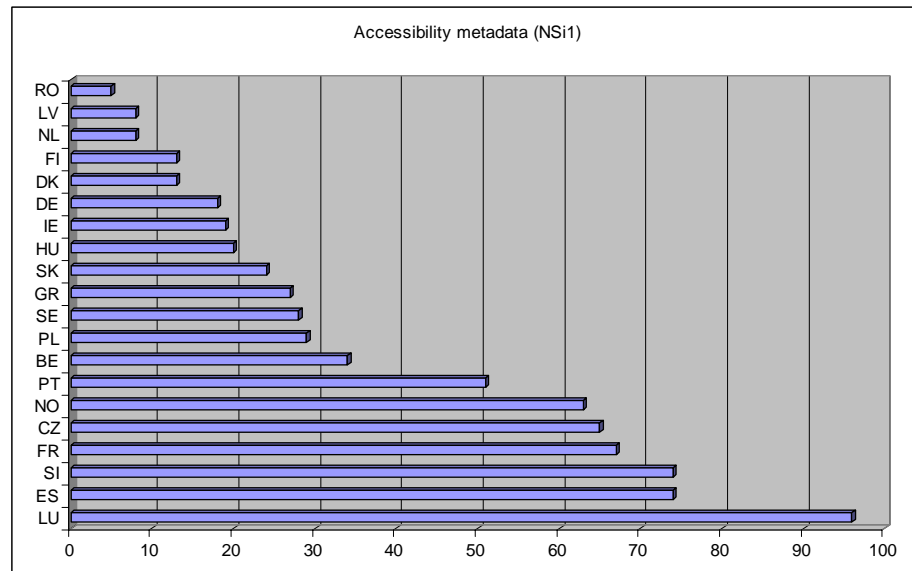
5.3.3 Network services

The NSi1 indicator refers to the degree to which spatial data sets and services can be discovered through (at least one) discovery services. Only three countries reach a level of more than 70% (SI, ES and LU). Thirteen countries have a discovery level of less than 35%. Four countries are somewhere in between, i.e. between 50 and 70% (PT, CZ, NO and FR). In general it is not true that data sets can be discovered more easily than services: sometimes this is true for data sets, sometimes this is true for services. This might be a little bit surprising since in general services are less documented with metadata than data sets (see 5.3.1).

Luxembourg is scoring also for this indicator very high and deserves to be further investigated.

All the reported data sets in the NSDI of Luxembourg can be viewed and downloaded¹⁰. Again Spain and Slovenia score high as well (> 70%), while also the same four countries that scored high for discovery services are doing well for this indicator: between 50 and 70% (PT, CZ, NO and FR). But this is far from being a European tendency. In general, accessibility of metadata is below 30% in most countries (13 countries).

Figure 10: Metadata of the reported data sets and services that can be discovered (%)

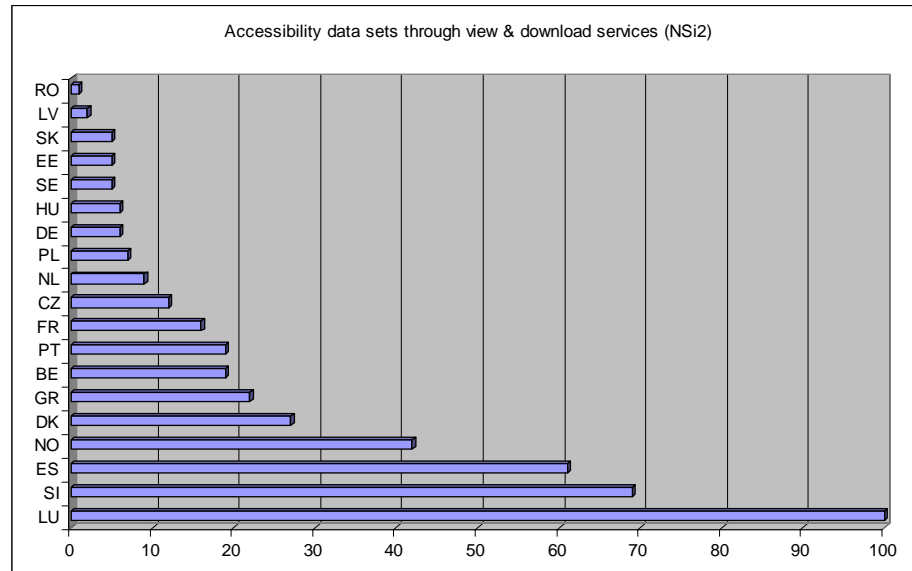


When looking at the differences between data sets that can be viewed and those that can be downloaded, one can see that in general more data sets can be viewed, as compared to those that can be downloaded. This is in line with the expectations.

Nine countries report on the conformity of (part of) their services. Spain reports on the 5 types of network services and reaches 74% conformity, even for transformation and invoking services for which no real implementing rules exist yet. Other countries report mainly for the discovery, viewing, and sometimes for download services with levels below 50%, except SE and FR who reach high conformity for their discovery service(s)¹¹.

¹⁰ Even if download services are only available for public authorities, not for the public per se.

¹¹ However, we need to be very careful when interpreting these results since they are, especially in the case of discovery services based on a very low number.

Figure 11: Reported data sets that can be viewed and downloaded (%)

5.4 Results of the assessment of 32 countries

In this section we describe the results of the assessment of the 32 countries for 2010, and compare the current status with the status in 2007, as well as the evolution over time since the start of the study in 2003. The Candidate Countries Croatia and FYROM are not yet integrated in this assessment since the available information currently only covers certain aspects and an assessment of the developments is not possible (yet)¹². We review the typology for 2010 as well. The assessment is based on the country report in which information from the detailed survey and from the INSPIRE MR was integrated.

5.4.1 Summary overview of state of play spring 2010

Table 2 contains a summary of the information compiled for the SDI in 32 European countries as valid in spring 2010.¹³ Colors indicate whether the studied SDIs are in large, partial or no agreement with the statements about the SDI-building blocks (see table 1 in chapter 4). Table 3 highlights the SDI building blocks for which the assessment in 2010 is different from the one in 2007, while table 4 highlights the differences between 2010 and the beginning of the study (the starting period of the original SoP study).

5.4.1.1 The status in spring 2010

All countries studied are developing a national SDI, with the exception of Belgium where this is only partially true. For the latter, we do not represent separate results for the Flemish and the Walloon SDI anymore, mainly for reasons of clarity

¹² Both countries are assessed in their respective country reports.

¹³ We keep the way the countries are organized (e.g. starting with the former EU-15) because of comparability purposes (change matrices).

and uniformity. In addition, it should be underlined that Belgium is on its way to develop a true national SDI by bringing together federal GI players and the three sub-national SDIs. Many other countries have also several dynamic sub-national SDIs. This is the case for Italy, Spain, Germany, Austria, UK, and even for France where several initiatives exist at the level of the 'department' or at the local level. We refer also to the results of the eSDI-Net+ project in which 139 European sub-national SDIs were documented in a public database (<http://www.esdinetplus.eu>).

Most countries have one or more building blocks of their SDI operational¹⁴. Three countries reach an overall score of 6/6 (DE, ES and NO), while eight countries reach 5/6. Five countries are scoring 2/6, while Turkey started only very recently with the development of an SDI (scoring 1/6).

The way countries are working, i.e. de type of organization that is taking the lead, the way coordination is happening, and the type of stakeholders that are participating in the SDI, are different across Europe. In 14 countries the National Data Producer – type National Mapping Agency (NMA) or Cadastre – is taking the lead. In 5 countries it is rather led by the users, while most countries have a situation in between. What often happens is that a Ministry or several Ministries, representing different user communities are coordinating¹⁵, while the NMA is taking the lead of the executive office. In 12 countries the GI association is still involved in coordinating the SDI, although that is not always very clear. In some countries, also universities, NGOs or private companies are involved in coordination (e.g. CH, CZ and ES). For 16 countries we can say that users actively participate in the development of the SDI. This is rather the case for countries from the 'old' EU-15, than for countries that joined the EU more recently. For 18 countries, the SDI is only meant for the public sector.

There are now 17 countries with a clear SDI legislation and/or strategy. The results of the detailed survey were integrated in the country reports (status: beginning of 2010) and this is reflected in the scoring for 2010. This is of course mainly due to the transposition of INSPIRE by several Member States and to the fact that several countries developed an explicit strategy or implementation plan. Another 12 countries are working on this legislation or strategic documents.

Regarding the degree to which geographic information is covered by IPR, privacy and PSI legislation, this remains to a certain extent unclear. In 17 countries geographic information can be specifically be protected by copyright law. At the same time 15 countries have a framework policy for sharing between public authorities, while licenses for personal use are still not very common (only 6 countries) or little is known about it. Also a pricing framework for commercial use is still not very common (only 7 countries have it). Sustainable funding for the NSDI remains a weak point: 17 countries have no such funding and rely on project money or money from the regular budget of existing organizations. This can become critical since INSPIRE & NSDI development triggered additional, very specific activities and obligations, sometimes with additional personnel.

¹⁴ For scoring we consider the building blocks legal issues and funding, data, metadata, network services, standards and environment. The building block "organizational issues" is not scored since it is rather describing how countries are organizing their SDI which can hardly be scored. Different ways of working can lead to the same results.

¹⁵ It should be noted that in reality, although these Ministries are users in the first place, they are often also producers of specific data sets. Nevertheless we can hardly categorize them as primary spatial data producers as is the case for e.g. NMAs.

On the other hand the components “data”, existence of “a transformable reference system”, existence of “metadata” and of “a metadata catalog” are quite well developed, especially in the 15 ‘old’ Member States and the EFTA countries (all of them have a high score on the related indicators). The newer Member States and candidate countries are working hard in this field too, and are sometimes at the same level of development as the EU-15. This could be confirmed by the INSPIRE MR results which were used to ‘upgrade’ several countries (see section 5.3). It should be repeated that ‘upgrading’ of the score was only applied in very obvious cases. E.g., when for the indicator “There are one or more view services available for to visualise data from the themes of the INSPIRE annexes” a country scored in the State of Play “partially in agreement” – maybe because in the past it was not so clear – and there is in the INSPIRE MR a clear evidence for such a service, ‘upgrade’ could be performed. Finally, a quality control procedure for data and other components of the SDI is not always in place or little is known about it.

Interoperability is a real point of attention (going beyond format conversions) in more than half of the countries. This is going hand in hand with particular initiatives in the field of geo-standardization. The latter is true for 23 countries. Those initiatives vary widely: from specific projects to the development of country profiles for certain existing standards. Standardization is in a certain sense becoming a ‘normal’ issue. Fifteen countries have English as a secondary language for their SDI.

The scoring for metadata availability is probably too optimistic. Partially based on the scoring in the past, 20 countries have metadata for 50% or more of their spatial data sets. However, as described in section 5.3, INSPIRE MR did not confirm that for the reported INSPIRE data sets: 11 countries have metadata for less than 50% of their reported data sets. As said before in this summary report and in the methodology report, we did not ‘downscale’ the scoring because INSPIRE does not necessarily contain all spatial data sets of the NSDI. In 5 countries, there is no metadata catalogue. Metadata implementation is done in a centralized way in 9 countries, while 7 countries have a more decentralized approach. For the other countries it is somehow in between or not so clear.

View services (26 countries) are better developed than discovery services (21 countries). This seems at first sight strange, but it is probably due to the fact that viewing services are easier to set-up. Fifteen countries also have download services, while twelve other have a similar system (e.g. FTP). The transformation services are rare and focusing on coordinate transformation only. The status on invoking services remains unclear, mainly because they are not (yet) clearly defined. Those Member States that report transformation and invoking services under INSPIRE MR, do not always correctly report these types of services. On the other hand, some countries are certainly working in this field, sometimes in test or pilot environment (e.g. DE, UK, ES and NL).

The specific attention for environmental data sets (and also specific projects and geo-portals) is confirmed by the INSPIRE MR, although data sets falling under annex III themes are less developed than the relevant ones under annex I & II (e.g. theme 9). This is illustrated by the fact that for theme 9 there are 745 data sets reported, and 20 out of the 25 countries reporting data sets, have many of the environmental themes of Annex III covered.

Table 2: Assessment of the building blocks of the NSDI, spring 2010

Country	Organisational issues (I)							Legal issues and funding (II)									Data for the themes of the INSPIRE annexes (III)						Metadata (IV)			Network services (V)				Standards (VI)	Environmental data (VII)	Country					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29				30	31	32		
AT	4																																		AT		
BE	3																																		BE		
DE	6																																		DE		
DK	5																																		DK		
ES	6																																		ES		
FI	5																																		FI		
FR	4																																		FR		
GR	2																																		GR		
IE	4																																		IE		
IT	4																																		IT		
LU	3																																		LU		
NL	5																																		NL		
PT	5																																		PT		
SE	5																																		SE		
UK	5																																		UK		
CY	2																																		CY		
CZ	5																																			CZ	
EE	4																																			EE	
HU	3																																			HU	
LT	4																																			LT	
LV	2																																			LV	
MT	2																																			MT	
PL	4																																			PL	
SI	4																																			SI	
SK	4																																			SK	
BG	2																																			BG	
RO	2																																				RO
TR	1																																				TR
CH	5																																			CH	
IS	4																																				IS
LI	3																																				LI
NO	6																																				NO

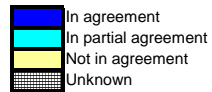


Table 3: Changes between status of NSDI building blocks between 2007-2010

Country	Organisational issues (I)							Legal issues and funding (II)									Reference data & core thematic data (III)						Metadata (IV)			Network services (V)					Standards (VI)	Environmental data (VII)	Country								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				31	32						
AT																																									
BE																																									
DE																																									
DK																																									
ES																																									
FI																																									
FR																																									
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NL																																									
PT																																									
SE																																									
UK																																									
CY																																									
CZ																																									
EE																																									
HU																																									
LT																																									
LV																																									
MT																																									
PL																																									
SI																																									
SK																																									
BG																																									
RO																																									
TR																																									
CH																																									
IS																																									
LI																																									
NO																																									

■ In better agreement than in 2007
■ In much better agreement than in 2007
■ In less agreement than in 2007
■ In much less agreement than in 2007
■ Change due to removal of 'unknown', error correction or second opinion

Table 7: Changes between status of NSDI building blocks between autumn 2007 and spring 2010

Table 4: Changes between status of NSDI building blocks between 2003 and 2010

Country	Organisational issues (I)							Legal issues and funding (II)									Reference data & core thematic data (III)						Metadata (IV)			Access services (V)				Standards (VI)	Environmental data (VII)	Country				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29				30	31	32	
AT																																				AT
BE																																				BE
DE																																				DE
DK																																				DK
ES																																				ES
FI																																				FI
FR																																				FR
GR																																				GR
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BG																																				BG
RO																																				RO
TR																																				TR
CH																																				CH
IS																																				IS
LI																																				LI
NO																																				NO

	In better agreement than in 2003
	In much better agreement than in 2003
	In less agreement than in 2003
	In much less agreement than in 2003
	Change due to removal of 'unknown', error correction or second opinion
	Twice changed due to removal of 'unknown', error correction or second opinion
	No change compared to 2003, or changes reversed

Table 5: Changes between status of NSDI building blocks between spring 2003 and spring 2010

5.4.1.2 Developments between 2007 and 2010, and since 2003

Tables 3 and 4 show the changes over time for the different building blocks. Changes can be of different nature. They can be: “in better agreement than in <year>”, “in much better agreement than in <year>”, “in less agreement than in <year>”, “in much less agreement than in <year>”, “change due to removal of ‘unknown’, error correction or second opinion” (or twice changed for this reason) or “no change”. Table 3 provides the changes between 2010 and 2007. Table 4 gives the difference between now (2010) and the start of the INSPIRE SoP (2003). The fact that for some countries “no changes” have been recorded does not mean that in those countries, no progress has been made: (1) countries which already were ‘in agreement’ for a lot of indicators can’t shift to another class anymore or/and (2) the changes could have been not significant enough to allow the shift to a higher class.

Between 2007 and 2010 there have been considerable shifts with regard to the way the NSDI is organized. This is an indirect effect of the INSPIRE Directive. There has been a shift from NMAs leading the NSDI to user oriented organizations, mainly Ministries (-5 for countries where NMAs have the lead). There is also a less prominent role for GI associations (-6). This is probably because they play more and more a supporting role, rather than a coordinating role. The impact of the users is more obvious now with 3 additional countries having users and producers participating in the NSDI. And more countries have not only the public sector participating.

Another striking observation is that 17 countries worked on legislation and/or a strategy or implementation plan. This can be read directly from the 8th indicator. In general there is also more information available on legal and funding issues. The framework policy for sharing between public authorities improved in four countries, while three more are working on it. The pricing framework for commercial use is now in six more countries available. Finally, the status of sustainable funding is worse now for two countries, while it improved for four countries.

Not so much changed regarding the spatial data availability over the previous years. This is probably due to the fact that 1) already many data sets existed before INSPIRE implementation and 2) major efforts are currently going on in order to bring existing spatial data sets in line with data specifications as defined in the INSPIRE process. Important work has been done in 7 countries regarding the development of catalogs and availability of metadata. It also seems that there is again a more centralized approach to gather and coordinate metadata efforts. As compared to the previous period, efforts have been going on in 8 countries to develop download services. And it should also be mentioned that important efforts have been done by countries in Eastern Europe concerning geo-standardization.

If we compare the status in 2010 with the status in 2003, we can conclude that¹⁶:

¹⁶ For making the comparison we count the number of shifts where we can say that the indicator is more in agreement than before. Some countries can have seen several shifts (e.g. from not in agreement to partial agreement and full agreement).

1. The way NSDI have been organized has been shifting over the years, with even several changes over the 7 year period in different directions (this can't be seen from the matrices as such).
2. A dramatic improvement occurred regarding the legal status and strategy development in the individual countries (24 of them).
3. A serious improvement concerning the funding and licensing of spatial data and NSDI activities.
4. More focus on interoperability issues.
5. Important developments in the field of metadata catalogs in several countries (+10) of which several countries started from scratch (5).
6. Spectacular developments regarding network service developments (+41!), with focus on viewing (+16) and downloading services (+18), rather than discovery services (+9).
7. Specific efforts have been carried out with respect to the environmental building block which is the driving force of INSPIRE (+10).

5.4.2 Typology spring 2010

Countries are divided over two distinct groups.

In countries of the first group, a NDP (NMA or a similar type of agency like a National Land Service, Cadastral Agency) is the officially mandated or de facto leading organization for the implementation of the NSDI. At a second level, the further involvement of users (associations or user representatives from Ministries) in the coordination activities is taken into account. Involvement in this respect means that user organizations are present in bodies defining the mandate of the lead agency for the NSDI and/or advising upon the NSDI-initiatives. Finally the degree of operability of the SDI-initiative, i.e. whether one or more of its components are operational or whether the NSDI is rather in the planning stage, is considered.

The second group of countries have NSDI-initiative(s) led by a council of ministries or administrative departments, by a (non governmental) GI-association or other type of partnership of mainly data users. This group is further subdivided according to the presence or absence of a legal or otherwise formal mandate for the SDI-coordination. At the third level, the operability of the initiative is used as a discriminating factor as well.

Since in several countries the organizational set-up changed because of the influence of the INSPIRE Directive (see section 5.2 and 5.4.1) it was also expected that countries would shift in the typology because of these changes in the way of working. Table 5 illustrates the classification of the 32 countries in 2010. Several countries shifted one stage of operability (LU, PL, EE and FR). Other countries are now classified as being more user-led rather than NDP-led (CY, BE, LV), while one country seems to have users less involved (PT) and one country just the opposite (TR).

Table 5: Classification of countries according to NSDI type (2010)

Level I	Level II	Level III	EU-27	CC	EFTA-4	Class
NDP-led	users involved	operational	DK, FI, SE, HU, LU, PL		IS, NO	1,1,1
		partially operational	AT, GR			1,1,2
		not operational	RO	TR		1,1,3
	users not involved	operational	SI, SK, LT, PT, EE, LU			1,2,1
		partially operational			LI	1,2,2
		not operational	MT, BG			1,2,3
not NDP-led	formal mandate	operational	DE, ES, NL, CZ		CH	2,1,1
		partially operational	IT, IE, LV, CY, BE			2,1,2
		not operational				2,1,3
	no formal mandate	operational	UK, FR			2,2,1
		partially operational				2,2,2
		not operational				2,2,3

We wonder if the typology will continue to give enough differences between countries. Indeed, due to the mandatory INSPIRE implementation, and the de facto involvement of more and more stakeholders, also in the coordination, most of the discriminating factors will become obsolete. This is certainly more true for the degree of operability. Nevertheless, it seems that in some countries, the NMA is becoming less predominant.

5.5 Highlighting some good practices in Europe

In this section we describe some of the most interesting trends in a more qualitative way, by giving examples and highlighting what can be considered as ‘good practices’ in Europe with regard to INSPIRE and NSDI development and implementation. The aim is not to be complete, rather to indicate specific activities or initiatives that deserve further attention. Not all countries are necessarily mentioned even if good practices can be found everywhere. The good practices are structured according to the different building blocks of the NSDI. The general trends regarding the different building blocks of the NSDI as described in the previous sections are not repeated here. So this section complements in a certain way the previous sections.

Organizational practices

The sub-national level, and in particular the **local level**, is gaining more importance in the development of INSPIRE and of the different (N)SDI activities. This is certainly true in *France*, but also in countries like *Spain*, *Italy* or *Denmark*. In Italy it is said that “INSPIRE datasets” are not sufficient for carrying out impact assessments. It is stated that there is a need for more local data in line with the INSPIRE specifications. FOTdanmark is an association established in October 2007 between the Danish state (Danish National Survey and Cadastre) and six of the municipalities in Denmark. In July 2009 more than 88 of the 98 municipalities within Denmark were members. FOTdanmark works for the establishment of a unified public topographic mapping of Denmark with the aim to become one of the main elements in the national strategy for eGovernment. Spatially enabled applications for citizens and private companies are part of the activities (e.g. V is Stedet – “Show the location”). The Municipal Geodata Agreement was established between the central and local authorities, to facilitate the access to spatial data and web services of the National Survey and Cadastre.

In several countries throughout Europe, the SDI development is going hand-in-hand with **eGovernment** initiatives. In the *Netherlands*, it is one of the seven key strategies of GIDEON, i.e. to give geo-information an appropriately prominent place within e-services. This is also true in *Switzerland* where the e-Geo project was initiated and is managed by COGIS (the Coordination, Geo-Information and Services Division from Swiss-topo). In 2008, e-Geo established a cooperation agreement with the e-government strategy partners, formalized its legal form, funding and responsibilities and established the concept for a national geoportal. All levels of authority are working together with this aim. Also *Sweden* sees the NSDI as a supporting tool for eGovernance, while for *Denmark* eGovernment is a vehicle for SDI development. Also the *Czech Republic* wants to bridge the gap between INSPIRE and eGovernment by using base registries as one of the core building blocks from the SDI (RÚIAN initiative). In *Lithuania* e-services are being developed producing land planning documents using the SDI.

Well developed technological strategy

In September 2007 the **architectural baseline** for the *German* National Spatial Data Infrastructure (GDI-DE) was adopted and presented to the public. The architecture has been conceived to be technically open and defines the most

important rules to be applied in order to ensure the interoperability of GDI-DE's constituent components. It is based on an analysis of already existing German SDI initiatives on both state and federal level and of INSPIRE. It is rooted on ISO and OGC specifications. Some federal states of the Federal Republic of Germany have already implemented or are in the process of implementing geoportals featuring a wide range of commonly used services. Considering typical use cases within GDI-DE, technological requirements were identified that the architecture has to fulfill. The Master plan is seen as the common guideline for all public institutions dealing and using geo information. Technically it follows the architecture of SOA (Service Orientated Architecture) and describes in detail the most necessary components such as Discovery-, View- and Download-Services. Also the **UK** has a very comprehensive strategy for the NSDI and INSPIRE, called the UK location strategy.

Legal aspects, funding and licensing

Certain countries are defining INSPIRE in a broader way, i.e. to bring into INSPIRE any single spatial data set, or at least as many data sets as possible. The *Netherlands* decided to implement INSPIRE in a more **focused** way. This means that not all the existing spatial data sets are brought into the INSPIRE basket, but rather to focus on some key spatial data sets to be used by all stakeholders and organized in the so called “**authentic registries**”. This is also one of the seven key strategies of the Dutch NSDI: “to encourage the use of the existing four key georegisters, and to set up two new ones”. This decision was based on a cost & benefit analysis of different potential ways of publishing data. Also *Lithuania* seems to follow this more focused approach.

Also in *Lithuania* a more flexible **pricing model** is being set-up, taking into account several parameters: e.g. the area, the number of layers, number of objects, number of clicks, etc. This model is largely based on the *Norwegian* model which is already in place for several years and has been quite successfully in order to make the NSDI financially sustainable. Also *Sweden* is applying this model, while it seems that there is a huge interest from other countries in Europe as well. This is e.g. the case for *Denmark*. In June 2008, the government's economic committee passed a new agreement on financing central government authorities' access to geodata and services from the National Survey and Cadastre. The new framework took effect on January 1, 2009. This agreement grants all ministries full access to geodata and relevant services from the National Survey and Cadastre. Rather than paying traditional usage fees, each ministry will pay a fixed annual contribution based on its use and needs. The framework provides all ministries and agencies, universities and elementary- and secondary- schools with access to the majority of the Cadastre's geodata holdings, as well as access to these geodata over the Internet through the Digital Map Supply. In The *Netherlands*, there can be seen interest in a sharing licensing framework, while some private companies in Europe are trying to integrate licensing into INSPIRE or NSDI workflows through specific software tools (services).

Data catalogs, geoportals and registries

Although the development of a (national) **geoportal** is not a legal obligation for INSPIRE, many interesting developments are taking place in several European countries. *Spain, France, Netherlands, Poland, Germany, Slovenia* and many other countries have well established portals that were further enriched with data, metadata, services and often other functionalities. The *Lithuanian* Geographic

Information Infrastructure (LGII) has been designed as an open, shared national spatial data infrastructure for accessing and distributing geographic information products and services online. It connects major public sector information sources through a single Internet portal (www.geoportal.lt) that has been launched in 2008. Geographic information classifiers and a national metadata profile have been prepared combining international standards and existing regulations in Lithuania.

A *French* Geo-Portal was launched in 2006 (www.geoportail.fr): the DGME is in charge of the project and IGN and BRGM are responsible for the realization (View services for maps, orthophotos by IGN and Discovery services by BRGM). The portal provides access to reference data, produced by IGN France (covering most of the themes of the Annexes I and II) but also by other producers. The geoportal gives on-line access to the public for a large number of data sets and its API allows other web sites and portals to embed geoportal visualization windows. The national geoportal is developed according to OGC standards. The geoportal's API is an extension of OpenLayers API from the OGC, and it is distributed with an open source licence. The GI on the portal is available in the most common formats and domain standards (KML, WMS, WFS). In the past year (2009-2010) the focus in France was on public authorities producing data sets under Annex I. The NSDI provided open and conformant tools: e.g. a template with an ISO19115 XML export facility, a Wiki dedicated to "How to fulfill metadata fields".

Besides The Netherlands, *Germany* is another country where registries are used in the context of the NSDI and INSPIRE. One of the **registries** is for coordinate reference systems (CRS), others are set-up to hold information on monitoring and reporting and on the results from conformity testing. This type of testing is also done by The *Netherlands*. As an important interoperability tool, a national validation service for the spatial planning standards was developed, which became operational by the end of 2008. A national validation service was provided to test digital plans at four levels. The first test ensures that the GML data encoding is according to the schemes and business rules of the standards. The second test sees whether all file names are used properly. A third test determines whether the geometry is fully interoperable, not only according to official GML-standards but also with specific choices to facilitate the use in a broad range of GIS and CAD systems. Finally, a check is made to see if the digital signature is valid to ensure the integrity and completeness of the plan.

Service development

Spain has probably reached the most developed service infrastructure. IDEE speaks themselves about the SDI of the SDIs with seven Ministries involved, 16 regions and 400 municipalities. There are 833 WMS (of which many are regional or even local) and 15,000 data layers, 205 WFS, 18 WCS, 9 CSW and 1 WCTS. There are even 6 WPS (e.g. WPS to perform buffering). Not all of these have been reported in the official INSPIRE MR. Also other countries focus more and more on a real **service bus**. This development is not so spectacular in other countries, but happens everywhere. This is the case for e.g. *Poland* as confirmed by the INSPIRE MR.

Particular efforts are occurring in the field of **conformity testing**. This issue has been tackled in the European GIGAS project, but is also a particular point of attention in *Germany*. The GDI-DE has set-up a test-suite to validate data sets,

metadata and services on their conformity with the respective implementing rules. The results of this testing is stored in registries (see higher) which are in turn used to feed the indicators for monitoring and reporting. An API (as web services) has been developed for using these tests in different applications. Ultimately this should lead to a real certification process. Similar developments are going on in *Sweden* where a testing and demonstration environment has been implemented with the aim of certifying.

Technological developments

Several technological trends within the NSDI can be seen over the last two years. A first trend is to use - besides open standards – more and more **open source software** environments, eventually combined with proprietary software environments. One of the striking illustrations of this is the use of the open source GeoNetwork platform for developing geoportals and for deploying catalogs. This is for example the case in the *Scandinavian* countries. A Nordic agreement on collaboration on Open Source Software development has been signed in order to promote this. The basic idea is that there is no single software that fulfills all the requirements of the NSDI, and therefore, maximum modularity is being looked for. Also in the *Netherlands* and *Switzerland* similar trends can be seen.

A second trend is the emergence of **linked data** technology. This can be seen in European projects, e.g. like the GIGAS project, as well as in developments in different individual countries like the *UK*. Other developments are in the field of metadata harvesting and crawling techniques for finding web services over the network (see work done in *Spain*). Also other type of web services like Web Processing Services or Quality Control Web Services are emerging (see for the latter e.g. developments in *Finland*).

Focus on environmental applications

In the *Czech Republic*, an environmental helpdesk has been established aiming at generating automatically geo-reports from real life cases, as well as from existing procedures in public authorities. Also in *Romania*, several environmental projects were initiated in which INSPIRE and NSDI components are developed and used. Similar developments can be seen in *Italy* where there is a close link with SEIS developments. In *Turkey*, efforts also focus partially on the environmental sector with the TEIEN network. In *Slovakia*, a specific environmental geoportal has been developed by the Environmental Agency. This is a general trend in Europe as can also be seen from the older initiative in *Germany*, the PortalU which is the unique connection point to rich series of environmental spatial and other data sets. The German Environmental Information Portal PortalU® (<http://www.portalu.de>) is online since June 2006. Its user-interface was realised on the basis of up-to-date portal-technology. The portal offers central access to over 2,500,000 web pages and about 500,000 database entries from over 340 public organisations in Germany such as the Environmental Specimen Bank of the Federal Environmental Agency (UBA) or the Documentation Data Base for Nature and Landscape of the Federal Agency for Nature Conservation (BfN).

Cross-border data & service sharing

With the implementation of INSPIRE we can also see interesting examples of **cross-border cooperation** and technical solutions. *Spain* has a long tradition of cooperating with neighboring countries like *France* and *Portugal*. The geoportal of

IDEE does not only provide a multilingual view on the available infrastructure, several cross-border projects saw light over the past years. One such new project tries to achieve horizontal interoperability among the national geoportals of Spain, France, Portugal and Andorra. In WMS viewers there are direct links by default to Portuguese, Spanish and Andorran WMS, to a combined display of each others' national cartography. From some clients it is possible to discovery GI of other countries. Another example can be found in a joint project of *Germany* and the *Czech Republic* to combine topographic databases from each country, i.e. ATKIS and ZABAGED, to reach interoperability of spatial data with focus on semantics and geometry problems. Also *Romania* and *Bulgaria* started a cooperation program to reach similar goals.

Finally it should be mentioned that most of the efforts regarding interoperability and harmonization of spatial data are carried out with the framework of European projects, e.g. GIS4EU, Humboldt, ESDIN, Nature-SDI*plus*, and many other projects. Final results of these are less visible in the current NSDI. It is expected they will come more to the forefront in the next years.

6. CONCLUSIONS AND RECOMMENDATIONS

In this chapter we draft the most important conclusions from the assessment and its methodology. Secondly we describe some recommendations, both regarding the development of INSPIRE as such, as with regard to the methodology.

6.1 Conclusions based on the assessment

The analysis of the status of the INSPIRE & NSDI implementation in the countries studied allows – based on the results from the detailed survey, the desktop study and the first results from the INSPIRE MR - to draw following conclusions regarding the state of play in Europe:

- The detailed survey revealed that most countries, mostly Member States, but also non-Member States have transposed or on their way to transpose the INSPIRE Directive. The establishment of coordination structures, the involvement of stakeholders and the ‘translation’ of the sharing concept were the most difficult parts of the exercise.
- Although some countries have very well elaborated strategic documents, e.g. the Netherlands or Germany, many have not such documents, nor implementation plans. Many countries do not have a clear funding policy for their NSDI, neither for INSPIRE. Many need to rely on existing budgets or seek for specific project funding. Some countries have some dedicated budget line for INSPIRE activities, but mainly for specific coordination activities or for monitoring & reporting.
- Regarding the coordination and cooperation, the national level still seems to be the most important level for INSPIRE & NSDI implementation. Although from the survey, it seems that not much is happening at the local level, the desktop study and visit to the three countries (NO, FR and PL) seem to contradict that, at least partially: there are more and more local initiatives as can be seen in e.g. France and Denmark. This is confirmed by European projects such as eSDI-Net+ (see <http://www.esdinetplus.eu>).
- Although there is a high diversity of coordination and cooperation structures in Europe – not every country is working in the same way – there seems to be a shift towards a more prominent role for the user communities, mainly the major Ministries which are large consumers of spatial data (but might produce also some of these). The role of mapping or cadastre agencies is still very important, but in a lot of cases they act mainly as an executive agency, taking the operational/technical lead. This evolutions caused a (modest) shift for some countries in the NSDI typology (e.g. CY, BE, LV). The shifts from NMAs to non-NMAs, from non user to user participation and from informal to formal mandates are what the International experts had expected but it is first time that these trends have been confirmed so clearly.

- Data & service sharing policies are just to emerge in Europe. This might be not so surprising since the Implementing Rules on data & service sharing have been published only recently. There is both unrestricted access and selective access in many countries with respect to different types of data. Numerous reasons (might) exist for limiting public data access across Europe. In particular the detailed survey mentioned confidentiality of personal data (privacy) often as a reason for doing so. In the workshop in Krakow, several countries also mention military (or security) reasons. In order to promote access to spatial data, many countries set up standard agreements/licenses for all/ groups of stakeholders. In general, sharing practices are poorly documented.
- The desktop study, as well as the INSPIRE MR results, confirms that most countries are very active in developing the different parts of their NSDI. Although many countries have metadata for a considerable part of their data sets, it seems that in the past, it was overestimated for some countries. While in the State of Play we have 20 countries with more than 50% of the data sets having metadata, 11 countries in the INSPIRE MR have less than 50% metadata for the reported data sets. Some countries have a different scoring in the State of Play as compared to the INSPIRE MR. This is possible due to the fact that the NSDI and INSPIRE are not the same (the NSDI being broader). It could also be that in the past the situation was overestimated. Conformity of the reported metadata varies between 2 and 80%.
- View services are very well developed and download services really start to emerge now. Also discovery services start to become available for most of the countries – 21 out of the 34 have them - although there are less of them, (which is normal). Transformation and invoking services are rather the exception. If transformation services exist, they are coordinate transformation services. It should be noted however, that the situation might be better overall, since many countries did not report on the services part, or only partially (e.g. for some types of services). It will not come to a surprise that the conformity of the data sets is mostly not reported, and if it is, it is very low. The same situation exists for the conformity of services. For the latter, a few countries do report on this, with Spain obtaining good results (74%). It has to be noted that the legislative basis is not available yet for several of these aspects.
- Although many countries are actively developing an INSPIRE geoportal – even if it is not a legal obligation – the survey reveals that 13 of the countries that responded to this question do not have one yet. The workshop in Krakow also revealed that the type of geoportal envisaged is different in different Member States: e.g. some will only provide authentic or conformant data sets and services, while others will make as many data sets as possible available through the portal. The level to which metadata – and thus their related data sets or services – can be discovered is very variable, but in general terms still very low. Only 7 countries score 50% or more. And data sets that can be both viewed and downloaded is even lower: only 3 countries reach the 50% mark. This might not be surprising since 5 countries even do not have an operational catalog.
- In general terms, there is more and more focus on interoperability issues, and geo-standardization to reach this interoperability. This is often underpinned

by specific standardization bodies and/or particular projects to develop country profiles. Countries that are active in the geo-standardization process (OGC, ISO, CEN) are also advanced in the application of existing standards/IR/guidelines. It should also be mentioned that many countries are active in the field of data harmonization through European funded projects.

- In several countries the NSDI is broader than INSPIRE, while other countries put more or less everything under the INSPIRE umbrella, it means that they see INSPIRE as very broad, with similar data sets from different stakeholders defined as being part of INSPIRE. A clear example of the first, is the Netherlands where the NSDI stakeholders decided to put a limited number of authentic data sources under the INSPIRE umbrella, while obviously there are a lot more. Also the fact that NSDI representatives from Spain indicate that the Spanish SDIs have more than 1000 operational services, while 'only' 215 are reported in INSPIRE MR, seems to confirm this.

Regarding the methodology followed, we can draw some conclusions as well:

- The preparation of the individual country reports has taken much more time, and longer than expected. This is mainly due to the fact that: 1) there have been many changes in the 2.5 year since the last update (2007) and 2) the 'cleaning' of obsolete information was not always easy (and is still to be done to a certain extent). The latter aspect was not made easier due to the fact that often the portals and documents mix current and historical information as well.
- The workshop in Krakow prior to the INSPIRE Conference (21-22 June 2010) has made it possible to get more focused input from the international expert group regarding the results of the survey, the INSPIRE MR results and the scoring of the countries. The workshop has made it also possible for (the representatives of) the countries to give feedback on the first findings and to discuss with and learn from each other. This made it possible to improve the country reports and final assessment.
- The analysis of the results from the desktop study, the survey and the INSPIRE MR indicators confirmed that it is not possible and not desirable to change the assessment of a country for a particular component (indicator) based on the result for the corresponding indicator coming from the INSPIRE MR (e.g. existence of metadata is often lower than what was assessed in previous State of Plays). This might indicate that we overestimated those indicators in the past, or it might indicate that the overall situation (the NSDI as compared to INSPIRE) is different.
- The fact that in many countries INSPIRE does not equal the NSDI, but is part of it, has put an additional challenge on the State of Play study. While the intention was/is to capture not only INSPIRE implementation aspects, but also NSDI developments at large, there was an obvious pressure to mainly report on INSPIRE activities, also in new material from countries, focus is on INSPIRE only. Organizations and countries as a whole tend to focus on the latter, and do not necessarily report, e.g. data sets that do not fall under one of the themes of the three annexes, or projects that are beyond the scope of INSPIRE. It was also a challenge not to narrow down the assessment to an 'organizational study'. Quite logic, the major efforts of the last two years in the different countries was on setting up a coordination structure, to prepare legislation, to search for the relevant stakeholders and bring them together,

to elaborate a strategy and find funding, to prepare M&R, etc. A lot of the work, e.g. regarding data harmonization is happening in the background and clear results are not always visible.

- The desktop study also revealed that, more than in previous years, the material on INSPIRE and NSDI is in the local language. Although there are a lot of good English documents, and (some pages of) the portal is sometimes in English as well, there seems a shift to the own language(s). This probably has to be explained by the fact that in previous years, the work of the national experts was often still at the international, European level, while they now work more and more in the different organizations to help implementing INSPIRE.
- Specifically regarding the detailed survey, it should be mentioned that not all the results from the different countries are comparable. Of course, this is not the final aim of the survey, which is rather to have a qualitative insight how certain things happen in different countries, rather than to compare them per se, but nevertheless it is suggested to verify in the second survey the definitions and the way the questions can be formulated more consistently.
- By June 2010, 24 Member States and Norway made their INSPIRE MR results available. This was more than expected and (for some of them) with only minor delays. The information has not been analyzed in depth, but the most important indicators could be used to verify and underpin most of our findings regarding the technological building blocks of the NSDI: metadata, data and network services.

6.2 Recommendations

6.2.1 Regarding the approach & methodology

- It is recommended that the approach & methodology – without changing it completely – can still be fine-tuned in the course of the following year. And in consequence that the deliverable “*INSPIRE & NSDI SoP: D1.1 – Report on Methodology*” can be modified at that time as well. Certain aspects, e.g. regarding how to interpret the results from the INSPIRE MR on the use of the infrastructure (services), as well as similar information that will be collected through the next detailed survey on the same topic, are not yet entirely documented. This is particularly true with regard to the question on how to normalize the information on usage.
- The first years’ survey resulted in interesting material for most of the countries studied. It is proposed to send the survey of the first year to the countries again, together with the second years’ survey questionnaire on the usage of the infrastructure. This would allow to collect additional information and to detect some of the dynamics that certainly will have occurred over the past year. However, since some of the questions, especially those related to measures regarding data and service sharing were not clear enough it is proposed to review/clarify the questions before sending them. Of course, responding or updating the existing responses to this first questionnaire would be an option for the countries. Priority should go to the new survey on the usage aspects.

- In order to learn more from the results of INSPIRE MR and to better integrate these in the overall findings, it is proposed to analyze the detailed information from the indicators in more depth during the second year. SADL proposes to have one or two of its trainees to explore the information in more depth in view of the European assessment. They could also contribute to cross-tabular analysis of results from the survey(s).
- The first results from the INSPIRE MR also show the need to further clarify the way the monitoring template is filled. It might help to enforce in the template the way it can be (or can not be) filled. E.g. if an implementing rule is not ready yet, the fields for these specific indicators might be blocked (or everything could be put by default to '999' as default value for 'no information available'). There should also be clearer guidelines on the application of this 'no value' ('no scoring'). Now the difference between a real '0' value and a 'no value' can hardly be made. There are some other smaller improvements that could be made as well.
- During the second year, special efforts should be made to integrate the results of the reports of the INSPIRE MR which were at the time of the assessment in 2010 not yet translated (at least not all). This will deserve specific attention from the INSPIRE & NSDI SoP team during the assessment in 2011.
- It is expected that the survey of the second year (2010-2011) which will focus on the usage and the usability of the (components of the) infrastructure will be able to reveal how they are integrated or not in existing day-to-day processes. Therefore, the survey of the second year should not only include questions regarding the use and usability, but also try to grasp this integration aspect.
- In more general terms, much more could be made of the pressing need that exists for a more systematic approach at the European level towards evaluation research in the field of SDIs as a whole. At the moment there are besides the INSPIRE MR, and the State of Play studies a number of ad hoc projects such as eSDI-Net+, EURADIN and the EuroSDR Atlas project that cover aspects of INSPIRE implementation, but as this report shows very clearly a much more integrated approach to evaluation by independent bodies is required to assess all aspects of INSPIRE & NSDI implementation, and to make the best use of the resources that are available.

6.2.2 Regarding the status of INSPIRE & NSDI implementation

6.2.2.1 Non technological

- From the perspective of the development and implementation of INSPIRE and the NSDI, the involvement of the relevant stakeholders is of utmost importance. It is clear that some countries still have difficulties in detecting and/or actively involving the right organizations, whether they are data custodian or not. This is especially true for organizations responsible for data sets from annex III. But in more general, the local level is still far from being integrated in the INSPIRE implementation. This will need particular attention in the coming years. It is therefore worthwhile to use and support initiatives that are focusing on this sub-national level (e.g. projects comparable to

eSDI-Net+) and to organize learning moments on how stakeholders (not only local ones) can be successfully involved.

- There is an overall need to work on capacity building, to create better awareness, and to train more experts to support the often complex tasks of INSPIRE and NSDI implementation. This need has been echoed during the workshop in Krakow and during the INSPIRE conference as well. There might be specific educational initiatives: e.g. the organization of a good INSPIRE e-learning offer at the European level focusing on different types of people; e.g. the exchange of experts among NSDI. Existing European educational/training programs could be used for this. Also specific initiatives could be taken by different universities, private companies and other stakeholders, or by the NSDI themselves. Existing initiatives might be streamlined in order to bring a more consistent training offer.
- Many countries are lacking a good strategic document and implementation plan. However it is deemed that this is necessary to achieve the envisaged results, i.e. to have a high quality NSDI to support multiple needs. Several countries have such plans: from very simple ones (e.g. LI) to more elaborated plans (e.g. NL, DE). It is proposed to have the existing ones together in a central repository, e.g. on the INSPIRE website, and eventually to translate some documents that are currently only in the national language. This could help countries that do not have (yet) such plans.
- Since several countries indicated they struggled with mostly the same issues when preparing the transposition, it is suggested to support those countries still working on the transposition to help them in order to avoid the same pitfalls or to learn from others on how they have overcome them. One of the EuroSDR projects, “INSPIRE: Atlas of implementation strategies” is aiming at this. The workshops organized within this project could be promoted among the different NSDI.
- Sustainable funding seems to be an important issue as well. While it is probably not feasible to have an overall funding program for INSPIRE at the European level, the more systematic usage of existing budget lines or the creation of specific activity lines in existing programs would be a good solution (combined with mobilization of own funds and business models in the respective countries). The experience of the eContent*Plus* projects which helped (and still help) funding a lot of the data harmonization projects has proven to be an effective way of working and has made important contributions to the INSPIRE implementation, also in separate countries. A similar approach could be followed for other parts of the infrastructure development.

6.2.2.2 Technological

- From the experience of different stakeholders and countries it is deemed to be very important that countries and individual technological stakeholders become active members of (some of) the standardization organizations like OGC and the ISO & CEN committees. Even if specific efforts are required for doing so, the experience that is being build-up throughout these activities, is helping the country/stakeholders to implement INSPIRE and the NSDI more easily. And in general, this work helps the stakeholders, as well as the countries to apply this experience in other sectors as well.

- It seems that the usage of registries for supporting (and as part of) the infrastructure is very powerful. It is advisable to develop certain registries as part of the European infrastructure. It could also be used, as is done already in Germany, to organize the conformity and performance testing of the infrastructure with a very close link to INSPIRE M&R. Currently very little is known about conformity and performance¹⁷, but with INSPIRE and NSDI becoming more developed and more mature, and with hopefully more and more users, these aspects will become critical. It is proposed to organize a separate workshop on this issue in order to bring together the first experiences in this area and to allow other countries to learn on how to tackle this issue.
- Development of metadata must be further improved since it is critical for the whole infrastructure. Especially the metadata for services is still in its initial stage and deserves particular attention. It is suggested to promote the existing metadata editing tools that can help to create metadata in an easier and conformant way.
- There are more and more network services available in the individual countries, or even at the sub-national level. However, it is not so clear how they perform and whether they are conformant. It is proposed to initiate a small project to do some of this testing. Part can be done within this State of Play study, but certainly not systematic. So another initiative could be envisaged. Also the use and usability of the infrastructure could be analyzed by analyzing how services are used and are usable or not within existing business processes. Issues of portrayal, granularity of services and chaining of services are becoming more important from that perspective. Again, the State of Play can help to collect (part of) this information, but certainly not systematic.
- Over the last few years, and confirmed by the country reports, many efforts have been done on the issue of harmonization and interoperability of spatial data. Several European projects have been carried out or are still continuing. Those experiences should be more systematically documented in view of selecting good practices and problems that were overcome. Questions like: “which harmonization strategy to follow”, “transformation or re-engineering”, etc. are important questions which have been (only partially) answered or will be tackled in many ongoing European and national projects. CEN/TC 287 is already working on a Technical Report to do this type of systematization. This work could be supported and extended, and it should certainly be promoted.
- Many countries are focusing on the development of a (national) geoportal. Aspects of usability should be taken more actively into account, involving ‘real’ users that can test prototypes. A nice geoportal (door) without a good catalogue and services behind it (content) has only limited usability. So focus should be on the latter and on the way it is presented.

¹⁷ Although it is not part of this INSPIRE & NSDI SoP study and it was not fully investigated, the reported network services in the INSPIRE MR were ad-random tested. Many of them were not on-line or performed poorly (at first sight).

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9. ANNEXES

9.1 Regular country reports

The 32 country reports are separate documents available in printed form, as .DOC or .PDF-files. The naming convention for the digital documents is the following:

Rcr10<COUNTRYCODE>v<X>.doc or rc10r<COUNTRYCODE>v<X>.pdf

with

- Rcr10 standing for 'regular country report 2010'
- V<X> standing for the version number, e.g. v4
- COUNTRY CODE as in Annex 9.4

9.2 Summary overview for 2003 - 2007

Table 7: Status of the 32 NSDI in 2004

Country	Organisational issues (I)							Legal issues and funding (II)									Reference data & core thematic data (III)						Metadata (IV)			Access services (V)			Standards (VI)	Environmental data (VII)	Country						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				29	30				
AT																																					AT
BE-VL																																					BE-VL
BE-WA																																					BE-WA
DE																																					DE
DK																																					DK
ES																																					ES
FI																																					FI
FR																																					FR
GR																																					GR
IE																																					IE
IT																																					IT
LU																																					LU
NL																																					NL
PT																																					PT
SE																																					SE
UK																																					UK
CY																																					CY
CZ																																					CZ
EE																																					EE
HU																																					HU
LT																																					LT
LV																																					LV
MT																																					MT
PL																																					PL
SI																																					SI
SK																																					SK
BG																																					BG
RO																																					RO
TR																																					TR
CH																																					CH
IS																																					IS
LI																																					LI
NO																																					NO

In agreement
 In partial agreement
 Not in agreement
 Unknown

Table 9: Status of the 32 NSDI in 2006

Country	Organisational issues (I)							Legal issues and funding (II)								Data for the themes of the INSPIRE annexes (III)					Metadata (IV)			Network services (V)					Standards (VI)	Environmental data (VII)	Country			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				29	30	31
AT	4																																	AT
BE	3																																	BE
BE-V	5																																	BE-V
BE-W	4																																	BE-W
DE	5																																	DE
DK	5																																	DK
ES	6																																	ES
FI	5																																	FI
FR	4																																	FR
GR	2																																	GR
IE	4																																	IE
IT	4																																	IT
LU	3																																	LU
NL	5																																	NL
PT	5																																	PT
SE	5																																	SE
UK	5																																	UK
CY	3																																	CY
CZ	5																																	CZ
EE	3																																	EE
HU	3																																	HU
LT	4																																	LT
LV	3																																	LV
MT	2																																	MT
PL	3																																	PL
SI	4																																	SI
SK	4																																	SK
BG	2																																	BG
RO	2																																	RO
TR	1																																	TR
CH	5																																	CH
IS	4																																	IS
LI	3																																	LI
NO	5																																	NO





-  In agreement
-  In partial agreement
-  Not in agreement
-  Unknown

Table 10: Status of the 32 NSDI in 2007

Country	Organisational issues (I)							Legal issues and funding (II)									Data for the themes of the INSPIRE annexes (III)						Metadata (IV)			Network services (V)					Standards (VI)	Environmental data (VII)	Country					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				31	32			
AT	4																																					AT
BE	3																																					BE
BE-V	5																																					BE-V
BE-W	4																																					BE-W
DE	5																																					DE
DK	5																																					DK
ES	6																																					ES
FI	5																																					FI
FR	4																																					FR
GR	2																																					GR
IE	4																																					IE
IT	4																																					IT
LU	3																																					LU
NL	5																																					NL
PT	5																																					PT
SE	5																																					SE
UK	5																																					UK
CY	3																																					CY
CZ	5																																					CZ
EE	3																																					EE
HU	3																																					HU
LT	4																																					LT
LV	3																																					LV
MT	2																																					MT
PL	4																																					PL
SI	4																																					SI
SK	4																																					SK
BG	2																																					BG
RO	2																																					RO
TR	1																																					TR
CH	5																																					CH
IS	4																																					IS
LI	3																																					LI
NO	6																																					NO

 In agreement
 In partial agreement
 Not in agreement
 Unknown

Table 6: Assessment of the building blocks of NSDI, end 2007

9.3 Typology from 2003 to 2007

Table 11: Typology of 32 NSDI for 2003

Level I	Level II	Level III	EU-15	EU+10	EFTA-4	Class
NDP-led	users involved	operational	DK, FI, SE	HU	IS, NO	1,1,1
		partially operational	AT,	CZ, PL		1,1,2
		not operational	GR, LU			1,1,3
	users not involved	operational		SI		1,2,1
		partially operational		LT	LI	1,2,2
		not operational		EE, LV, MT, SK		1,2,3
not NDP-led	formal mandate	operational	BE-VL, DE, PT		CH	2,1,1
		partially operational	IE, IT			2,1,2
		not operational				2,1,3
	no formal mandate	operational	NL, UK			2,2,1
		partially operational	BE-WA			2,2,2
		not operational	ES, FR			2,2,3

Table 12: Typology of 32 NSDI for 2004

Level I	Level II	Level III	EU-15	EU+10	CC-3	EFTA-4	Class
NDP-led	users involved	operational	DK, FI, SE, PT	HU, CZ		IS, NO	1,1,1
		partially operational	AT, GR, LU	PL			1,1,2
		not operational					1,1,3
	users not involved	operational		SI			1,2,1
		partially operational		LT, SK		LI	1,2,2
		not operational		EE, LV, MT, CY	RO, BG, TR		1,2,3
not NDP-led	formal mandate	operational	BE-VL, DE, IT, IE			CH	2,1,1
		partially operational					2,1,2
		not operational					2,1,3
	no formal mandate	operational	NL, UK, BE-WA				2,2,1
		partially operational	FR				2,2,2
		not operational	ES				2,2,3

Table 13: Typology of 32 NSDI for 2005

Level I	Level II	Level III	EU-15	EU+10	CC-3	EFTA-4	Class
NDP-led	users involved	operational	DK, FI, SE, PT	HU, CZ		IS, NO	1,1,1
		partially operational	AT, GR, LU, BE	PL			1,1,2
		not operational					1,1,3
	users not involved	operational		SI, SK			1,2,1
		partially operational		LT		LI	1,2,2
		not operational		EE, LV, MT, CY	RO, BG, TR		1,2,3
not NDP-led	formal mandate	operational	BE-VL, DE, IT, IE			CH	2,1,1
		partially operational					2,1,2
		not operational					2,1,3
	no formal mandate	operational	NL, UK, BE-WA				2,2,1
		partially operational	FR, ES				2,2,2
		not operational					2,2,3

Table 14: Typology of 32 NSDI for 2006

Level I	Level II	Level III	EU-15	EU+10	CC-3	EFTA-4	Class	
NDP-led	users involved	operational	DK, FI, SE, PT	HU		IS, NO	1,1,1	
		partially operational	AT, GR, LU	PL			1,1,2	
		not operational	BE					1,1,3
	users not involved	operational		SI, SK, LT				1,2,1
		partially operational		EE, LV, CY			LI	1,2,2
		not operational		MT		RO, BG, TR		1,2,3
not NDP-led	formal mandate	operational	BE-VL, DE	CZ		CH	2,1,1	
		partially operational	IT, IE				2,1,2	
		not operational						2,1,3
	no formal mandate	operational	NL, UK, BE-WA, ES					2,2,1
		partially operational	FR					2,2,2
		not operational						2,2,3

Table 15: Typology of 32 NSDI for 2007

Level I	Level II	Level III	EU-27	CC(-1)	EFTA-4	Class	
NDP-led	users involved	operational	DK, FI, SE, PT, HU		IS, NO	1,1,1	
		partially operational	AT, GR, LU, PL			1,1,2	
		not operational	BE, RO				1,1,3
	users not involved	operational	SI, SK, LT				1,2,1
		partially operational	EE, LV, CY			LI	1,2,2
		not operational	MT, BG		TR		1,2,3
not NDP-led	formal mandate	operational	BE-VL, DE, ES, NL, CZ		CH	2,1,1	
		partially operational	IT, IE			2,1,2	
		not operational					2,1,3
	no formal mandate	operational	UK, BE-WA				2,2,1
		partially operational	FR				2,2,2
		not operational					2,2,3

9.4 Country codes

Table 16: Acronyms for countries

EU-27	
AT	Austria
BE	Belgium
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GR	Greece
IE	Ireland
IT	Italy
LU	Luxembourg
NL	The Netherlands
PT	Portugal
SE	Sweden
UK	United Kingdom
CY	Cyprus
CZ	Czech Republic
EE	Estonia
HU	Hungary
LT	Lithuania
LV	Latvia
MT	Malta
PL	Poland
SI	Slovenia
SK	Slovak Republic
BG	Bulgaria
RO	Romania
Candidate Countries	
CR	Croatia
MK	FYROM – Republic of Meceдонia
TR	Turkey
EFTA countries	
CH	Switzerland
IS	Iceland
LI	Liechtenstein
NO	Norway
Non-European countries	
AU	Australia
CA	Canada
US	United States of America

