



Spatial Data Infrastructures in Europe: State of play spring 2011

D4.2 - Summary report regarding the
results of the European Assessment of
34 NSDI (second year)



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EXECUTIVE SUMMARY

Since Spatial Data Infrastructures emerged two decades ago in many countries all over the world, they have been assessed in order to motivate their funding, to steer their development or to evaluate their impact on policy making and on society at large. With the launch of the INSPIRE initiative in 2001 an ex ante impact assessment was carried out to estimate its potential benefits which in turn served as a motivation for the INSPIRE legislation to be elaborated (Craglia et al., 2003). However, this was not enough. From the very beginning, it was recognized that INSPIRE should build upon the existing components of the emerging SDIs at national and sub-national level. In order to have a better view on the status and development of these SDIs, the European Commission launched a study to assess the state of play in 32 European countries. Furthermore, once the INSPIRE Directive entered into force the assessment was extended to include an evaluation of the INSPIRE implementation in the different Member States (Vandenbroucke et al., 2008). This final report is summarizing the results of the last assessment, carried out in Spring-Summer 2011. As for previous years, the objective of this report is to describe, analyze and assess the status of INSPIRE and NSDI implementation in 34 countries in Europe: 27 Member States, 4 EFTA countries and 3 Candidate Countries¹.

The overall approach to perform the assessment has not been changed as compared to the previous years (2003-2007), 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 different NSDIs. The indicators from the State of Play were scored 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, presentations during conferences & workshops, etc.). The results from the 8 indicators from the INSPIRE Monitoring & Reporting were used to underpin the scoring of some of the State of Play indicators. In addition, two detailed surveys were carried out to collect information on particular topics: 1) on coordinating, funding and sharing measures (November 2009 - April 2010) and 2) on the use and usability of INSPIRE and the NSDI (January 2011 – May 2011). In total five countries – France, Poland, Norway (2010) and Lithuania, Spain (2011) – were visited to validate the findings. The collection of the information, the structuring, analysis and assessment were carried out twice: in Spring 2010 and Spring 2011. The results of each assessment were discussed during a two-day workshop in Krakow (2010) and Edinburgh (2011), prior to the INSPIRE conference.

The current report takes the developments over the last two years into account but focuses on the assessment of the status of INSPIRE & NSDI implementation in 2011. In practice, the assessment evaluates where the countries stand as compared to the requirements of the 'ideal' SDI as described in the GSDI Cookbook (Nebert, 2004) and the INSPIRE Directive and its implementing rules (European Commission, 2007). It highlights the major trends & most important

¹ For this final summary report, the analysis for Croatia and FYROM are included as well.

observations regarding the technological and non-technological components implemented by the 34 countries, as well as some of the 'Best Practices' throughout Europe. In addition, the report gives an overview of the most important conclusions and formulates some recommendations towards the countries and/or the European Commission that should be taken into account when further implementing and developing INSPIRE.

Since the INSPIRE Directive entered into force we can observe the following major trends:

- Every country in Europe is developing a NSDI according to the principles, rules and guidelines defined in the INSPIRE Directive and its Implementing Rules. Despite the fact that all countries make progress, there seem to be an increasing gap between countries.
- There are potentially competing and overlapping goals for different SDI initiatives: the NSDI versus INSPIRE or the NSDI versus e-Government. INSPIRE is usually seen as part of the broader NSDI. The SDI developments are often linked to e-Government initiatives.
- There is an increased involvement of Ministries of Environment (and their Environmental Agencies) along with a central operational (often also coordinating) role for the mapping and cadaster agencies.
- The sub-national (regional) and the local levels of government are not yet involved in all the countries, but their role is becoming more important.
- The users and user communities of INSPIRE & the NSDI are not always very clear. They only start to emerge, if they emerge at all.
- Open data policies, and open data are playing a more prominent role. This goes together with the emerging Open Source Software development (in practice mostly combined with proprietary systems) and the application of open standards.
- The technological developments are going fast with new emerging technologies (e.g. linked data), new infrastructures (e.g. cloud computing) and new standards (e.g. Sensor Web).

The non-technological developments relate to the organizational and the legal & funding issues. The organizational issues comprise aspects such as the leadership of the NSDI & INSPIRE process, the coordinating structures, and the involvement of the users and the different sectors of application. The legal and funding issues analyses the status of the transposition, the existence (or absence) of strategic documents and implementation plans, and other relevant legal developments. With regard to the non-technological developments, following observations can be made:

- The organization of an SDI, and the way INSPIRE is implemented can vary and largely depends on historical, cultural and political factors. Some countries work in a hierarchical way; others follow a networked oriented approach. Some involve the market (private sector), others not. Independent from who is leading or coordinating, all the SDIs need to seek cooperation with all the data custodians and (major) users in order to integrate and streamline the activities.

- All the 34 countries with the exception of Belgium have a truly national approach for their NSDI and INSPIRE.
- The overall maturity of the different SDIs has reached a satisfactory level for most of the countries. Only a few countries are lagging behind but are now very actively developing their NSDI under the stimulus of INSPIRE, and are taking the necessary measures to fill the gap.
- As was already the case in 2009, we can observe a shift in who is taking the lead in/of the coordinating structure. While 10 years ago, many of the European NSDI were equal to, or at least dominated by the National Mapping and Cadastral Agencies, the role of the major SDI users (e.g. Ministries) have gained importance over the past years.
- The majority of the countries involve the user and user communities, but the survey conducted in 2011 revealed that this involvement is very modest and fragile.
- At the time this report is written, all EU Member States had one or more pieces of legislation in place that transpose the INSPIRE Directive into national legislation². The situation has developed rapidly since the last year: between spring 2010 and spring 2011 11 countries finalized the transposition.
- In addition to the EU-27, also the countries from the European Economic Area (EEA) decided to implement INSPIRE, and of course candidate countries like Croatia, FYROM and Turkey are working towards the preparation of such legislation as well³.
- Several countries took measures during the last few years to improve sharing between public authorities: countries like Belgium, Spain, France, Lithuania and Poland made clear progress. One of the measures that are often taken is to simplify the licensing mechanisms in place.
- The funding of INSPIRE & the NSDI remains an issue and is certainly not guaranteed/sustainable for all countries for the years to come.

Technological developments relate to the spatial data sets, metadata, and network services. In addition to these the status of the development of geo-portals as major access point to the spatial data sets and services, and the efforts made by the countries to achieve improved interoperability through standardization was analyzed as well. The most important observations are as follows:

- Based on the figures of the INSPIRE MR of 2010 (reported in 2011) it can be stated that the European coverage of the spatial data sets reported by the Member States is very good.
- On the other hand, the conformity of the spatial data sets (with the data specifications) is currently hardly measured. This is not surprising since the data specifications for annex I have only been adopted in December 2010.
- The INSPIRE MR results and the discussions during the workshop in Edinburgh revealed important differences in policies & strategies with regard to the data sets that are considered to be part of INSPIRE. By far most of the spatial data sets are reported by Spain (38%) followed by Germany (12%). Some countries

² Belgium has legislation at the regional level, but not a full transposition at the national level yet.

³ This is also true for other countries, e.g. the Western-Balkan countries.

reported very few data sets, i.e. less than 100 (DK, EE, PL and SI). The Netherlands give priority to the so called authentic registers.

- The availability of metadata for the spatial data sets and services (status end 2010) is variable among the countries. While 15 countries (on 24 countries that reported these figures) have metadata for more than 70% of the reported spatial data sets and services, 4 countries are below the 50% mark.
- However, the availability of metadata has improved drastically between 2009 and 2010: for 9 countries, the data sets and services for which metadata exists increased with more than 10%.
- The figures for 2010 reveal also that 5 countries (out of the 24) reach more than 70% conformity for metadata of spatial data sets and services. The figures are – as is the case for the availability - higher for annex I and II data.
- The discovery of spatial data sets and services happens through dedicated discovery services. This was a weak point in the last years' assessment and it still remains a concern. Almost all countries have a (or at least one) discovery service, but many reported data sets and services can't be discovered at all. In only 9 of the 24 countries that provided figures more than 70% of the data sets and services can be discovered through such a service.
- There are only 2 countries for which more than 70% of the reported spatial data sets can be viewed and downloaded.
- Although this is not a legal obligation, many geoportals see light, including thematic portals, or even portals for single organizations and/or projects.

What are the main conclusions and which recommendations would allow to improve the further development of INSPIRE & NSDI implementation?

1. The transposition of the INSPIRE directive has been completed in almost all the Member States. While this is positive, some concerns and risks should be raised. It is important to emphasize that the objective of increased data sharing is not achieved by transposing the directive, but that a long-term and continuous effort is needed to promote the general purpose of the NSDI, i.e. facilitating spatial data sharing so that these data can be used in the processes of the public authorities. This is linked to another concern that currently the Member States' focus in the building of the NSDIs does not seem to be on the general purpose of data sharing, but on fulfilling the technical obligations and requirements of the INSPIRE implementing rules. While these technical requirements are important for the successful exchange of spatial data, the Member States' first concern should remain with sharing data in their NSDI, rather than complying with technical specifications that will only apply to the part of the NSDI covered by INSPIRE. The European Commission also has a role to play in this perspective: it should put more emphasis on the objective of data sharing, regardless of the shape or form these data are in, rather than on compliance with technical specifications.
2. While the involvement of the user communities in the NSDI remains low in several Member States, and initiatives to increase this involvement should certainly be recommended, it should be recognized that there is no such thing as 'the single user community' for the NSDI, but that there are several types of user communities that all may have different needs and requirements. This

may mean that the creation of one ‘user forum’ or a comparable body within the NSDI might not be successful, but that multiple initiatives towards the different types of users will be more beneficial. It is also advisable that Member States and non-Member States collect information on their (potential) users and on what the users are using the infrastructure for.

3. INSPIRE is meant to cover all spatial data sets and services useful and used for environmental and related policies, covering the 34 themes of the 3 annexes of the Directive. The INSPIRE Directive is a mechanism to establish such a rich interoperable infrastructure that can be used by as many as possible, (the Directive as a piece of legislation is not an end goal in itself). In practice we see Member States and other countries implementing INSPIRE in different ways, especially with regard to what is considered to be part of INSPIRE and what not. From the user perspective it is advisable that countries consider as many data sets as possible to be part of INSPIRE, e.g. also derived (aggregated or generalized) data sets. Also spatial data sets that will never match the data specifications (e.g. because they are far from the specifications) should be considered part of INSPIRE. They should be made available/accessible in the same way and under the same conditions as the data sets that will be made conformant to the specifications.
4. There is a clear demand from the MS for structural EU- funding e.g. capacity building, compliancy- test-environments, recommendations for licenses (liability issues), standardization web browsers (geoportal issues) etc... The INSPIRE project often seems to be the main playground for technology-savvy people. For a broader understanding of what the INSPIRE project and implementation really entails, activities to improve capacity training could be fostered and financed by the EU. It is also recommended that prior to the INSPIRE Conference, a dedicated workshop is continued to be held to discuss progress of INSPIRE & NSDI implementation. The two workshops conducted within the framework of the INSPIRE & NSDI State of Play study have proved to be useful to better understand the developments of INSPIRE and the NSDI in the 34 countries. It is also proposed to elaborate an INSPIRE & NSDI Cookbook. This cookbook should not be conceived as a blueprint for SDI implementation, but rather it should be a flexible mechanisms (regularly updated) summarizing the implementation experiences including the problems encountered, solutions found and examples of those practical solutions.
5. From the assessment it can be learned that many spatial data sets and network services became available. However, many of them can't be discovered yet, and many can't be viewed or downloaded. Some countries want to make data sets and services conformant to the implementing rules before publishing them on their geoportal or making them accessible for all. However, from the users' point of view, it is worthwhile to have readily access to these resources, even if the data sets are not yet transformed or the services do not yet meet the performance criteria. When building services on top of the data sets, enough reflection should be given on how to do this. Finally it is advisable to integrate services as much as possible in existing applications or to develop new applications, or to use them within GIS desktop applications. This way the services become part of the overall information infrastructure and the existing ICT environments of organizations.

6. The European projects supporting data specifications developments, as well as interoperability experiments and test-beds have proved to help implementing INSPIRE and NSDI. On the one hand such environments help the stakeholders to learn while doing, while it creates also better insight in the conformity and performance of the infrastructure. It is clear that countries that are actively developing such environments prior to make the infrastructure accessible to a larger public and based on an active involvement in standardization work are able to develop their NSDI faster and even in a more stable/sustainable way.

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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.

API	Application Programming Interface
BRGM	Bureau de Recherches Géologiques et Minières (France)
CC	Candidate Country
CEN	Comité Européen de Normalisation (European Committee for Standardization)
CNIG	National Council for GI
CRIGE-PACA	Centre Regional de Information Geographique for the Provence-Alpes-Cote d'Azur
CSW	Catalogue Services for the Web
DGME	Direction Générale de la Modernisation de l'Etat
EC	European Commission
EEA	European Environmental Agency
EEA	European Economic Area
EFTA	European Free Trade Association
ESDIN	European Spatial Data Infrastructure Network
ESTAT	Statistical Office of the European Communities
EU	European Union
EURADIN	European Address Infrastructure
EUROGI	European Umbrella Organization for Geographic Information
FYROM	Former Yugoslavian Republic of Macedonia
G2B	Government to business
G2C	Government to citizen
G2G	Government to government
GDI	Geographic Data Infrastructure
GI	Geographical Information
GIDEON	Dutch SDI implementation strategy
GIS	Geographic Information System
GML	Geography Markup Language
ICT	Information and Communication Technology
IDEE	Spanish SDI
INSPIRE	Infrastructure for Spatial Information in Europe

INSPIRE MR	INSPIRE Monitoring and Reporting
IGN-FR	National Mapping Agency France
IPPC	Integrated Pollution Prevention and Control
IPR	Intellectual Property Rights
ISO	International Standards Organization
JRC	Joint Research Centre of the European Commission
KML	Keyhole Markup Language
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 Organization
NIA	No Information Available
(N)SDI	(National) Spatial Data Infrastructure
OGC	Open Geospatial Consortium
PNOA	National Plan for Aerial Orthophoto
PPP	Public-Private Partnership
PSI	Public Sector Information
SOA	Service Orientated Architecture
SOGI	Swiss Organisation for GI
SoP	State of Play
TWG	Thematic Working Group
WCS	Web Coverage Service
WCTS	Web Coordinate Transformation Service
WFS	Web Feature Service
WMS	Web Mapping Service
WPS	Web Processing Service
XML	Extensible Markup Language

1. 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 in 2006 and 2007), to describe, monitor and analyse the activities related to the national spatial data infrastructures in 32 European countries: 27 EU Member States⁴, 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 on-going or planned at the national public sector level.

In the meantime, the implementation of INSPIRE by the Member States (as well as Candidate Countries and countries from the European Economic Area or EEA) started also in practice with specific measures and activities carried out in different areas. 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.

The aim of the current INSPIRE & NSDI State of Play is building further on what has been achieved since 2002. Three objectives are defined:

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

⁴ 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.

compliance, to better grasp some key issues on successful implementation and best practice.

The current report is final deliverable – i.e. “D4.2 - Summary report regarding the results of the European Assessment of 34 NSDI (2011)”. It is part of Activity 4 of the project which is carried out by the Katholieke Universiteit Leuven together with a group of International Experts (contract n° 50502 2008.001-2008.833). The report describes the results of the assessment at the European level covering the period January – June (or spring) 2011. It is based on 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. It complements and is based on the 34 updated country reports which describe the status of INSPIRE & NSDI implementation in the 34 individual countries studied. It also builds further on the first summary report (2011) and integrates the results of the second detailed survey which was conducted between January 2010 and June 2011 as described in the report “INSPIRE & NSDI State of Play: D3.2 - Detailed survey on use and usability (August 2011)”.

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 1⁵, 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 has been simplified as compared to the summary report of 2010. It contains following chapters and sections:

- The results of the analysis of the state of play in 2011 are summarized in chapter two. This is the main chapter of the report. It gives first the general trends of NSDI & INSPIRE implementation in Europe. Then it describes the status for each of the SDI building blocks (organisation, legal & funding issues, data, metadata and services, interoperability & standardisation). For each of these the examples of best practices are given in separate boxes throughout the text. This chapter uses the results of the 32 SoP indicators, as well as the results of the INSPIRE MR, and the specific input received during the workshop in Edinburgh from the international experts and the representatives from the countries. It also contains a section on the use and application of INSPIRE & NSDI based on the deliverable “INSPIRE & NSDI State of Play: D3.1 - Detailed survey concerning Coordination, Funding and Sharing Measures”.
- Chapter three describes the major conclusions & concerns, and the recommendations to take into account by Member States and the European Commission during the further implementation process of INSPIRE.

⁵ Phase 1 goes from September 2009 – August 2010, while phase 2 goes from September 2010 to November 2011.

- Additional information can be found in separate annexes. [1] In separate volumes 34 country reports are presented (A4.1). [2] A summary of the methodology applied which complements the report: *“INSPIRE & NSDI State of Play: D1.1 – Report on the Methodology”* (A4.2). [3] The assessment matrices for 2003, 2010 and 2011 and the change matrices 2010-2011 and 2002-2011 (A4.4). [4] The matrices with the results of the INSPIRE MR indicators for 2009 and 2010, as well as the change matrix for 2009-2010 (A4.5).

2. STATE OF PLAY SPRING 2011

2.1 Introduction

In this chapter we summarize the results of the assessment of the INSPIRE & NSDI status in the 34 countries studied (Spring 2011). It is based on the analysis of the 32 State of Play indicators, 7 INSPIRE Monitoring & Reporting indicators, on the discussions and feedback received during a workshop in Edinburgh (June 2011), and on observations from all the experts of the project team.

It first gives an overview of the general trends we can observe and describes the facts & findings for each of the building blocks of the SDIs: organization, legal and funding issues, data, metadata and services. The chapter ends with a summary of the findings of the survey on use and usability of the INSPIRE & NSDI infrastructures.

For each of the building blocks best practices are highlighted in separate boxes. It should be stressed that these are not necessarily the only best practices that can be found, nor should they necessarily be copied or implemented by other countries in exactly the same way. They serve rather as typical examples that are worthwhile to consider when further implementing INSPIRE & NSDI over the next years.

The conclusions and recommendations summarized in chapter 3 are based on this assessment.

2.2 Results of the assessment of 32 countries

2.2.1 Overall developments and major trends

During the workshop in Edinburgh, the experts from the project team discussed the overall developments and the major trends of the INSPIRE & NSDI developments in Europe. The following major trends can be observed:

1. While the different countries in Europe all developed their SDI (components) over the past 8 years in view of achieving the common goal of the establishment of a European SDI, there seems to be increasing differences between countries. While developments in some countries are going fast, other countries are lagging somewhat behind. Overall the impression remains that the gap between the different countries is growing.
2. There are potentially competing and overlapping goals for different SDI initiatives: the NSDI versus INSPIRE (e.g. FI and UK) or the NSDI versus e-

Government (e.g. NL and UK). INSPIRE is usually seen as part of the broader NSDI. The SDI developments are often linked to e-Government initiatives.

3. There is a clear impact of the fact that responsibilities changed over time with the increased involvement of Ministries of Environment and their Environmental Agencies who took the lead in many countries, along with a central role (in most cases operational) role for the mapping and cadaster agencies.
4. The sub-national (regional) and the local levels of government are not yet involved in all the countries, but their role is becoming more important as data custodian and as key user of INSPIRE & the NSDI.
5. The users and user communities of INSPIRE & the NSDI are not always very clear. They only start to emerge, if they emerge at all.
6. Open data policies, and open data are playing a more prominent role. This goes together with the emerging Open Source Software development (in practice mostly combined with proprietary systems) and the application of open standards.
7. The technological developments are going fast with new emerging technologies (e.g. caching, linked data), new infrastructures (e.g. cloud computing) and new standards (e.g. Sensor Web).

2.2.2 Non-technological developments

The non-technological developments relate to the organizational and the legal & funding issues. The organizational issues comprise aspects such as the leadership of the NSDI & INSPIRE process, the coordinating structures, and the involvement of the users and the different sectors of application. The legal and funding issues analyses the status of the transposition, the existence (or absence) of strategic documents and implementation plans, other relevant legal developments (e.g. IPR & privacy), the licensing mechanisms and NSDI & INSPIRE funding. The assessment is based on the country reports and other relevant information received through the surveys and during workshops and the INSPIRE conference.

2.2.2.1 Organization

The organization of a SDI, and the way INSPIRE is implemented can vary and largely depends on historical, cultural and political factors. Some countries work in a hierarchical way; others follow a networked oriented approach. Some involve the market (private sector), others not. Independent from who is leading or coordinating, all the SDIs need to seek cooperation with all the data custodians and (major) users in order to integrate and streamline the activities.

All the 34 countries with the exception of Belgium have a truly national approach for their NSDI and INSPIRE. Belgium relies on three regional SDIs and has an emerging federal SDI, but no integrated national SDI⁶. And while the national level

⁶ Even if Belgium has no real national SDI, it has one NCP and a national coordinating body with the regions and the federal level actively involved.

remains the focus in most countries, the sub-national level is very important as well in other countries (Austria, Belgium, Germany, Italy, Spain and UK). In addition, the local level is more and more included in an explicit or implicit way. Examples of such local involvement are given in the best practice box below.

Best Practice

Involvement of the local level

(France, Swiss)

In France, the local authorities play an important role in the NSDI. The dynamic that has been created by INSPIRE is seen as an opportunity to involve the sub-national authorities in the NSDI. The large involvement of the local authorities is reflected in the composition of the National Council for Geographic Information (CNIG), which advises the government on the coordination of the NSDI and has been assigned the role of the coordinating body and structure for INSPIRE. Of the 35 members of the Council, 8 represent the local authorities (with an additional 3 members representing the private sector and 5 members representing the associations and interest groups). (See <http://www.legifrance.gouv.fr/texteconsolide/PKH7E.htm>). The involvement of the sub-national level can also be seen from the large number of sub-national SDIs described in the eSDI-Net+ catalogue of good practices (<http://www.esdinetplus.eu/>). One of the sub-national SDI award winners in 2009 was the “*Centre Regional de Information Geographique for the Provence-Alpes-Cote d'Azur (CRIGE-PACA)*”. Their SDI was developed for the public sector in a large region covering six Departments in South-East France where one job in five is in the tourism industry. The strong thematic dimension of this SDI is evident from the twelve different applications that have been established. One of their main objectives is the coordination of the communities of practice within the region.

The Swiss NSDI can be regarded as a joint initiative of public administrations of all levels together with associations and private companies in Switzerland. The program e-geo.ch provides the general framework for the NSDI in Switzerland. The objective of this program is to create easy and inexpensive access to key selection of spatial data by establishing a National Spatial Data Infrastructure (NSDI). In order to reach the e-geo.ch objective, it is essential to include all parties. The key parties involved are the federal government (represented by its coordinating body GCS-COSIG), the cantons and municipalities (represented by their coordinating body IKGEO) and SOGI (Swiss Organization for Geographic Information) being the umbrella organization for the geodata private sector, educational institutions, governmental and non-governmental associations. In summary, the key advantages of e-geo.ch are that all key players are involved in the NSDI-development; that it is based on democratic (consensus-driven) processes; that it is flexibility; that it is efficient and effective for implementing and maintaining local SDIs; and that there is a strong relation with E-government activities.

The overall maturity of the NSDI expressed through indicator 2 – one or more SDI building blocks are operational on a scale from one to six - has reached a satisfactory level for most of the countries. Only a few countries are lagging behind but are now very actively developing their NSDI and are clearly taking the necessary measures to fill the gap. These countries are Greece, Latvia, Malta, Bulgaria, the Republic of Macedonia and Turkey. Seven countries reached a higher level of operability between 2009 and 2010 under the stimulus of the INSPIRE initiative: France (5/6), Italy (5/6), Sweden (6/6), Estonia (5/6), Lithuania (5/6), Romania (3/6) and Switzerland (6/6).

As was already the case in 2009, we see a shift in who is taking the lead in/of the coordinating structure. While 10 years ago, many of the European NSDI were equal to, or at least dominated by the National Mapping and Cadastral Agencies, the role of the major SDI users have gained importance over the past years: more environmental agencies or Ministries of Environment take now the lead, while the mapping agencies often play the operational leading role. According to the survey on coordination, funding and sharing measures, the surveying and Mapping Agencies are leading in 14 countries, Environmental Agencies in 10, and ICT Agencies in Bulgaria and Malta (26 respondents). Based on the information in the 34 country reports we see a similar trend over time. In 2011 we can say that 14 mapping agencies have the lead in the coordination body (or there are the coordinating body), while in 4 countries the users are taking the lead and in 12 countries the users take the lead partially (usually these are important ministries). While the role of the GI associations became somewhat less obvious over the past years, we see recent initiatives stimulated by EUROGI, the European umbrella organization representing these associations at the European level.

The majority of the countries (21/34) involve the user and user communities, the survey conducted in 2011 revealed that this involvement is very modest and fragile. In some cases the users are represented in coordinating bodies, or their feedback is asked for through surveys, but generally speaking the knowledge about the users, the real usage of the infrastructure, and the user needs is not very well developed. This was confirmed during the workshop in Edinburgh where it was stressed that this aspect deserves particular attention in the coming years. Finally, the majority of the countries focus the NSDI & INSPIRE implementation on the public sector only (18/34 countries). Other countries like e.g. Spain, Germany, and the Czech Republic successfully involve actively the private sector, universities, etc.; even if also in these countries there is room for improvement.

Best Practice

Monitoring the user satisfaction

(Sweden)

Sweden is without doubt the country where most efforts are made to know more about the users, their requirements and their concerns. Sweden is, in addition to the regular and mandatory monitoring & reporting, doing particular efforts to assess the successful implementation of INSPIRE and their NSDI. The country carries out annual user surveys and integrates that information together with information from the INSPIRE MR in a kind of dashboard using the Balanced Score Card methodology. Three perspectives are taken into account: the data and services aspects, user satisfaction and cooperation. In the survey, nine questions relate to the level to which the availability and usability of data and services corresponds to user demand and expectations. The user survey includes also possibilities to comment on the implementation of INSPIRE and NSDI. Besides the involvement of user representatives in the coordinating structure, there is a user forum and complaint mechanism.

<http://ijsdir.jrc.ec.europa.eu/index.php/ijsdir/article/view/192/292>

2.2.2.2 Legal issues and funding

At the time this report is written, all EU Member States had one or more pieces of legislation in place that transpose the INSPIRE Directive into national legislation⁷. The situation has developed rapidly since the last year: between spring 2010 and spring 2011 11 countries finalized the transposition. This does not necessarily mean that the transposition carried out is done in the most optimal way, or that all sharing issues are resolved, but at least it gives a basis for the implementation of INSPIRE and the further development of the NSDI. Many countries have also legislation for their sub-national level. In the summary report of 2010 the most important problems during transposition were mentioned: the establishment of a coordination structure, the measures for sharing spatial data sets and services among the public administrations and the potential reasons for limiting such sharing and/or public access.

In addition to the EU-27, also the countries from the European Economic Area (EEA) decided to implement INSPIRE, and of course candidate countries like Croatia, FYROM and Turkey are working towards the preparation of such legislation as well. The assessment of 2010 shows that not many countries are elaborating a strategic or implementation plan to guide the stakeholders in their implementation, and to define priorities and timelines. Below, an example of a good strategic document is given focusing on the improvement of sharing practices, but within the broader context of location as a key asset to underpin new and innovative services for government, business and citizens. Other good examples can be found in The Netherlands and Germany.

Best Practice

Licensing frameworks to improve sharing (Belgium, United Kingdom)

In the Flemish Region, the NSDI legislation (GDI-decreet) goes beyond the requirements of article 17 of the INSPIRE directive and enables even broader data sharing between the public authorities within the region. All public authorities can access spatial data free of charge for the use thereof in any of their public service tasks. In an executive decision, the use conditions have been set out, so in principle it is no longer necessary for the public authorities to conclude a licensing agreement.

(<http://www.agiv.be/gis/downloads/?SID=55>).

The UK Location Strategy wants to ensure that spatial data are available under clear licensing requirements and has published a guidance document to support the public authorities in licensing their data. This guidance establishes the UK Government Licensing Framework as the basis for licensing the use of datasets that are part of UK Location. In this way, it links the UK's NSDI to the existing initiatives on open government data, and builds on the success of the existing licensing framework rather than creating a new policy specifically for spatial data. (UK Location, UK Location Data Sharing Operational Guidance Part 2 – Licensing and Charging, <http://location.defra.gov.uk/2011/03/data-sharing-operational-guidance/>). The UK Public Sector Mapping Agreement performs a similar role to the above mentioned Flemish legislation in promoting data sharing.

Eight countries in Europe apply one or another form of public-private partnerships (PPP) for their NSDI. Other countries like Switzerland are evolving also in this

⁷ Belgium has legislation at the regional level, but not a full transposition at the national level yet.

direction. However, in most countries PPPs are not being applied at all, or only to a limited extent. The majority of the countries have the PSI Directive transposed while some non-EU countries have similar legislation. This is also valid for IPR and privacy issues: these are taken into account (to a certain extent) by 23, respectively 19 of the 34 countries. Several countries took measures during the last few years to improve sharing between public authorities: countries like Belgium, Spain, France, Lithuania and Poland made clear progress. One of the measures that are often taken is to simplify the licensing mechanisms in place. At the same time, funding remains a problem despite the fact that in some countries fixed INSPIRE or NSDI budgets are now foreseen. But it remains a concern since this funding is not necessarily stable due to the economic and financial crisis, and because the implementation of INSPIRE needs additional investments (e.g. for transforming data, setting up a portal, etc.), while the gains will only be visible in a later stage.

2.2.3 Technological developments

Technological developments relate to the spatial data sets, metadata, and network services. In addition to these we also discuss briefly the status of the development of geo-portals as major access point to the spatial data sets and services, and the efforts made by the countries to achieve improved interoperability through standardization. The information is derived from the country reports (online search) and include the information received through the surveys and the results from INSPIRE MR. The indicators from the INSPIRE MR allowed to have a more precise idea on the number of data sets and services that are considered to be part of INSPIRE in the different countries, as well as their characteristics. The matrices with the 7 indicators of the INSPIRE MR for 2009 and 2010 can be found in annex 4.5 of this report. We have also added a change matrix indicating the progress between 2009 and 2010.

2.2.3.1 Spatial data sets

Spatial data sets are the core of each SDI. Without data there is no content, and without content the infrastructure has no meaning. Spatial data sets from the 34 themes defined by the INSPIRE Directive can be used and combined to answer particular questions in support of local, national and European policies. They can also be integrated and used in web applications (e.g. through network services) which are meant for the larger public, or they can even support the work of private companies and research centers. In order to make them usable for and understood correctly by all, especially in cross-border contexts, they need to be harmonized, i.e. they need a clear structure and common semantics. For European wide applications, a consistent and European coverage is necessary as well.

The European coverage of the spatial data sets reported by the Member States is very good if we consider the figures of the INSPIRE MR of 2010 (reported in 2011). Only Bulgaria scores very low for the data sets of all the annexes (between 10 and 25% coverage). Poland and Norway are just below the 70% threshold mark. The situation was already good in 2009 and therefore the changes are not major. The figure for some countries even decreased due to the addition of new data sets of

which some cover not yet the entire target area. This decrease is highest for countries like Hungary, Poland and to a lesser degree also for Latvia. In general terms, the existence and coverage of spatial data sets for the three annexes is quite good. It should be noted that several countries including Denmark (A.II & A.III), France (all annexes) and UK (A.III) did not report the information on the area covered.

In order to be able to combine spatial data sets from different data providers across different organizations and countries, spatial data sets need to be interoperable or harmonized. In practice this means that a spatial data set is available according to the INSPIRE data specifications for that theme, or that at least the data set can be transformed towards the data specification. One indicator of the INSPIRE MR measures this conformity with the implementing rules for data specifications. If we analyze the results for this indicator, it becomes clear that the conformity of the spatial data sets is currently hardly measured. This was also the case in 2009. Eight countries provided information for annex I data. The conformity varies between 2% (Spain) and 26% (Slovakia). We can state that conformity with the data specifications, and thus interoperability is far from being achieved. This is not surprisingly since the first rules for the themes of Annex I entered only into force in December 2010. In addition, one needs to take into account that the number of data sets reported differ greatly: e.g. while Spain reported 1872 data sets for this annex (many at the sub-national level), Slovakia reported only 53.

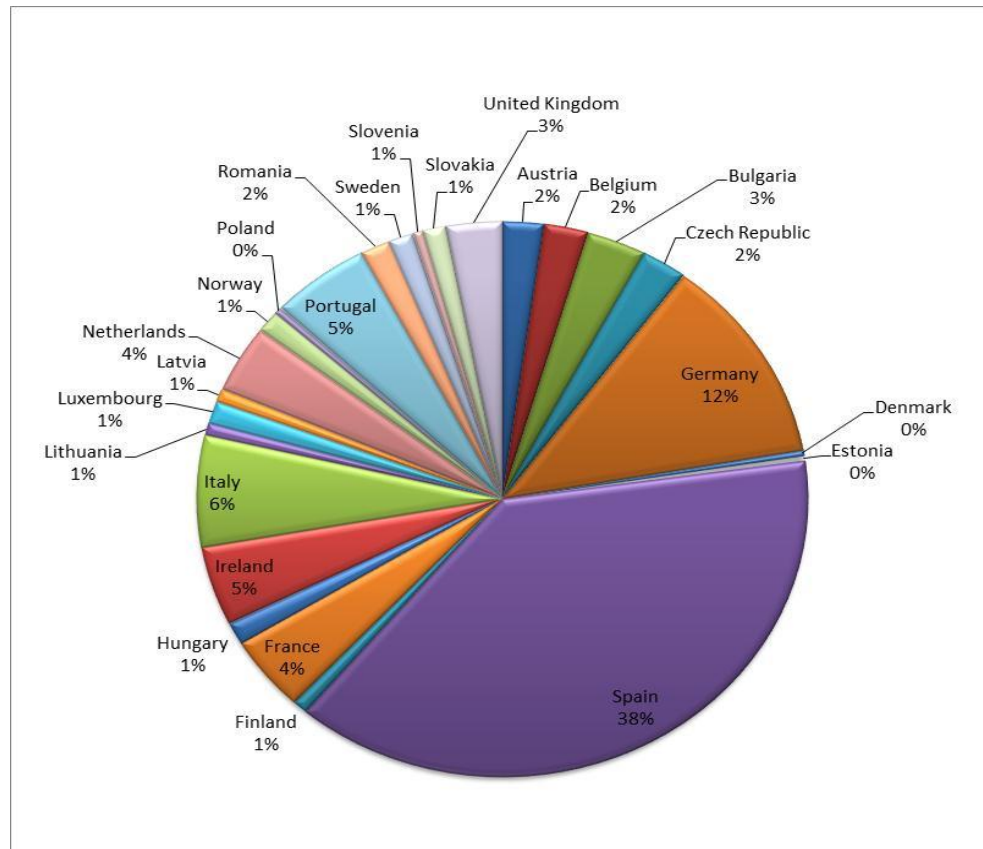


Figure 1: Share of reported spatial data sets per country (Status end 2010)

This brings us to the complex issue which relates to the way the different countries established their list of spatial data sets. The INSPIRE MR results and the discussions during the workshop in Edinburgh revealed important differences in policies & strategies to this regard. By far most of the spatial data sets are reported by Spain (38%) followed by Germany (12%). Some countries reported very few data sets, i.e. less than 100 (DK, EE, PL and SI). Figure 1 gives an overview of the distribution of the data sets among the 25 countries that provided this information. While Spain, Belgium and other countries decided to bring all the spatial data sets they consider part of the 34 themes in the INSPIRE basket, other countries decided to agree on a rather restricted set of data sets, e.g. The Netherlands and Lithuania. In the Netherlands, the concept of the authentic registers was developed (see box). This concept defines the key data sets for each theme that public bodies are obliged to use for their public tasks. Additional spatial data sets were reported by The Netherlands under the INSPIRE MR obligations, but only to a certain extent. Spain on the other hand looked for all the potentially interesting data sets. In consequence their list of reported data sets under INSPIRE MR is much longer. Some countries selected only those data sets that will be made conformant to the INSPIRE implementing rules. Often, derived data sets (e.g. generalized or aggregated) are not listed. This all results in the INSPIRE data set list being a sub-set of the spatial data sets that can be found in the respective countries.

Best Practice

The establishment of authentic registers

(The Netherlands)

A key element of the NSDI is the definition and establishment of so called “*authentic registers*” (basisregistraties). Authentic registrations are registrations with a uniquely defined core dataset, which government agencies are obligated to use. The collection and maintenance of the data is regulated in legislation, and the data are consistent, adhering to the data specifications, across the registration. The users are obliged to report incorrect information to the data producers, and there is a stringent policy on quality assurance. Through the establishment of a set of key registers, the Dutch government intends to improve services, reduce administrative burden, and organize its own operational processes more efficiently. This approach allows to gather data once, and to use those data in multiple places within the government. The foundation for the set of registers has been laid in recent years. These geo-registers formed the foundation of GIDEON (the NSDI- implementation strategy for the years 2008 – 2011).

The authentic registrations include several datasets that can be considered as spatial datasets. First, the law making Top10NL of the Cadaster the authentic registration for topography was adopted in January 2008 by amendments to the Law on the Cadaster. Second, the authentic registration for addresses and buildings was included in the law of 24 January 2008 (which was amended on 14 February 2009). For the third authentic registration, the large-scale topography (1:500 to 1:2.000), draft legislation was intended to be issued in early 2010. It is expected to be introduced in the parliamentary process mid-2011. The fourth authentic registration, subsurface, will be fully operational by 2013. This was approved by a Decision from the cabinet in December 2008. A fifth registration concerns the WOZ registration (Assessment of immovable objects registration). This registration is the basis for real property taxation.

The above described approach applied by The Netherlands is certainly not the only possible option. The advantage is that 1) the NSDI can focus their harmonization work on a 'limited' number of data sets, and 2) all the public authorities are working with the same data sets for their public tasks. The drawback is that there might be less choice for the user, e.g. in the context of cross-border research. However, it is understood from the discussions during the workshop in Edinburgh that additional data sets can still be reached through the NSDI (the same portal), but that they are not necessarily harmonized with the specifications⁸.

2.2.3.2 Metadata

Metadata are an equally important building block of a SDI and of INSPIRE in particular. Metadata, or data about the data & services, provide all the necessary characteristics in order to discover, understand and evaluate, and to use the spatial data sets. Metadata are useful for human beings (e.g. to know the conditions of use, the history or lineage of the data) and are necessary for the infrastructure itself (e.g. services and applications make use of it). According to the INSPIRE Directive, all the spatial data sets and services should have metadata conformant to the metadata implementing rules. The latter entered into force in December 2008. Before the end of 2010 Member States had the obligation to create the metadata for data sets of Annex I and II.

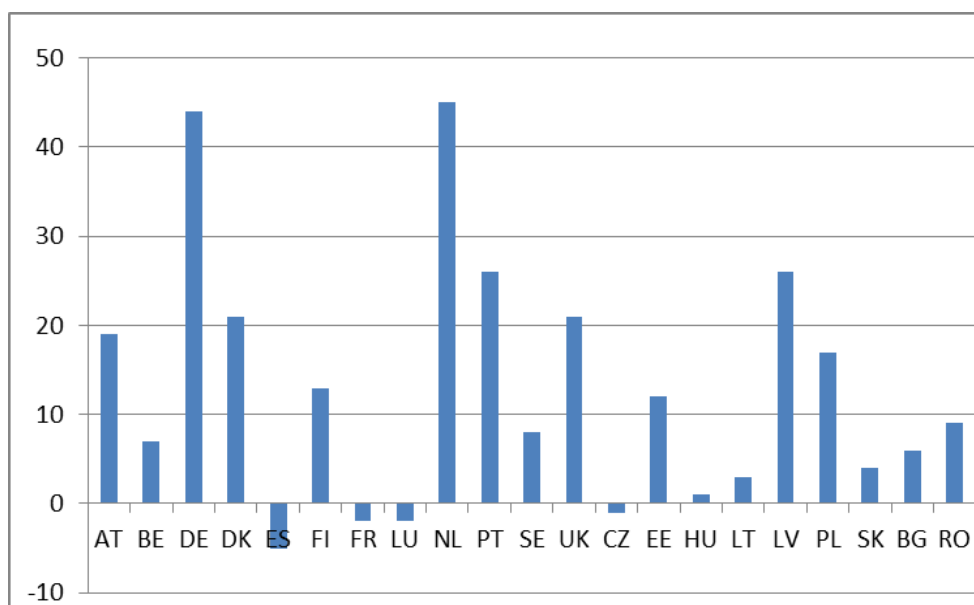


Figure 2: Spatial data sets with metadata – change between 2009-2010 (INSPIRE MR)

The availability of metadata for the spatial data sets and services (status end 2010) is variable among the countries. While 15 countries (on 24 countries that reported these figures) have metadata for more than 70% of the reported spatial data sets and services, 4 countries are below the 50% mark (BG, HU, RO and SK). The situation is better for the data sets of annex I and II, where 19 countries score more than 70% (against 10 and 9 countries for data sets of annex III and services respectively). The situation has improved drastically between 2009 and 2010 (see

⁸ In fact the INSPIRE data sets are flagged in the catalogue.

figure 2): for 9 countries, the data sets and services for which metadata exists increased with more than 10%. For Germany and The Netherlands, the situation improved even with more than 40%! For 4 countries, the situation developed oppositely: the number of reported data sets and services with metadata decreased slightly: Spain (-5%), France (-2%), Luxembourg (-2%) and the Czech Republic (-1%). This is mostly due to the fact that – sometimes many – services (CZ, ES, LU) and/or data sets (FR) were added, in particular for annex III, for which often no metadata exist yet. While the situation in 2009 was still alarming, it is clear that most of the countries did a very huge effort to fill the metadata gap.

Since the implementing rules for metadata have already been adopted in 2009, it was expected that also the conformity of the existing metadata with these rules would improve. The figures for 2010 reveal that 5 countries (of the 24) reach more than 70% conformity for metadata of spatial data sets and services. The figures are again higher for annex I and II data: respectively 14 and 15 countries reach the 70% threshold. While only 4, respectively 2 perform well (> 70%) for the annex III data and the services. Some countries have a very high score for annex I and II in particular. This is mostly the case for countries that have a limited but clearly defined set of data sets. The way the countries establish their list of spatial data sets and services has certainly an influence on the level of metadata conformity. What is more important though is that many countries have made progress since 2009: e.g. 8 countries increased the number of spatial data sets from annex I with conformant metadata with more than 50%. Especially countries like Poland, Portugal, Latvia, Sweden and the UK progressed for almost all types of data sets and for services, while also Belgium and Germany did well for certain annexes. Countries that have added many data sets and services show less spectacular results (e.g. ES) or even a slight decrease (FR).

Best Practice

Network of metadata managers and dedicated tools

(Portugal)

According to the INSPIRE Monitoring and Reporting (2011), metadata exist and are compliant with the Implementing Rules on Metadata (Commission Regulation Nr 1205/2008) for all 256 spatial datasets of Annex I and for all 117 spatial datasets of Annex II. Metadata exist for 87% of the Annex III data sets (82% conformity). The metadata catalogue holds currently 11.000 records about data, data services and applications. The number of records is increasing daily, mainly due to the creation of a specific tool to support metadata production available for free from the SNIG website (<http://sourceforge.net/projects/migeditor/>) with an interface either in Portuguese or English. The Catalogue interface enables users to create a set of multi-options queries. It is possible to make selection based on free text, keywords, temporal and spatial frames, and also geographic names using a detailed gazetteer. The new metadata catalogue application is now being used by the public authorities involved in the NSDI network, to fill the metadata catalogue according to INSPIRE standards. The organization is decentralized. A network of about 50 metadata managers has been created involving most public authorities responsible for the datasets associated to the INSPIRE Annex themes. The identification of the metadata manager is mandatory according to the new SNIG legislation. The national metadata profile was updated to conform all INSPIRE metadata requirements.

2.2.3.3 Services

In order to access the spatial data, INSPIRE foresees a services oriented architecture (often called the service bus) fed by all the Member States. Five types of network services are foreseen: discovery services to search and find the data & services, viewing services to visualize the spatial data, download services to download (parts of) data sets, transformation services (e.g. to transform coordinate systems or map data models), and finally invoking services to chain different services together. In addition to the services defined and mandatory for INSPIRE, several countries are also developing other services: e.g. authentication services to manage access to the infrastructure.

The discovery of spatial data sets and services happens through dedicated discovery services. This was a weak point in the last years' assessment and it still remains a concern. Almost all countries have a (or at least one) discovery service, but many reported data sets and services can't be discovered at all. In only 9 of the 24 countries that provided figures more than 70% of the data sets and services can be discovered through such a service. The results are better for spatial data sets (10/24) than for services (6/24). The situation is weakest in countries like BE, BG, HU, LV, RO and SK, and to a lesser extent PL, SE and UK. For the first group, less than 30% of the reported data sets and services can be discovered, for the second group this is between 30 and 50%.

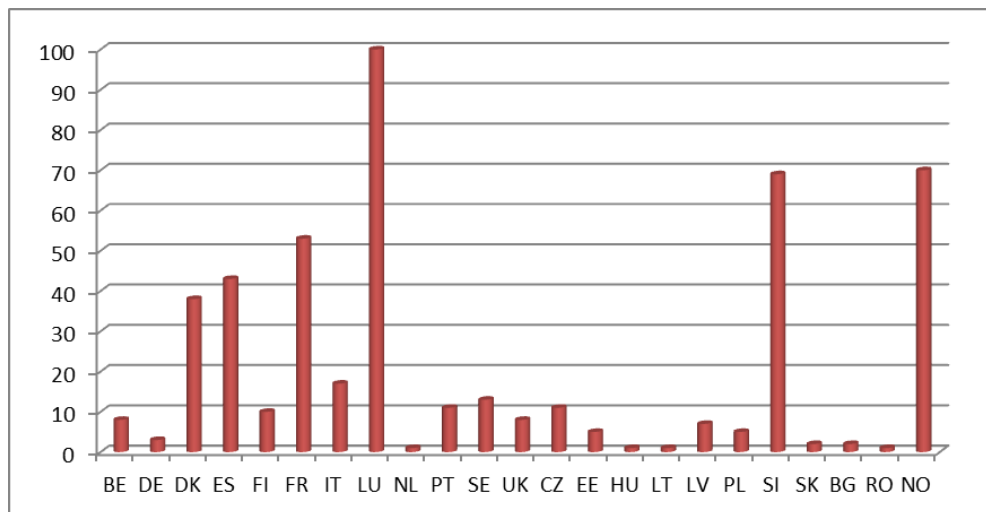


Figure 3: % of reported spatial data sets that can be viewed and downloaded through a network service (INSPIRE MR 2011, status 2010)

Even though there are many network services emerging – in 2009 countries reported 798 network services, while in 2010 this figure raised to 2338 – there are only 2 countries (LU, NO) for which more than 70% of the reported spatial data sets can be viewed and downloaded, while this is even 100% for Luxembourg (see figure 3). France and Finland follow with a score between 50 and 70%, and Spain and Denmark with a score between 30 and 50%. If we look at the view and download services separately, the situation is reasonable for the viewing services (in 10 countries more than half of the reported spatial data sets can be viewed), much less for the download services (only 3 countries are in that situation). This could lead to the conclusion that the many reported viewing services are built on top of the same spatial data sets. In other words several viewing services exist for

the same data. Transformation services and especially invoking services remain an exception.

With regard to the conformity of the network services, it is not surprisingly that the majority of the 10 countries that provide some information for these indicators score low. Only Spain and Poland have a majority of conformant services. However, most countries do not monitor the conformity yet.

Best Practice

CartoCiudad:

**Nationwide integrated spatial data accessible through network services
(Spain)**

'CartoCiudad' (<http://www.cartociudad.es>), accessible through the Spanish NSDI (IDEE), is a nationwide, integrated map and spatial database of roads, cadastral information, census and postal information for Spain. It is the result of harmonization and integration of official digital cartography and information produced by several of the main Spanish suppliers of Geographical Information:

- General Directorate of Cadaster: data displaying the urban background: blocks, urban parcels, buildings, streets axes, house numbers, toponomy and auxiliary lines as sidewalks;
- National Institute of Statistic: Census Districts and sections contours;
- Post Office: database of the house numbers in related to the postal codes;
- General Directorate of the National Geographic Institute: reference national cartography, mainly the road network and the boundaries of the municipalities and high resolution digital Orthophotography from the National Plan for Airborne Orthophotography (PNOA).

The data can be accessed using several OGC Web service: WMS to display the cartographic background; WFS-MNE (Gazetteer Service) to perform toponomy searches and WFS to download features. In addition, a WPS (Web Processing Service) has been developed with two capabilities:

- Search by proximity or influence area: defining the location by coordinates or by the postal address, and specify the kind of points and the maximum ratio of the area in which to search them; the service return the points contained inside this circle.
- Route downloading in GML: it allows calculating routes from coordinates of the start and endpoint, and downloading the result in GML.

Cartociudad also provides georeferencing and geocoding capability. Also added value applications are developed on top of this, consuming the access services of the Cartociudad infrastructure. An example is ONSTIC. It is an Android application developed for the Abredatos (Open data) challenge 2011 to consume the Cartociudad open data services and the open data of the PNOA. The features developed are Cartociudad WMS services, route calculation and reverse geocoding from the WPS service, address searching from the WFS service and a PNOA viewer.

<https://market.android.com/details?id=es.mapps.cartociudad>

Other services are emerging in some countries, but it is certainly not (yet) common practice. In some NSDI, mechanisms for digital rights management are investigated, tested or implemented. Most commonly this is about the

implementation of authentication mechanisms to register and monitor users, and to protect (parts of) some spatial data sets (or related data). Linked to this is also the security issue. Some work with this regard is done in e.g. Germany, Belgium and UK, but certainly not yet in an operational setting.

2.2.3.4 Geoportals and applications

Most countries developed or are developing a national and/or sub-national geoportals as access point(s) to the NSDI and INSPIRE. A geoportal assumes that users that search for particular spatial data sets will go to this portal to find out about the available data sets that might fit their needs (metadata), to pre-view the data, and eventually to bind it in their own application by using a view service or by downloading it. Although this is not a legal obligation, many geoportals see light, also thematic portals, or even portals for single organizations and/or projects. From the detailed survey we learned that 16 (of the 25 countries that replied to the question) develop a single national geoportal, 5 countries develop several national portals and 3 a dedicated INSPIRE portal.

Although there is no problem as such with having many portals, there seems to be a danger that the development of all these access points makes access for the user again cumbersome, or that competing portals emerge provide the same type of functionality and data. In addition, many financial resources can go to the development of the portals, leaving not enough resources for building the other parts of the infrastructure (data harmonization, metadata, services).

Best Practice

Geoportal with straight access to the data and API for developers (France)

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 implementation (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 spatial data 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 license. The GI on the portal is available in the most common formats and domain standards (KML, WMS, and WFS). One of the reasons for success is that the data are readily accessible with a few mouse clicks. Besides the discovery and other services, also several integrated applications allow to view and query spatial data. Also local data are accessible. In addition, the portal is very performing.

Some of the existing geoportals are very successful. This is e.g. the case for the French geoportal described briefly in the best practice box above. It has an estimated 3,0 million unique visitors per year. Other countries like Spain, Poland and the Czech Republic have between 300.000 and 500.000 unique visitors per year. In other countries, the figures do not exceed the 20.000 mark.

The development of specific application using the services starts only to emerge. Examples can be found on the different portals, but more will certainly follow in different application domains.

2.2.4 Interoperability and standardization

The improved interoperability described above is driven by standardization. While the elaboration of data specifications is based on the ISO 19100 series of standards, many of the services are based on OGC standard interfaces. Since a few years also CEN/TC 287 plays an important role by promoting the application of standards in the GI field and more in particular for SDIs⁹. It is promising that more and more countries get actively involved in the work of CEN, ISO and OGC. Experts from many countries help in the Thematic Working Groups (TWG) that prepare the data specifications for the different INSPIRE themes, and/or they cooperate in EU funded projects that prepare data models for specific fields of application, or they are active in OGC interoperability experiments (the largest number of members comes now from Europe).

Best Practice

Learning while doing: integrated European projects and test beds (Europe)

The eContentPlus programme has been the ideal platform for supporting data specifications developments, transformation testing, and the set-up of experimental service oriented architectures in support of the INSPIRE process. Several projects such as OneGeology, Nature-SDIplus, GIS4EU, GS Soil, ESDIN, Euradin, Plan4all, etc., allowed INSPIRE stakeholders from almost all EU-countries to make contributions to the INSPIRE & NSDI implementation. The most important lesson learnt from these projects is that results can be achieved by implementing, testing and evaluating before going to a permanent operational set-up, and apply the principle “learning while doing”. Therefore similar approaches in research and other programmes should be envisaged.

⁹ A specific working group on standards and SDIs exists since some years, with JRC as conveyor.

2.3 Application and use

The analysis is based on the survey *“Use and usability of INSPIRE and NSDI”* carried out between January and June 2011. The detailed survey was conducted among the 34 countries studied in the INSPIRE & NSDI State of Play. For this purpose a questionnaire was elaborated covering four major topics: 1) the involvement of the users; 2) the use of the infrastructure; 3) the users and the type of usage and 4) examples of the use in business processes and the expected benefits. From the 34 countries, 26 countries replied: 21 EU member states, 1 candidate country and 4 EFTA countries.

From the survey it becomes clear that while in most countries the intended users and user communities of INSPIRE and the NSDI are the same, in some other countries the opposite is true: INSPIRE is considered to be a part of the NSDI. Often only the public sector is considered as the target user community, while the private sector, NGOs, individual citizens and even local authorities are not considered as part of INSPIRE. This might cause some concern since INSPIRE clearly targets all levels of authority, and the broader public as well.

In less than half of the countries, a user requirements survey was carried out. However, no relationship was found between having performed such surveys (or not) and the development stage (or maturity) of the NSDI as described by the degree of operationality the State of Play. While some developed NSDIs like the German or Spanish SDI did not perform a user requirements survey, others like the Dutch and French NSDI did so, while the four SDIs are quite mature.

There are many ways through which users are involved in INSPIRE and NSDI development, and although most countries apply several approaches, the large majority of the countries involve them through representatives in coordinating bodies. Specific user groups and forums are emerging in many countries with Poland having more than 48.000 registered forum users as a striking example.

It is also striking and very positive that all the 26 countries have one or more user feedback mechanisms. Besides surveys and complaint mechanisms, new original approaches are mentioned including the use of twitter and Facebook. It is also clear from the examples of complaints that reach the NSDIs that they provide useful information to allow focused improvements of the infrastructure.

The countries that monitor the use of services do so in several ways. While few countries only monitor INSPIRE conformant services, others monitor all services they consider INSPIRE services. An equal number of countries monitor other services as well. From those countries that monitor the use of geoportals, the majority is doing this only for the national geoportal. Finally, when countries register users of the infrastructure this happens mostly at the level of individual users and organizations.

The countries tend to agree with the statement that they do not know very well the number of users (and the use) of their infrastructure. Some countries mention that it is difficult to measure and know the usage because of the complexity of SDIs. And even if this type of information is collected at the level of single organizations (data providers) or at the level of specific parts of the infrastructure, it is difficult to collect all the information and integrate this at the national level.

The majority of the countries do not yet monitor the use of their network services (14/26). This could already be observed by analyzing the INSPIRE MR results of 2009, but is now confirmed by the results of the survey. This should deserve particular attention since the INSPIRE Directive and the specific implementing rules for monitoring and reporting requires such monitoring from the very beginning. Some countries refer to the lack of expertise to do so, others state it is not their current priority and they will develop tools in parallel with the development of the services. Countries that monitor the use of network services state that the results are in line with what they expected. The few countries that are able to compare the 2009 and 2010 figures observe an increase in usage.

Most countries have a national geoportal or are developing one. Specific INSPIRE geoportals are an exception. The figures on the usage of the national geoportal show a group of countries with low usage, while other countries show relatively high usage. France is somehow a special case with very high usage figures. It should be mentioned that the figures should be interpreted with care since the way the measurements are carried out vary.

The impact of the existence of network services to access the spatial data on the sales of these data can't be confirmed. Some countries state that the existence of services caused a decrease of the sales of the underlying data sets, while almost the same number of countries sees rather the opposite. In case a decrease in sales is noticed, this is not necessarily seen as negative.

The level at which information is gathered with regard to the users is mostly the organizational level meaning that SDI coordinators know which organizations use the infrastructure, less so the individual users. Several mechanisms to know the users exist: surveys, logging and authentication, direct contacts and feedback, agreements, etc.

The sectors in which the infrastructure is mostly used are "environmental monitoring and management", "agriculture", "regional & spatial planning", "disaster & emergency planning" and "transport & mobility". The 'weaker' sectors are "tourism", "security" and "coastal zone management & fisheries".

The types of organizations that use the infrastructure in practice are mostly the public sector (at all levels) and the academic sector.

The types of usage were analyzed from two perspectives. With regard to the publish-find-bind paradigm, the search for spatial data is the most important use case, followed by the visualization of spatial data, the publishing, downloading and transformation. When looking at the type of activities, the infrastructure is mostly used for monitoring & reporting policies, followed by spatial analysis.

Several countries can't give an example of a business process in which components of the infrastructure is used. Even if it is true that INSPIRE implementation is at an early stage, it is considered feasible and useful to find such examples, or at least to wander how the uptake of components of the infrastructure could/should happen. From the 18 countries that give examples, many of them describe the use of spatial data in business processes in general terms, rather than the use of the different components (services, geoportal, etc.). Some interesting examples are given by a few countries including some cross-border applications.

All countries mention benefits of the infrastructure for the G2G, G2C and G2B processes. Most countries acknowledge clear gains in efficiency in the three different types of processes. Improved flexibility and openness & transparency seem to be important for G2G processes. Innovation seems to be more important for both G2G and G2B, while improvement of effectiveness and quality is more important for G2C processes. Several interesting examples are given on how INSPIRE and NSDI can make a difference.

Finally countries see further possible improvements of the infrastructure with “the harmonization of spatial data” ranked first, followed by “making more spatial data discoverable through the geoportal”.

In general terms we can conclude that the knowledge about the use, the users and the usages should be further enhanced. Many countries do not have a clear idea on what their infrastructure is being used for. And although it should be noticed that the INSPIRE & NSDI implementation is still at an early stage, it is advisable for all countries to better understand the use and user satisfaction in order to streamline further development. In the summary report more specific recommendations will be made with regard to the results of this detailed survey.

Best practice

Strong user involvement and long tradition of embedding the NSDI in the Environmental and eGovernment sectors

(Czech Republic)

The Czech Republic has a long tradition in the development and use of the NSDI which is embedded within and strongly linked to the environmental and eGovernment sector. There is a permanent attention to involve the user communities. The focus is on all sectors: public authorities, academia, NGO's, private companies and the citizens at large. The coordinating structure, KOVIN, involves 21 members from almost all ministries and central offices, and a profession association. The group met a first time in December 2010, with meetings usually organized every 6 weeks. Once a year a national INSPIRE conference is organized, as well as workshops focusing on a particular issue of a draft implementing rule. There is also a strong tradition of GIS and e-Government focused conferences. These events provided important platforms for exchanging views and experiences and expressing needs. Moreover all the regional authorities were visited in Autumn 2010.

Many data and services are available. Most of the data producers have been providing them for the past 3 years or longer. In most cases the infrastructure of the Czech Republic is available without any registration. Users can search metadata, view or use most of the services directly, while also many data are offered for downloading. Usually registration is required for the purchase of the data, also for those data with limited access. The demand for data has definitely increased since the time the data providers started to run their first view services. The most important data provider in the Czech Republic is the Czech Office for of Surveying, Mapping and Cadaster who noticed the increase of the demand for WMS of the Cadastral Map of 83% between the 2008 and 2009, and another 30% between 2009 and 2010.

There are many fields of application. In addition to the more ‘traditional’ sectors like environmental monitoring & management, agriculture, regional and spatial planning, etc., also other sectors are covered such as mining, protection of monuments, statistics, GIS consultation for local authorities, telecommunication, state control of nuclear facilities and radiation protection, banking, energy provision, surveying, and land-, water-, & forest management. The NSDI plays an important role in fulfilling the Building Act:

providing information about utilities to local authorities, design of the utilities, repairs of utilities and testing. Sometimes citizens need a piece of information that can be based on analysis of the spatial data that is part of the NSDI. This information needs to be presented in a different way. This is very often achieved by the so called “geo-reports” that are already provided in the field of geology and utilities.

Best practice

Ambiente in Comune: Small Municipalities and Environmental Monitoring (Italy)

The Italian Ministry of Environment, Land Protection and Sea (MATTM) and the National Association of Local Municipalities have designed a specific program of actions to cover the specific needs of small municipalities in terms of environment and land management to interchange data and information. Small municipalities often possess very useful geographic information but often lack ICT infrastructure to share and interact, to catalogue, process and visualize these data. The project supports up to 300 Italian municipalities with a population of less than or equal to 5000 inhabitants.

The project ‘*Ambiente in Comune*’ involves the financing of supporting activities to initiate and/or consolidate the processes of the practical exploitation of information resources available and, at the same time, enhance the professional skills of their staff focused on some environmental issues, including: air pollution and mobility; noise and electromagnetic; Integrated Pollution Prevention and Control (IPPC); environmental impact assessment; Strategic Environmental Assessment.

The system of environmental and territorial data is fueled by the participating small municipalities. The infrastructure provides an open source metadata catalog (<http://cart.ancitel.it/catalogometadati>) which allows a very detailed search. It also gives access to an open source web viewer (<http://cart.ancitel.it/GranoGis>) which allows to display the specific cartographic layers available for/at each of the about 300 communes. The viewer also allows adding WMS and WFS services. This system is developed in line with the INSPIRE Directive.

The information system of environmental and spatial data allows the monitoring of the environment and to plan interventions to safeguard the ex-ante local and central level (preventive approach rather than emergency management).

3. CONCLUSIONS & RECOMMENDATIONS

3.1 Non technological

3.1.1 Focus on sharing

The transposition of the INSPIRE directive has been completed in almost all the Member States. While this is positive, some concerns and risks should be raised. The transposition of article 17 has caused many questions with regard to the interpretation of terms such as ‘measures for the sharing of spatial data sets and services’, ‘practical obstacles’, etc. This has led a number of the Member States to just transpose the obligations of article 17, without paying much attention to the need for additional implementation or supporting measures, or guidance for the public authorities on how to share data. It is important to emphasize that the objective of increased data sharing is not achieved by transposing the directive, but that a long-term and continuous effort is needed to promote the general purpose of the NSDI, i.e. facilitating spatial data sharing so that these data can be used in the processes of the public authorities.

This is linked to another concern that currently the Member States’ focus in the building of the NSDIs does not seem to be on the general purpose of data sharing, but on fulfilling the technical obligations and requirements of the INSPIRE implementing rules. This can be concluded from the results of the survey on coordination, funding and sharing measures conducted in 2009-2010 and from the information in the INSPIRE MR reports. But it is also based on the fact that most information found to update the country reports related to the legal transposition, the setting-up of the coordination structures and the development of the technological parts of the infrastructure. While these technical requirements are important for the successful exchange of spatial data, the Member States’ first concern should remain with sharing data in their NSDI, rather than complying with technical specifications that will only apply to the part of the NSDI covered by INSPIRE. The European Commission also has a role to play in this perspective: it should put more emphasis on the objective of data sharing, regardless of the shape or form these data are in, rather than on compliance with technical specifications.

Many Member States and public authorities struggle with the legal conditions and requirements how to make their data available, and are looking for appropriate licensing solutions. While the increasing attention for the existing initiatives for the licensing of public sector information in general may already provide some support, the European Commission can play a role in facilitating the Member States’ activities on licensing by providing a forum where Member States can exchange experiences and licensing models, in order to increase transparency and harmonization. A good example is provided by the Netherlands and Germany, who have exchanged practices on licensing, but this could be extended to the

level of all the Member States, supported by the Commission. Next, the Member States should then take up the task to create national models and agreements to support the public authorities, so that these do not have to consider the licensing models for their data by themselves.

In more general terms it would be good to see on the INSPIRE website examples of national implementation strategies, communication plans, business models and model licenses as applied in different European countries.

3.1.2 Increased involvement of user communities

While the involvement of the user communities in the NSDI remains low in several Member States, and initiatives to increase this involvement should certainly be recommended, it should be recognized that there is no such thing as ‘the single user community’ for the NSDI, but that there are several types of user communities that all may have different needs and requirements. This may mean that the creation of one ‘user forum’ or a comparable body within the NSDI might not be successful, but that multiple initiatives towards the different types of users will be more beneficial.

Related to this, it is interesting to note that while some Member States regret the lack of involvement of the private sector or academia, others have taken the standpoint that INSPIRE is directed towards the public sector, and that this should be the first focus. From a practical point of view, this enables a focused implementation of INSPIRE, but on the other hand it also shows the arising questions on the relationship between INSPIRE and the NSDI.

It is also advisable that Member States and non-Member States collect information on their (potential) users and on what the users are using the infrastructure for. The survey has revealed that this information is incomplete, sometimes even non-existent. While this is not surprising - because INSPIRE & NSDI implementation is still ongoing - it is considered a must to better understand the user requirements, and to get feedback from the use of existing components of the infrastructure. This allows then to improve further developments, to streamline the implementation process and to review priorities. In addition, the knowledge about and follow-up of specific fields of application will also allow countries to gain a better insight in the benefits of the infrastructure in order to demonstrate the added value of INSPIRE & NSDI for policy making, service provision and real-world business processes at large.

3.1.3 What is in, what is out?

INSPIRE is meant to cover all spatial data sets and services useful and used for environmental and related policies, covering the 34 themes of the 3 annexes of the Directive. The INSPIRE Directive is a mechanism to establish such a rich interoperable infrastructure that can be used by as many as possible, (the Directive as a piece of legislation is not an end goal in itself). In practice we see Member States and other countries implementing INSPIRE in different ways, especially with regard to what is considered to be part of INSPIRE and what not, in short there are different strategies to reach the above mentioned goals. De facto choices have to be made by countries on how to establish the list of data sets. In practices countries seem to take into account (amongst others).

- To select a single data set per theme, mostly the data set with the highest quality / most detailed / reference or ‘authentic’ source;
- To put data sets in the list that might match the specifications in the end or those from which it is known there will be network services build on top of it
- To put national data sets / or include local data sets;
- Agree to put as many data sets as possible, including derived data sets (generalized, processed).

From the user perspective it is advisable that countries consider as many data sets as possible to be part of INSPIRE, e.g. also derived (aggregated or generalized) data sets. Also spatial data sets that will never match the data specifications (e.g. because they are far from the specifications) should be considered part of INSPIRE. They should be made available/accessible in the same way and under the same conditions as the data sets that will be made conformant to the specifications. It is also not advisable to wait putting spatial data sets on the list of INSPIRE MR until they are harmonized (transformed). This would make MR for some of the indicators obsolete and does not allow knowing where a country stands as regard to their infrastructure, also at an early stage in the process. It is a good approach to flag data sets in data catalogues as being INSPIRE data sets.

3.1.4 Capacity building, training programs and test-environments

There is a clear demand from the MS for structural EU- funding e.g. capacity building, compliancy- test-environments, recommendations for licenses (liability issues), standardization web browsers (geoportal issues) etc... The INSPIRE project often seems to be the main playground for technology-savvy people. For a broader understanding of what the INSPIRE project and implementation really entails, activities to improve capacity training could be fostered and financed by the EU. In this context, sometimes the lowest level (local authorities) are not always fully involved or informed. The same is true for SMEs in the (geo-)ICT sector. Set-up of training programs and/or funding for capacity building to foster the local level (municipalities). Ideally these seminars can also work as a source of information for the EC.

It is also recommended that prior to the INSPIRE Conference, a dedicated workshop is continued to be held to discuss progress of INSPIRE & NSDI implementation. The two workshops conducted within the framework of the INSPIRE & NSDI State of Play study have proved to be useful to better understand the developments of INSPIRE and the NSDI in the 34 countries. Through this types of workshops Member States and non-Member States can benefit from the exchange of experiences and build networks and they clearly appreciated the possibility to actively discuss the details of certain topics with regard to the implementation process with their peers.

It is also proposed to elaborate a INSPIRE & NSDI Cookbook. This cookbook should not be conceived as a blueprint for SDI implementation, but rather it should be a flexible mechanisms (regularly updated) summarizing the implementation experiences including the problems encountered, solutions found and examples of those practical solutions.

In some Members States, the SDI is already in a mature state but not yet known enough; to encourage the use of the SDI services (and hence data), building of applications etc. awareness activities can be set up together with other communities e.g. open data community: competitions/contest and/or code-sprints for websites, mobile applications or computer applets to use open data and geospatial data/services. e.g. The OpenData Challenge 2011 (ES): a 48-hour contest for development of technology services for citizens based on the use of public data. The organization of a competition/contest and or INSPIRE code-sprint as a side-event at the next INSPIRE conference is another possibility.

3.2 Technological

3.2.1 Making existing components accessible

From the assessment in chapter 3 we learn that many spatial data sets and network services became available. However, many of them can't be discovered yet, and many can't be viewed or downloaded. Some countries want to make data sets and services conformant to the implementing rules before publishing them on their geoportal or making them accessible for all. However, from the users' point of view, it is worthwhile to have readily access to these resources, even if the data sets are not yet transformed or the services do not yet meet the performance criteria.

When building services on top of the data sets, enough reflection should be given on how to do this. Member States might think about basic services on key reference or authentic spatial data sets, but also specific services for specific user communities might add a lot of value. At the end, many services can exist for the same data set, opening up the rich content of these data sets (e.g. portrayal of different attributes of the same data set). Such a strategy should also take into account how the data sets are combined, aggregated and/or merged (or not) across the country. Specific cross-border implementations should be envisaged as well.

Finally it is advisable to integrate services as much as possible in existing applications or to develop new applications, or to use them within GIS desktop applications. This way the services become part of the overall information infrastructure and the existing ICT environments of organizations. While the use of the infrastructure through the national or other geoportals remains very important (to support the publish-find-bind paradigm), the direct integration could boost the uptake within day-to-day business processes.

3.2.2 Creating a test suite and test environment

The European projects supporting data specifications developments, as well as interoperability experiments and test-beds have proved to help implementing INSPIRE and NSDI. On the one hand such environments help the stakeholders to learn while doing, while it creates also better insight in the conformity and performance of the infrastructure. Germany has gained already a lot of experience in this field. It is proposed to work towards a kind of test suit for

Member States to allow them to test their services, data sets and metadata against the specifications. It is advisable that this suite is used across Europe for reasons of similarity. One or a few Member States could take the lead and build further on what have been developed already.

It should be further discussed whether it is necessary to work towards a kind of certification mechanism (or not). While there is a clear interest from some of the private stakeholders of INSPIRE, the implementation of such mechanisms could be complex and require a considerable amount of resources (e.g. certification authority, testing and validating procedure, etc.).

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ANNEXES

Regular country reports

The 34 country reports are separate documents available in printed form, as .DOC or .PDF-files. The naming convention for the digital documents is the following:

Rcr11<COUNTRYCODE>v<X>.doc or rc10r<COUNTRYCODE>v<X>.pdf

with

- Rcr11 standing for 'regular country report 2011'
- V<X> standing for the version number, e.g. v12.2
- COUNTRY CODE according to ISO 3166-2 (UK being an exception)

Summary methodology

This annex summarizes the approach and methodology of the State of Play study. It is based on 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 2010-2011 no changes took place anymore.

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.

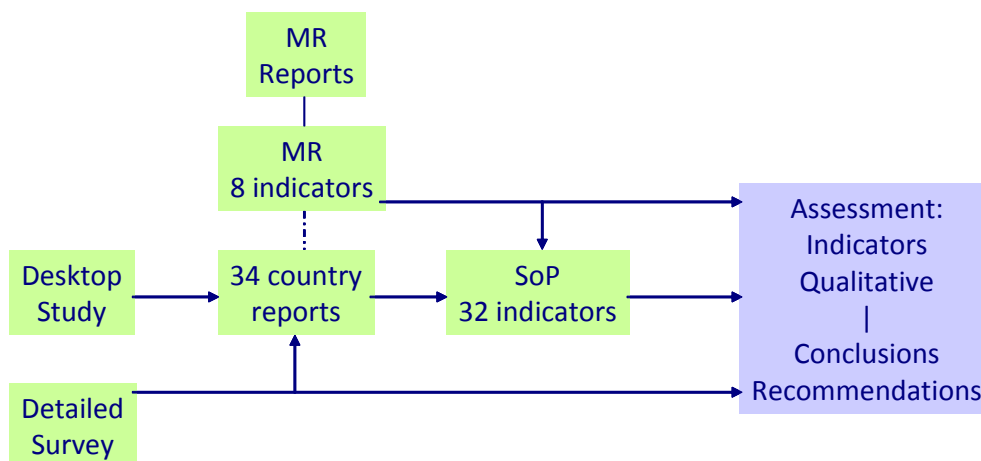
The general approach of the State of Play is a step-by-step approach:

- 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 five 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. Lithuania and Spain were visited in May and July 2011. 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 workshops prior to the INSPIRE conference in Krakow (2010) and Edinburgh (2011). 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 4: 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 together¹⁰.</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>

¹⁰ This was a comment formulated during the workshop in Leuven on methodology. 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?¹¹</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>

¹¹ 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	<p>The SDI-initiative is devoting significant attention to standardisation issues</p> <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	<p>Thematic environmental data are covered by the described SDI-initiative or there is an independent thematic environmental SDI</p> <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>

Resulting assessment matrices 2002-2011

The State of Play assessment matrices on the following pages give an overview of the status for the different building blocks of the 34 NSDI through the scoring on 32 indicators. The status for 2011 is given, as well as the status of 2010 and 2003, the first year that the assessment was carried out. In addition we provide the change matrix for 2010-2011 and 2003-2011. The first indicates the most recent developments, while the latter provides an overview of the changes over a period of 8 years. Matrices for 2004, 2005, 2006 and 2007 are available as well, but not included in this annex. They can be found in the respective summary reports (<http://inspire.jrc.ec.europa.eu/>).

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	Green	Green		Green				Green		Green		Green						Green						Green													Green		AT
BE	Green	Green	Red	Green	Orange	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	BE	
DE	Green	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	DE	
DK	Green	Green						Green		Green									Green																			Green	DK
ES	Green	Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	ES	
FI	Green	Green						Green		Green									Green																			Green	FI
FR	Green	Green	Orange	Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	FR	
GR	Green	Green						Green		Green									Green																			Green	GR
IE								Green		Green									Green																			Green	IE
IT				Green	Green			Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	IT	
LU		Green			Green	Green		Green		Green									Green																			Green	LU
NL				Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	NL
PT			Green	Orange	Orange	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	PT
SE					Green	Green		Green		Green									Green																			Green	SE
UK	Green		Orange		Green			Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	UK	
CY			Orange					Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	CY	
CZ		Green	Orange					Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	CZ
EE		Green						Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	EE
HU					Orange			Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	HU
LT								Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	LT
LV		Green	Orange					Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	LV
MT								Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	MT
PL		Green			Orange	Green		Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	PL
SI		Green				Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	SI
SK		Green			Green			Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	SK
BG	Green					Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	BG
RO	Green	Green	Green	Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	RO
HR	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	HR
MK	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	MK
TR	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	TR
CH							Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	CH
IS								Green		Green									Green																			Green	IS
LI		Green	Orange					Green		Green										Green																		Green	LI
NO		Green			Orange			Green		Green										Green																		Green	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 6: Changes between status of NSDI building blocks between 2003-2011

Resulting INSPIRE MR matrices 2010-2011

On the next three pages, the matrices for 7 INSPIRE MR indicators are presented (2009 and 2010), as well as the change matrix (2009-2010).

- The matrix for 2009 has been published in the D4.1 Summary Report (2010) as well. The figures for 2009 are based on the filled template sent by the Member States (and NO) in May and June 2010. For 2009, three Member States were missing at the time of the analysis: CY, IT and MT.
- The figures for 2010 are based on the filled template sent by the Member States (and NO) in May and June 2011. For 2010, four Member States were missing at the time of the analysis: CY, IE, GR and MT. It should be noticed that in two countries, some indicators are above the 100 mark which is not possible. We assume that these are errors and therefore did not take them into account.
- The figures for the change matrix were calculated as the difference between 2010 and 2009 and given a separate color.

The grey fields indicate that no information was received or that the indicator was not filled by the country.

	MD Existence					MD Conformity					DS Existence				DS Conformity				NS accessibility metadata			NS accessibility view & download			NS conformity						
	MDi	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	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	0	0	1	2	3			0	100	100	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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
	No information																														
	Very high				> 70																										
	High				50-70																										
	Low				30-50																										
	Very low				< 30																										

Figure 5: 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	19	32	38	10	NA	NA	NA	NA	NA	NA	0	1	-15	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
BE	7	21	19	5	-71	34	30	66	27	NA	2	5	1	0	2	6	NA	NA	-21	-20	-71	-11	-22	-2	NA	NA	NA	NA	NA	NA	
DE	44	36	NA	NA	NA	56	68	NA	NA	NA	0	0	NA	NA	NA	NA	NA	48	38	NA	-3	2	-4	NA	NA	NA	NA	NA	NA		
DK	21	48	NA	NA	26	NA	NA	NA	NA	NA	-1	-1	NA	NA	NA	NA	NA	58	34	85	11	NA	NA	NA	NA	NA	NA	NA	NA		
ES	-5	-1	4	15	-9	5	4	5	1	2	-1	0	1	-2	NA	NA	NA	NA	-14	-2	-17	-18	-13	-15	7	-2	7	15	-10	0	
FI	13	6	41	12	NA	27	37	67	15	NA	7	-1	-1	16	NA	NA	NA	NA	37	48	NA	10	9	23	0	NA	0	NA	NA	NA	
FR	-2	-20	-6	-12	23	-1	-10	-11	-4	4	NA	NA	NA	NA	NA	NA	NA	23	-14	NA	37	52	38	1	NA	3	NA	NA	NA		
GR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
IE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
IT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
LU	-2	0	0	0	-7	44	0	0	0	NA	0	0	0	0	NA	NA	NA	NA	2	0	2	0	0	0	NA	NA	NA	NA	NA	NA	
NL	45	80	NA	NA	2	52	97	NA	NA	NA	0	0	NA	NA	NA	NA	NA	48	NA	NA	-8	NA	-9	NA	NA	NA	NA	NA	NA	NA	
PT	26	33	27	20	33	38	42	54	30	33	2	0	3	2	NA	NA	NA	NA	28	26	40	-8	-6	-8	NA	NA	NA	NA	NA	NA	
SE	8	6	25	3	9	30	67	50	13	40	0	0	2	1	NA	NA	NA	NA	21	22	13	8	NA	NA	0	0	0	NA	NA	NA	
UK	21	18	25	6	NC	66	91	94	9	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
CY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
CZ	-1	5	0	11	-19	0	5	-9	-4	-3	3	2	-4	NC	2	7	-7	NA	18	18	8	-1	-28	-11	-3	20	-9	NA	NA	NA	
EE	12	29	25	0	9	29	76	62	-6	17	5	0	17	1	NA	NA	NA	NA	NA	NA	NA	0	7	0	NA	NA	NA	NA	NA	NA	
HU	1	17	-10	4	-5	7	NA	3	NA	5	-10	-8	-16	-11	NA	NA	NA	NA	-4	-6	6	-5	NA	NA	-1	11	-4	-6	NA	NA	
LV	3	2	0	5	NA	NA	NA	NA	NA	NA	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
LT	26	17	25	20	49	61	73	73	44	NA	-6	-3	-9	-7	NA	NA	NA	NA	0	2	-10	5	15	3	NA	NA	NA	NA	NA	NA	
MT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PL	17	50	11	61	-29	35	84	38	59	7	-22	-3	-33	-25	0	0	NA	NA	19	49	-33	-2	NA	NA	82	5	NA	NA	NA	NA	
SI	0	0	0	0	NA	NA	NA	NA	NA	NA	1	0	0	2	NA	NA	NA	NA	0	0	NA	0	0	0	NA	NA	NA	NA	NA	NA	
SK	4	9	0	-9	10	10	52	2	-12	9	9	19	4	12	2	12	1	-2	-5	-8	5	-3	-23	-3	6	18	3	0	NA	NA	
BG	6	NA	NA	-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
RO	9	15	12	9	NA	12	20	16	11	NA	-1	-1	-1	-1	0	NA	3	NA	0	1	NA	0	0	1	-2	-15	-2	NA	NA	NA	
TR																															
CH																															
IS																															
LI																															
NO	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-27	-7	9	-34	NA	NA	NA	NA	8	8	7	28	22	27	NA	NA	NA	NA	NA	NA	
frequency																															
31																															
67																															
61																															
94																															
95																															
25																															

Figure 7: Development of 7 indicators of INSPIRE Monitoring & Reporting (2009-2010)

