Spatial Data Infrastructures in *Spain:* State of play 2010

SPATIAL APPLICATIONS DIVISION
K.U.LEUVEN RESEARCH & DEVELOPMENT

Celestijnenlaan 200 E, BE-3001 LEUVEN
TEL.: 32 16 32 97 32 FAX: 32 16 32 97 24
URL: http://www.sadl.kuleuven.be

Report meta-information

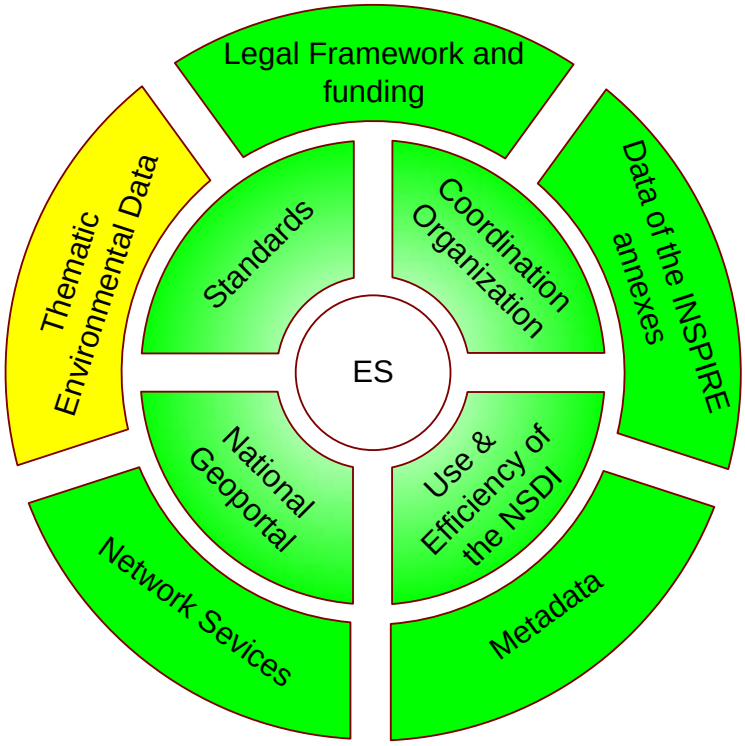
Title	Spatial Data Infrastructures in Spain: State of play 2010
Creator	Danny Vandenbroucke & Dimitrios Biliouris (SADL)
Date Issued	2010-09-01
Subject	INSPIRE State of Play
Publisher	K.U.Leuven (SADL + ICRI)
Description	This report is summarizing the review of SDI in Spain
Contributor	Danny Vandenbroucke & Dimitrios Biliouris (SADL), Katleen Janssen (ICRI), Joep Crompvoets (OE)
Previous Contributor	Marco Fritz, Catharina Bamps, Jos Van Orshoven, Danny Vandenbroucke (SADL); Peter Beusen, Katleen Janssen (ICRI); Sebastián Mas Mayoral , Diana López, Jordi Guimet, Antonio Rodríguez Pascual (ES)
Format	MS Word 97/2000
Audience	INSPIRE stakeholders
Identifier	rcr09ESv111.doc
Language	EN
Coverage	Autumn 2009 – Spring 2010

Version number	Date	Modified by	Comments
1.0	2002-11-05	Marco Fritz (SADL) & Peter Beusen (ICRI)	First version
2.0	2002-12-20	Jos Van Orshoven (SADL)	Completion & harmonization with 31 other country reports
3.0	2003-07-31	Catharina Bamps (SADL)	Integration of completing and correcting comments received from Mr Sebastián Mas Mayoral (Subdirector General de Geomática y Teledetección, Instituto Geográfico Nacional) Addition of : - Report meta-information - Executive summary - Abbreviations/acronyms
4.0	2003-08-14	Jos Van Orshoven (SADL)	Harmonisation with 31 other country reports
5.0	2004-06-10	Catharina Bamps (SADL)	Integration of comments from - Mrs Diana López, responsible environmental GIS databases, Autonomous government of Catalunia, - Dr. Jordi Guimet i Pereña, Project director PROJECTE IDEC - limited review of web sites General review, correction and update. Addition of table pointing to changes with regard to Version 4
6.0	2004-06-25	Katleen Janssen (ICRI)	General, review, correction and update of legal framework
7.0	2004-07-01	Jos Van Orshoven (SADL)	Consolidation
8.0	2005-04-22	Diana López Agostini (Governm. Catalunia)	Update of status 2005
8.1	2005-05-12	Jordi Guimet (IDEC)	Update of status 2005
8.2	2005-05-31	Antonio Rodríguez Pascual (IGN)	Update of status 2005
8.3	2005-07-25	Katleen Janssen (ICRI)	General review, correction and update of legal framework
8.4	2005-08-10	Danny Vandenbroucke	Review of the 2005 update and consolidation

8.5	2005-09-23	Danny Vandenbroucke	Final Report based on minor comments from Commission
9.0	2006-07-14	Jordi Guimet (IDEC)	Update status 2006 for IDEC, new legal framework
9.1	2006-11-30	Antonio Rodríguez Pascual (IGN)	Update of status 2006 for IDEE
9.2	2006-12-18	Katleen Janssen (ICRI)	General review, correction and update of legal framework
9.3	2006-12-22	Danny Vandenbroucke	Review of the 2006 update, integration of input from the visit to Spain (29-30/11/06) and consolidation
10.0	2008-03-27	Katleen Janssen (ICRI)	Correction and update legal and organizational framework
10.1	2008-04-12	Danny Vandenbroucke, Ludo Engelen (SADL)	Integration results survey
10.2	2008-07-23	Danny Vandenbroucke (SADL)	Metadata and final changes
11.0	2010-03-02	Dimitrios Biliouris (SADL)	Update of status 2009
11.1	2010-05-31	Katleen Janssen (ICRI)	Correction and update of legal status 2009

Change matrix 2010 versus 2007

A concise graph is added to indicate changes of the various paragraphs compared to the previous report. Two colours are used: Green and Yellow indicating major and minimum changes respectively compared with the 2007 State of Play. This graph does not reflect the country situation. It merely represents our findings/changes per section from our preparation of the desktop analysis.



Executive summary

NGHC ("Consejo Superior Geográfico") is the governmental body appropriate as Public Authority in Spain to define and set up the NSDI (IDEE) and its national Geoportal. NGHC is an advisory collegiate body depending on the Ministry of Infrastructures and Transports. Its technical secretariat is held by National Geographic Institute and NGHC members are representatives from the three government levels of Spain.

It was established by Art. 9 Law 7/86 for Cartography in Spain and its rules were updated by the Royal Decree 1545/2007.

The Specialized Commission on SDI has been working through a Working Group established on November 2002, and it is reporting and advising to the NGHC.

The NSDI Working Group (IDEE WG) is open to all relevant actors actually involved in the process (data producers, software companies, universities, governmental bodies). Currently it has more than 300 individual members

The legal framework defined by the INSPIRE Directive 2007/2/CE is complemented by R.D. 1545/2007, defining a new composition and role for the NGHC. There are different initiatives to legislate on SDIs at Regional level; three Regions (Cataluña, Andalucía and Castilla y León) have approved their specific laws establishing Regional SDIs. To complete the framework, the text of the Spanish law transposing the INSPIRE Directive is concluded (from the technical point of view) and it has been agreed in WG IDEE.

Funding of National SDI Geoportal and coordination must be assumed by National Geographic Institute of Spain, as National Geographic High Council´s Technical Secretariat, through the State General Budget assigned to this agency. In general funding from IGN Spain for National SDI Geoportal and NSDI activities was 1,300,000 €/year during (2006-2009).

There is not yet a fixed document defining the strategy of the implementation process for Spain. However, there is a core of common ideas shared among the main actors of Spanish NSDI. For example is agreed that each individual SDI shall have at least three minimum services: Catalogue (CWS), Gazetteer (Gaz) and Web Map Service (WMS) while the resources of all SDI initiatives in Spain are distributed in a fully, polycentric, open, and interoperable way.

The current National Website for the IDEE (http://www.idee.es) provides access to the Main Node of Distribution and Screening of Data and Geographical Services in Spain. It is available in 7 languages (Spanish, English, Basque, Galician, Catalan, Portuguese and French) and it implements 9 different OGC specifications (WMS, CSW, Gaz, WMC, WFS, WCS, WCTS, WPS and SLD), in a chainable and usable way. ISO standards and INSPIRE principles has been implemented in the national node: The IDEE viewer allows to access to more than 800 Web Map Services. A number of other services such as data download - catalogue, territory analysis, etc are available.

Through the national Geoportal it is possible to access other Spanish SDI geoportals, to consult documentation about the project, and a new approach is being implemented to offer client applications to access the whole set of available services in all the nodes integrated in Spanish NSDI.

At Regional and local level, several SDI projects have been active for years and constantly being developed with notable example the IDEC the SDI of Catalonia.

Overall, the Spanish SDI is considered one of the most developed in Europe. This is mainly due to a good coordination and cooperation at all levels of government and with all the stakeholders of the SDI network. Although IDEE is clearly lead, **all stakeholders work on the basis of equality and partnership and see each other as equal node in the SDI network**.

Table of Contents

Abbreviations and acronyms

AENOR	Asociación Española de Normalización y Certificación
AESIG	Asociación Española de Sistemas de Información Geográfica
BCN	Digital Cartographic Databases
BTA	Base Topogràfica Armonizada
CCCC	Cartographic Coordination Commission of Catalunya
CEDERCAM	Asociación para el Desarrollo Rural de Castilla-La Mancha
CNIG	Centro Nacional de Información Geográfica
CSG	Consejo Superior Geográfico (National Geographical High Board)
CT	Core Thematic Data
CWS	Catalogue Web Service
DIGA	Directorio de Informacion Geografica Accessible
FEGA	Fondo Europeo de Garantía Agraria
FIR	Further Investigation Required
GI	Geographical Information
GINIE	Geographic Information Network in Europe
GIS	Geographical Information System
ICC	Institute of Cartography of Catalunya
IDCV	Comunidad Valenciana SDI
IDEA	Andalucia SDI
IDEC	Infrastructura de Dades Espacials de Catalunya
IDENA	Navarra SDI
IDEE	Infraestructura de Datos Espaciales de España
IGN	Instituto Geográfico Nacional
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
INTA	Instituto Nacional de Técnicas Aeroespaciales (Ministry of Defence)
ISO	International Organization for Standardization
LOPD	Protección de Datos de Carácter Personal
LORTAD	Regulación del Tratamiento Automatizado de los Datos de Carácter Personal
MIGRA	Mecanismo de Intercambio de Información Geográfica Relacional formado por Agregación
MNE	Modelo de Nomenclátor de España (Spanish Gazetteer Model)
NCGI	National Center of Geographical Information
NEM	Núcleo Español de Metadatos (Spanish Core Metadata)
NGHC	Consejo Superior Geográfico
NOMECALLES	Nomenclator/Callejero de la Comunidad de Madrid
NRGE	National Reference Geographic Equipment

NSDI	National Spatial Data Infrastructures
OGC	Open Geospatial Consortium
PNOA	National Plan for Aerial Orthophoto
PPP	Public-Private Partnerships
PRG	Platform Resources Geoinformation
PSI	Policy and legislation on access to public sector information
REF	Reference data
SDI	Spatial Data Infrastructure
SEIS	Sistema Español de Información de Suelos
SGE	Servicio Geográfico del Ejército
IDERioja	La Rioja SDI
SIGCX	Sistema de Información Geográfica de Extremadura
SIGPAC	Sistema de Información Geográfica para una Política Agraria Común
SIOSE	Land Cover and Land Use Information System of Spain
SITGA	Galicia SDI,
SITNA	Sistema de Información Territorial de Navarra
SIMA	Internet Map Server of the Environmental Department of the Catalonia Government
SLD	Styled Layer Descriptor (SLD)
SME	Small and Medium Enterprise
TRACASA	Trabajos Catastrales, SA – the Cadastre for the Region of Navarra
WCS	Web Coverage Service
WCTS	Coordinate Transformation Service (WCTS)
WFS	Web Feature Service
WG	Working Group
WMS	Web Map Service
WPS	Web Processing Service

1 GENERAL INFORMATION

1.1 Method

This report is summarizing the review of SDI in Spain, and reflects the degree to which the SDI situation in Spain is similar to the ideas set out in the INSPIRE position papers[1] and the more recent INSPIRE scoping documents.

The 2002 report was based on the analysis of various documents, project references and web sites readily accessible in English, Spanish and Catalan. Most resources were gathered from the Internet. The existence of a white paper for a GIS strategy in Cataluña seemed to give appropriate reason to evaluate not only the national overall strategy for Spain (with a limited documentation available) but also the regional, more advanced SDI-like project in Cataluña. The GINIE final report was very informative for describing the Cataluña initiative.

The information has been completed by integration and consolidation of comments received from representatives of the Instituto Geográfico Nacional (2003 version) and from representatives of the Autonomous government of Cataluña and the Catalan IDEC Project.

The update of 2005 was based on the input from several Spanish experts and integrated in the last version of the report.

The update for 2006 was based on input received from Mr. Jordi Guimet (ICC) Mr. Antonio Rodríguez Pascual (IGN), on material from- and discussions during the two day visit to Madrid (29-30 November 2006), and through various other sources. For the 2007 update, information was received from the national level (IDEE) as well as from the regional level (IDEC, SITNA). Detailed information was provided regarding data sets and services, and data sharing practices. Also, very useful information was received concerning the use of the infrastructure. The information was integrated in the report. A new section was added dedicated to the developments in Navarra. However, this section is not as complete as compared to the other sections (IDEE, IDEC) since not all the necessary information was gathered.

For the 2009 update information was received from the survey reply along with the different SDI workshops, where Spanish authorities and organisation presented the current status and trends of SDI and INSPIRE implementation in Spain. In this version obsolete information was removed. Moreover, information for regional SDI as a separate section was also removed, while a conclusion paragraph regarding the status of each indicator was added for each component.

1.2 Overview of SDI-initiatives and players in Spain

Public authority in Spain is organized according to three distinct levels: local, regional and national, all of which are generators and holders of public information. This structure influences the development of decentralized and relatively autonomous SDI.

The Spatial Data Infrastructure of Spain (Infraestructura de Datos Espaciales de España, IDEE) is an initiative to integrate data, metadata and geographical information produced in Spain and make them publicly available online, so as to enable potential users to locate, identify and access such information.

NGHC ("Consejo Superior Geográfico") is the governmental collegiate body appropriate as Public Authority in Spain to define and set up the NSDI (IDEE) and its national Geoportal. NGHC is an advisory collegiate body depending on the Ministry of Infrastructures and Transports. Its technical secretariat is held by National Geographic Institute and NGHC members are representatives from the three government levels of Spain. It was established by Art. 9 Law 7/86 for Cartography in Spain and its rules were updated by the Royal Decree 1545/2007.

The Specialized Commission on SDI has been working through a Working Group established on November 2002, and it is reporting and advising to the NGHC.

The NSDI Working Group (IDEE WG) is open to all relevant actors actually involved in the process and having some activity in this field (e.g. data producers, software companies, universities, governmental bodies) it numbers up to more than 300 individual members. The Working Group is developing IDEE under the INSPIRE principles and according its rules (Rodriguez, 2009).

The members of the National Geographical High Council are:

- ▪Representatives from Ministries: Infrastructures and Transports (IGN/CNIG), Foreign Affaires, Economy & Finances (Cadastre, National Statistical Institute), Environment, Agriculture, Interior (State Civil Defence Office), Defence, Science and Innovation, Industry, Tourism and Commerce, Justice, Education.
- 17 Representatives from every Regional Government
- 6 Representatives from Spanish Federation of Provinces and Municipalities (Local Authorities).

The legal framework defined by the INSPIRE Directive 2007/2/CE is complemented by R.D. 1545/2007. There are different initiatives to legislate on SDIs at Regional level; four Regions (Cataluña, Andalucía, Castilla y León and Canarias) have approved their specific laws establishing Regional SDIs. To complete the framework, the text of the Spanish law transposing the INSPIRE Directive is concluded from the technical point of view and has been agreed in WG IDEE (Alonso et al., 2009).

The current National Website for the IDEE (http://www.idee.es) provides access to the Main Node of Distribution and Screening of Data and Geographical Services in Spain.

On the regional level, several initiatives undertaken, e.g. in Galicia, Asturias, País Vasco, Navarra, La Rioja, Cataluña, Castilla y León, Castilla-La Mancha, Extremadura, Andalucía, Valencia, Murcia, Andalucía, Baleares y Canarias have established their regional SDIs and geoportals.

The Catalan IDEC project is a well developed regional SDI. The Spatial Data infrastructure of Catalonia (IDEC) is the platform to interchange and sharing spatial information through Internet involving all Public Administrations as the Catalan Government, the Spanish Government, Local Entities as well as other public and private institutions of Catalonia. The main purpose is that users can have access to the existing geospatial datasets for operating and downloading them, making public that knowledge of available information. IDEC Support Centre was created by the Institut Cartogràfic de Cataluña and the Geographic Information Law 16/2005, approved by the Parliament of Catalonia, according to the Inspire European Directive.

The Cartographic Coordination Commission of Cataluña is the basic body for the coordination and collaboration between the regional administrations and the local entities in the area of the cartography and related geographic information. A specific WG (CT3-INSPIRE) has been created to cope with Inspire implementation. This CT3 Commission has a clear function to prepare and give support to all the Catalan administrations for the Technical implementation, when necessary. The group consists of 13 people representing Regional government organizations and 13 people from local authorities. Several technical people from the ICC have participated in the DT implementation rules and continue to be aware of the Inspire progress.

IDEC maintains a very well developed Map viewer and various thematic geoportals with numerous services, available datasets and registered organizations. Moreover, it has been awarded as one of the 'best European practice' of 2009 in the framework of the eSDInet+ project. In March 2010 the total metadata entries published were 23,344 with 118 registered organisations.

The SDI of La Rioja (IDERioja) has been also awarded as one of the 'best European practice' of 2009 in the contest organized by eSDInet+ project. With a population of only 300,000 Rioja is a relatively small region. Its SDI has get success to involve local level and all the 183 Municipalities have opened a local Geoportal with the technical support of the regional government.

In addition, a number of regional and local SDI and GIS initiatives and Geographical Databases exist in Spain. In the IDEE website a detailed list exists on SDI and GIS initiatives (http://www.idee.es/show.do?to=pideep_IDE_SIG.EN) where all the actors in National, Regional and Local level are stated.

AESIG (Asociación Española de Sistemas de Información Geográfica) is the Spanish member of Eurogi. Its goal is to promote the introduction, use and development of geographic information technologies while encouraging research and development. Moreover, AESIG acts as a forum for debate and discussion between individuals, groups and organisations, users and providers of these technologies, in order to establish and standardise common technologies, stimulate technological investigations and

developments, while promoting, representing and defending the interests of the GI-sector. Last but not least, AESIG promotes the collaboration between public and private organisations concerned with GI. (http://www.aesig.es/).

1.3 Common ground for the selected SDI-initiatives

1.3.1 Cooperation between the national, regional and local level, and with other stakeholders

When speaking about the Spanish SDI, one has to take into account the different levels of authority. IDEE is therefore a joint effort of Authorities at the National, Regional and Local levels. Following Ministries are involved: Agriculture, Foreign Affairs and Cooperation, Defence, Economy and Finance, Public Works and Transports, Education and Science, Environment, Interior, Industry - Tourism and Commerce. Several of them are data producers or have specific Institutes or Agencies dedicated for such tasks (e.g. Cadastre under Ministry of Economy and Finances, IGN under Ministry of Infrastructures and Transports, …). Currently all of the 17 regions are involved in the development of IDEE and are building their own regional SDI node (from 12 in 2007 and 6 in 2005).

The basic philosophy is to create an SDI where all levels of Government share their information (INSPIRE) and open the GI for the citizen (similar to Aarhus Convention). The principle of decentralisation is being applied with local, regional and national SDI nodes. One of the objectives of the IDEE is to be open to public administrations, private sector and citizens, not only making its available standardized data, metadata and geographic services, but also offering the possibility to them of integrating their own data, metadata, and services in this infrastructure.

In addition to the technical developments, efforts are made by the Working Group to propose a common data policy, including licensing and pricing. Several efforts have been made and a number of services are available for developers. Analytically these services include:

OGC Services:

- Web Map Service (WMS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Web Processing Service (WPS)
- Catalog Service for Web (CSW)
- Styled Layer Descriptor (SLD)
- Web Map Context (WMC)

- Coordinate Transformation Service (WCTS)

There are also some implementations of the OSGeo Recommendation WMS-C to improve the performance of visualization services.

and

OGC Client

- CSW Client 2.0.0
- Distributed Gazetteer Client

Therefore, not only data are commonly used, but also services and technical solutions are shared.

Not only are universities and private companies developing (parts) of IDEE and the regional SDI, but they are also seen as contributors to create added value and as users of the infrastructure. This makes that there is a strong SDI development in the private sector and that big companies like Telefonica are interested to make investments in this fields since it is seen as an opportunity to broaden existing markets. This collaboration is further enhanced, harmonised and simplified with the constantly updated IDEE resources and services.

Specific efforts towards the local level

The local authorities are involved in several ways. One way is the setting-up of local SDI linked to the regional SDI and IDEE. Examples are IDEPamplona, IDEZar, the IDE of Gatafe, etc. Some Regional Governments, as Cataluña and La Rioja, have deployed a specific strategy to promote the implementation of local Geoportals. Another way is through the use of services from the regional SDI and the development of specific applications like GEOPISTA which focuses on the interoperability at the local level and (1) to make control of geographic information easier for local authorities, (2) to offer better access to geographic information at lower cost and (3) to improve efficiency of municipal services (40 municipalities are involved).

The SDI of Catalunia was the first fully developed regional SDI in Spain with a fully functional geoportal. The portal is updated twice a year and in 2009 there are 161 entities that contribute with metadata, 169 entities with accessible WMS and 657 participant entities in thematic SDIs. There are 27,314 metadata registries, 225 WMS and 6 WFS accessible services, and 5250 accessible layers of data. Moreover, 9732 IDEC services are accessed monthly and 14000 datasets of around 50 products can be downloaded.

A number of sectoral and local initiatives are taking place in the framework of the strategy set by IDEC. Notable examples are IDEC Univers, IDEC Litoral, IDEC Local initiative, etc (http://www.geoportal-idec.cat/geoportal/eng/iniciatives-locals/).

Moreover, IDEC has developed the Platform Resources Geoinformation (PRG). PRG is a web site available to the public administrations and its agencies that brings together

several functions for use by the web browser user, such as the extensive inventory of geoinformation available through IDEC network and services with applications.

The main elements are:

- Access to all geographic data available on the network or geo IDEC.
- Simple and intuitive tools for creating and customizing applications.
- Readily available applications that can be adapted to user needs.

2 Details of the Spanish NSDI initiative IDEE

2.1 General Information about IDEE

The Spanish National Spatial Data Infrastructure (IDEE for Infraestructura de Datos Espaciales de España) was launched in November 2002 and is available in www.idee.es from June 2004. IDEE is based in INSPIRE principles and ideas, is in conformance with ISO19100 suite of standards and Open Geospatial Consortium specifications, and also fulfils the harmonization requirements established at national level by the Spanish Working Group for the IDEE.

IDEE can be seen as a SDI made of other SDI, because of the structure of Spanish government decentralized in three main levels, each with a high level of own responsibilities and self-governed: the National Government; 17 Autonomous Regions and 2 Autonomous cities (Ceuta and Melilla); and more than 8,100 Municipalities. IDEE integrates the servers, services, nodes, geoportals and resources of all SDI initiatives in Spain in a fully distributed, polycentric, open, interoperable system. Each individual SDI shall have at least three minimum services: Catalogue (CWS), Gazetteer (Gaz) and Web Map Service (WMS). Every Geoportal of IDEE is able to perform a waterfall searching in all the resources catalogues included in its area of responsibility as well as in the Gazetteers of its area and it is also able to view, overlay and analyze the results of these searches.

A way of describing the essential ideas and philosophy of a project is based on the mention of its objectives. IDEE project shares and assume INSPIRE objectives and goals, which can be summarized as follows:

1) To make the sharing of GI among governmental agencies possible, in order to save investments and resources and to avoid data inconsistency.
2) To ease e-government, with the help of an open, distributed, interoperable and easily available GI.
3) To give open access to GI managed for government to all citizens and users, recognizing the right of people to read and see the geospatial data captured and maintained by their government, following the spirit of Aarhus Convention and according to Directive 2003/98 about Reuse of information managed by the Government.
4) To open IDEE to the private sector giving to any organization the possibility to publish their GI trough IDEE Geoportal under some conditions of interoperability and metadata standardization.

The Spanish NSDI is a collective work produced by all the relevant actors in the Spanish GI sector: universities; official bodies of national, regional and local governments; private companies; users, etc. Especially important is the role played by regional initiatives in Spain, covering its area of responsibility, fostering user's communities, involving local level and developing powerful and well established SDI. It is necessary

also to mention the essential contribution to IDEE of the University of Zaragoza that, under the umbrella of a Collaboration Agreement with IGN Spain, has developed most of the technology for the National Geoportal.

The Instituto Geográfico Nacional (http://www.ign.es) (IGN - National Geographic Institute) belongs to the Ministry of Public Works and Transportation. Its main activities are cartography, geodesy, photogrammetry, remote sensing, GIS and national Seismic Network, Geophysics and Astronomy.

The Centro Nacional de Información Geográfica (CNIG – National Centre for GI) is an autonomous body linked to the IGN. Its goal is to produce, develop and distribute geographic works and publications, including the commercialisation of the products of IGN. It is the commercialization station of cartographic products of the National Geographic Institute.

[43]

[44]

[45]

2.2 Component 1: Coordination and organisational issues

IDEE is defined and set by the National Geographic High Council ("Consejo Superior Geográfico"). NGHC is an advisory collegiate body depending of the Ministry of Infrastructures and Transports, which technical secretariat is held by National Geographic Institute and whose members are representatives from the three government levels of Spain. It was established by Art. 9 Law 7/86 for Cartography in Spain and its rules were updated by the Royal Decree 1545/2007.

Members of the National Geographic High Council are:
▪ Representatives from Ministries: Infrastructures and Transports (IGN/CNIG), Foreign Affaires, Economy & Finances (Cadastre, National Statistical Institute), Environment, Agriculture, Interior (State Civil Defence Office), Defence, Science and Innovation, Industry, Tourism and Commerce, Justice, Education.
▪ 17 Representatives from every Regional Government
▪ 6 Representatives from Spanish Federation of Provinces and Municipalities (Local Authorities).

On April 2002 the National Geographic High Council (NGHC) committed to its Specialized Commission on SDI as Executive Board to define and setting up the NSDI (IDEE).

The Specialized Commission on SDI of National Geographic High Council defines and develops the SDI in Spain (IDEE) and it is made up of:

- Chairperson: D. Sebastián Mas Mayoral (IGN).
- Secretary: D. Antonio F. Rodríguez Pascual (IGN).

- 7 Members

This Commission set up a Working Group (WG) for the definition and development of the Spatial Data Infrastructure in Spain. This Group is developing IDEE under the INSPIRE principles and according to its rules. This WG is a technical open group that combines agents and experts of geographical information, at both reference and thematic areas, from all governmental levels, universities and private sector. IDEE WG organizes three meetings per year and one technical workshop. From 2010 the technical workshop will evolve to an Iberian Congress on SDI (Spain, Portugal and Andorra). (Rodriguez, 2009).

The NSDI Working Group (IDEE WG) lists more than 300 individual members. A detailed list of all the members is available at: http://www.idee.es/show.do?to=pideep_que_es_grupo.EN

Although IDEE is clearly leaded, **all stakeholders work on the basis of equality and partnership and see each other as equal node in the SDI network**.

Moreover, an IDEE blog is running since June 2008 (http://blog-idee.blogspot.com/).

There is not yet a fixed document defining the strategy of the implementation process for Spain. The formal definition of the Management Board (*Consejo Directivo*), mentioned in the RD 1545/2007, responsible for the steering and executive management of the NSDI is being expected. However, there is a core of common ideas shared among the main actors of Spanish NSDI (National and Regional official web services providers).

This Management Board will be responsible for the definition of the strategy and implementation plan. The establishment of the Management Board depends on the signature of a set of collaboration agreements, slightly delayed due to bureaucratic problems, which is expected to be accomplished in the first months of 2010. Moreover, there are not specific funds foreseen for the implementation. By Law every agency/institution managing data and/or services related with INSPIRE implementation must assume their funding.

Funding of National SDI Geoportal and coordination must be assumed by National Geographic Institute of Spain, as National Geographic High Council´s Technical Secretariat, through the State General Budget assigned to this agency.

In general funding from IGN Spain for National SDI Geoportal and NSDI activities was 1,300,000 €/year during (2006-2009).

2.2.1 Conclusions of Component 1

The approach and territorial coverage of the SDI is truly national and a number of the SDI components have reached a significant level of operationality. Moreover, the sub-national level plays an important role. There is clear coordination but several important stakeholders play a pre-dominant role. The coordinating structure National Geographic

High Council (NGHC) with the Management Board is taking the lead. In practice, it is the NMA who is taking the role of secretariat. In the NGHC most of the Ministries are represented, but also representatives from universities and private sector, even NGO. Commercial and professional users are involved in the formulation of the strategy, as well as utility companies, universities, etc.

Based on these conclusions we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national
- One or more components of the SDI have reached a significant level of operationality (6)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (Not so clear)
- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users (Not so clear)
- An organisation of the type 'national GI-association' is involved in the coordination of the SDI (No)
- Producers and users of spatial data are participating in the SDI
- Only public sector actors are participating in the SDI (No)

2.3 Component 2: Legal framework and funding

[5], [57] – [60]

2.3.1 Legal framework

The Royal Decree 1545/2007 establishes the National Cartographic System (*Sistema Cartográfico Nacional*), as an activity model looking at efficiency and coordination among public geographic data and services providers. This National Cartographic System (SCN) includes in principle all public data producers at the three levels of government in Spain (National, Regional and Local), but it's voluntary for each member at Regional and Local level to be integrated or not in it.

Decree 1545/2007 defines:

- The National Reference Geographic Equipment (NRGE)
- Official Cartographic Production Planning

- Central Cartographic Register
- Geographic Information National Infrastructure NSDI according INSPIRE Directive

In 2007, the Ministry of Infrastructures and Transport (IGN-E) was given the responsibility for the transposition of the INSPIRE directive, together with the Ministries of Environment, Agriculture, Economy and Finances, Industry, Tourism and Commerce and Public Health. The Ministries formed a Committee for the transposition, chaired by the IGN-E, to prepare a draft. A first draft was sent in July 2008 to the National Geographic High Council, and after some amendments, a final draft was accepted by the NGHC in March 2009, and by the regional governments. It was then sent to the Ministries for approval by the Ministries and to the Parliament. The final text has not been voted yet in the Parliament (Mas-Mayoral et. al., 2009).

Furthermore, sub national legislation exists for the autonomous communities (regions) of:

Andalucía
http://www.juntadeandalucia.es/boja/boletines/2006/154/d/updf/d1.pdf
Castilla y León
http://www.sitcyl.jcyl.es/sitcyl/recursos/pdf/Normativa/Decreto_Ordenacion_Cartografia.pdf
Cataluña
http://www.boe.es/boe/dias/2006/02/04/pdfs/A04340-04350.pdf
Canarias
http://www.gobiernodecanarias.org/boc/1994/104/004.html

2.3.2 Public-private partnerships (PPP's)

Cooperation between Public Authorities and the private sector/universities is well developed. For example National/Regional Mapping Agencies, National Government Agencies and several Provincial/Local Government authorities have set up interoperable OGC web services to access and share spatial data. At the same time the Ministry of Infrastructure and Transports has published a regulation (Order FOM/956/2008-March 31st 2008) establishing free access to IGN Spain's spatial data for non commercial uses. Similarly the production and harmonization of geographic information can be seen in the Aerial Orthophotography National Plan (PNOA), Spain Land Cover & Use Information System (SIOSE) and CartoCiudad.

2.3.3 Licensing framework

A success factor of the SDI implementation is that most of the Geographic Information producers Public Authorities are applying a data policy based on open access to geographic information data and services.

Specifically, IGN-E has established on April, 8th 2008, a new data policy setting up that:

▪National Reference Geographic Equipment (NRGE) Information and Metadata are Public Sector Information accessible under conditions such as free access, free use and free of charge (without the need of a licence).
▪Other Digital Geographic Information is accessible for **non commercial uses** under conditions such as free access and free of charge (while a license is needed mentioning the origin and ownership of data).
▪Services for viewing, analysis and geoprocessing on line by Internet is free of charge.
▪Downloading by Internet is free of charge (while an on line licensing is needed).
▪Downloading off line if free with marginal costs paid.
▪Direct internal use at companies in company management systems is considered non commercial use. Therefore, Geographic information from IGN used as internal can be published on Internet giving added value to the original GI when the uses are non commercial.

▪Digital Geographic Information will be accessible for **commercial uses** under agreement contract with CNIG. These uses do not require initial fees, only commercial profits sharing. Fees are established by agreement taking into account the Reference Value of the GI and the total business value. (Mas-Mayoral et al., 2009; Rodriguez et al., 2009).

2.3.4 Funding model for SDI and pricing policy

The geoportal and the coordination of IDEE are funded by the State general budget that is assigned to CNIG. The annual expenses for the implementation and the maintenance of the geoportal are 1.3 M€ per year (since 2005 to 2009). The ministries that are involved in the production of geographic data, such as the Ministry of Environment and Agriculture, the Ministry of Science and Innovation, the Ministry of Industry and the Cadastre fund their own IDEE nodes or portals. Regional SDIs are funded by Regional Governments while every agency assumes its data harmonisation expenses. In multilateral or bilateral projects the expenses are shared by partner agencies (Rodriguez, 2009).

Datasets produced or directly coordinated by IGN Spain are distributed free of charge for non-commercial uses, except when a digital copy in a magnetic media is required. In this case only costs related to the production of the copy would be charged. For commercial users, a licence must be signed and there is to be some charge depending on the contribution of the original dataset to the final product or service, the sales figures and the benefit obtained.

2.3.5 Conclusions of Component 2

At the time the survey was conducted, the INSPIRE legislation was transposed – a final text is available but is not voted yet. Cooperation between Public Authorities and the private sector/universities is well developed. There is a clear collaboration between public and private sector, but it is not so clear whether it is in the form of co-financing. A success factor of the SDI implementation is that most of the Geographic Information producers and Public Authorities are applying a data policy based on open access to

geographic information data and services. The geoportal and the coordination of IDEE are funded by the State general budget that is assigned to CNIG.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or –development (Partially)
- There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects (Not so clear)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (No)
- GI can specifically be protected by copyright
- Privacy laws are actively being taken into account by the holders of GI (In preparation)
- There is a framework or policy for sharing GI between public institutions (In preparation)
- There are simplified and standardised licences for personal use (No)
- The long-term financial security of the SDI-initiative is secured (Partially)
- There is a pricing framework for trading, using and/or commercialising GI (No)

2.4 Component 3: Data for themes of the INSPIRE annexes

2.4.1 Data by resolution or scale range for the INSPIRE themes

Regarding the three INSPIRE annexes addressing the 34 spatial data themes, IDEE is providing discovery and view services for most of them while a number of them can be also downloaded. A complete list will be presented in the updated report including the information provided by the country in 2010.

2.4.2 Geodetic reference systems and projections

The national projections systems are based on the International Spheroid of 1924. For the Canary Islands the WGS84 spheroid is used:

PROJECTION UTM
DATUM EUR_M
UNITS METERS
SPHEROID INT1924
ZONE 29
XSHIFT 0
YSHIFT 0
parameters

PROJECTION UTM
DATUM EUR_M
UNITS METERS
SPHEROID INT1924
ZONE 30
XSHIFT 0
YSHIFT 0
parameters

PROJECTION UTM
DATUM EUR_M
UNITS METERS
SPHEROID INT1924
ZONE 31
XSHIFT 0
YSHIFT 0
parameters

PROJECTION UTM (Canarias)
DATUM WGS84
UNITS METERS
SPHEROID WGS84
ZONE 28
XSHIFT 0
YSHIFT 0
parameters

[52]

2.4.3 Quality of the data

Quality description includes the sources of data used and the lineage of the data product (”linaje”). For example regarding the National Plan for Aerial Orthophotography (PNOA) project, the Regional Government agencies assume responsibility for the quality control of their data while the IGN-E carries out the general project coordination, the final quality control step and the integration of the resulting data.

Analytically, Positional accuracy, coherence and semantic accuracy are indicators for data quality.

[56]

2.4.4 Interoperability

There is a need to harmonise information between the regions since there are differences between regions at different scales while even orthophotos can be different.

As a result several initiatives have been taken: Cartociudad - official street map database of Spain; PNOA - National Plan for Aerial Orthophoto; SIOSE - Land Cover and Land Use Information System of Spain and the National Geographical High Council have worked on the BTA (Base Topogràfica Armonizada) specifications through the Geographic Information Standards Commission. At the same time cross-border issues are solved in numerous projects. Moreover, the INSPIRE principles and guidelines are already being applied with ISO 19100 standards and OGC specifications being used.

It should be mentioned that IDEE Geoportal has a section for developers that provide technical information on Web Services relating to Geographic Information available within the IDEE framework to be used for the implementation of value-added applications and services. These services include:

OGC Services

- Web Map Service (WMS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Web Processing Service (WPS)
- Catalog Service for Web (CSW)
- Styled Layer Descriptor (SLD)
- Web Map Context (WMC)
- Coordinate Transformation Service (WCTS)

There are also some implementations of the OSGeo Recommendation WMS-C to improve the performance of visualization services.

OGC Client

- CSW Client 2.0.0

- Distributed Gazetteer Client

2.4.5 Language and culture

Unique identifiers are used according to MIGRA standard.

2.4.6 Data Content

All data are accompanied by text explanations for their attributes.

2.4.7 Geographical names

Geographical names are managed in Spanish (Castellano), but also in the other official languages of Spain: Catalán, Euskera, Valenciano, and Gallego. Secondary names are set in the official languages of Spain. Additionally, toponyms are used in Ibicenco, Aranés, and Bable.

[56]

2.4.8 Character sets

As character set the repertory 1,6, 100 of ISO 8859 is used, this includes all characters used in Spain.

[56]

2.4.9 Conclusions of Component 3

Already from the previous ES's SoP report Geodatasets existed which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components while the geodetic reference system and projection systems are standardised, documented and interconvertable. The 2010 MR indicated that 2950 datasets exist. Regarding quality control there are some elements available but no standard procedures exist. Interoperability is one of the main concerns and besides the technical interoperability which receives much attention, specific harmonisations projects are ongoing (e.g. SIOSE). Spanish is the operational language while more websites provide now information documents in English and other languages as it happens in IDEE portal.

Based on these conclusions we score the indicators as follows:

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

2.5 Component 4: Metadata

2.5.1 Availability

One of the main objectives of the IDEE-initiative is to produce metadata. IDEE created the Metadata Geographic Information Website:

(http://www.idee.es/show.do?to=pideep_portal_metadatos.EN).

Inside it is possible to find:

- General information on metadata.
- Norms, description of tools.
- Methodologies to apply for the creation of metadata.

2.5.2 Metadata catalogues availability + standard

A list of the available data catalogues can be found at:

http://www.idee.es/show.do?to=pideep_catalogoIDEE.EN

and the national catalogue service can be seen at:

http://www.idee.es/show.do?to=pideep_catalogoIDEE.ES

It includes data and services from all the regional and local IDE in Spain (e.g. Andalucía, Aragon, etc).

The Searching service, based on a Catalogue Web Service, offers a powerful and versatile interface to look for available datasets at a particular scale, with a selected extent, for a specific date and belonging to a specific category or provider. Scales range from more than 1/5,000 to 1/1,000,000 and smaller. The available categories are:

- Agriculture and Farming
- Biota
- Administrative Boundaries
- Climatology, Meteorology and Atmosphere
- Economy
- Elevation
- Environment
- Geoscientific Information
- Health
- Imagery and Base Maps
- Military Intelligence
- Inland Waters
- Location
- Oceans and seas
- Cadastre
- Society
- Structures
- Transportation
- Utilities and Communications

2.5.3 Dublin core metadata standards for GI-discovery

Not applicable.

2.5.4 Metadata implementation

There are two available applications to create metadata:

- CatMDEdit, free software application developed by UNIZAR for metadata capture, multiplatform, with multilingual support, thesaurus facilities, ISO 19115 compliant interface and XML export facilities and
- MetaD, developed by the IDEC Centre of Support. http://www.geoportal-idec.cat/geoportal/eng/meta-d/

Additionally, a Toponomy Editor to graphically edit geonames according to MNE and using WMS services is also available as free software.

2.5.5 Conclusions of Component 4

Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes. The 2010 MR states that 84% of the reported data sets have metadata. A list of the available data catalogues can be found at IDEE. The metadata is a decentralised responsibility.

Based on these conclusions we score the indicators as follows:

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

2.6 Component 5: Network Services

The IDEE Geoportal was opened on 2003 December as a provisional beta version, the first version appeared in July 2004, and the second version with a new interface dated from 2005. Today it is available in 7 languages (Spanish, English, Basque, Galician, Catalan, Portuguese and French) and it implements 9 different OGC specifications (WMS, CSW, Gaz, WMC, WFS, WCS, WCTS, WPS and SLD), in a chainable and usable way.

The main characteristics of the services and application at national level available from the Geoportal are:

1) The **Gazetteer** service is based on a database of more than 500,000 geonames, and is implemented as a WFS using the Spanish Gazetteer Model (MNE), a conceptual model for geonames defined by WG IDEE, including some key attributes (language, source and etymology), and allowing several names for the same feature.
2) The **Map Viewer** access directly to more than 833 services throughout Spain offering more than 6,500 layers, classified as reference data at the three levels of government (National, Regional and Local), thematic data and other non official data, following the INSPIRE annexes classification. Some Basic visualization commands are available as: zoom in, zoom out, pan, hide layers, distance and area measure, see coordinates, etc.
3) **Catalogue** service allows search and selection in a metadata database, describing more than 40,000 datasets produced by IGN and the Catalonia Cartographic Institute.
4) A **Catalogue Service of Services** allows the searching of captured on-line descriptions from Capabilities information about OGC services available in Spain, and provides the address to find them.
5) **Data Download:** It is possible to freely download some general and basic reference data in GML format: Administrative Boundaries of Spain at three scales, Geodetic Networks and a Euroglobal, Map Data Base at 1:1,000,000.
6) There are also two simple examples of **remote sensing analysis**: a Corine-Land Cover analysis utility, based on WFS and offering a statistics about land uses in each municipality; and a DTM analysis application, based on WCS, allowing the calculation of maximum, minimum, and average height of an area.
7) A set of software tools are available as **freeware**: a simple OGC conformant client application for access WMS and Gazetteer services from PDA; the IGN-CNIG 2D/3D Viewer, a thick OGC client to perform a virtual flight over a cartographic layer(s) served as an WMS and using a DTM obtained via WCS; a simple light WMS viewer to be inlaid in a web page.
8) Two **Free Software** applications: CatMDEdit for metadata capture, multiplatform, with multilingual support, thesaurus facilities, ISO 19115 compliant interface and XML export facilities and a Toponomy Editor to graphically edit geonames according to MNE and using WMS services.

A first prototype of the IDEE Services Catalogue has been developed (http://www.idee.es/IDEE-ServicesSearch/ServicesSearch.html?locale=en).

This prototype allows search and access to the description of services subscribed to the IDEE. Before this prototype, this description of services was updated manually within the IDEE services directory (http://www.idee.es/show.do?to=pideep_catalogo.EN. Additionally this prototype facilitates the online connection with OGC Web Map Services (WMS). As regards the contents that are accessible through this prototype, it has been established a process to compile all the service URLs contained in the original static directory (335 services altogether) and apply the automatic method to convert the

getCapabilities response into a metadata record compliant with INSPIRE and ISO 19115/19119 metadata models (Nogueras-Iso, 2009).

Some figures of usage and statistics of IDEE Geoportal are provided below:

- More than 85,000 visits from January to April 2009.
- More than 28,000,000 individual requests to the services in April 2009.
- More than 6,300,000 individual requests to WMS IDEBase service.
- More than 20,200,000 individual requests to WMS PNOA service.
- More than 1,500,000 individual requests to other WMS service.
- Accesses from 105 countries (Rodriguez, 2009).

Web Map Service is the standard geoservice implemented in IDEE, but there are eight OGC specifications more implemented at the SDI national node (Catalogue Service Web, Gazetteer, Web Feature Service, Web Coverage Service, Web Map Context, Style Layer Descriptor, Web Coordinate Transformation Service and Web Processing Service), fully documented and described, with examples in the Developer's Corner page of IDEE Geoportal (www.idee.es/show.do?to=pideep_ejemplosOGC.ES).

The CartoCiudad (www.cartociudad.es) project provides at national level the following services:

- a Gazetteer service providing coordinates of a given postal address; a WPS to calculate minimum walking path between two postal addresses included in the same municipality; - a WPS to compute an influence area, the convex hull of all points placed nearer than 200 m (www.cartociudad.es/content/infserv/Servicios_Web_CartoCiudad.pdf).

The Regional SDI of Catalonia (www.geoportal-idec.net) has a set of SOAP services available, defined and documented in its Geoportal (www.geoportal-idec.net/geoportal/IDECServlet?pag=geoservices&home=s).

The Cadastre Spanish Authority (Dirección General de Catastro) has also a set of SOAP services fully described on the Net (http://www.catastro.meh.es/ws/webservices_catastro.pdf).

IGN Spain has implemented, as a solution to speed up OGC WMS services, some WMS-C services (WMS Tile Caching) following the definition of tiles to implement a cache recommended by the Open Source Geospatial Foundation (OSGEO) (http://wiki.osgeo.org/wiki/WMS_Tile_Caching). IDEE-Base, PNOA orthophotos and CartoCiudad WMS are published by applying the OSGEO Tiling Recommendation and cache storages to improve performance.

The services of IDEE are available at: http://www.idee.es/CatalogoServicios/

They comprise of 833 WMS services in total with 76 national, 328 regional, 390 local and 39 services for the rest of the world. Moreover, there are 211 WFS, 18 WCS, 6 WPS, 12 CWS and 1 WCTS. Apart from the OGC services there are 3 OSGEO and SOAP respectively.

2.6.1 Conclusions of Component 5

Spain has several discovery, viewing and download services (21, 184 and 39 respectively, according to the 2010 MR). At the same time the 2010 MR states that are 3 transformation and 4 middleware services.

Based on these conclusions we score the indicators as follows:

- There are one or more discovery services making it possible to search for data and services through metadata
- There are one or more view services available for to visualise data from the themes of the INSPIRE annexes
- There are one ore more on-line download services enabling (parts of) copies of datasets
- There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability
- There are middleware services allowing data services to be invoked

2.7 Component 6: Thematic environmental data

Thematic Environmental data are included in the list of available data of IDEE, see section 2.5.2.

2.7.1 Conclusions of Component 6

There are some thematic environmental data as listed at IDEE.

Based on the information provided on the previous paragraph we score the indicator as follows:

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

2.8 Standards

Inside the IDEE Metadata Geographic Information Website (http://metadatos.latingeo.net/) there are established rules on how to create metadata. The main metadata standards are presented and these are:

NEM (the Spanish Core metadata)

ISO 19115 and

Dublin Core.

NEM is a profile of the international standard ISO19115: 2003, consisting of a minimum set of metadata elements for resource description, which enables the interoperability of metadata that is generated in Spain. Its implementation is not intended directly but use is encouraged. Each institution or agency must consider the metadata which are considered appropriate according to geographic characteristics of the products that generate, and once established, they should at least include the items set the profile NEM, thus ensuring compatibility with other initiatives .

2.8.1 Conclusions of Component 7

Inside the IDEE Metadata Geographic Information Website (http://metadatos.latingeo.net/) there are established rules on how to create metadata. The main metadata standards are presented and these are:

NEM (the Spanish Core metadata)

ISO 19115 and

Dublin Core.

Based on these conclusions we score the indicator as follows:

- The SDI-initiative is devoting significant attention to standardisation issues

2.9 Use and efficiency of SDI

Special attention has been given to Cross Border collaborations with the French and Portuguese SDIs.

Analytically, French and Spanish NMAs have taken a number of actions towards a seamless cross border service. These are:

- Participation in the joint INSPIRE pilot projects (e.g. SDIGER);
- Translation of both Geoportals to the other party's mother language;
- Implementation of the mechanisms needed to plug the Spanish WMS-C services in the French geoportal viewer;
- Implementation of the mechanisms needed to access the French WMS-C in the Spanish geoportal using an Application Programming Interface (API) specific solution;
- Cooperation to support the French initiative to develop Open Source software for accessing datasets, OGC compliant, for European NMAs (Rodriguez et al., 2009).

Similarly, interoperability towards an Iberic SDI is being set forward between Spain and Portugal. This interoperability involved a number of actions and projects such as:

OTALEX (http://www.ideotalex.eu/), the Territorial Observatory of Alentexo (Portugal) and Extremadura (Spain), defined as a trans-national, multilingual SDI based on the collaboration of ten public bodies from Spain and Portugal.

SIGN II (www.proyectosign.org), an SDI project involving seven partners and covering the area of 56 municipalities from Galiza and the Northern part of Portugal.

Terra Douro (www.sitcyl.jcyl.es/sitcyl/), a transborder territorial observatory for the definition and evaluation of policies of sustainable development, defined as an SDI project, involving seven partners and covering the area of 4 NUTS III, Salamanca and Zamora in Spain, and Alto Trás-Os-Montes and Douro in Portugal (Julião et al., 2009).

3 Annexes

3.1 List of SDI addresses / contacts for Spain

Table: SDI contact list			
	Web address	Organisational mailing address	Over-all contact person: tel./fax/e-mail
National			
Universidad de Zaragoza Departamento Informática e Ingeniería de Sistemas Centro Politécnico Superior	http://iaaa.cps.unizar.es	C/. María de Luna 3 E-50015. Zaragoza	Investigador responsable: Dr. Pedro R. Muro Medrano prmuro@posta.unizar.es Tfno.: [34] 976 761 950
Instituto Geografico Nacional	http://www.ign.es	General Ibanez Ibero 3 ; 28003 Madrid	Contact person: Sabastian Mas Mayoral Tel: +34-91.59.79.646 Fax: +34-91-59.79.764
Centro Nacional de Información Geográfica	http://www.cnig.es	General Ibáñez de Ibero, 3 28003 Madrid	Contact person: Pedro Vivas White Tel: +34 91 5979792 Fax: +34 91 7001864 pvivas@cnig.es
Universidad Jaume I Departamento de Informática Escuela Superior de Tecnología y Ciencias Experimentales,	http://www.lsi.uji.es	Campus Riu Sec E-12080. Castellón de la Plana	Investigador responsable: Dr. Carlos Granell carlos.granell@lsi.uji.esmailto: Tfno.: [34] 964 72 83 17
Universidad Politécnica de Madrid	http://www.topografia.upm.es/	Campus SUR de la UPM km 7,5 de la	Investigador responsable: Dr. Miguel Angel Bernabé Poveda

Departamento de Ingeniería Topográfica y Cartografía		Autovía de Valencia E- 28031. Madrid	mab@mercator.org Tfno.: [34] 91 336 7907
AENOR Asociación Española de Normalización y Certificación	http://www.aenor.es	Departamento Comercial Calle Génova, 6 28004 Madrid	Tel. : +34 91 432 60 29/33/36 Fax. : +34 91 310 36 95
IDEC (Projecte per a la creació de la Infrastructura de Dades Espacials de Catalunya)	http://www.geoportal-idec.net	The Cartographic Institute of Catalunya: Institut Cartogràfic de Catalunya Parc de Montjuïc – 08038 Barcelona	Project director : Dr. Jordi Guimet i Pereña Tel. 93 567 15 00 – Fax 93 567 15 67

3.2 *List of references for* Spain

Table: List of references used to compile the Country Report	
Web sites:	http://forum.europa.eu.int/Members/irc/jrc/eesdi/library?l=/working_groups/standards_architecture/nsdis_state_play&vm=detailed&sb=Title [2] http://redgeomatica.rediris.es/metadatos [3] http://redgeomatica.rediris.es/metadatos/colaborar.htm [4] http://redgeomatica.rediris.es/metadatos/jstic2002.pdf [5] http://redgeomatica.rediris.es/index.html [6] http://www.larioja.org/ma/sig1.htm [7] http://b5m.gipuzkoa.net/web5000/ [8] http://www.mfom.es/ign/ [9] http://web.bizkaia.net/home/ca_carto.htm

	[10] http://imsturex.unex.es/linkarcims.htm [11] http://www.alava.net/cartografia/ [12] http://www.sitibsa.com/ [13] http://www.ec-gis.org/reports/policies.pdf [14] http://sitna.cfnavarra.es/ [15] http://www.gva.es/icv/ [16] http://oph.chebro.es/ [17] http://www.mapya.es/portada/pags/indice.asp?arriba=/indices/pags/agric/agricsup.htm&izq=/indices/pags/agric/agricizq.htm&der=/agric/pags/sig/informacion.htm [18] http://leu.irnase.csic.es/mimam/seisnet.htm [19] http://fyl.unizar.es/geoatlas/inicio.htm [20] http://artieda.cps.unizar.es/eurisko/ [21] http://www4.madrid.org/nomecalles/ [22] http://www.icc.es/idec/ang/links.html [23] http://www.icc.es/idec/ang/doclib.html [24] http://www.icc.es/idec/ang/quequi.html [25] http://www.icc.es/idec/ang/depositories.html [26] http://www.icc.es/idec/ang/depositories.html#environ [27] http://www.icc.es/angles/presen.html [28] http://www.icc.es/projint/castella/afiliaciones.html [29] http://www.icc./es/cat99/catd/bases.html [30] http://www.icc.es/cat99/catd/productes.html [31]

http://www.icc.es/pdf/priccuk.pdf
[32]
http://www.icc.es/idec/docs/e1m2mv21dpe_1.pdf
[33]
http://www.icc.es/mapsv/vols/ccvols_ang.html
[34]
http://www.icc.es/mapsv/home_ang.html
[35]
http://www.icc.es/satelit/cas/aplicas.html
[36]
http://galileo.icc.es/website/resums/resum_series.php
[37]
http://www.aesig.org/infosig/infosig_i.htm
[38]
http://www.aesig.org/monsig/docs_sig/llibreblanc/Llibre%20blanc%20SIG2001.pdf
[39]
http://www.aesig.org/monsig/docs_sig/jornada/material/El%20PROJECTE%20IDE.pps
[40]
http://www.aesig.org/monsig/monsig_i.htm
[41]
http://www.aesig.org/monsig/docs_sig/jornada/jornadatec.htm
[42]
http://www.oan.es/servicios/e/CNIG.html
[43]
http://www.megrin.org/gddd/orgs/os_6.htm
[44]
http://www.cnig.es/jsp/english/default.jsp?pagina=creacion
[45]
http://www.cnig.es/jsp/english/default.jsp?pagina=objetivos
[46]
http://www.cnig.es/jsp/english/default.jsp?pagina=manormativo
[47]
http://www.cnig.es/jsp/english/default.jsp?pagina=ordcartog
[48]
http://www.cnig.es/jsp/productos.jsp
[49]
http://www.cnig.es/jsp/descargas.jsp?posicion=0&cantidad=20
[50]
http://www.cnig.es/descargas/CP/Ortofotomapas_25.pdf
[51]
http://data-dist.jrc.it/cgi-bin/tl1.pl?tl1.pl+projectionsys+ES
[52]
http://www.anvil.eu.com/find/Glossary-spanish2.htm
[53]

	http://www.aenor.es [54] http://www.gencat.es/dursi [55] http://www.map.es/csi/pg5m51.htm [56] http://www.map.es/csi/propiedad/ [57] http://www.certh.gr/cordis/t_en/p/es/p_r51_en.asp-adtid=1025.htm [58] http://www.privacyinternational.org/survey/phr2002/phr2002-part3.pdf [59] http://195.228.254.144/program.html [60] http://www.icc.es/idec/ang/idecproject.html [61] http://www.icc.es/idec/ang/find.html [62] http://www.aesig.org/monsig/docs_sig/llibreblanc/Libro%20blanco%20SIG.pdf [63] http://sima.gencat.net [65] http://www.juntadeandalucia.es/obraspublicasytransportes/jsp/tema.jsp?ct=8 [66] http://www.geoportal-idec.net/geoportal/IDECServlet?idioma=eng [67]
Publications :	M. Craglia, A. Annoni, R.S. Smith and P. Smits [Eds.]: Spatial Data Infrastructures: Country reports. Final version D 5.3.2(b). GINIE reports, September 2002. http://wwwlmu.jrc.it/ginie/doc/SDI_final_en.pdf [1] GINIE - GI in the Wider Europe Complete Book, October 2003 http://wwwlmu.jrc.it/ginie/doc/ginie_book.pdf [64] A. Rodríguez, S. Mas, D. Richard, F. Chirié. IGN Spain and IGN France collaboration to set up cross border INSPIRE compliant services. 2009 Abad, P., Mas, S., Alonso, J.A., Rodríguez, A. and Sánchez, A. "Spanish SDI as a platform of resources and web services" *Proceedings INSPIRE workshop 2008, Maribor, Slovenia, Junio 23-25, 2008.*

Alonso, J.A., "Legal and organisational framework for the Spanish national SDI" *Proceedings INSPIRE workshop 2008, Maribor, Slovenia, Junio 23-25, 2008.*

J. Mezcua-Rodriguez. The Spatial Data Infrastructure of Spain as an example of success in Europe. Ninth United Nations Regional Cartographic Conference for the Americas New York, 10-14 August 2009

J. Nogueras-Iso, J. Barrera, A.F. Rodríguez, R. Recio, C. Laborda and F.J. Zarazaga-Soria. Development and Deployment of a Services Catalog in Compliance with the INSPIRE Metadata Implementing Rules. SDI Convergence. Research, Emerging Trends, and Critical Assessment. B. van Loenen, J.W.J. Besemer, J.A. Zevenbergen (Editors). Nederlandse Commissie voor Geodesie Netherlands Geodetic Commission 48, 2009.

A.Rodríguez, S. Mas, P. Abad, J.A., Alonso, A. Sanchez, and C. Gonzalez. Data and services availability in Spanish NSDI GSDI 11 world conference, 2009. (http://www.gsdi.org/gsdiconf/gsdi11/papers/pdf/161.pdf) .

R.P., Julião, S., M. Mayoral, A.R., Pascual, D., Furtado. Portugal and Spain twin SDI's From national projects to an Iberian SDI. GSDI 11 world conference, 2009

S. Mas Mayoral, Antonio F. Rodríguez-Pascual. National spatial data infrastructure of Spain: organisational & legal framework. Proceedings of the 24th International Cartographic Conference 2009, Santiago, http://www.icaci.org/documents/ICC_proceedings/ICC2009/html/nonref/3_3.pdf