INSPIRE
Infrastructure for Spatial Information in Europe

Member State Report: Spain, 2012

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1. Executive summary

This is the official report on the application of the INSPIRE Directive in Spain during the period 2010-2012 in response to the mandate of Commission Decision 2009/442/EC, of 5 June, which implements Directive 2007/2/EC as regards monitoring and reporting. The structure of this document responds to the instructions received from the EC/EEA INSPIRE Team, which is the team responsible for coordinating the activities relating to compliance with Commission Decision 2009/442/EC.

The document is organised in the following parts:

- A chapter is dedicated to the coordination structures set up for application of the Directive in Spain. It develops the organisational aspects at national level and the instruments for the relationship with the nodes of reference of the General State Administration and the Autonomous Communities and Cities.
- The abovementioned chapter includes a section on the quality assurance of the data sets and services offered by the Public Administrations via the spatial information infrastructures. This chapter places special emphasis on quality assurance procedures, the problems posed and the quality certification mechanisms which are applied.
- A chapter is dedicated to the functioning and coordination of the geographical information infrastructure. The main stakeholders are identified, as are the measures taken to facilitate the exchange of spatial data and services between them and the use of the INSPIRE geoportal.
- A chapter is dedicated to the use of the spatial information infrastructure, both from the point of view of the use of data sets and services, and regarding the use made by the general public. Special attention is paid to cross-border use of the infrastructure and the use of transformation services.
- A chapter is dedicated to the agreements for data exchange, distinguishing those entered into between public authorities and between these and the European institutions. A specific section analyses the barriers detected in relationship with agreements of this type.
- A chapter is dedicated to aspects related with the costs deriving from the implementation of the Directive and the benefits observed.
- After the conclusions, the Annexes offer a list of the organisations that act as nodes of reference in Spain and their functions are described. A list is also given of the addresses of the web sites mentioned, the legal and bibliographical references.

2. Abbreviations and acronyms

ADIF	Administrador de Infraestructuras Ferroviarias (Administrator of Railway Infrastructures)
AGC	Administración de la Generalidad de Cataluña (Administration of the Regional Government of Catalonia)
AGE	Administración General del Estado (General State Administration)
AGILE	Association of Geographic Information Laboratories for Europe
AOC	Consorci Administració Oberta de Catalunya (Consortium for Open Administration of Catalonia)
BTA	Base Topográfica Armonizada (Harmonised Topographic Database)
BBDD	Base de datos Digital (Digital Database)
CCAA	Comunidades Autónomas (Autonomous Communities)
CCHS	Centro de Ciencias Humanas y Sociales (Centre for Human and Social Sciences)
CDE	Conjuntos de datos espaciales (Spatial data sets)
CE IDE	Comisión Especializada en IDE del Consejo Superior Geográfico (Specialised Commission on SDI of the Geographic High Council)
CENG	Comisión Especializada de Normas Geográficas (Specialised Commission on Geographic Standards)
CICTEx	Centro de Información Cartográfica y Territorial de Extremadura (Cartographic and Territorial Information Centre of Extremadura)
CINTA	Centro de Información Territorial de Aragón (Territorial Information Centre of Aragón)
CODIIGE	Consejo Directivo de la Infraestructura de Información Geográfica de España (Executive Board of the Geographic Information Infrastructure of Spain)
CPT	Comunidad de Trabajo de los Pirineos (Working Community of the Pyrenees)
CSG	Consejo Superior Geográfico (Geographic High Council)
CSIC	Consejo Superior de Investigaciones Científicas (Spanish National Research Council)
CSIDEC	Centro de Apoyo de la Infraestructura de Datos Espaciales de Cataluña (Support Centre for the Spatial Data Infrastructure of Catalonia)
CSW	Catalogue Service for the Web
C4	Comissió de Coordinació Cartogràfica de Catalunya (Cartographic Coordination Commission of Catalonia)
CTP	Comisión de Trabajo de los Pirineos (Working Commission of the Pyrenees)
EAGLE	Eionet Action Group on Land Monitoring in Europe
EC	European Commission
EC/EEA	European Commission / European Environment Agency
EIONET	European Environment Information and Observation Network

EGDI	pan-European Geological Data Infrastructure
ELRA	European Land Registry Association
ETC/SIA	European Topic Centre for Spatial information and Analysis
EURADIN	European Address Infrastructure
EUREF	European Geodetic Reference Systems
EUROGEOSS	European approach to the Global Earth Observation System of Systems
FEGA	Fondo Español de Garantía Agraria (Spanish Agricultural Guarantee Fund)
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information System
GIS4EU	Project GIS4EU
GIT	Geographic Information Technologies
GMES	Global Monitoring for Environment and Security
GPS	Global Positioning System
GT-EIEL	Grupo de Trabajo de la Encuesta de Infraestructura y Equipamientos Locales (Working Group of the Survey on Local Infrastructure and Facilities)
GT-IDEAndalucía	Grupo de Trabajo de la IDE de Andalucía (Working Group of the SDI of Andalucía)
HELM	Harmonized European Land Monitoring
HLANDATA	Harmonization of European Land Use and Land Cover Databases
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
ICC	Institut Cartogràfic de Catalunya (Cartographic Institute of Catalonia)
ICV	Instituto Cartográfico Valenciano (Valencian Cartographic Institute)
IDE	Infraestructura de Datos Espaciales (Spatial Data Infrastructure)
IDEAragon	Infraestructura de Datos Espaciales de Aragón (Spatial Data Infrastructure of Aragón)
IDEC	Infraestructura de Dades Espacials de Catalunya (Spatial Data Infrastructure of Catalonia)
IDECV	Infraestructura de Datos Espaciales de la Comunitat Valenciana (Spatial Data Infrastructure of the Valencian Community)
IDEE	Infraestructura de Datos Espaciales de España (Spatial Data Infrastructure of Spain)
IDEG	Infraestructura de Datos Espaciales de Galicia (Spatial Data Infrastructure of Galicia)
IDEIB	Infraestructura de Dades Espacials de les Illes Balears (Spatial Data Infrastructure of the Balearic Islands)
IDEM	Infraestructura de Datos Espaciales de Madrid (Spatial Data Infrastructure of Madrid)
IDENA	Infraestructura de Datos Espaciales de Navarra (Spatial Data Infrastructure of Navarra)
IECA	Instituto de Estadística y Cartografía de Andalucía (Institute of Statistics and Cartography of Andalucía)
IG	Información Geográfica (Geographic Information)

IGME	Instituto Geológico y Minero de España (Geological and Mining Institute of Spain)
IGN	Instituto Geográfico Nacional (National Geographic Institute)
INIG	Infraestructura Nacional de Información Geográfica (Geographic Information National Infrastructure)
IIGE	Infraestructura de Información Geográfica de España (Geographic Information Infrastructure of Spain)
ILAF OGC	Iberian and Latin-American Forum of the Open Geospatial Consortium
INSPIRE	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
IP	Internet Protocol
IPTS	Institute for Prospective Technological Studies
ISO	International Organization for Standardization
JIIDE	Jornadas Ibéricas de Infraestructuras de Datos Espaciales (Iberian Congress of Spatial Data Infrastructures)
JRC	Joint Research Centre
LISIGE	Ley sobre las Infraestructuras y los Servicios de Información Geográfica en España (Law on Geographic Information Infrastructures and Services in Spain)
LMO	INSPIRE Legally Mandated Organisations
MAGRAMA	Ministerio de Agricultura, Alimentación y Medio Ambiente (Ministry of Agriculture, Food and the Environment)
MNE	Modelo de Nomenclátor de España (Spanish Gazetteer Model)
Nature SDI+	Best Practice Network for *SDI* in *Nature* Conservation
NEM	Núcleo Español de Metadatos (Spanish Core Metadata)
NCA	Norma Cartográfica de Aragón (Mapping Standards of Aragón)
NGA	Nomenclátor Geográfico de Andalucía (Geographic Gazetteer of Andalucía)
NGBE	Nomenclátor Geográfico Básico de España (Basic Geographic Gazetteer of Spain)
NGCE	Nomenclátor Geográfico Conciso de España (Concise Geographic Gazetteer of Spain)
NSDI	National Spatial Data Infrastructure
NTCA	Normas Técnicas Cartográficas de Andalucía (Technical Mapping Standards of Andalucía)
OGC	Open Geospatial Consortium
OSE	Observatorio de la Sostenibilidad de España (Observatory on Sustainability of Spain)
OTALEXC	Proyecto del observatorio territorial y ambiental del Alentejo, Centro de Portugal y Extremadura de España (Territorial and Environmental Observatory of Alentejo and Centro of Portugal and Extremadura of Spain)
PCA	Plan Cartográfico de Aragón (Mapping Plan of Aragón)
PCC	Plan Cartográfico de Cataluña (Mapping Plan of Catalonia)
PNOA	Plan Nacional de Ortofotografía Aérea (National Aerial Orthophotography Plan)

RCC	Registro Cartográfico de Cataluña (Cartographic Register of Catalonia)
RSS	Really Simple Syndication
SCN	Sistema Cartográfico Nacional (National Cartographic System)
SDIC	INSPIRE Spatial Data Interest Communities
SGT	Subgrupos de Trabajo (Working Sub-Groups)
SIG	Sistema de Información Geográfica (Geographic Information System)
SIGPAC	Sistema de Información Geográfica de Parcelas Agrícolas (Geographic Information System for Agricultural Plots)
SIOSE	Sistema de Información sobre Ocupación del Suelo de España (Information System on Land Cover and Use of Spain)
SITAR	Sistema de Información Territorial de Aragón (Territorial Information system of Aragón)
SITIBSA	Sistema de Información Territorial de Illes Balears, SA (Territorial Information system of the Balearic Islands)
SITNA	Sistema de Información Territorial de Navarra (Territorial Information system of Navarra)
SIU	Sistema de Información Urbana (Urban Information System)
TechWG	Technical Working Group
TechWG M&R	Technical Working Group for Monitoring and Reporting
TRACASA	Trabajos Catastrales, SA
TWG	Thematic Working Groups
UNSDI	United Nations Spatial Data Infrastructure
VIG	Validación de Información Geológica (Validation of Geological Information)
WMS	Web Map Service
WG NSDI	Working Group of the Spanish National Spatial Data Infrastructure
XML	Extensible Markup Language

3. Introduction

The development of SDI projects in Spain has been carried out progressively in recent years, with different but constant rhythms at the three levels at which the country is organised administratively:

- The national level, represented by the organisations of the General State Administration;
- The regional level, represented by the governments of the Autonomous Communities; and
- The local level, represented by Provincial, Inter-Island, Island and City councils.

The development of the SDIs has mainly been led by the public sector and, especially, by the mapping agencies that produce geographical information.

The period 2010-2012 has seen the continuation of the implementation and improvement of the reference geoportals at each one of those levels. The different INSPIRE monitoring campaigns carried out during this period indicate the existence of a large number of spatial data sets and services made available to the public via the Internet through these geoportals. This is the result of the generalised initiative by all the Public Administrations in Spain to offer free and interoperable geographic information. The meetings held by the Working Group of the Spatial Data Infrastructure of Spain (WG NSDI), supported by the Geographic High Council (CSG), have been instrumental as a driving force.

From the organisational point of view, this period stands out due to the introduction in 2010 of the Law on Geographic Information Infrastructures and Services in Spain (LISIGE). This law transposes the INSPIRE Directive and creates the legal and institutional framework to further both the implementation of the Directive and the development of the SDIs. This task has been the responsibility of the Executive Board of the Geographic Information Infrastructure of Spain (CODIIGE), which was formed in 2011 and which has been implemented via the creation of the Technical Working Groups (TechWG). The TechWGs are a series of thematic or specialised working groups which have been given the mission of solving the different technical and coordination challenges that face the CODIIGE. The TechWGs have been formed throughout 2012 and their members are formal representatives of the corresponding institutions.

A considerable effort has been made to participate in the Thematic Working Groups (TWG) which have developed the themes of Annex III and an attempt is made to participate at all the events and projects that arise in relationship with the Directive.

From the point of view of the offer of spatial data sets and services, it is worth emphasising that during the period 2010-2012 all the nodes of reference have evolved positively, although at very different rhythms. The geoportal of the Spanish National Spatial Data Infrastructure (NSDI), known in Spain by its Spanish initials IDEE, has been the driving force for activity, a point of access to the Spanish SDI, a repository of documentation, coordinator of catalogues and a showcase of resources and tools. The NSDI geoportal is the main reference, but each node that forms part of the NSDI is independent and

participates in the same conditions as the rest. Moreover, the large-scale harmonisation projects developed under the auspices of the CSG have incorporated the data models of INSPIRE (BTA, MNE, NEM, CartoCiudad, etc.). However, to date only a few examples are available of spatial data sets that comply with INSPIRE and a single network service that complies with the implementation rules of the Directive.

At the end of the 2010-2012 period, very much marked by the difficult economic circumstances suffered by Europe, the challenge consists of maintaining the provision of the services implemented in the NSDI, of continuing with the incorporation of new services and of applying the implementation rules of the INSPIRE Directive.

Regarding this report

This report has been compiled using the structure proposed by the EC/EEA INSPIRE Team and in compliance with Commission Decision 2009/442/EC, of 5 June, implementing Directive 2007/2/EC of the European Parliament and of the Council as regards monitoring and reporting.

It has been compiled thanks to a network of organisations and bodies that form part of the monitoring network of the INSPIRE Directive and which participate every year in the monitoring campaigns: 9 organisations of the General State Administration, 17 Autonomous Communities and 2 Autonomous Cities. In addition, the 15 TechWGs in existence during the consultation period have also collaborated.

The report has been coordinated by the TechWG for Monitoring and Reporting via a consultation and review process that has been divided into four phases:

- Phase 1, Compilation of raw data. At the beginning of June 2012 information was requested, both from the participants in the annual monitoring and from the TechWGs, in relationship with the different chapters of the report. In September a first document was prepared with all the information compiled, crossing the information received from the participants in the monitoring with that received from the TechWGs.
- Phase 2, Second round of requests for data. The document obtained was distributed among the contacts of the Autonomous Communities and Cities and the TechWGs in order to comment on it and complete it. The request was issued in mid-November and the replies were compiled in mid-January. The idea was to thus locate the most important errors and omissions and prepare the wording for version zero.
- Phase 3, Version zero of the report. In the middle of February version zero was issued to all the participants of the monitoring campaigns. 11 April was set as a limit.
- Phase 4, Definitive version. On the basis of the contributions made the definitive version was written, which was completed with the data compiled during the 2012 monitoring campaign.

The writing of the report has been the responsibility of the INSPIRE monitoring team of the National Geographic Institute (IGN) (Regional Service in Catalonia, Barcelona) and has been supervised by the

TechWG for Monitoring and Reporting (TechWG M&R). Once written, each chapter was published on the coordination site of the TechWG M&R for internal comments of the TechWG.

In addition to the contributions mentioned, the report-writing team has taken into account: the documentation generated by the eight meetings of the WG NSDI which took place during the period 2010-2012; the communications presented at the three Technical Congresses of the Infrastructure for Spatial Data of Spain (JIIDE) during the same period and various documents related with the development of SDIs in Spain. Use has also been made of the information published in the catalogues compiled by the NSDI geoportal, in the monthly bulletin SobreIDEs published by the WG NSDI, in the Blog of the NSDI and in the three INSPIRE monitoring campaigns in Spain.

4. Coordination and quality assurance

4.1 Coordination

The development of the SDI's in Spain has been led by the CSG since 2002, when the WG NSDI was created within the Specialised Commission on SDI of the Geographic High Council (CE IDE). It has been defined since the outset as an open group, of a technical nature, and it is formed by university experts, professionals from the private sector and representatives of the producers of geographic information, both for reference and thematic, at state as well as regional and local levels. The WG NSDI has become consolidated as an enriching space for communication and participation that has stimulated the creation of geoportals and the publication of data via interoperable web services.

July 2010 saw the approval of the LISIGE, which modernised state legislation relating to the production of geographic information. Among other things, the LISIGE regulated the creation of the CODIIGE and granted it responsibility for applying in Spain the implementing rules deriving from the INSPIRE Directive. The CODIIGE was set up in April 2011, and it took responsibility for the CE IDE and the WG NSDI, and immediately began to define the TechWGs with the objective of analysing the application of the implementing rules of INSPIRE by the Spanish Public Administrations and helping their bodies and organisations to achieve implementation.

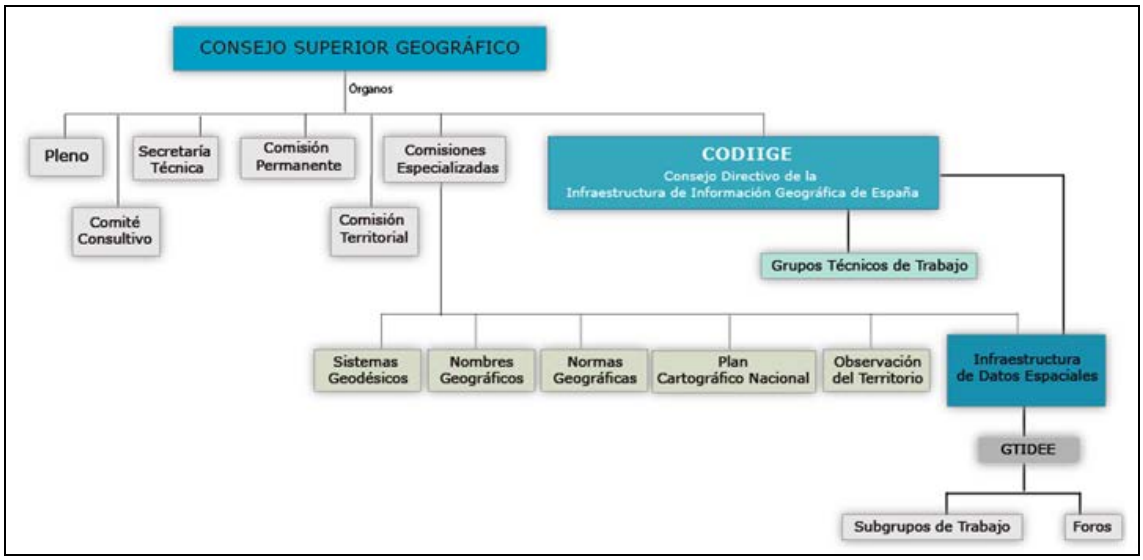

Figure 1. Structure of the CSG after the LISIGE. The position of the CODIIGE and its relationship with the CE IDE is highlighted.

Simultaneously, both the organisations of the General State Administration related with the production of geographic data and the Autonomous Communities have developed their own organisational

structures. The following sections provide an overall description of the set of organisational structures and section “10.1 List of Organisations” lists them individually with summaries.

4.1.1 Member State Contact Point

Name and contact information

Name of public authority	Consejo Superior Geográfico (Geographic High Council)
Contact information:	
Mailing address:	Secretaría Técnica del Consejo Superior Geográfico Instituto Geográfico Nacional General Ibañez de Íbero, 3 28003 – Madrid
Telephone number	
Fax number	
Email address	
URL of the organisation’s web site	http://www.fomento.es/MFOM/LANG_CASTELLANO/ DIRECCIONES_GENERALES/ ORGANOS_COLEGIADOS/CSG/ (link)
Contact person	Sebastián Mas Mayoral
Email address	smas@fomento.es
Telephone number	+34 91 5979646
Contact person – substitute	Antonio Rodríguez Pascual
Email address	afrodriguez@fomento.es
Telephone number	+34 91 5979661

Table 1. Member State Contact Point.

Role and responsibilities

The CSG is the management body of the National Cartographic System (SCN)[1]. It is a collegiate body, attached to the Ministry of Public Works and Transport, and it performs the consultative and planning function for geographic information and official mapping.

According to article 4 of the LISIGE, the CSG is the contact point with the European Commission in relationship with article 19.2 of the INSPIRE Directive. Furthermore, it is the body responsible for coordination and management of the Geographic Information Infrastructure of Spain (IIGE), owing to which it is responsible for its constitution and maintenance, being responsible for:

[1] The SCN is the obligatory framework for action by the General State Administrations with regard to mapping and for all the public Administrations that adopt it voluntarily as the model for cooperative action. It was established via Royal Decree 1545/2007.

a) Proposing to the competent Authorities the actions to be performed by the Administrations or organisations of the public sector for the establishment of the IIGE.

b) Guaranteeing its accessibility and interoperability.

c) Integrating the contributions of other producers or suppliers.

4.1.2 The coordination structure

Name and contact information

Name of the public authority	Consejo Directivo de la Infraestructura de Información Geográfica de España (CODIIGE) (Executive board of the Geographic Information Infrastructure of Spain)
Contact information:	
Mailing address:	Secretaría Técnica del Consejo Superior Geográfico Instituto Geográfico Nacional General Ibañez de Íbero, 3 28003 – Madrid
Telephone number	
Fax number	
Email address	
URL of the organisation's web site	http://www.fomento.gob.es/MFOM/LANG_CASTELLANO/ORGANOS_COLEGIADOS/CSG/ORGANOS/CDirectivoIGeografica.htm (link)
Contact person	Sebastián Mas Mayoral
Email address	smas@fomento.es
Telephone number	+34 91 5979646
Contact person – substitute	Antonio Rodríguez Pascual
Email address	afrodriguez@fomento.es
Telephone number	+34 91 5979661

Table 2. Coordination structure that supports the Member State Contact Point.

Role and responsibilities

It corresponds to the CODIIGE, by virtue of that set forth in article 28 of the SCN, to coordinate, control and manage the IIGE.

Likewise, the CODIIGE is responsible for:

a) Proposing to the CSG, via its Permanent Commission, the actions to be performed by the Public Administrations or public sector organisations for the establishment of the IIGE.

b) Proposing to the CSG, via its Permanent Commission, the agenda for action and the work to allow the constitution and effective operability of the IIGE, as well as proposing its funding model and the participation in it by each Administration or public sector organisation.

c) Assisting the CSG in the tasks of:

a. Guaranteeing that the Public Administrations establish the geographic information infrastructures for integration of the geographic data and interoperable geographic information services for which they are responsible, ensuring that they are accessible and interoperable through the network constituted by the IIGE.

b. Assisting the IIGE to integrate the contributions of geographic data and interoperable geographic information services of other producers and suppliers of added value services, as well as to receive, analyse and incorporate, if considered appropriate, the contributions of the above and of the users, in general, regarding current practices, the needs of users and reactions to the application of this law.

c. Acting as a contact point with the European Commission in relationship with the INSPIRE Directive.

d. Assisting the Technical Secretariat in the performance of its duties which are entrusted to it by Article 29.4 of the SCN, in relationship with the IIGE.

e. Formulating proposals to the competent authorities regarding the rules for management and implementation, the policy for sharing, access and use of the data and services and the policy for the communication, distribution and dissemination of the information.

f. Any others that may be entrusted to it by the Permanent Commission or the Plenary Session.

The CODIIGE includes members of the Commissions of the CSG with expertise on both SDIs and on the standards for geographic information, and it must include representation of the three levels of Administration.

In this respect, the CODIIGE is formed by:

a) A President, who will be the President of the CE IDE.

b) A first Vice-President, who will be the President of the Specialised Commission on Geographic Rules.

c) A second Vice-President, who will be the President of the Specialised Commission on Geographic Names or of the Specialised Commission of the National Cartographic Plan, who may substitute each other.

d) A Secretary, who will be a senior civil servant of the National Geographic Institute.

e) 11 members, all experts on SDIs:

a. 2 representatives of the General State Administration, at the proposal of the Permanent Commission.

b. 5 representatives of the Autonomous Communities, at the proposal of the Territorial Commission.

c. 1 representative of the Local Administration, at the proposal of the Territorial Commission.

d. 3 members elected by the Permanent Commission from among the managers of nodes or geoportals integrated in the NSDI.

The functions of the CODIIGE also include the management of the CE IDE, the activity of which is focused via the WG NSDI.

4.1.3 Relationship with third parties and summary of the manner of working and procedures

The relationship with third parties takes place, at state level, in two different spheres which are distinguished from each other by their executive capacity. As has been seen, on the one hand the mechanisms are still in place for the relationship between public organisations, the universities and the private sector which take place in the framework provided by the WG NSDI and which already enjoy a long tradition. Various open forums have arisen around the WG NSDI, meetings and workshops are organised, knowledge is exchanged and the Iberian Congress of Spatial Data Infrastructures (JIIDE) is held. Furthermore, since 2010 the management structure of the IIGE has been formed, headed by the CODIIGE, which has a more executive and managerial function, and which mainly focuses on the official producers of geographic information. In both spheres considerable importance is given to relations between the different stakeholders, both the contributors to the SDIs in Spain in general and those responsible for satisfying the demands of INSPIRE in particular.

It is also appropriate to mention the structures for coordination and relationship with third parties that have been formed both within the state organisations and in the framework of the administrations of the Autonomous Communities. We will therefore distinguish the following components:

i. The CODIIGE
ii. The WG NSDI
iii. Coordination structures of the General State Administration
iv. Coordination structures of the Autonomous Communities

i. The CODIIGE

Since it was set up in April 2011, the CODIIGE has met in July and November of 2011 and in April, July and October of 2012. During the first meetings the TechWGs were defined. These are standardisation

groups responsible for analysing the application of the Implementation Rules of INSPIRE by the Spanish Public Administrations and assisting their bodies and organisations in achieving compliance. The guidelines, methodologies, classifications, gazetteers, codes, etc. defined by the TechWGs to favour the standardisation of the contents of the IIGE will be proposed to the CODIIGE so that, if it considers them adequate, it will communicate them to the CSG to enable them to follow their usual approval procedure.

The TechWGs include representatives of all the stakeholders with responsibility for both the data and services required by INSPIRE (table 3).

- Metadata and catalogue
- Monitoring and reporting
- Architecture, standards and network services
- Data and services policy
- Geodetic Reference System / Official Coordinates System
- Geographic names
- Territorial and Administrative Boundaries
- Addresses and street plans
- Local authorities
- Hydrography
- Transport networks
- Protected sites (Historic-Cultural Heritage)
- Protected sites (Environment)
- Cadastral parcel
- Digital models of elevations
- Orthoimagery
- Land use and occupation
- Geology
- Population entities

Table 3. List of TechWGs at 15 May 2013.

Each TechWG has been assigned a coordinator and is free to organise itself as considered convenient in order to respond to the questions posed by the CODIIGE. The different TechWGs have been constituted during 2012, as they have begun to participate in the Monitoring and Reporting tasks of INSPIRE.

ii. The WG NSDI

The WG NSDI currently enjoys the participation of 344 individuals linked to the more than 160 Spanish organisations and the dynamics of its work consist of the holding of regular meetings, during which technical presentations are given, recommendations are agreed and approved for the implementation of SDI projects in Spain, experiences are shared and the evolution of the NSDI project and other national,

regional and local SDI projects is presented. The WG NSDI has met on eight occasions during the period 2010-2012 (table 4).

25/02/2010	Madrid
14/05/2010	Mérida
29/10/2010	Lisbon
18/03/2011	Barcelona
29/04/2011	Jaén
11/11/2011	Barcelona
13/04/2012	Madrid
19/10/2012	Madrid

Table 4. List of meetings of the WG NSDI in the period 2010-2012.

In the period 2010-2012 it is appropriate to mention the organisation of the JIIDE, a congress-type event which is held annually. It substitutes the Conference of the Spatial Data Infrastructure of Spain, repeating the model and extending it to Portugal and Andorra, owing to which the respective geographic information authorities have collaborated (table 5). :

27-29/10/2010	Lisbon	I JIIDE
09-11/11/2011	Barcelona	II JIIDE
17-19/10/2012	Madrid	III JIIDE

Table 5. List of JIIDE in the period 2010-2012.

The Working Sub-Groups of the WG NSDI listed in table 6 are currently constituted.

- SGT1. Reference Data and Thematic Data
- SGT2. Metadata
- SGT3. Architecture and Standards
- SGT4. Data Policy
- SGT6. SDI Observatory
- SGT7. UNSDI Coordination Office
- SGT8. Data catalogue
- SGT9. Legal Security in Territorial Information
- SGT10. Cartographic Heritage in the SDI
- SGT11. Local SDI
- SGT12. Historic Heritage

Table 6. List of the Working Sub-Groups of the WG NSDI at 15 May 2013.

The Working Sub-Groups are free to choose their composition, the matters to be dealt with, the way of working and the respective objectives. The results of the Working Sub-Groups are presented at the meetings of the WG NSDI, which may propose them to the CSG for approval as Recommendations.

In view of the coincidence with the recently created Technical Working Groups, the CE IDE is proposing the transformation of the Working Sub-Groups into Forums, much more open and participative structures. Furthermore, the organisational format of the Forum is much more open than that of the Working Sub-Groups, which permits the range of topics and participants to be expanded. A good example is the Iberian and Latin-American Forum of the Open Geospatial Consortium (ILAF OGC), a forum promoted from the Open Geospatial Consortium (OGC) to stimulate the participation of the Spanish, Portuguese and Catalan-speaking population in the development of standards and other related activities. ILAF OGC has its own dynamic, its own purposes and its own links within the international arena.

During the period 2010-2012 the Forums listed in table 7 have been active.

• Metadata Forum • ILAF OGC • Addresses Forum • Universities Forum

Table 7. List of the Forums with activity during the period 2010-2012.

iii. Coordination Structures of the General State Administration

With regard to the organisations of the General State Administration three types of coordination structures can be considered which are involved in the implementation of INSPIRE

I – The National Cartographic Plan

Defined in the LISIGE, the National Cartographic Plan is a planning instrument for official mapping production by the General State Administration. It should include the technical rules for production, at the proposal of the competent Authorities, and the criteria for standardisation, harmonisation and coordination of the production of the Administrations that form part of the SCN. To achieve this, mechanisms are to be established for collaboration with the Armed Forces Mapping Plan and with the Plans approved by the Autonomous Communities.

During the year 2012 information has been complied between the different organisations of the General State Administration with responsibility for producing geographic information, in which questions have been asked regarding both the data and services which they manage and their future plans in this respect.

II – Inter-institutional coordination structures

In the case of the ministries or organisations that manage multiple institutions it is necessary to establish an organisational structure to coordinate their production activity with regard to geographic information.

In the case of the Ministry of Agriculture, Food and the Environment (MAGRAMA) a Working Group was set up in 2012 for the Coordination of Geographic Information Services, formed by representatives of the Under-Secretariat, the Secretariat of State for the Environment, the General Secretariat for Agriculture and Food, the General Secretariat of Fishing, and Autonomous Community Organisations. One of the first tasks they have performed is the compilation of the spatial data sets that the Ministry must provide in order to comply with INSPIRE.

A similar case is that of the Spanish National Research Council (CSIC) which has different research groups in different Centres and Institutes, with geoportals that publish geospatial information openly on the Internet with SDI specifications and protocols. The Centre for Human and Social Sciences has assumed the role of coordinator, beginning with the collection of information using INSPIRE as a reference. Training courses have also been given on “Introduction to SDIs” for personnel of the whole CSIC organisation.

III – Intra-institutional coordination structures

Within each institution it has also been necessary to coordinate adaptation to INSPIRE of the activity performed by their different units. This is the case of the Geological and Mining Institute of Spain (IGME) which during the year 2012 has implemented an internal project which involves experts of the different disciplines covered by the Directive, both technical and thematic, the main objective of which is the implementation of INSPIRE in the Institute. In the implementation process, as well as purely technical and conceptual matters, consideration has been given to aspects of training and dissemination of the Directive among the technicians.

iv. Coordination structures of the Autonomous Communities

In the exercise of their competences, the Autonomous Communities manage a large amount of geographic information divided among multiple institutions, which has made it necessary to coordinate their management, to plan it and to define contact points to coordinate at state level. Furthermore, the Autonomous Communities assume the role of coordinating their activity with that performed by the Local Administration and they channel all the information compiled.

This coordination takes various forms. Section 10.1.2 of this document lists them all. By way of summary, three main types can be mentioned.

The Autonomous Communities that have created coordination structures for managing their production of geographic information:

- In Andalucía, the Consejo Andaluz de Estadística y Cartografía (Andalucian Council of Statistics and Cartography).
- In Aragón, the Consejo de Cartografía de Aragón (Cartographic Council of Aragón).
- In Catalonia, the C4 (Cartographic Coordination Commission of Catalonia).
- In Castile and Leon, the Consejo de Cartografía de Castilla y León (Cartographic Council of Castile and Leon).
- In Extremadura, the Centro de Información Cartográfico y Territorial de Extremadura (Cartographic and Territorial Information Centre of Extremadura).
- In Galicia, the Comisión de Coordinación de Sistemas de Información Geográfica y Cartografía (Commission for the Coordination of Geographic and Cartographic Information Systems).
- In Navarra, the SITNA (Territorial Information System of Navarra).
- In Euskadi, the Basque Government has created for its coordination the Management Committee, the Technical Committee, and the Interdepartmental Informative Commission of the Euskadi SDI, chaired by the Department of Territorial Planning and Development, via the Mapping Service of the Basque Government.

The Autonomous Communities that assign this coordination to a specific institution:

- In Asturias, the Centro de Cartografía (Cartographic Centre).
- In La Rioja, the Sección de Sistemas de Información Geográfica y Cartografía (Geographic Information Systems and Cartography Department) of the Territorial Planning Service (Directorate General of Planning and Housing).
- In Madrid, the Centro Regional de Información Cartográfica (Regional Centre for Cartographic Information) which belongs to the Directorate General for Planning and Territorial Strategy (Department of the Environment and Territorial Planning).

The Autonomous Communities in which coordination is carried out within the framework of the management of their SDI project:

- In the Valencian Community, the Spatial Data Infrastructure of the Valencian Community (IDECV).
- In the Balearic Islands, the Spatial Data Infrastructure of the Balearic Islands (IDEIB).

4.1.4 Comments on the monitoring and reporting process

The monitoring and reporting activities have been performed according to the calendar, the instructions and the tools made available by the EC INSPIRE Team. The results are available in the geoportal of the NSDI and in the INSPIRE portal (Muñoz and Capdevila, 2012).

At an organisational level, the IGN in its condition of Technical Secretariat of the CSG was formerly responsible for carrying out and coordinating the monitoring and reporting process. Subsequently, with the publication of the LISIGE and the creation of the CODIIGE, in 2011 the TechWG M&R was constituted, and has assumed that mission. The monitoring process has varied along with the creation of the new organisational structures:

- The monitoring for 2010, carried out in 2011, was started on 29 March and was completed on 15 May. As a support tool a wiki was implemented with instructions and some Excel spread sheets were distributed, similar to the one provided by the EC INSPIRE Team but translated and broken down by themes and types of services. 15 organisations of the General State Administration and 17 Autonomous Communities collaborated. In total 7289 records were reported. The instructions given to the participating organisations were solely those of the EC INSPIRE Team. Only the format of the content was controlled and never its compliance with the data specifications. In the meeting of July 2011 of the CODIIGE it was concluded that the result of the monitoring for 2010 showed a large quantity of available data and services, a high degree of disorganisation in the way the information was structured and a considerable lack of knowledge of what was required by INSPIRE. To deal with this it was proposed, among other things, to request additional data for the purpose of controlling and improving the quality of the response to INSPIRE.
- The monitoring for 2011, carried out in 2012, was characterised by the appearance of the TechWGs, including the TechWG for Monitoring and Reporting. The process was commenced in February and was completed on 15 May. It was supported by a wiki with instructions and some new Excel spread sheets were distributed with the additional columns approved by the CODIIGE. 8 organisations of the General State Administration and 17 Autonomous Communities collaborated. 6089 records were reported. In March the TechWGs were requested to analyse the data received in the first phase of the consultation. On the basis of their considerations, at the meeting of the CODIIGE in April some rules were established to filter the information received. This explains the reduction in the records reported compared to those initially received. Even so, the CODIIGE is aware that the response is still not very well adapted to the desired development of INSPIRE in Spain.
- The monitoring for 2012, carried out in 2013, incorporated a new web tool, the Gestor S&I, with the objective of providing a tool for coordination between the TechWG M&R and the participating organisations. The Gestor S&I replaced the wiki of previous campaigns and it was rolled out at the beginning of March. The Gestor S&I allowed control of the times of the different

phases of the monitoring calendar and it incorporated a system for validation of the format of the information provided, which reduced the number of incidents of this type detected in previous years. As in the 2011 campaign, the TechWGs of the CODIIGE reviewed the spatial data sets and services of their thematic sphere, communicating to the organisations regarding the content incidents detected. The TechWG for Geodetic Reference System-Official Coordinates System, which deals with themes 1 and 2 of Annex I, considered that it was not necessary to report Spatial Data sets since Regulation 1089/2010 does not require it. Other TechWGs prepared lists with the spatial data sets that they considered should be reported, in some cases necessarily and in others exclusively. The TechWG for Architecture, Standards and Network Services placed special emphasis on the fact that only services that comply with the specifications of semantics and performance specified in Regulation 976/2009 and Regulation 1088/2010 were reported as compliant services. 8 organisations of the General State Administration and 17 Autonomous Communities collaborated. In total 5979 records were reported.

With regard to the INSPIRE Report for 2010–2012, the TechWG for Monitoring and Reporting proposed the preparation process in four phases, as has been described above in chapter 3.

In general, the following conditioning factors have been observed during the monitoring and reporting process:

- In the monitoring process, records with contents that are not adapted to INSPIRE are still reported by the organisations of the General State Administration and the Autonomous Communities.
- The participation of the TechWGs as specialists is essential for the selection of the information compiled.

All of this compiling of information has been carried out in a different way according to the type of interlocutor: organisation of the General State Administration, TechWG or Autonomous Community.

The organisations of the General State Administration have reported on the basis of the documentation provided by the TechWG M&R in the official request for data. A particular case is the CSIC, since it has the consideration of producer of scientific data but does not have administrative competences in the spheres of these data. Therefore, the data generated in the framework of the activity of the CSIC are not usually considered as official. Even so, these data are generated by an official organisation, they coincide with the themes of INSPIRE and are considered to be of interest. The CSIC has different research groups in different Centres and Institutes, with geoportals[2] that publish geospatial information openly on the Internet with SDI specifications and protocols. The working procedure to report on this has consisted of the collection of information from each one of the Centres by filling in the Excel files

[2] The section “web sites” of chapter 10.2 lists the geoportals managed by the CSIC.

and the support documentation provided by the TWG M&R, and the tools made available by the EC INSPIRE Team.

The intervention of the TechWGs is limited to the review and analysis of the spatial data sets sent by the TechWG M&R corresponding to their area. Each TechWG establishes its own coordination mechanisms based on the requirements established by the CODIIGE. For example, the TechWG for Hydrography has carried out a monitoring and reporting process via the coordination between representatives of SDI nodes of River Basin Organisations and Authorities and different Sub-Directorates of the Directorate General for Water.

With regard to the Autonomous Communities different cases can be seen:

- In Andalucía the INSPIRE monitoring and reporting process is carried out via the Working Group of the Andalucía SDI (GT-IDEAndalucía). Those responsible for the different nodes contribute the information that corresponds to them, which is standardised and integrated by the Geographic Infrastructures Service of the Institute of Statistics and Cartography of Andalucía (IECA), from where it is sent to the CODIIGE. The results of the monitoring and reporting process are communicated both to the Working Group itself and to the Interdepartmental Commission of Statistics and Cartography. Likewise, the lists of data and services prepared in the monitoring process are given coherence with the contents of the Spatial Data Catalogue of Andalucía and the Catalogue of Interoperable Services.
- In Aragón the INSPIRE monitoring and reporting process is managed annually via the Territorial Information Centre of Aragón (CINTA) which performs the task of reporting on the data sets and mapping services managed by any department or public organisation of the Government of Aragón.
- In Catalonia, the Cartographic Institute of Catalonia (ICC), it its capacity of permanent support body of the C4, performs the whole process of annual monitoring, which consists of compiling the information of all the organisations of Catalonia (31 organisations consulted), the incorporation of the information in the corresponding forms and the sending of the completed forms to the TechWG M&R. In the case of the spatial data sets and services, the list of existing spatial data sets included in the catalogue of the Mapping Plan of Catalonia (PCC) is reported in the first instance, since this is the basic information that the public administrations in Catalonia require and produce for the exercise of their competences. In this way it is possible to evaluate and monitor the degree of territorial coverage, the existence or not of metadata and the existence of services associated with the data. With regard to network services the services reported by the entities consulted are reported, complemented by those included in the catalogue of the Spatial Data Infrastructure of Catalonia (IDEC).
- In Extremadura the process is coordinated from the Cartographic and Territorial Information Centre of Extremadura (CICTEx), which communicates the surveys for the collection of INSPIRE indicators to the different departments that provide the spatial data sets and network

services. Prior to the sending of the information to the TechWG M&R, a filtering and standardisation process is carried out in the CICTEx.

- In Galicia, the process is performed via a document sent to the local administrations of Galicia to inform them of this process. In this document information is requested on their spatial data sets and services made available to the users.
- In Navarra the preparation of the INSPIRE process for the monitoring of data, metadata and services is entrusted to and has been performed since 2010 by the public company Tracasa. Based on the inventory of spatial data sets of the Territorial Information system of Navarra (SITNA) those which correspond to the themes of the Directive are selected and studied and, with the assistance of the representatives of the public administration of Navarra in the Thematic Working Groups, responsibility is established for the layers of information. The contributions to the INSPIRE report are analysed and approved by the abovementioned bodies.
- In La Rioja the organisational structure developed for the production/publication of geographic information as well as the size and single-province nature of the institution allows the monitoring and reporting tasks to be approached from a general perspective, avoiding the delegation of data collection to other departments and institutions.
- In the Valencian Community monitoring is made of those services that have been created or registered within the Spatial Data Infrastructure of the Valencian Community (IDECV). Duplication is detected in the publication of spatial data services, since there are users who have the data and decide to publish them although they are not the owners. It is not known whether spatial data with services exist outside the sphere of the Valencian Government. Furthermore, there is no knowledge of intranet services that have not been included in the national monitoring file owing to the fact that they have restricted access and/or duplicate data.
- In the Balearic Islands the compilation of SDI data is performed by the public company dedicated to the production and distribution of mapping, SITIBSA. The information is collected from the Government of the Balearic Islands and the Island Councils.
- In Euskadi, this process is performed by the Mapping Service of the Basque Government (Directorate of Territorial Planning and Development).

4.2 Quality assurance

The logical route to quality assurance is to establish, in the first place, regulations that define it according to product and service; in the second place, to establish procedures to measure and assure the previously defined quality and, finally, a certification mechanism that officially validates compliance with the required levels of quality.

In the INSPIRE regulations quality assurance has not been resolved. In the thematic guidelines some aspects are defined of what is considered quality in each case. However, procedures are not defined for the measurement and assurance of quality. Certification is the responsibility of each member state.

This chapter will cover three aspects of quality:

a) Quality in spatial data sets, distinguishing that which affects structure (compliance with the data model of the INSPIRE regulations) from that which affects content (degree of compliance with the parameters of precision, accuracy, completeness, etc. of the data).

b) Quality in the metadata, where a distinction will be made, in a similar manner to that described above, between structure and content.

c) Quality in services, distinguishing quality in the performance (requirement for compliance with the INSPIRE regulations for network services) of the functionalities corresponding to each type of INSPIRE service (basically, the requirements established to guarantee interoperability).

Quality assurance affects three groups of stakeholders:

- The CODIIGE and the TechWG. Their mission is to guarantee the correct functioning of the IIGE, owing to which they should disseminate the INSPIRE regulations and certify compliance.
- The different structures that are in place for the inter-institutional coordination of the General State Administration and the Autonomous Communities, which inherit the requirements of INSPIRE and the decisions of the CODIIGE and which are in contact with the producers of data and services.
- The producers of data and services which must adapt to the INSPIRE regulations.

The work of the TechWGs is still in the early stages and they are beginning to face the challenges posed by quality assurance. The TechWG for Geographic Names assumes as quality criteria those recommended by INSPIRE and adds that of thematic accuracy (spelling errors and variants). Quality thresholds are yet to be established for these parameters and, in general, for the procedures to evaluate them. However, the TechWG observes that the work necessary to assure quality has a high cost.

Regarding the other coordination structures, their responses are diverse although some common affirmations can be detected:

- The requirement for quality is usually transferred to the producers of data via compliance with the Technical Conditions.
- Quality assurance with regard to the structure of metadata is carried out via the use of templates or appropriate metadata editing software.
- Quality assurance of the functioning of some types of services is carried out via the use of the validation tool of the INSPIRE geoportal.

Some matters worth highlighting include:

- In Andalucía, in accordance with Decree 141/2006, the Mapping Plan of Andalucía 2009 establishes the principles for quality assurance and the Draft Statistical and Mapping Plan of Andalucía 2013-2017 defines a series of strategies which include “standardisation and the guarantee of quality”, and its Section 5 is dedicated to the “Standardisation and Quality of Information”. In order to standardise the procedure for assuring and documenting the quality of spatial data and services, the Interdepartmental Commission on Statistics and Cartography in its meeting of 23 September 2011 approved the Technical Mapping Standards of Andalucía relative to this topic, named respectively NTCA-01002-Quality Assurance and NTCA-01003-Quality Documentation. The documentation on the levels of quality of geographic information is prepared at two levels. Prior to production, each mapping activity must have a Technical Report which specifies the methodology to be used, the desired results and the quality controls to be performed. Upon completion of the mapping activity, the descriptive metadata of the data produced include references to the quality of the product, lineage being among the obligatory metadata in the Spatial Data Catalogue of Andalucía.
- In Aragón, by virtue of Decree 208/2010, and after approval by a resolution of the Governing Council on 6 March 2013 of the Mapping Plan of Aragón (PCA) 2013-2016, the Mapping Standards of Aragón (NCA) have been prepared, which define quality parameters at the level of metadata, data and geographic services. In this way the minimum technical specifications will be adapted or defined which must be complied with by each producing unit of mapping information in order for this to be published in the node of SDI of Aragón (which implies the consequent evolution of the current Territorial Information system of Aragón (SITAR)).
- In Catalonia, the Law 16/2005 and Decree 398/2006 which implements it, together with the Mapping Plan of Catalonia (PCC) define, in a general manner, the basic procedures for the quality assurance of spatial data sets and services. These rules establish that the official mapping and official geographic information in Catalonia are to be used compulsorily by all the Catalonian administrations for the formation of new cartography, as well as in the exercise of the competences of the Catalonian Government, local authorities and other public bodies in Catalonia, when this exercise requires the use of geographic information.

4.2.1 Quality assurance procedures

Quality assurance procedures have yet to be defined by the CODIIGE.

With regard to the other coordination structures and producers of data and services three classes can be distinguished:

1. With procedures implemented
2. No procedures implemented but with technical quality standards
3. With technical standards in the preparation phase

4.2.1.1 With procedures implemented

The IGME with metadata structure: it has defined a specific profile that complies with ISO, NEM and INSPIRE; it reviews all that is generated from the formal point of view (XML structure, concordance with regulations) and from the point of view of content; the XML file is validated with the “INSPIRE metadata validator” application.

With regard to the spatial data sets themselves a procedure has been prepared, named Validation of Geological Information (VIG), which controls aspects of compliance with the GEODE model and geometry.

In Andalucía, the procedures are included in the standard NTCA-01002-Quality Assurance, which in turn adopts the procedures of the following ISO standards: ISO 19113: Quality Principles; ISO 19114: Quality Evaluation Procedures; ISO 19138: Data Quality Measures and ISO 19131: Data Product Specifications.

In Aragón, consideration is given to the receipt of communications and the management of incidents communicated by users, both internal users of the Administration itself and external users. Furthermore, and after the approval of the NCA (which is expected to take place at the end of 2013 or the beginning of 2014) the mapping information published in IDEAragon will comply with minimum quality requirements at the level of metadata (Inspire profile), spatial data sets (NCA or Technical specifications of mapping products or sectoral rules of administrative units or public organisations of the Government of Aragón for mapping information products) and services (ISO 19119).

The Spatial Data Infrastructure of the Balearic Islands (IDEIB) guarantees quality in the performance of services via a monitoring tool, Nagios.

In Catalonia there are two mechanisms for carrying out quality assurance:

- The C4 officialises the technical specifications of each product, which incorporate the quality requirements for each one. At 31/12/2012 a total of 15 technical specifications of spatial data sets are officialised. The technical specifications are also standardised by this Commission, and are written according to the ISO 19100 standard.
- The Cartographic Register of Catalonia (RCC) carries out quality control of all the geographic information requested for inscription in this Register. This quality control is carried out by the ICC, which determines its final qualification, after review of the geographic information, the technical specifications and the metadata file.

The ICC has implemented support tools with the objective of improving the quality of the data and of their metadata. It has thus developed the program for the collection and editing of metadata: MetaD, already in its version 4.0, for the editing and exporting of metadata with the profile defined by the Spatial Data Infrastructure of Catalonia (IDEC) (subset of the standard ISO 19115 with its implementation ISO 19139). Tasks of support and assistance in the installation and use of the program are also performed.

In Extremadura quality assurance is performed according to type:

- For data sets: the data produced by the CICTEx follow quality control processes, in each one of their phases, via custom developments and final supervision by operators. Quality controls are made of externally produced data sets to ensure positional quality and a certain thematic logic.
- For Metadata: the use of CatMdEdit validating the Spanish Core Metadata (NEM) and ISO 19115 profiles.
- For services: monitoring for detection of faults and alarm system of the corporate system.

In Galicia contributions are validated in relationship with the requirements established in the corresponding contracting specifications. For metadata, CatMDEdit is used.

In Madrid the companies that perform the contracts for mapping updates follow specific quality control protocols to ensure compliance with the contracting specifications. The Regional Centre for Cartographic Information supervises the work delivered, by checking each one of the pages of the map, visually checking the position and content of the new elements in relationship with the orthophotographs, and possibly performing fieldwork to check geographic names.

In Navarra the structure of the metadata is assured via the use of templates and the INSPIRE validator. With regard to spatial data sets, the Data Catalogue and a GIS Metacatalogue are used as tools. The first of these allows the information to be organised and prevents duplications or incoherence and assigns ownerships correctly. The second allows each piece of data incorporated in the system to adjust to a common data model; this ensures their parameters of logical and thematic quality. The GIS uploading tools used incorporate topological validation components to prevent erroneous, duplicated, etc. elements. The information incorporated is always reviewed and analysed by its competent owners (the only ones with capacity to incorporate information in the Territorial Information system of Navarra (SITNA)) before its definitive publication. The intensive use of all this information by very diverse users is another source of control that allows quality to be maintained in the information published. For the quality of services an automated procedure has been implemented which consists of issuing regular requests to the most used services to ensure their correct functioning (search for metadata, requests for maps, capabilities, etc.). In addition it is ensured that the response does not exceed a specified time.

In la Rioja a control is carried out (using a 1:5,000 topographic map as a reference) of the geometric quality of the topology via automatic procedures. The integrity of the databases in which the upload is carried out and the semantics are controlled via the use of a system of validation rules. Furthermore, citizen feedback is used as a mechanism for control and verification. The structure of the metadata is guaranteed by means of a template in a tool integrated in the database. With regard to services, informal monitoring of their activity is performed (interaction with users, etc.).

In the Valencian Community the structure of the metadata is guaranteed using xml templates in Geonetwork and the options for the validation of metadata. The performance of the services is checked via capacity tests of the discovery and viewing services and availability is assured by the use of three replicated servers.

In Euskadi, the Mapping Service of the Basque Government validates the provision of information to the Euskadi SDI. In the case of metadata they are incorporated via a template and are generated and

validated with CatMDEdit. The basic mapping has its own specific quality controls (geometric, topological and semantic as applicable) and the various departments are responsible for guaranteeing the quality of the information they produce. Even so, before being uploaded to the Euskadi SDI, some general controls are carried out: nomenclature, reference system, geometric adaptation to the referred scale, verification of geometries, unjustified existence of gaps or overlaps and semantic control of null entries. In relationship with network services a monitoring service analyses the availability of the SDI services. Furthermore, the accessibility and free dissemination of the Euskadi SDI is generating a multitude of external queries that, as a complement, allow an improvement in the quality of the information and services.

4.2.1.2 No procedures implemented but with technical quality standards

The MAGRAMA has established a set of standards to be complied with for the implementation of any GIS in the Ministry. These standards include: delivery formats, geodetic reference systems and the use of official data sources.

For metadata, the MAGRAMA has prepared a common template of metadata for the whole Ministry and requires the layers of information integrated in the GIS to include the corresponding metadata.

Apart from the VIG procedure mentioned above the IGME has two technical guides for the quality control of digital geological information at a scale of 1:50,000. The intention of the Institute is to combine and extend procedures and technical guides for use in supervising spatial data sets adapted to the corresponding specifications.

In Galicia quality control is being proposed in the provision of services.

4.2.1.3 With technical quality standards in the preparation phase

Aragón is in the drafting phase of the NCA.

The other nodes have not yet prepared the necessary internal regulations.

4.2.2 Analysis of quality assurance problems

The producers of information have reached the following conclusions.

A) The main problem regarding the quality assurance of the data is its cost.

> Large volumes of data need to be managed in complex production processes where there is a requirement that they should be extremely up-to-date. In many cases, quality needs to be checked in the field, which involves considerable cost.

B) Quality parameters have not yet been established to describe the quality of spatial data sets.

The technical guides prepared by INSPIRE lack quality assure procedures and many of the contracting specifications or technical requirements for spatial data sets lack this chapter.

C) Diversity of origins of the data.

To satisfy the data models required by INSPIRE in many cases it will be necessary to provide data obtained from different sources, obtained via diverse procedures and with different requirements and quality controls.

D) Diversity of legal regulations of the different competent authorities, for both the creation and maintenance of the data.

E) Metrics have not been determined for the quality assurance of services.

4.2.3 Measures taken to improve quality assurance

From the panorama set forth in the previous paragraphs it can be concluded that there is still a considerable lack of reference regulations with regard to quality. As a result of this, quality assurance procedures are scarce.

An interesting development is that carried out in Catalonia via Decree 62/2010 which defines and identifies the spatial data sets that the General Autonomous Community Administration and the Local Administration produce and use. It determines the structure, quality, availability, interoperability, updating and access conditions of the spatial data sets. This decree, together with the Law 16/2005 and Decree 398/2006 which implements it, define the mechanisms necessary for the approval of specifications and standards, and the creation of support tools with the objective of improving the quality of the data and metadata, and boosting the creation of working groups for their definition, implementation and dissemination.

Furthermore, the economic situation is a burden for both the necessary developments and their roll-out.

Among the most usual measures is the use of templates and metadata editing software, the intention of which is to ensure the structural quality of the metadata offered. This strategy is being widely used for the metadata of spatial data sets. The metadata of services, however, are not yet sufficiently implemented and discrepancies are still observed between the metadata and the information provided by the service (the *capabilities*). In Navarra emphasis is given to the training of those responsible for filling in these metadata.

The gradual implementation of coordination structures will also allow the improvement of quality assurance since these problems will be approached much more specifically. For example, the MAGRAMA is carrying out a standardisation and integration of both the geographic information existing in the Ministry and of the systems used for its management, owing to which the implementation of a Corporate GIS platform supported by standard web services is key. Some Autonomous Communities, as in the case Galicia or Navarra, also favour this strategy.

The documentation on lineage and quality of the products is essential, owing to which special emphasis is placed on this in Andalucía.

The participation of the users in the improvement processes is considered very valid by the Balearic Islands and La Rioja.

4.2.4 Quality certification mechanisms

Many of the stakeholders involved in the management of public geographic information consider the implementation of official Registers, in which the quality of the data compiled should be guaranteed. However, the majority of these have not yet been set up.

In the case of Catalonia, the RCC, created by the Law 16/2005, is the official body that certifies the quality of mapping and geographic information in Catalonia since, prior to registration, all of the information presented to the Register is subject to quality control by the ICC with regard to the data, the specifications and the metadata. On 31 December 2012, this Register had a total of 26,315 official items registered in its official section. Likewise, some bodies responsible for spatial data sets in Catalonia submit their data to ISO standards certifying bodies.

In general, it is appropriate to assume the comment made by Andalucía: "We are at an initial moment of the infrastructure when the abundance of all the information available is strategic, regardless of its quality, since the application of strict criteria would slow down the development of the SDI".

5. Functioning and coordination of the infrastructure

5.1 General description of the SDIs

The LISIGE establishes that the IIGE is formed by all the infrastructures and interoperable geographic information services available on national territory, the territorial sea, the neighbouring area, the continental platform and the exclusive economic zone, generated under the responsibility of the Public Administrations[3].

This means a clear backing of the SDIs by the Spanish Public Administrations. An attempt has been made by the CSG to stimulate their deployment via the incorporation of the WG NSDI, with a clear view of serving as a reference for the Spanish SDI community, and the holding of the JIIDE. This view has led to the introduction of the NSDI geoportal, the NSDI blog and the publication of the monthly electronic bulletin SobreIDEs. Quoting the 2011 *State of Play* report for Spain (Vandenbroucke et al, 2011:6):

> "Concluding, the Spanish SDI is considered one of the most developed ones in Europe with a very active SDI and INSPIRE-minded community at all governmental levels. This is mainly due to a good coordination, cooperation and agreement at all levels of the government and with all the stakeholders of the NSDI network".

The period 2010-2012 has been characterised by the continuation of this dynamic together with the creation of coordination structures for the implementation of INSPIRE. The same report *State of Play* comments that:

> "Although the NSDI is clearly led, all stakeholders work on the basis of equality and partnership and see each other as an equal node in the SDI network. The Spanish SDI has been launched with no fixed regulations (...)"

Furthermore, the different stakeholders are defining their roles in greater detail, taking shape in the form of geoportals, web services, etc. In the case of the General State Administration, it is appropriate to mention that in November 2011 the SDI Portal of the MAGRAMA was launched with the objective of being the node of reference at national and European level for geographic information of an environmental nature as well as that related with agricultural, livestock and fishing resources.

A similar development, although uneven, is being carried out in the Autonomous Communities. During this period it is appropriate to mention the formalisation of the participation of all of them (except Catalonia) in the SCN and the approval of specific legislation by Aragón (Decree 208/2010). In the case of the Valencian Community there is concern to train technicians of the autonomous government for

[3] This definition coincides with that already established by Royal Decree 1545/2007 although the difference between them is the change of designation from INIG to IIGE.

compliance with INSPIRE, which includes a clear definition of which data should be published and the information technology details necessary to comply with the requirements of the Directive.

Each Autonomous Community has at least one reference geoportal, and over time these are becoming consolidated as essential elements for SDI development in Spain. But beyond the reference geoportal of each regional SDI, the organisation, conception and contents vary between them. Let us look at two disparate examples:

SDI development in Catalonia is stimulated by the Support Centre for the Spatial Data Infrastructure of Catalonia (CSIDEC), a member of the ICC, which provides the necessary technical support for its organisation, promotion, exploitation and maintenance. Its purpose is the dissemination of geo-information and connected services, to make them more accessible to ensure their shared use. The CSIDEC maintains a metadata catalogue service, which is public, in which the producers of public and private data and services can incorporate the metadata they generate. This service acts as a central node in the territorial scope of Catalonia. It contains its own database and is interconnected with other catalogues of other bodies and organisations. The CSIDEC is also responsible for the geoportal of the IDEC, which contains all the information linked to the SDIs, it is possible to view standard WMS OGC services and to consult the abovementioned metadata catalogue. The principles on which the IDEC is based are those of non-duplication and facility of access and shared use of the geo-information. The development of IDEC has followed two strategic lines:

- Promotion of thematic SDIs or those specialising in specific domains, stimulating the creation of nodes that allow enlargement of the global network of suppliers of spatial data sets and services. Each node is viewed by the end user with the specific, sectoral and specialised view required.
- Integration of local bodies, thanks to the initiatives promoted by the Consortium for Open Administration of Catalonia (AOC) or the Provincial Council of Barcelona or some town councils.

The SDI of La Rioja aggregates the services offered by the Government of La Rioja and those of 172 of the 174 municipalities of the Community. All the services operate on the contents of the corporate Spatial Database of the Government of La Rioja. The different stakeholders can maintain and manage the information that they generate via graphic and alphanumerical editing tools accessed via the Internet. The Government of La Rioja maintains a public geoportal in which information is provided and access is permitted to these services, which are based on OGC and ISO standards. In the geoportal viewing services are also available and a geographic viewer (Geovisor) has been developed which can be adapted to different thematic and territorial environments, which allows each municipality to integrate the viewer in its own Web page via a link, adapted to its own territory.

Aragón, over the next two years, will carry out the logical transformation of SITAR to IDEAragon which implies the updating of both metadata and geodata according to the execution standards established as well as the updating of non-interoperable geographic services to interoperable web services with the objective of improving the provision of services by this Public Administration.

5.2 INSPIRE stakeholders and their roles

In the current stage of implementation of the INSPIRE Directive it is still not possible to speak of a clear differentiation between INSPIRE stakeholders and SDI stakeholders. It is to be hoped that, as and when specific responsibilities are established and services are consolidated, the roles of the different SDI stakeholders in relationship with INSPIRE will become clearer.

At present we can distinguish two main groups:

- Those who have been directly related with INSPIRE or have shown their interest in being so. We include here the experts who have participated in the INSPIRE working groups and the organisations registered as LMO and SDIC in INSPIRE.
- Those who participate in the development of the SDIs and who can play a role in the implementation of INSPIRE.

5.2.1 Stakeholders directly related with INSPIRE

The participation of Spanish experts and technicians began in the INSPIRE definition process and, subsequently, after its approval in the year 2007, Spain collaborated in various activities: for example, 22 voluntary experts participated actively in the TWGs to prepare and discuss the drafts of the implementation regulations and of the data specifications of the Directive. In total they have participated in the development of the data specifications of 5 themes of Annex I, in 4 drafts of Annex II and 10 of Annex III (Muñoz and Capdevila, 2012).

On the date of this report 28 Spanish organisations are registered in the INSPIRE portal as SDICs (table 8) and 11 as LMOs (table 9). Those registered as SDIC mainly belong to public institutions or organisations (50%) of the General State and Autonomous Community Administrations, and to centres related with research or education. To a lesser extent they belong to the private sector. Four of the twenty-eight SDICs correspond to European groups or projects based in Spain or registered from Spain, such as, for example EURADIN or the AGILE group. Two SDICs of cross-border projects between Spain and Portugal and between Europe and South America are also registered. All of the LMOs belong to the public sector, with the exception of the LMO *Competitiveness and Sustainability Unit* of the JRC-IPTS.

The INSPIRE stakeholders were requested to forecast the specific roles, distributed in nine categories, that they would assume in the development of INSPIRE. In the case of the SDICs these roles correspond in the first place to collectors and descriptors of user requirements related with environmental policies (89%), in the second place they declare themselves to be participants in review processes (78%) and in the third place as participants in projects to test, review or formulate implementation regulations (61%). The LMOs assumed at a higher percentage (66.7 %) of participation

in review processes, as well as in the assignment of experts and the contribution of reference material for the drafting teams (50%).

Both the SDICs and the LMOs indicate that they have greater specific experience in the areas of metadata (79% and 50%) and data specification (75% and 80%), while the SDICs (71%) have greater experience in the area of network services in comparison with the LMOs (25%).

With regard to the INSPIRE Themes, the SDICs define themselves in the majority as Users and to a lesser extent as Producers and Coordinators (around 60%). However a high percentage of the LMOs define themselves as Users and Producers of INSPIRE themes (83%).

- AGILE
- Banco de Datos de la Naturaleza (Biodiversity Nature Data Base)
- Commission on Geographic Norms (National Geographic High Council)
- Consorcio Regional de Transportes de Madrid (Madrid Regional Transport Consortium)
- Cross border Data Interest between Spain and Portugal, European Economic Geography,
- Cross border SDIC between Europe and South America
- Environmental Information Network of Andalucía
- EURADIN
- Estandarización Electrónica de Datos Ambientales (Electronic Standardisation of Environmental Data)
- European working group for the soils European study with remote sensing
- Euskal Herriko Datu Espazialen Azpiegitura
- GID Universitat Jaume I
- INM Group for implementation GIS in Climatology and meteorology
- Idearium Consultores
- Indra Espacio S.A.
- Ministry of Industry, Tourism and Trade
- SITNA
- SIOSE
- ILAF OGC
- EUROPARC (Observatorio de los espacios naturales protegidos del Estado español)
- Open Architecture and Spatial Data Infrastructure for Risk Management
- Personal GIS OpenSoftware Developer
- Registra, SL
- SDI of Catalonia - network of local authorities
- Sistemas de Información, Gestión y Asesoria
- Social Validation of INSPIRE Annex III Data Structures in EU Habitats
- Spain Railways SDI at Executive Direction of Circulation (ADIF)
- Spatial Data Infrastructure of Extremadura

Table 8. List of SDICs at 15 May 2013

- Colegio de Registradores de la Propiedad, Mercantiles y Bienes Muebles de España (Association of Land and Mercantile Registrars of Spain)

• Comissió de Coordinació Cartogràfica de Catalunya (Cartographic Coordination Commission of Catalonia) • Competitiveness and Sustainability Unit, JRC-IPTS • Direccion General para la Biodiversidad (Directorate General for Biodiversity) • European Land Registry Association (ELRA) • GT-EIEL • Dirección General de Catastro (Directorate General for Cadastre) • Gobierno de La Rioja • NSDI Working Group of the Commission on Geomatics (National Geographic High Council) • ICC • IGME

Table 9. List of LMOs at 15 May 2013.

5.2.2 Stakeholders directly related with NSDI

To describe this group we will consider the following structure according to their role in the development and use of SDIs in Spain: coordination mechanisms, data producers, services providers, research centres and users.

Coordination mechanisms

At national level, we have already mentioned the coordinating role of the CSG, via the CODIIGE and the TechWGs, and with points of convergence such as the WG NSDI and the CODIIGE.

Each TechWG has its own coordination dynamics, which often coincide with Specialised Commissions of the CSG. This is the case of the TechWG for Geographic Names, which has, at national level, the Specialised Commission for Geographic Names as its main coordination mechanism. It is formed by leaders and experts on the subject. Its activities include the regular organisation of open Conferences in relationship with toponymy. Recent conferences have seen the increasing relevance of the role of Geographic Names within the SDIs.

An important function of the TechWGs is to discriminate the roles of the different stakeholders who intervene in their sphere of action. For example, in the case of the TechWG Geographic Names they need to distinguish between the inherently linguistic aspects of geographic names (standardisation, cultural background, linguistic knowledge, historical recovery) and those that require the use of geographic names within the framework of more general projects (confection of official databases, mapping projects, search mechanisms, the need to name new infrastructures). Each one of these aspects has its own data producers and in many cases those who "standardise" are different from those who "officialise". This requires special coordination in the administrative areas with competences in geographic names where this duality occurs. The specific cases are diverse.

At the level of state and autonomous community organisations the role of the different coordination mechanisms that have been set up has already been seen in paragraph 4.1.3. The coordination mechanisms participate by:

- Preparing inventories of data and services, which in many cases take the shape of registers and catalogues.
- Preparing technical recommendations or transmitting those which are generated at other levels.
- Organising meetings and different types of events for the dissemination of the SDIs.

These mechanisms are supported by organisations that participate by taking on different roles (the IGN for the NSDI project, the ICV for the terr@sit project, the ICC for the C4, etc.):

- Providing tools for the harmonisation of data and metadata.
- Providing hosting services.
- Providing support for the publication of the geoportal and the activities of the coordination mechanism.

In cases where there is no formally established coordination mechanism, there are organisations that provide support for the performance of these tasks (such as, for example, the case of La Rioja).

Data producers

The bodies and organisations of the General State Administration and of the Autonomous Communities that are data producers act as nodes within the NSDI and, in general, are responsible for the publication of the services that distribute the data they produce. This model is replicated at autonomous community level where, within the respective SDIs, the autonomous community and local organisations are included as nodes.

All the levels of Administration that produce data and provide services are being encouraged to publish them via interoperable web services.

The spatial data sets do not yet comply with INSPIRE. Some Autonomous Communities (Andalucía and Catalonia) use the INSPIRE annex structure in their mapping plans as a classification mechanism for the respective data sets in their areas of responsibility. Aragón uses the structure of the LISIGE Annexes.

Using the INSPIRE themes as an organisational approach to the production of data gives rise to certain complexity. For example, in the case of the Geographic Names theme, we find:

- Mapping producers: organisations at all levels of Public Administration.
- Onomastic offices or services: standardisation bodies with regard to onomastic matters set up in some Autonomous Communities (especially those with a co-official language).

- Infrastructure producers: responsible for the management of roads, airports, ports, etc. also at all levels of Public Administration.
- Managers in different spheres: national parks, etc.

One of the missions of the TechWGs is to coordinate participation in the SDIs by this diversity of sources.

Another view of the diversity of producers is territorial. For example, the terr@sit project of the Valencian Community incorporates information from various organisations (table 10).

- Academia Valenciana de la Lengua (Valencian Academy of the Language)
- Entidad de Saneamiento de Aguas residuales de la Comunitat Valenciana (Public Wastewater Treatment Company)
- Conselleria de Infraestructuras, Territorio y Medio Ambiente (Ministry of Infrastructures, Territory and the Environment)
- Instituto Valenciano de Edificación (Valencian Institute of Building)
- Conselleria de Sanidad (Ministry of Health)
- Conselleria de Justicia y Bienestar Social (Ministry of Justice and Social Welfare)
- Conselleria de Educación, Formación y Ocupación (Ministry of Education, Training and Employment)
- Instituto Cartográfico Valenciano (Valencian Cartographic Institute)

Table 10. List of organisations that participate in terr@sit.

In the case of Catalonia the IDEC catalogue is available, managed by the CSIDEC, from which information can be extracted on the basis of the contributions made in its metadata catalogue by various public and private organisations, all of which are data producers. The available records are divided into 4 main groups: uploads performed by the ICC itself, those performed by the local bodies integrated in the IDEC Local, those performed by the universities and research centres integrated in the IDEC Univers and the uploads made by the different departments of the Government of Catalonia (table 11).

	Catalan	Spanish	English	Total
ICC	24,235	24,235	24,235	72,705
IDEC Local	8,806	7,612	5,140	21,558
IDE Univers	5,338	5,351	5,309	15,998
Generalidad	498	365	364	1,227
Total	**38,877**	**37,563**	**35,048**	**111,488**

Table 11. Metadata available at 31 December 2012 in the IDEC catalogue corresponding to a total of 169 organisations (157 public and 12 private).

Service providers

In general lines the data producers themselves are implementing the corresponding services.

In some cases, the organisations that support the SDI activity of an organisation or an autonomous community host the spatial data sets prepared by others and are responsible for publishing them via the

appropriate services. This is the case of La Rioja which plays this role in relationship with the spatial data sets and services of most of the municipalities of the community.

In the case of Catalonia, the metadata of services are prepared using a new internal application, in compliance with the ISO 19119 standard, which allows the creation of metadata that comply with the INSPIRE profile and the NEM 1-1 profile. The total number of service metadata in the IDEC catalogue, at 31 December 2012, was 546, the total number of organisations that publish these metadata being 169. A total of 7,212 layers are available via the IDEC network.

Owing to the large quantity and diversity of the metadata managed some catalogues have been created which are annexed to the general catalogue and which facilitate the search for metadata: SDI on earth observation, Catalogue of sensors in Catalonia, IDEC Univers, IDEC Litoral and IDEC Local. Each one of these catalogues has its own portal, which allows centralisation of more specific and/or thematic searches of metadata.

Technology based university centres

In Spain the technological research and development centres linked to universities and to other governmental organisations are playing a relevant role in the development of the SDI. They are generators of technology, data and knowledge, which is demonstrated by their participation at the JIIDE.

Users

Users usually constitute a good control system for the quality of the services provided. At the general level there are two mail lists hosted in RedIris, where comments are usually raised regarding problems of bad functioning of web services: these are the GIS List and the NSDI List.

An important group of users is formed by the Public Administrations, which consume the data they produce themselves via the SDIs:

There are various *mashups* which benefit from the existence of interoperable data services as a source of data: Goolzoom, the hydrocarbons portal of the Ministry of Industry, the Housing Atlas, Wikiloc, Anthos, etc.

5.3 Measures taken to facilitate sharing and stakeholder cooperation

There is a considerable legal structure for this purpose, which was reported on in the 2007-2009 INSPIRE report. We present here the new additions:

- At national level:

  - LISIGE.

- At Autonomous Community level:
  - Aragón: Decree 208/2010 approving the Regulations for the Regulation of Geographic Information in Aragón.
  - Andalucía: the IDEAndalucía adopts the Creative Commons licence.
  - Catalonia: Decree 62/2010, which establishes the general framework for action in its territory and urges the bodies responsible for the different spatial data sets included in it to facilitate and simplify access thereto, according to the regulations established for this purpose by the C4 and in accordance with that established in the Law 37/2007 on the reuse of public sector information.
  - Castile and Leon: Decree 27/2012, of 19 July, which regulates the conditions of use of cartography and geographic information produced by the Administration of the Community of Castile and León, and public prices of the service are established for its recording on physical media.

The paradigm of the SDI stimulates the publication of geographic data via web services and interoperability is a relevant factor which is increasingly taken into account. An important component to promote this is the projects for harmonisation between different administrations. A good example is related with geographic names, where there is a double focus:

- Harmonisation of contents: which takes shape in the Concise Geographic Gazetteer of Spain (NGCE) and Basic Geographic Gazetteer of Spain (NGBE) projects.
- Harmonisation of the data model, which takes shape in the Spanish Gazetteer Model (MNE). However, it does not correspond with the INSPIRE model. Currently the data model promoted is that which is offered by INSPIRE. In the case of the Geographic Gazetteer of Andalucía (NGA) the MNE model is maintained with adaptations to comply with the INSPIRE regulations.

The different organisations involved in harmonisation and data exchange projects do so via collaboration agreements. The autonomous community of Aragón has signed agreements with the IGN, the Ministry of Defence, the Directorate General of Cadastre and the River Basin Authorities.

Another important component is free access to the information, something which is generalised among the publishers of geographic data on behalf of the Public Administration. In some cases, this policy is assumed explicitly. The C4, in Catalonia, approved it, in 2009, with the following wording:

> "With the applicable exceptions, the geo-information produced by the public administrations and organisations, and specifically the spatial data sets, which comprise the PCC, will benefit from free distribution and universal access".

The different stakeholders have a forum for meeting and cooperation, the TechWGs and the WG NSDI described in points 4.1.2 and 5.1 of this report. The cooperation takes place in the meetings of the

TechWGs, of the WG NSDI and in the work performed at each one of the Forums and Working Sub-Groups of the latter.

In the case of organisations of the General State Administration, some maintain specific mechanisms. This is the case of the Directorate General of Architecture, Housing and Land of the Ministry of Public Works and Transport, with 3 mechanisms:

- collaboration agreements with publicly-funded companies,
- agreements with Autonomous Communities, and
- participation in the project “Urbanismo en red” via a collaboration agreement with the Public Corporate Entity Red.es and the Spanish Federation of Municipalities and Provinces.

In the case of the autonomous communities, many of these replicate the functioning that is taking place at national level. This is the case of Andalucía, which has constituted the Working Group of the Andalucía SDI, where all the regional and local administration participates in the holding of Conferences and Seminars related with SDIs for the purposes of information, training and participation. An interesting factor is the distinction made by the autonomous community of Catalonia, explaining that the agreements between stakeholders are entered into bilaterally despite the existence of coordination mechanisms such as the C4, with the objective of speeding up the sharing and transfer of information between organisations. The Spatial Data Infrastructure of Navarra (IDENA) is the response by the Territorial Information System of Navarra to the requirements of INSPIRE. Therefore, the organisation and functioning of the SITNA provides support to the maintenance and improvement of that SDI. It is also appropriate to emphasise that the INSPIRE Workshop has been held on four occasions (with a frequency of two per year) providing information, guidance and coordination with regard to the activity to be performed within the region. 10 thematic working groups have already been formed in Navarra, corresponding to the themes of annexes I and II.

The encouragement of participation and dissemination is essential. The WG NSDI develops this by means of various resources: the Blog of the NSDI, the bulletin SobreIDEs, the NSDI distribution list, the e-learning courses of the NSDI and the inter-ministerial courses organised by the IGN.

By way of example, the activity performed in this respect can be quantified in the autonomous community of Extremadura during the period 2010-2012:

- 1 Course on metadata for the regional administration
- 1 Course on metadata for the university of Extremadura
- 4 General courses on SDI for the regional administration
- 22 Courses on standardisation of thematic urban planning information and publication in the SDI
- 2 awareness sessions

In Catalonia, the CSIDEC has carried out the following dissemination and participation activities during the three year period 2010-2012:

- Preparation of the news bulletin of the Support Centre for the Spatial Data Infrastructure of Catalonia (CSIDEC), distributed by e-mail and web consultation.
- Annual organisation of the GIT GIS Forum.
- Participation in congresses and conferences, both in Spain and internationally.
- 16 training courses for administration personnel, of both Government and Local Administrations.
- 12 information and awareness sessions.

In the case of La Rioja, there is a news section on the web page, which is complemented by three RSS channels and a Twitter account. It has been observed that every time a tweet is published with information of interest together with a link to the geoviewer in which the information referred to is shown, the number of geographic queries increases. These are proactive mechanisms in which the SDI does not wait passively for the user, but places the information supplied on their computer, tablet or mobile telephone.

5.4 Access to services through the INSPIRE Geoportal

In general a high rate of usage of the client applications of the INSPIRE Geoportal by users of the IIGE is not noticed. However, some services are in great demand. The geoportal is considered to be the implementation of catalogue references, viewer and editor of metadata and it is usually assessed as an example by those who are interested in the implementation of a geoportal. Moreover, it also serves as a test to verify the functioning of the web services.

Since 2012 the NSDI has offered a web discovery service based on the INSPIRE Catalogue profile (CSW ISO AP) which allows access to and consultation of the metadata registers of the data sets and geoservices provided by the public administrations that form part of the NSDI.

Throughout the year 2012, the CSW service of the NSDI has connected, via *harvesting* or exchange of XML files, as applicable, the catalogues shown in table 12.

National sphere	SDI River Basin Authority of the Duero
	SDI River Basin Authority of the Guadalquivir
	SDI Ministry of Agriculture, Food and Environment
	Node of the National Geographic Institute
	Node of the Directorate General for Cadastre
Regional sphere	SDI Andalucía
	SDI Cantabria
	SDI Castile and Leon
	SDI Catalonia
	SDI Valencian Community
	SDI Galicia
	SDI Basque Country/Euskadi

Table 12. SDI nodes that contribute their metadata to the CSW service of the NSDI at the end of 2012.

At the beginning of 2013, the SDI Rioja and the SDI of the River Basin Authority of the Guadiana have joined and it is hoped to add the SDI of Extremadura as well as the rest of the national and regional SDIs that comprise the National SDI.

To be able to provide access to the NSDI geoservices in the INSPIRE geoportal, it is necessary for the metadata to be accessible via the INSPIRE catalogue client.

On 21 June 2012, the NSDI CSW service was included in the Registry Service of the INSPIRE geoportal and as a consequence the metadata records contained in NSDI are available for searches via the catalogue client of the INSPIRE geoportal.

During 2012 the INSPIRE registry system performed collections every 2 weeks. However, owing to the large number of metadata included in the NSDI catalogue, at the beginning of 2013 the decision has been taken that to carry out the collections of metadata on a monthly basis. Moreover, the Inspire Registry service prepares a report to be sent to the contact point of the NSDI to communicate, among other things: the number of metadata collected, those corresponding to web services, data sets and services as well as whether the metadata comply with the XML schemas both of INSPIRE and of ISO 19139.

The number of metadata records catalogued in 2012 was over 470,000, of those more than 270 correspond to web services and can be consulted in the INSPIRE geoportal. With regard to the metadata registers, these are available at series, service and individual data set level.

6. Usage of the infrastructure for spatial information

6.1 Use of spatial data services in the SDI

There is no systematic monitoring of the use of the spatial services of the SDI in Spain. In this chapter we can only provide the data compiled as a result of the INSPIRE monitoring campaigns for the years 2010, 2011 and 2012. It should be mentioned that the monitoring still suffers from many defects which mean that the results are not very reliable.

The use of network services is accounted for via the general indicator NSi3, which summarises the result of five specific indicators: NSi3.1 for discovery services, NSi3.2 for viewing services, NSi3.3 for download services, NSi3.4 for transformation services and NSi3.5 for access services. Each indicator is the average of the accesses counted per number of services in each type (table 13).

Year	NSi 3.1	NSi 3.2	NSi 3.3	NSi 3.4	NSi 3.5	NSi 3
2010	2,214,028	664,469	76,897	1,936	74,945	603,589
2011	4,058	752,811	544,040	0	0	713,058
2012	4,367	457,323	2,937	0	0	405,532

Table 13. Monitoring indicators of the use of network services referred to in article 11, paragraph 1 of Directive 2007/2/EC.

The figures for accesses to the discovery, viewing and downloading services for the period 2010 to 2012 are shown in table 14.

Year	Discovery services	Download services	Viewing services
2010	42,066,538	16,840.401	1,011,322,411
2011	68,980	133,833,934	1,042,643,124
2012	69,865	748,849	967,599,630

Table 14. Access figures reported for discovery, viewing and download services

In general it can be observed that the highest use corresponds to viewing services, accesses to which have remained almost constant over the three years. Accesses to the discovery and download services have shown very disparate behaviour, clearly being influenced by the abovementioned defects in the INSPIRE monitoring campaigns. Among those defects, it is worth mentioning the low percentage of information received in relationship with the access figures: on average, only 22% of the reporting

organisations provide the data on accesses to discovery services, 26% for viewing services and 19% for download services.

Qualitatively, it is appropriate to emphasise the different uses that can be given to spatial data services. In the case of Geographic Names, on the one hand this is reference information, that is, the geographic names appear in the majority of viewing services that display maps and, therefore, they are also used as a search mechanism, although the majority of the implementations are not via web services but via local installation of the database or gazetteer. In the IDEAndalucia, the IDEASevilla and the web service for downloading maps and orthophotos Line@ of the IECA it is performed via a web service, allowing a continuous synchronisation of the modifications and updates made in the NGA.

Quantitatively, the IGN emphasises that, in 2012, the basic map viewing service IGN-base had an average of somewhat more than 7,000,000 accesses per month and the PNOA orthophoto viewing service received over 15,000,000 accesses per month.

The IGME reports average visits for viewing services of 155,575 during the period 2010-2012. The MAGRAMA reports around one and a half million accesses per month to the OGC services during this period.

Monitoring of the use of services presents problems for some organisations, such as the CSIC, since they do not have a single centralised geoportal, so it requires the unification of the access statistics.

In addition different metrics are being used. In the case of the Autonomous Community of Andalucía they consider as indicators of the degree of use of IDEAndalucía the visits or accesses[4], requests[5] and traffic[6]. On average, during the period 2010-2012 they have detected an average annual growth of 15%. They emphasise that the most used service is that of viewing and that the catalogue only represents 3% of accesses to the server. With regard to content, most consultations are of topographic maps (44%) followed by orthophotographs (40%) and thematic layers (15%).

Aragón, by way of information, keeps weekly and monthly statistics of the queries made to the CINTA and to the SITAR platform. Currently, the SITAR responds that the monthly statistic of accesses made by users is 75,000 queries, with occasional peaks of up to 150,000 queries, or that the number of images provided by the server is 950,000. The average number of downloads per month is fairly stable which implies average traffic of 140 GB. Furthermore, the CINTA has a monthly average of 30 to 70 queries of which at least 50% are usually linked to the SITAR platform. The activity report of the CINTA will report annually on the statistics of accesses and downloads using the electronic platform.

Asturias provides the information included in table 15.

[4] Number of times that any client connects to the server and remains connected during the same session. It is not visitors that are considered (unique IPs that can access several times) but the number of occasions on which a connection is established, regardless of the time of duration.

[5] This is the total number of files requested, understanding as a file an HTTP request which for Html pages would be files and for WMS services would be each one of the requests *GetCapabilities*, *GetMap* or *GetFeatureInfo*.

[6] The total number of Kilobytes downloaded by the visitors including HTML pages, images, Javascript files, style sheets, etc.

	2010	2011	2012
Session opened	77,989	129,041	43,174
Downloads	16,182	15,885	8,053

Table 15. Information on use of the IIGE managed by Asturias (2012 incomplete).

Galicia concentrates on visits to the different services (table 16):

	2010	2011	2012
Discovery	29,441	-	-
Viewing	4,792,129	-	5,348.850
Download	30,393	-	20,477

Table 16. Information on visits received by the IIGE managed by Galicia (2012 estimated).

The general trend is a spectacular increase in activity. The evolution of requests in general for Navarra is shown in table 17.

Year	Requests
2010	3.972.654
2011	16.350.228
2012	38.606.694

Table 17. Total requests received by the IIGE managed by Navarra.

In the case of Valencia it can be seen that in the second half of 2012 the number of viewing requests has tripled, accumulating 68 million requests during the year. With regard to the discovery service, an average of 33,180 search requests is received per month.

La Rioja offers the statistics shown in table 18.

Statistic	Level	2011	2012	(January-April)
Web pages	Cartography	9,973,044	5,010,753	
Accesses(login)	Spatial Database	111,613		
Downloads	Geographic ftp	269,585		53,343
Accesses	Regional viewer	517,982	375,762	60,509
Accesses	Municipal viewers	452,933	223,009	
Accesses	Thematic viewers	1,520		480
Accesses	WMS/WFS	1,716,734		881,766
Accesses	RSS	91,423	34,492	

Table 18. Statistics for access to the IIGE managed by La Rioja.

In the case of Catalonia for the period 2010 to 2012 almost a billion service requests are counted (table 19).

Type of service	Number of requests for service. 2010-2012
Discovery services	244,974
Viewing services	732,082,496
Download services	261,878,706
Transformation services	7,823
Access services	0

Table 19. Total requests received by different nodes and organisations of the infrastructure in Catalonia.

6.2 Use of spatial data sets

Spatial data sets are becoming more and more widely used in the context offered by the network of SDI geoportals now available. In this respect, the efforts for harmonisation are outstanding. In the case of Geographic Names, two lines of work stand out:

- with regard to content, the NGCE project and NGBE.
- with regard to data model, the MNE.

In general the Autonomous Communities indicate that most of the use of the SDIs is made by the public administrations themselves. However, an indicator has not been defined that can be applied to measure the use of SDIs by external users.

Some communities, such as Andalucía, have performed analyses of the IPs that generate the most traffic, checking their origin. Galicia indicates that the services are used mainly by technicians who belong to the area of companies that work in the sphere of regional planning. Aragón assesses that 40% of the use of data is by the Public Administrations. La Rioja also points to a large number of internal users.

Regarding the most requested themes, Galicia highlights reference information, specifically the cartographic base, orthoimages and geographic names. In the Valencian Community, at a general level, extensive use is being made by the public administrations of the 1:5,000 orthophoto, the 1:5,000 cartographic series and the street map information of CartoCiudad, both the data sets and access to services. As examples of use within the public administration we can name the inclusion of the database of CartoCiudad in sanitation-type applications and in the databases of students of public sector schools of the Community. Diverse applications are using spatial data services for management. Among them, we can name the application for the management of drains of the Entitat de Sanetjament

d'Aigues Residuals, where the graphic and alphanumeric databases of the drains of the Valencian Community are updated and registered.

In Cataluña, to reflect the use of spatial data sets, information is available relative to accesses to the different catalogues of the IDEC. The number of accesses is listed for each one of the three years of the period considered and for each one of the catalogues. The sum total of accesses to the catalogues is 32,310 (table 20).

Accesses to catalogue	2010	2011	2012
IDEC	7,711	9,071	10,604
IDEC Local	510	988	441
IDEC Univers	97	98	112
IDEC Litoral	117	231	229
IDEC sensors	0	1,198	406
IDEC earth observation	0	0	497

Table 20. Accesses to the catalogues managed by the IDEC.

6.3 Use of the SDI by the general public

Data are not available regarding the use of the SDIs by the general public beyond the data reported on the use of services and the analysis of the IPs from which the accesses were made. According to Aragón approximately 60% of uses are made by the general public.

The Valencian Community states that, with regard to the use of spatial data sets by the general public, the use of GPS cartography stands out. The downloads, and consequently the use that is being made of this, are very relevant, as are the contributions of the users for its improvement.

According to Andalucía the general public is still unaware of the services provided by the IDEAndalucía, since its interconnection protocols are very technical and there are still no added value services provided by third parties.

An exception to this general evaluation is consultancy companies in the area of public works such as urban planning, agriculture or the environment, who are beginning to know and use the services of IDEAndalucía. This professional use can be appreciated via the analysis over time of the above indicators, which provide the following data:

- There is a reduction of accesses in the holiday periods of December and August.
- Accesses at weekends are two thirds those of working days
- Time peaks for the highest number of accesses are from 11 a.m. to 6 p.m.

These indicators reflect professional use and a low penetration among domestic users.

In the case of Catalonia no precise information is available to provide evidence for the use of the infrastructure by the general public. The number of accesses listed in the previous section includes those made by the general public.

As from mid-2013 a survey is expected to be implemented in the NSDI geoportal in order to gain more knowledge of the use of SDIs in Spanish society.

6.4 Cross-border usage

Cross-border usage can be approached from two angles, on the one hand accesses to spatial data services made from IPs located outside Spain and, on the other, the accesses and use of data sets by cross-border projects.

As an example of the first case we can quote that reported by Aragón, which records 10% of foreign accesses. The IGME indicates that it is not possible to differentiate accesses to its web page from accesses to spatial data services. Approximately, national access to the web page of the IGME has a rate of some 20%. The remaining 80% corresponds to cross-border access, in which access from the USA stands out with a 66% share.

With regard to cross-border projects the most emblematic is OTALEXC, which has had a cross-border SDI since the year 2007 with information and collaboration by the regions of Alentejo and Centro in Portugal and Extremadura in Spain. The end of 2012 will see the introduction of OGC services of general information and socio-economic and physical-environmental indicators, data services linked with general information and tools for exploitation of the OTALEXC indicators.

The CSIC highlights the GBIF Spain node which it manages. GBIF is an intergovernmental organisation which was set up in 2001 and which currently includes 53 countries and 43 international organisations. GBIF is structured as a network of national nodes with an international secretariat in Copenhagen. The objective of GBIF is to provide free and open access – via Internet – to biodiversity data from around the world to support scientific research, encourage biological conservation and favour sustainable development. The priorities of GBIF are concentrated at the level of organisms and, at this level, the initial priority is collections.

The HLANDATA project, coordinated by the Government of Navarra, benefits from the participation of the IGN, the company Tracasa and partners from Austria, Holland, Czech Republic, Slovakia, Latvia and Lithuania. Its objectives are 1) the analysis of the needs of European users on the subject of land cover and use, 2) the application of the INSPIRE specifications on Land Cover and Land Use to the respective national data sets, 3) the publication of these in geoportal environments that support added value tools for the users. The project has reported results to the European Commission regarding the knowledge of users at European level, it has collected productive experiences on the transformation to

INSPIRE, published in the same web environment the harmonised data of different countries and designed advanced tools for their processing.

6.5 Use of transformation services

The existence is not currently known of any transformation system to make the data interoperable.

7. Data sharing arrangements

7.1 Data sharing arrangements between public authorities

As has been explained in previous chapters, the CSG provides the organisational framework for data co-ordination and exchange between different government agencies, or Public Administrations. Royal Decree 1545/2007 sets the legal framework for this co-operation with regard to the planning of the production of cartographical material, co-operation in the production and harmonisation of data and geographic information, and data exchange between different bodies. The LISIGE establishes the responsibility of the CSG, by means of the CODIIGE, for the IIGE and makes this role compatible with INSPIRE. Section 1 of Chapter III makes it obligatory for the Public Administrations to put measures in place that ensure that geographic data geographic information services are shared between the different Public Administrations and public sector bodies, by facilitating the access to, and the exchange and use of, the data. These measures must include those which aim to establish geographic information infrastructures and these must be accessible and interoperable by means of the IIGE. The law also establishes the conditions for this access, without placing limitations on the possibility of awarding licences or demanding fees or setting prices in accordance with current legislation. Furthermore, it extends the application of these measures to the sharing of geographic data and geographic information services with private enterprises, in accordance with the relevant regulatory conditions for this, with the Public Administrations or public sector bodies of other member states of the European Union and with institutions or bodies of the European Commission in the exercise of their public duties with regard to the environment. Section 3 of Chapter III establishes the geographic information services which must be accessible on the geographic information infrastructures of the Public Administrations, making it mandatory to provide, at least, location, viewing, downloading, and geographic data transformation services, as well as services which provide access to these. It imposes the generalised accessibility of geographic information services, with the condition that the body which manages these services may rightfully deny access when there is a public interest in doing so. It also establishes the fact that certain types of services must be made available free of charge. Moreover, it imposes upon the Public Adminstrations the obligation to ensure that the geographic information services can connect with each other and are interoperable. Finally, it establishes the limits on public access to geographic data and geographic information services which the Public Administrations may set and the conditions for the access to geographic information services.

Chapter IV of the LISIGE makes reference to the Geographical Information Infrastructure of the AGE, establishing the obligation to set up its geoportal and the responsibilities of the Directorate-General of the IGN in this regard.

The IGN is subject to Ministerial Order FOM/956/2008, which approved the policy of public dissemination of the geographic information which the Directorate-General generates. This Order

makes all of the information contained in the Equipamiento Geográfico de Referencia Nacional (the National Reference Geographic Equipment) and other information freely available for non-commercial use, free of charge but subject to the conditions set in the usage licence. It also set conditions for its commercial exploitation, encouraging the development of value-added services related to the geographic information, in exchange for a percentage of the profits that those providing these value-added services obtain.

The existence of geoportals set up by data producers and service providers, most of these being public bodies, can also be considered to be a data-sharing mechanism, both between public authorities and with the general public (see section 5.2, under the heading “Data-producers”). A good example is MAGRAMA’s SDI portal, which was launched in November 2011 with the aim of being the national and European hub for geographic information of an environmental nature and for information on agricultural, livestock and fishing resources.

Various data harmonisation projects are in existence, some of which have been mentioned previously:

- NGCE, at a scale of 1:1.000.000, and NGBE, at a scale of 1:25.000, developed by the IGN in collaboration with the CCAA which have their own gazetteer and with the Ministerio de Política Territorial’s (Ministry of Territorial Policy) Registry of Local Organisations.
- CartoCiudad project
- PNOA Project.
- SIOSE Project.
- BTA model created by the CENG of the CSG.
- Co-operation Agreement between FEGA and the General Directorate for Cadastre for the production of a shared map layer for land plots for SIGPAC and the land registry SIG.

With regard to the CCAA, the following information is worth noting:

- In Andalucía, co-operation agreements have been signed between the regional government, the Junta de Andalucía, and all of the provincial councils in the region for the cataloguing, exchange and dissemination of the main spatial data sets, with particular reference to the Callejero Digital de Andalucía (Digital Roadmap of Andalucía).
- In Aragón, the first specific agreements within the SCN framework have been formalised, entailing the exchange of data and services between the regional government, the Gobierno de Aragón, and the IGN.
- In Extremadura, the Consejo de Información Cartográfica y Territorial de Extremadura (the Territorial and Cartographic Information Council of Extremadura) created three thematic committees for the implementation of data-sharing: the Thematic Commission for Territorial and Cartographic Information of Extremadura, the Thematic Commission for Spatial Data Infrastructure and the Thematic Commission for Toponymy, which various departments of the

regional government, the Gobierno de Extremadura, and Public Administrations with responsibility for geospatial information in Extremadura are members of.

- In Navarra, the SITNA has signed agreements with Pamplona city council (the Ayuntamiento de Pamplona), the Pamplona regional council (the Mancomunidad de la Comarca de Pamplona), Correos and Acciona Energía. All of the utility companies operating in Navarra participate in the project entitled "Portal de Coordinación de Canalizaciones Subterráneas" (PCCS, Co-Ordination Portal for Subterranean Pipelines & Cabling).
- In Murcia, co-operation agreements have been signed between the regional government's Department of Public Works & Town Planning (Consejería de Obras Publicas y de Urbanismo), and the Department for Agriculture and Water (Consejería de Agricultura y Agua), for the use, publication, cataloguing, exchange and dissemination of the region's main spatial data sets.
- In Galicia, an agreement was signed between the regional government's Department for the Environment, Territory and Infrastructures (Consellería de Medio Ambiente, Territorio e Infraestruturas), and the Galician Federation of Municipalities and Provinces, (FEGAMP), for the definition and generation of the geographic and territorial information to be exchanged, and the organisation of the model for the joint management of this information. It also established mechanisms for co-operation and the co-ordination of activities between the Instituto de Estudios del Territorio (IET) and the municipalities and other organisations which form part of the local government network in the region.
- In the Comunitat Valenciana, or Valencian Community, it is noteworthy that the establishment of agreements is proving to be problematic. There is some reluctance by data producers to share information and some unwillingness on the technical side with regard to devoting effort to the implementation of publication services on their own servers. The agreements which have been made are informal in all cases and the results are almost completely the fruit of the efforts by the technical staff of the ICV. In accordance with this general approach, the ICV has proposed working with the support of the region's Directorate-General for IT, the Dirección General de Tecnologías de la Información, in order to launch services external to the ICV within the Valencian Community.
- In the Balearic Islands, the regional government, the Govern de les Illes Balears, has signed co-operation agreements with regard to cartography and spatial data infrastructure with all of the governments of the individual islands and with several city and town councils in the region. The signatories to these agreements have committed themselves to the creation of their nodes by means of the established standards. They have also made commitments with regard to: the creation of a catalogue of the geographic information they possess, the exchange of these, facilitating the exchange of geo-information and agreeing on joint activities for the training of technical staff.
- In Catalonia, agreements have been signed between the ICC and the IGN for the creation and shared use of the orthophotos of the PNOA programme and the SIOSE. Agreements have also

been signed between the ICC and the provincial councils, metropolitan bodies and various city and town councils for the creation and shared use of 1:1.000 urban mapping, while there are also agreements in place between the provincial councils and the metropolitan bodies regarding the shared use of the 1:1.000 cartographical databases and the adaptation of cadastral and town planning maps. The implementation and development of the IDEC-Local (a project aimed at involving local organisations in the creation of the IDEC) is undertaken on the basis of an agreement between the ICC and the AOC. There are no problems with regard to the exchange and shared use of information between the different bodies.

- In the Basque Country, the production of basic mapping does largely form part of a co-ordinated production model, despite the fact that no agreement has been formalised. The regional government, the Gobierno Vasco, organises the relevant flights and the production of the orthophotos. The provincial councils use the information gained from these flights to make 1:5.000 maps which are then used to create and complement the Gobierno Vasco's 1:5.000 BTA. Several co-operation agreements have been signed with the AGE in order to generate spatial data sets within the SCN framework.

7.2 Data-sharing arrangements between the public authorities and Community institutions and bodies

Spain participates in various projects for data sharing at a European Community level:

- EUREF.
- EURADIN.
- Nature SDI+
- HLANDATA (see section 6.4)
- SIGPAC.
- GIS4EU.
- Projects promoted by EuroGeographics.
- The OTALEXC indicator and data system.
- Thematic data in the area of the International Tajo Natural Park.
- Thematic data from the structural project of the Alqueva reservoir.
- EUROGEOSS

- The Copernicus programme (GMES) for the global monitoring of spatial, environmental and security information, with responsibility for the observation of land, marine waters, the atmosphere, emergencies, security and climate change.
- The EIONET network for the provision of environmental information. The EAGLE working group of the ETC/SIA EIONET network, focused on the development of more advanced INSPIRE specifications regarding land cover and land use.
- The HELM project, working towards the definition of a harmonised European programme for land monitoring.

Furthermore, specifically with regard to the geographic information referred to in Ministerial Order FOM/956/2008, the access and use of this geographic information by European Community institutions and bodies is free, with the condition that the information provided is not used for commercial purposes, while being subject to the corresponding usage licence. Access by the Commission to all the land registry information by means of the Cadastral Electronic Site will also be free of charge. It is to be made available in all of the official languages of Spain as well as in English.

The IGME has played an active role in the eWater and OneGeology-Europe projects, both of which were co-funded by the European Union. The primary objective of these two projects, carried out before the data specification of Annexes II and III were drawn up, was the harmonisation of the data and metadata of national geological and hydrogeological information. It is important to note that the data model and the lists of the specific terminology created during the OneGeology-Europe project formed the starting point for the establishment of the specification of the sub-domain of geology of the theme “Geology".

Currently, the IGME is taking part in the pan-European Geological Data Infrastructure project, EGDI, which aims to facilitate the creation of a harmonised geological data infrastructure, for which the decisions taken on the basis of the INSPIRE Directive will no doubt play a key role.

The regional government of Aragón has signed a co-operation agreement for the exchange of GPS station data with France and it is represented on the Cartography Commission of the CTP.

In Catalonia, the ICC is represented on the Cartography Commission of the CTP, and takes an active role in the EUREF and the IDEC Univers, which consists of an SDI made up of a network of universities, with its objective being to facilitate the access to, and the exchange and the interoperability of, the large quantity of georeferenced information produced by universities and research centres in the course of their projects.

7.3 Barriers to sharing and the actions taken to overcome them

According to the Geographic Names TechWG, the planning and the corresponding forecast of costs that would be necessary for the public launch of the services required by INSPIRE is lacking. A key

problem is the lack of resources, as a budgetary provision is not normally made for both co-ordination expenses (meetings, etc.) and development (data checking, etc.). The IGME reports that it has found it difficult to make contact with the technical staff responsible for geographic information at agencies of the Public Administrations.

With regard to jointly run projects, the case of the OTALEXC is particularly interesting. In order to harmonise the socioeconomic, physical and environmental data and indicators coming from the Centro and Alentejo regions in Portugal and Extremadura in Spain, problems that have had to be overcome include those caused by administrative differences between the different countries, the different times at which the data are updated and the different environments in which these data are collected on either side of the border.

In Aragón, there have been reports of the difficulty of co-ordinating activities once the budgets of the different institutions have been set, a situation which is exacerbated by the difficulties caused by budget cuts.

In the Valencian Community, some reluctance has been encountered at a local level with regard to using the new official co-ordinate reference system for the spatial data sets due to delays, particular problems at some state agencies or a lack of technical training. The measures implemented in this area over the last two years have consisted of greater dissemination and the provision of direct support to local bodies, raising awareness and providing training to professional groups. These measures are now giving rise to positive results.

The Ministry for Public Works and Transport's Directorate-General of Architecture, Housing and Land (Dirección General de Arquitectura, Vivienda y Suelo) has reported that various co-operation agreements have been signed with the Autonomous Communities, on the one hand, and with Red.es and the Spanish Federation of Municipalities and Provinces (Federación Española de Municipios y Provincias), on the other, and that this has enabled problems concerning the sharing and integration of data from different sources to be overcome.

The IGME has analysed the problems deriving from the adaptation of structured geological information compiled in accordance with IGME specifications to the specifications of the INSPIRE Directive. The two most important problems found were:

- The application of the scheme proposed in the data specifications would entail a loss of information when compared with the digital geological information provided by the IGME.
- The adaptation of all of the relevant and up-to-date IGME information, using the extension of the geology model included in the INSPIRE Directive, is a very demanding task.

In Catalonia, the main obstacles observed can be summarised in terms of three points:

a) a lack of documentation concerning the technical specifications, making exchange more difficult;

b) the existence of different specifications for the definition of a single spatial data set;

c) a lack of resources for the standardisation of the geographic information contained in the the spatial data sets for the purpose of facilitating interoperability.

8. Cost/benefit aspects

8.1 Costs resulting from implementing the INSPIRE Directive

There are no studies that assess the cost of application of the INSPIRE Directive, nor are there more general studies which assess the cost/benefit impact of the development of SDIs at a national level. At a regional level, in Catalonia two socio-economic impact studies have been undertaken: the first was commissioned by the JRC's INSPIRE unit (Garcia et al., 2008) and was undertaken by the Universitat Politècnica de Catalunya's Centre de Política del Sol i Valoracions (the Centre for Land Policy and Valuations); the second was a SIG Master's Degree dissertation for the Fundació Politècnica de Catalunya (Cívico, 2011).

With regard to the costs being incurred by Spanish Public Administrations through the application of the INSPIRE Directive, these can be summarised as follows.

- Costs of transforming geographic information in order to adapt it to the data specifications established by the INSPIRE implementing rules, and the costs of generating and maintaining metadata:
    - Each government agency meets, as part of its own budget, the costs of the transformation of data and the generation of metadata.
- Costs of harmonisation of the geographic information:
    - In harmonisation projects or those of bilateral or multilateral joint production, the costs are shared between the institutions participating in the project. Each project has its own formulas for cost-sharing, but for those projects involving the AGE and the Autonomous Communities, 66% of the costs are assumed by the AGE and 34% by the Autonomous Communities.
    - In other cases, when the project does not involve other Public Administrations, the cost is met completely by the data producer, such as when an Autonomous Community integrates the BTA model into its production chain.
- Costs of implementation and operation of interoperable geographic information services:
    - The costs are met by the institutions that provide the interoperable services.
- Costs of implementation and operation of the SDI Geoportals:
    - The costs are assumed respectively by the budgets of the AGE, the Autonomous Communities and the Local Authorities which set up the corresponding geoportals.

- Costs of implementation and maintenance of the NSDI Geoportal:
    - Provision is made for the costs in the budget of the IGN, and within the General Budget of Spain, with regard to the Technical Secretariat of the CSG. These costs have amounted to €1,300,000 per year, on average over the last 5 years.

Some of the information in this respect provided by the Autonomous Communities includes the following:

- Aragón: the direct cost in the course of various projects of the updating of data and the adaptation of services to the INSPIRE Directive has amounted to 60,000 euros (including VAT).
- Navarra: the data producers assume the costs of the incorporation, harmonisation and the maintenance of the data and metadata for the SITNA. The costs of implementation and maintenance of the IDENA geoportal and the services it provides, operated by Tracasa, is funded from the regional government's budget, with an annual assignation of approximately €100,000.
- Valencian Community: the direct costs concern the integration, software and maintenance of the search engine (Google), amounting to €60,000 and the infrastructure hardware, costing €75,000.

8.2 Benefits observed

It is not possible to provide quantitative data for the 2010-2012 period. It is evident that making data freely available and the fact that this is done in an interoperable way bring benefits to the SDI end user, regardless of whether users are government bodies or private individuals, and this should, in theory, have an economic benefit. However, there are no methods with which to directly measure these benefits and the indirect methods are costly and imprecise. This represents a significant obstacle for the determination of these parameters.

Another issue to take into account is the thematic specificity of Spain's SDI, which heightens the interest that particular stakeholders specialising in undertaking research have in accessing Spain's geoportals. The quantification of this is somewhat patchy.

In the particular case of the SIU, developed by the Ministry of Public Works and Transport's Directorate-General of Architecture, Housing and Land, the level of transparency in the public provision of information with regard to town planning and land is a qualitative characteristic, in the respect that doing so forms part of the sound management of public affairs.

A second study carried out in Catalonia, for which data were collected in 2010, concluded that the main benefits are seen at the local authority level in terms of internal efficiency and it was estimated that the internal resource savings amounted to more than 2.5 million euros per year (Cívico, 2011).

In Navarra, the analysis of the observable benefits is the main objective of the SITNA Action Plan for 2013. In order to achieve satisfactory results, great difficulties must be overcome which concern:

- The diverse range of interrelated channels and media through which the SITNA provides its services; IDENA is one of these, which is important due to its specific functions (mainly for its catalogue, metadata, viewing service and downloads), but it is also essential in order to be able to use data, call on services, etc., via other channels.
- The lack of standardised methodology, even with regard to using the same metrics, which entails that ad hoc methods have to be drawn up, which, of course, makes comparisons impossible.
- The diverse range of types of benefits observed: a few are quantifiable in money terms, others are otherwise quantifiable, while most are simply assessed.

All of this is especially serious given that:

- The system managers perceive the undeniable efficiency of the system.
- Budget constraints demand a cost/benefit analysis in order for a case to be made for the necessary funding of the system.

In the Valencian Community, the proposal for the classification of benefits is as follows:

- Access to the information: one of the major initial problems for any project is the collation of the initial information, increasing costs. Spatial reference data for publicly or privately funded studies are now more accessible, whether by download or via viewing services.
- Knowledge of the accuracy of the information: through the use of metadata, we are now able to verify the data properties and ensure that they are compatible with the requirements of the study in question.
- Analysis and exchange: the use of known and homogeneous spatial data enables the exchange of information and makes it possible to undertake the analysis of data from a variety of thematic sources.

INSPIRE is in the early stages of development. Projects seeking to establish infrastructures involve a high level of initial investment, with expenses later being reduced to those for maintenance and updating. However, the benefit to society will increase as the system progress, improves and matures, because, if the defined objectives are achieved, then its use by the Public Administrations, the private sector and by the general public will increase (as access services improve) and it will also be increasingly employed in decision-making at European, national, regional and local levels.

Therefore, the benefits will not be enjoyed by the producing organisations. Governments must provide financial support to these institutions in order to ensure society as a whole is able to reap the medium term and long term benefits.

The data harmonisation which INSPIRE demands is key part of facilitating and encouraging the integrated management of European territory.

9. Conclusions

The main conclusion is that the implementation of the INSPIRE Directive in Spain is underway but it is still at a very early stage.

The positives that can be taken are as follows:

- The INSPIRE Directive has been incorporated into Spanish legislation by means of the LISIGE.
- The executive organisational structures which must take responsibility for the implementation of the Directive have been established.
- The development of Spain's SDI is at an advanced stage and there is a large catalogue of spatial data sets and services, with the latter being based on interoperable standards.
- One consequence of the previous point is that there are significant levels of use of the spatial data sets and services provided by the Public Administration, although it has only been possible to quantify this in a few cases.
- Four monitoring campaigns have been carried out, meaning that the different organisations and bodies who must provide the spatial data sets and services demanded by INSPIRE are aware of the requirements of the Directive and they have given due consideration to how these are to be satisfied.

Negatives of the current situation are:

- Not all of the implementation rules planned for by the European Commission have been developed as yet, affecting the correct identification of the spatial data sets for INSPIRE.
- Adequate planning has not as yet taken place with regard to how to undertake the implementation of the Directive.
- Many of the organisational structures created are still only beginning their work, so that some time will need to pass before they are able to take on all of the tasks they will need to undertake to ensure the Directive is fully implemented.
- In many cases, there is still much work to be done with regard to the harmonisation of data, which is a necessary prior step before the spatial data sets and services required for INSPIRE can be defined.
- There is also still much work to be done with regard to educating those responsible for providing the spatial data sets and services, especially concerning clarifying the exact significance of what is required for INSPIRE.
- The current economic situation is delaying or preventing the launch of the mechanisms necessary for the generation of those services required by the implementation rules.

- SDI development by the different agencies of the AGE and Autonomous Communities of Spain is rather uneven, so that there is still a need to continue tasks aimed at promoting and stimulating activity.
- It is important to reiterate that the impressive efforts made in relation to the INSPIRE Directive with regard to the provision of data, metadata and services have not been accompanied by the establishment of knowledge with regard to uses, users, levels of satisfaction, cost/benefit analyses, etc. Therefore, the report can only with some difficulty provide limited and heterogeneous information on these issues.

10. Annexes

10.1 List of organisations

10.1.1 AGE

Organisation:	Ministerio de Fomento (Ministry of Public Works and Transport) Dirección General del Instituto Geográfico Nacional (Directorate-General of the National Geographic Institute)
Contact person:	Antonio F. Rodríguez Pascual
Position:	Area Head for Infraestructura de Información Geográfica (Geographic Information Infrastructure)
E-mail:	afrodriguez@fomento.es
Telephone:	(34) 915979661
Role:	Producer of official cartographic materials and provider of the corresponding web services
Co-ordination structure:	There is a person in charge of the production of each of the IGN's geographic data products, who must co-ordinate the production of data, metadata, specifications and determine quality. At the Centro Nacional de Información Geográfica (part of the IGN), there is also a co-ordinator for the metadata and catalogue of the whole IGN, a publication co-ordinator (for data, metadata and specifications) at the Download Centre and a web service implementation team which publishes the services itself or assists the production unit doing so.
Responsibilities of the co-ordination structure:	To implement and maintain the SDI node of the IGN, based on the set of web services publishing the IGN's data products. This includes: production of data, metadata, specifications and the implementation of services.

Organisation:	Ministerio de Fomento (Ministry of Public Works and Transport) Dirección del Instituto Geográfico Nacional (Directorate of the National Geographic Institute) Centro Nacional de Información Geográfica (National Centre for Geographic Information)
Contact person:	Sebastián Mas Mayoral
Position:	Director of the National Centre for Geographic Information
E-mail:	smas@cnig.es
Telephone:	(34) 915979646
Role:	Inspire National Contact Point

	Co-ordinating body for the NSDI
Co-ordination structure:	President of WG NSDI and CODIIGE (S. Mas) Secretary of WG NSDI and CODIIGE Group leader of TechWG Architecture Regulations and Standards Group leader of TechWG Metadata and Catalogues
Responsibilities of the co-ordination structure:	Point of Contact for Spain with EU bodies Coordination and harmonisation of the NSDI, by implementing the decisions of CODIIGE

Organisation:	Ministerio de Hacienda y Administraciones Públicas (Ministry of the Treasury and Public Administrations) Dirección General del Catastro (General Directorate for Cadastre)
Contact person:	Fernando Serrano Martínez
Position:	Subdirección General de Estudios y Sistemas de Información (Subdirectorate-General of Information Studies and Systems)
E-mail:	fernando.serrano@catastro.minhap.es
Telephone:	(34) 915 83 68 80
Role:	Collation and preparation of the information concerning spatial data sets and networked services of the General Directorate for Cadastre in order to establish a spatial data infrastructure in accordance with the INSPIRE Directive.
Co-ordination structure:	Area of Computerised Cartography: • Luis Ignacio Virgós Soriano, luis.virgos@catastro.minhap.es • Francisco Quintana Llorente, francisco.quintana@catastro.minhap.es • José Miguel Olivares García, jmiguel.olivares@catastro.minhap.es Area of Institutional and International Relations: • Amalia Velasco Martín Varés, amalia.velasco@catastro.minhap.es
Responsibilities of the co-ordination structure:	Implementation of the policies of the General Directorate for Cadastre in its areas of responsibility, in accordance with the following description: In accordance with article 4 of Royal Decree 256/2012, of 27th January, regarding the organic structure of the Ministry of the Treasury and Public Administrations: a) The creation and management of cadastral mapping, the updating of the rural cadastre and cadastral valuation, including the co-ordination of values, the approval of reports and the management of the cadastral observatory of the property market. d) Co-operation and exchange of information with other government bodies, public institutions, and notaries. e) The dissemination of cadastral information. i) The provision of information services and assistance to the general public, and the safeguarding and maintenance of the cadastral records. k) The drafting and analysis of the statistical information contained in the cadastral databases and that regarding the payment of property-related taxation. l) The design, operation and maintenance of the electronic, computerised and telematic systems and media necessary in order to carry out the required tasks and provide cadastral services.

	ñ) Institutional relations with other bodies or agencies of the AGE and with the Autonomous Communities, local authorities, international bodies, other countries or any other public or private institution.

Organisation:	Ministerio de Fomento (Ministry of Public Works and Transport) Dirección General de Arquitectura, Vivienda y Suelo (Directorate-General of Architecture, Housing and Land) Subdirección General de Política de Suelo (Subdirectorate-General of Land Policy)
Contact person:	
Position:	
E-mail:	suelo@fomento.es
Telephone:	(34) 91728 40 97
Role:	The design, maintenance and updating of the Sistema de Información Urbana (SIU, Urban Information System), for the collation and processing of statistical data for town planning and land, in co-ordination with the other government bodies with responsibilities in this area.
Co-ordination structure:	
Responsibilities of the co-ordination structure:	Implementation of the Government's policy in the areas of access to housing, construction, land and architecture in those areas for which the AGE has responsibility.

Organisation:	Ministerio de Economía y Competitividad (Ministry of Economy and Competitiveness) Secretaría de Estado de Investigación Desarrollo e Innovación (Secretariat of State for Research, Development and Innovation) Instituto Geológico y Minero de España (IGME, Geological and Mining Institute of Spain)
Contact person:	Fernando Pérez Cerdán
Position:	
E-mail:	f.perez@igme.es
Telephone:	(34) 91 728 72 39
Role:	Responsible for the implementation of the INSPIRE Directive at the IGME, especially with regard to the themes of "Geology", "Mineral Resources" and "Natural Risk Zones".
Co-ordination structure:	
Responsibilities of the co-ordination structure:	The IGME is the national organisation responsible for earth sciences information and knowledge. It forms part of the WG NSDI and it is also the co-ordinator of the TechWG on the theme "Geology" for the CODIIGE.

Organisation:	Ministerio de Economía y Competitividad (Ministry of Economy and Competitiveness)

	Secretaría de Estado de Investigación Desarrollo e Innovación (Secretariat of State for Research, Development and Innovation) Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC, Spanish National Research Council) Vicepresidencia de Investigación Científica y Técnica (VICYT, Vice-Presidency for Scientific and Technical Research) Serrano 117 28006 Madrid
Contact person:	
Position:	
E-mail:	vicyt@csic.es ; http://www.csic.es
Telephone:	(34) 91 568 14 00
Role:	In accordance with article 18.2 of Royal Decree 1730/2007, of 21st December, regarding the creation of the Spanish National Research Council, the Vice-Presidency for Scientific and Technical Research (VICYT) will undertake the following functions: a) Overall responsibility for the planning, supervision and co-ordination of scientific and technical research and knowledge transfer. b) Overall responsibility for the planning and co-ordination of the provision of scientific and technical staff to the centres, institutes and units. c) Overall responsibility for the co-ordination of the Scientific and Technical Areas and of the in-house and collaborative research programmes. d) Overall responsibility for the management of the large scientific and technical facilities and for scientific and technical assessment. e) Overall responsibility for the planning, monitoring and co-ordination of the activities for the recruitment and training of research staff and technical personnel. f) Overall responsibility for the management of the CSIC's participation in competitive tendering processes at a national and regional level.
Co-ordination structure:	Centro de Ciencias Humanas y Sociales (CCHS, Centre for the Humanities and Social Sciences) Contact person: Isabel del Bosque González Email: isabel.delbosque@csic.es Tel: +34 91 6022576
Responsibilities of the co-ordination structure:	Collation and preparation of the information concerning spatial data sets and networked services of the CSIC in order to establish a spatial data infrastructure in accordance with the INSPIRE Directive.

Organisation:	Ministerio de Agricultura Alimentación y Medio Ambiente (Ministry of Agriculture, Food and the Environment) Dirección General del Agua (Directorate-General for Water)
Contact person:	Grupo de Trabajo para la Coordinación de los Servicios de Información Geográfica (Working Group for the Co-Ordination of Geographical Information Services)
Position:	
E-mail:	gabinetesubsecretaria@magrama.es
Telephone:	(34) 91 347 51 82

Role:	Co-ordination of all of the Directorate-Generals and Autonomous Bodies of MAGRAMA which produce spatial data
Co-ordination structure:	Working Group for the Co-Ordination of Geographical Information Services
Responsibilities of the co-ordination structure:	Coordination of the spatial data produced by MAGRAMA

Organisation:	Observatorio de la Sostenibilidad en España (Sustainability Observatory in Spain) Universidad de Alcalá C/ Colegios, 2 28801 Alcalá de Henares (Madrid)
Contact person:	Almudena Checa Rodríguez
Position:	Administration and Documentation Officer
E-mail:	almudena.checa@uah.es
Telephone:	918854049
Role:	Responsible for the Infraestructura de Datos Espaciales del Observatorio de la Sostenibilidad en España (IDE-OSE, Spatial Data Infrastructure of the Sustainability Observatory in Spain)
Co-ordination structure:	Observatorio de la Sostenibilidad en España Universidad de Alcalá C/ Colegios, 2 28801 Alcalá de Henares (Madrid) E-mail: almudena.checa@uah.es OSE website: www.ose.es IDE-OSE website: www.ide.ose.es
Responsibilities of the co-ordination structure:	The Sustainability Observatory in Spain (OSE) was set up in 2005 by means of co-operation agreement between MAGRAMA, the Fundación Biodiversidad and the Universidad de Alcalá. Its mission is to stimulate social change and promote sustainability by means of making the best possible information available to society and those involved in decision-making processes in public life. The aim of the IDE-OSE is to make georeferenced information available to users via the internet with regard to socioeconomic, environmental, cultural, territorial and governance issues which enable the sustainability of Spain's development to be assessed. The IDE-OSE facilitates the access to and the use and dissemination of the sustainability indicators developed by the OSE, along with their integration with the range of basic and thematic cartographic information made by other organisations. This project constitutes the OSE's response to the INSPIRE Directive with regard to sustainability indicators at a European level and to the NSDI at a national level.

10.1.2 Autonomous Communities

Organisation:	Andalucía Instituto de Estadística y Cartografía de Andalucía (Institute of Statistics and Cartography of Andalucía) Leonardo Da Vinci, 21. Isla de la Cartuja 41071-Sevilla
Contact person:	Agustín Villar Iglesias
Position:	
E-mail:	agustint.villar@juntadeandalucia.es
Telephone:	(34) 900 101 407/955 033 800 Fax: 955 033 816
Role:	Administrator of the Spatial Data Infrastructure of Andalucía Coordinator of the GT-IDEAndalucía working group Representative of the regional government, the Junta de Andalucía, on the CODIIGE
Co-ordination structure:	Comisión Interdepartamental Estadística y Cartográfica (Interdepartmental Commission for Statistics and Cartography) WG for IDEAndalucía (SDI of Andalucía) cartografia@juntadeandalucia.es www.ideandalucia.es
Responsibilities of the co-ordination structure:	The legal basis for the IDEAndalucía is to be found in Decree 141/2006, of 18th July, regarding cartographical work in the Autonomous Community of Andalucía. Chapter IV and the Annexes of this Decree establish the principles and procedures for the functioning of IDEAndalucía, including its co-ordination structures. Specifically, article 18.4 of Decree 141/2006 establishes that "the overall technical management and co-ordination of the Spatial Data Infrastructure falls within the remit of the Institute of Cartography of Andalucía, in accordance with the criteria set by the GT-IDEAndalucía and under the supervision of the Comisión de Cartografía de Andalucía (the Cartography Commission of Andalucía)." In compliance with Decree 141/2006, on 9th March 2007 the Cartography Commission of Andalucía approved the constitution of the working group GT-IDEAndalucía, endowing it with the following functions: • Facilitating the incorporation of information originating from different public and private organisations • Ensuring compliance with the principles and standards • Monitoring the updating of the information and exercising quality control over the information which is added • Defining the functional requisites that the computer platforms must fulfil • Planning the growth and development of IDEAndalucía Law 4/2011, of 6th June, constituted the Sistema Estadístico y Cartográfico de Andalucía (Statistical and Cartographic System of Andalucía), which saw the Cartography Commission of Andalucía replaced by the new Interdepartmental Council for Statistics and Cartography, along with the reorganisation of the former ICA as the Institute of Statistics and Cartography of Andalucía.

Organisation:	Aragón Centro de Información Territorial de Aragón (Centre for Territorial Information of Aragón). Dirección General de Ordenación del Territorio (Directorate-General for Territorial Planning). Departamento de Política Territorial e Interior (Department for Territorial and Interior Policy). Gobierno de Aragón (Government of Aragón). Paseo María Agustín, nº 36. Edificio Pignatelli. Puerta 14. 3ª Planta. CP. 50.071 ZARAGOZA.
Contact person:	Sergio Monteagudo Latorre
Position:	Secretary of the Consejo de Cartografía de de Aragón (Cartographic Council of Aragón)
E-mail:	cinta@aragon.es
Telephone:	976 71 56 04 / 976 71 56 05 Fax: 976 71 43 57
Role:	• To obtain, organise and disseminate documentation and information on the territory of the Autonomous Community, by means of the management and co-ordination of the territorial information instruments regulated by Law 4/2009, of 22nd June, regarding territorial planning in Aragón. • Key executive body of the Sistema Cartográfico de Aragón (Cartographic System of Aragón). • Creation of the Plan Cartográfico de Aragón (Cartographic Plan of Aragón). • Maintenance of the Territorial Information System of Aragón (SITAR). • Creation of the Spatial Data Infrastructure of Aragón (IDEAragón).
Co-ordination structure:	Consejo de Cartografía de Aragón (Cartographic Council of Aragón).
Responsibilities of the co-ordination structure:	• To advise the Government of the Autonomous Community, as well as other Public Administrations, with regard to all those issues related to geographic information and mapping. • To promote co-operation and collaboration between different Public Administrations and other bodies with regard to activities related to mapping and geographic information in Aragón. • To lead and promote the creation, processing and use of georeferenced and cartographic data by the Public Administrations, and their contribution to and participation in the IDEAragón. • To provide information on the Cartographic Plan of Aragón project. • To provide information on the Cartographic Standards of Aragón. • To provide information on the Catalogue of Geographical Names of Aragón.

Organisation:	Principado de Asturias (Principality of Asturias) Consejería de Fomento, Ordenación del Territorio y Medio Ambiente (Department of Public Works, Territorial Planning and the Environment) c/ Coronel Aranda, 2 edificio de servicios múltiples sector izquierdo, planta baja 33005 Oviedo
Contact person:	Alvaro Álvarez Rodríguez

Position:	Head of Area for Sistemas de Información Geográfica (Geographical Information Systems)
E-mail:	Alvaromanuel.alvarezrodriguez@asturias.org
Telephone:	Tel: 985 108955 fax: 985 105714
Role:	Responsible for the Sistema de Información Territorial del Principado de Asturias (SITPA, the Territorial Information System of the Principality of Asturias)
Co-ordination structure:	Centro de Cartografía (Cartography Centre) Address: c/Coronel Aranda s/n Edificio Administrativo EASMU Planta 0, sector izquierdo 33005 – OVIEDO Telephone: 985105935 Fax: 985105714 Contact person: Alberto Peón Peláez (Head of the Service) E-mail: alberto.peonpelaez@asturias.org
Responsibilities:	It is the Cartography Centre's responsibility to assist the Department of Public Works with regard to the studies, planning and procedures related to its area of responsibility. It provides cartographic planning and production services, whether these are basic or derived and thematic, and it also co-operates with other organisations with regard to the provision of general-use territorial graphic information, especially to those organisations pertaining to the Principality of Asturias which have responsibility for information systems and publications. (Decree 77/2012, of 14th June, establishing the basic organic structure of the Department of Public Works, Territorial Planning and the Environment)

Organisation:	Comunidad Autónoma de les Illes Balears (Autonomous Community of the Balearic Islands) Direcció General d'Ordenació del Territori de la Conselleria d'Agricultura, Medi Ambient i Territori del Govern de les Illes Balears (DGOT, Directorate-General of Territorial Planning of the Department of Agriculture, the Environment and Territory of the Government of the Balearic Islands)
Contact person:	Joan Mesquida Sampol
Position:	Director General of Territorial Planning
E-mail:	jmesquida@dgoterri.caib.es
Telephone:	
Role:	To participate as the territorial node of the NSDI Co-ordinator of the WG IDEIB Representative of the Autonomous Community of the Balearic Islands on the CODIIGE
Co-ordination structure:	The Directorate-General of Territorial Planning of the Department of Agriculture, the Environment and Territory of the Government of the Balearic Islands is the body responsible in the region for the territorial node of the NSDI, the IDEIB. The DGOT has assigned responsibility for the establishment and maintenance of the IDEIB project to the public company Serveis d'Informació Territorials de les Illes Balears (SITIBSA).

	The contact person for IDEIB at SITIBSA is: Name: Fèlix Escalas van Nouhuys E-mail: fescalas@sitibsa.com Telephone: 971177870 Fax: 971177871
Responsibilities of the co-ordination structure:	The Department of Agriculture, the Environment and Territory, through the Directorate-General of Territorial Planning, is responsible for the development of the SDI of the Balearic Islands, using the standards laid down by the INSPIRE Directive and the LISIGE, in order to ensure the interoperability between the geographic services of the different government agencies involved from the AGE, the regional government, the governments of the individual islands, town and city councils, etc. For this reason, it constantly seeks to facilitate the participation of all of the Public Administrations involved in the project, offering as much technical advice and co-operation as is within its power. The signatories to the co-operation agreement for the IDEIB project made a commitment to drawing up a plan for the creation of the regional node while following the established standards. The project members also made the following further commitments: • To draw up a catalogue of the geographic information they possess. • To exchange catalogues • To facilitate the exchange of geographic information • To agree on joint activities for the training of the organisations' technical staff.

Organisation:	Gobierno de Cantabria (Government of Cantabria) Consejería de Medio Ambiente, Ordenación del Territorio y Urbanismo (Department of the Environment and Territorial and Town Planning) Dirección General de Ordenación del Territorio y Evaluación Ambiental Urbanística (Directorate-General for Territorial Planning and Urban Environmental Assessment)
Contact person:	Gabriel J. Ortiz Rico
Position:	Head of the Unidad de Cartografía y Sistemas de Información Geográfica (Unit for Cartography and Geographical Information Systems)
E-mail:	ortiz_g@cantabria.es
Telephone:	940 20 81 71
Role:	Technical co-ordination and systems administration
Co-ordination structure:	
Responsibilities of the co-ordination structure:	

Organisation:	Castilla-La Mancha (Castile-La Mancha) Junta de Comunidades de Castilla-La Mancha (Government of the Communities of Castile-La Mancha) Consejería de Fomento (Department of Public Works) Paseo Cristo de la Vega s/n

	45001 Toledo
Contact person:	Manuel López Castro
Position:	Head of the Servicio de SIG y Cartografía (SIG and Cartography Service)
E-mail:	mlopez@jccm.es
Telephone:	925 26 69 80
Role:	On 10th June 2010 the official gazetteer of Castile-La Mancha (the Diario Oficial) published Decree 93/2010, of 01/06/2010, regarding the regulation of cartographical activity by the Government of the Communities of Castile-La Mancha. Article 13 provides for the creation of the Centro Cartográfico de Castilla-La Mancha (Cartographic Centre of Castile-La Mancha) as the technical and administrative management body which will report to the regional government department responsible for territorial planning and of the appropriate functioning of the public cartographic activity of the Government of the Communities of Castile-La Mancha and the rest of the regional public sector bodies. The functions of the Cartographic Centre include: h) The creation and maintenance of the catalogue of geographic information metadata of Castile-La Mancha. i) Overall technical responsibility and co-ordination of the SDI of Castile-La Mancha, in accordance with the criteria of the Comisión de Coordinación Cartográfica de Castilla-La Mancha (Cartographic Co-Ordination Commission of Castile-La Mancha).
Co-ordination structure:	Contact: Centro Cartográfico de Castilla-La Mancha Address: Paseo Cristo de la Vega s/n Tel: 925 26 69 00 E-mail: centrocartografico@jccm.es Website: http://centrocartografico.jccm.es/ Contact person: Manuel López Castro Tel: 925 26 69 80 E-mail: mlopez@jccm.es
Responsibilities of the co-ordination structure:	a) The creation of the Cartographic Plan, the Cartographic Standards and the Catalogue of Geographical Names of Castile-La Mancha. b) Establishing, managing, preserving and improving the necessary physical infrastructure and technological systems for the management of the Servicio de Posicionamiento Geodésico de Castilla-La Mancha (Geodetic Positioning Service of Castile-La Mancha), in co-ordination with the national geodetic positioning infrastructures. c) Creating, acquiring and managing satellite imagery, photogrammetric flights, orthophotographs, digital models of elevations and other products which facilitate the observation of the territory of Castile-La Mancha, undertaken in collaboration with the AGE. This is without prejudice to the creation, acquisition and management of such products that other bodies of the Government of the Communities of Castile-La Mancha or other regional public sector organisations may carry out in the fulfilment of their particular functions. d) The creation and updating of the topographic maps of the territory of Castile-La Mancha. e) The creation and updating of thematic general-interest maps for the Government of the Communities of Castile-La Mancha, when this is not the responsibility of other agencies of the regional government. f) The dissemination and distribution of the cartographic products that are

	acquired or created, along with any other cartographic material or spatial data of the territory of Castile-La Mancha which, without having been produced at the Centre, are provided to it, due to these materials or data being of general interest, or because the agency responsible for them so decides it, without prejudice to the legislation concerning intellectual property. g) The management of the Register of Cartography of Castile-La Mancha. h) The creation and maintenance of the catalogue of geographic information metadata of Castile-La Mancha. i) Overall technical responsibility and co-ordination of the SDI of Castile-La Mancha, in accordance with the criteria of the Comisión de Coordinación Cartográfica de Castilla-La Mancha (Cartographic Co-Ordination Commission of Castile-La Mancha). j) In general, technical support to the Cartographic Co-Ordination Commission of Castile-La Mancha in the exercise of its functions. k) The promotion of R&D&I co-operation projects on cartographical issues with other institutions and organisations, especially with the Universidad de Castilla-La Mancha (University of Castile-La Mancha). Also the provision of training in, and dissemination and publicisation of, technological advances and developments with regard to territorial observation amongst public-sector geographic-information professionals. l) The promotion and encouragement of the use and development of free-to-use software for mapping and related areas. m) The preparation of the issues to be considered by the Cartographic Co-Ordination Commission of Castile-La Mancha.

Organisation:	Junta de Castilla y León (Government of Castile and León) Consejería de Fomento y Medio Ambiente (Department of Public Works and the Environment) C/ Rigoberto Cortejoso, 14 47014 Valladolid
Contact person:	Alberto González Monsalve
Position:	Head of the Centro de Información Territorial (Centre for Territorial Information)
E-mail:	gonmonal@jcyl.es
Telephone:	983 41 91 90
Role:	The Centre for Territorial Information, part of the Dirección General de Vivienda, Arquitectura y Urbanismo (Directorate-General for Housing, Architecture and Town Planning) of the Department of Public Works and the Environment, is the body charged with the overall technical responsibility and co-ordination of the SDI of Castile and León, in accordance with Decree 82/2008, of 4th December, regarding the regulation of mapping in Castile and León. www.cartografia.jcyl.es
Co-ordination structure:	Consejo de Cartografía de Castilla y León (Cartographic Council of Castile and León) Consultative and advisory collegial body to the Public Administrations, consisting of representatives from all of the relevant government agencies. Comisión Técnica de Cartografía de Castilla y León (Technical Cartographic Commission of Castile and León) Consultative and advisory collegial body to the Autonomous Community, composed of representatives from the directorate-generals whose areas have

	the greatest impact on and need for geographic information. Centro de Información Territorial (Centre for Territorial Information) Administrative body of the regional government which promotes and co-ordinates cartographic activity and performs the functions of the technical secretariat of the Council and the Commission.
Responsibilities of the co-ordination structure:	One of the Cartographic Council's main goals is to foster co-operation and collaboration between government bodies and organisations in order to promote and support the SDI in Castile and León. The main goals of the Autonomous Community's Technical Cartographic Commission include the promotion of the development, co-ordination and maintenance of the SDI in Castile and León, as well as ensuring the co-ordination of the geographic information systems of the Government of the Autonomous Community and promoting its territorial information system. The Centre for Territorial Information is the administrative body of the Government of Castile and León charged with basic cartographical production and the co-ordination of the SDI of Castile and León.

Organisation:	Cataluña (Catalonia) Comissió de Coordinació Cartogràfica de Catalunya (C4, Cartographic Coordination Commission of Catalonia) Institut Cartogràfic de Catalunya (ICC, Cartographic Institute of Catalonia) Parc de Montjuïc, s/n 08038 Barcelona
Contact person:	Jaume Miranda i Canals
Position:	Acting president
E-mail:	jaume.miranda@icc.cat ; www.icc.cat
Telephone:	93 567 15 00
Role:	The Cartographic Coordination Commission of Catalonia (C4) is the key organisation for the interaction, collaboration and co-ordination between the AGC, the Administration of the Regional Government of Catalonia) and the Administración Local de Catalunya (ALC, association of local government in Catalonia) with regard to mapping and geographic information. It is regulated by Decree 398/2006 and forms part of the Departament de Territori i Sostenibilitat (DTES, the Department of Territory and Sustainability) of the Government of Catalonia. Its functions are: • To ensure that the relationships between the Public Administrations in Catalonia undertaking cartographical and geographic information activities proceed according to the principles established by Law 16/2005, and to resolve any problems that may arise. • To issue a report on the Plan Cartográfico de Catalunya (PCC, Cartographic Plan of Catalonia) project and also regarding any modifications or reviews. • To establish the rules and standards that must be applied to the creation of cartographic materials and geographic information. • To ensure that the objectives and priorities of cartographic activities in Catalonia are fulfilled, in accordance with that which is laid down in the PCC. • To make proposals to the Government of Catalonia with regard to the adoption of further co-ordination measures which it deems appropriate. • To issue a report on the procedures for the drawing up of regulations by

	the Government of Catalonia on mapping and related geographic information, based on the report which may be made by the ICC. • To ensure the dissemination and compliance with the rules and standards, and that the updating and availability to which article 10 of Law 16/2005 refers to is carried out and to receive information on the management of the Registro Cartográfico de Catalunya (RCC, Cartographic Register of Catalonia). • To inform the ICC of the position of local bodies with regard to the initiatives of national, EU, or international organisations and to adopt, where appropriate, shared positions so that the ICC can propose these to the bodies it forms part of, and to be informed of the activities and interactions with these organisations. • To issue a mandatory report with regard to the objections made to the Minister of the DTES concerning the resolutions taken with regard to registration in the RCC. The C4, with the support of the ICC, co-ordinates and supports the implementation of the INSPIRE Directive in Catalonia. The ICC is the point of contact of the Consejo Superior Geográfico (CSG, Geographic High Council) in Catalonia.
Co-ordination structure:	Contact: Institut Cartogràfic de Catalunya Address: Parc de Montjuïc, s/n 08038 Barcelona Tel: 93 567 15 00 Fax: 93 567 15 67 E-mail: webmaster@icc.cat Website: www.icc.cat Contact person: Joan Sendra Tarrida Tel: 93 567 15 00 E-mail: joan.sendra@icc.cat
Responsibilities of the co-ordination structure:	The C4 is the key body for the co-ordination of geographic information in Catalonia and, in order to be able to carry out this function, it can call on a permanent supporting body, a legal instrument and two bodies for the dissemination of information. <u>Permanent supporting body</u> Law 16/2005 established that the Government of Catalonia delegates its responsibilities for geodesy, mapping and the SDI of Catalonia (known as the IDEC) to the ICC. The functions of the latter body, as described in Law 16/2005, include: • To create and propose the PCC, and also undertake, when necessary, any corresponding modifications or reviews. • To promote the C4, provide permanent support to it and implement the agreements it makes, when this implementation does not correspond to one of the C4 members within the remit of their respective responsibilities. • To co-operate with the agencies of the AGE which have cartographic responsibilities and undertake the co-ordination and co-operation with local bodies in Catalonia in this area. • To oversee and run the RCC. • To create, structure, publicise and maintain the IDEC in accordance with national and Community regulations regarding spatial information structures and networks and co-operate with other bodies and agencies of the Government of Catalonia, in order to undertake continuous improvement of this infrastructure. • To foster and promote public and private cartographic services, research

into, education in, and the technological development of mapping.

- To co-ordinate, within Catalonia, the implementation of Community and international standards and obligations corresponding to the functions of the ICC.

In order to provide support to the C4, the ICC's tasks include the production of progress reports on the development of the PCC and of the application of the INSPIRE Directive in Catalonia.

Co-ordination instrument

In order to co-ordinate the mapping and geographic information-related activities in Catalonia, there exists a key instrument: the PCC.

The aims of the PCC include the establishment of the objectives of and the co-ordination of cartographic activities, the constitution and continuous improvement of the geographic information infrastructure of Catalonia and the proper use and co-ordination of this information across the range of public policies concerning territorial issues.

The PCC identifies and define the 113 Conjuntos de Información Geográfica (CIGs, Geographical Information Data Sets) that the AGC and the ALC produce and use in Catalonia. In this respect, the PCC determines their structure, quality, availability, interoperability, updating and access conditions.

The CIGs referred to in the PCC are recorded in a catalogue, being grouped thematically in accordance with Annexes I, II and III of the INSPIRE Directive. A Group 0 has been added in order to integrate the cartographic materials with the topographical information.

For each of the CIGs, the catalogue establishes the following regulatory specifications:

- Name, unique identifier and group of the INSPIRE classification to which the CIG belongs.
- Government body, Department of the Government of Catalonia (where applicable) and responsible organisation.
- Level of authorisation for access to the information.
- Minimum advisable frequency with which it should be updated.
- Description

Body for the recording of cartographic and geographic information

The RCC is the key organisation for cartographic and geographic information related to the AGC and local bodies in Catalonia; it forms part of the DTES and it is run and managed by the ICC.

The RCC must contain all of the cartographic and geographic information which has an official status and this must be catalogued in the IDEC.

The use of the officially recorded cartographic and geographic information is mandatory for the autonomous government and local authorities in Catalonia when creating new maps, as it is also for local and other public bodies in Catalonia in the exercise of their responsibilities, when these require the use of cartographic or geographic information or are based on such information.

Body for IDEC promotion, maintenance and dissemination

Law 16/2005 created the Centro de Soporte a la Infraestructura de Datos Espaciales de Catalunya (CSIDEC, Support Centre for the Spatial Data Infrastructure of Catalonia) as the key technical body for the promotion, use and maintenance of the IDEC, with the purpose of disseminating the geospatial information and the services based on it, and of making this information accessible and its shared use possible.

The functions of the CSIDEC include:

- Promoting and maintaining the IDEC.
- To raise awareness, describe and publicise the geographic information in existence and the services based on it.

	• To provide information on the technology used in order to make the information accessible and interoperable and facilitate its sharing. • To act as the co-ordination structure for the implementation and maintenance of the IDEC, taking on board the contributions of the data producers, users, value-added service providers and co-ordination bodies, amongst others.
Organisational structure	In order to carry out its functions, the C4 has created 3 Technical Commissions: • Technical commission for the implementation of the PCC and the INSPIRE Directive (CT1) • Technical commission on the geographic information of the ALC (CT2) • Technical commission for the European Earth Observation Programme (CT3) In turn, CT2 created 3 Working Groups reporting to it with specific responsibilities: • Working group for the establishment of the technical specifications • Working group for the implementation of the RCC • Working group for the establishment of the technical specifications of the streets database

Organisation:	Comunitat Valenciana (Valencian Community) Conselleria de Infraestructuras, Territorio y Medio Ambiente (Department of Infrastructures, Territory and the Environment) Francesc Cubells 7 46011 Valencia
Contact person:	Emilio Forcén Tárrega
Position:	
E-mail:	Forcen_emi@gva.es ; www.citma.gva.es
Telephone:	96 342 59 91
Role:	The Conselleria de Medio Ambiente, Agua, Urbanismo y Vivienda (Department of the Environment, Water, Town Planning and Housing) signed on 15th April 2010 a co-operation agreement (published by Resolution of 26th May 2010 by the Conselleria de Industria, Comercio e Innovación (Department of industry, Commerce and Innovation)) with the Geographic High Council (CSG), on behalf of the AGE, by means of which the Government of the Valencian Community came to form part of the National Cartographic System (SCN), in which the geographic information infrastructure of the Valencian Community is to be integrated with the national geographic information infrastructure. By means of Decree 5/2011 of 21st June, the Government of the Valencian Community assigned to the Department of Infrastructures, Territory and the Environment responsibilities with regard to public works, territorial and coastal planning, housing and building quality, transport, ports and airports, the environment, the landscape and climate change. The department is now structured in terms of two major bodies, the Secretaría Autonómica de Infraestructuras y Transporte (the Regional Secretariat for Infrastructure and Transport) and the Secretaría Autonómica de Territorio, Medio Ambiente y Paisaje (the Regional Secretariat for Territory, the Environment and the Landscape). By means of Decree 75/2011, of 24th June, by the Consell (the executive body of the Government of the Valencian Community), the Regional

	Secretariat for Infrastructure and Transport assumed the functions attributed to it by article 68 of the Law of the Consell, regarding public works, transport and logistics, ports, coasts, airports, its own land-related activities, architecture, urban projects and facilities, housing and building quality and mapping. By means of this same decree, the Regional Secretariat for Territory, the Environment and the Landscape assumed the functions attributed to it by article 68 of the Law of the Consell, regarding strategic territorial activities and planning, the landscape, natural spaces and biodiversity, environmental assessments, territorial co-ordination, town planning, environmental quality, waste and climate change.
Co-ordination structure:	Contact: Institut Cartogràfic Valencià (ICV, Valencian Cartographic Institute) Address: C/Santos Justo y Pastor 116, Valencia, Telephone: 902 200 428, Fax: 96 342 59 51, E-mail: responde_icv@gva.es Website: www.icv.gva.es Contact person: Laura Cabezudo de la Muela Telephone: 96 342 59 79 E-mail: cabezudo_lau@gva.es
Responsibilities of the co-ordination structure:	The ICV is part of the department of the Government of the Valencian Community with responsibilities for territorial planning (currently the Department for Infrastructure, Territory and the Environment), with the aim of leading, co-ordinating and, where appropriate, encouraging cartographic, photogrammetric, geodetic, topographic activities, or those involving any other kind of geographic technology, where responsibility for this falls within the remit of the Government of the Valencian Community. The functions of the ICV include: a) Establishing strategic objectives for geodesy, photogrammetry and mapping in the Valencian Community, along with the creation of long-term geodetic and cartographic planning. b) Collating, correcting and administering the existing cartographic materials possessed by the public bodies of the Valencian Community and, where appropriate, by other privately-run organisations in order to create a cartographic database. c) Creating, reproducing and distributing basic cartographic work, along with the publishing and disseminating other works that it deems appropriate. d) Co-ordinating and supervising the cartographic work of the public bodies of the Valencian Community. e) Improving the cartographic and geographic information systems of the public bodies of the Valencian Community. f) Training staff of the public bodies of the Valencian Community who are assigned to cartographic activities. g) Research and development of new techniques in geodetic, cartographic and topographic engineering. h) Maintaining relationships and co-ordinating with analogous regional, national or international organisations. i) Creating, structuring and organizing the Cartoteca Valenciana (Valencian Cartographic Library). j) Issuing reports to the Government of the Valencian Community with regard to all kinds of cartographic issues, while also passing on to it any studies, suggestions or reports in its area which it deems appropriate. k) To propose the Plan Cartográfico de la Comunidad Valenciana (the Cartographic Plan of the Valencian Community), together with annual and

	multi-year plans. The ICV is the body charged with ensuring the integration of the Government of the Valencian Community in the SCN, in accordance with the co-operation agreement signed by the Presidency of the CSG, on behalf of the AGE, and the Department of the Environment, Water, Town Planning and Housing, on behalf of the Government of the Valencian Community, on 15th April, 2010. This agreement concerns the integration of the IDECV into the national geographic information infrastructure, and the development of the ICV web geoportal, which is to provide access to the geographic information services

Organisation:	Extremadura Centro de Información Cartográfica y Territorial de Extremadura. (CICTEx, Cartographic and Territorial Information Centre of Extremadura) Consejería de Fomento, Vivienda, Ordenación del Territorio y Turismo (Department of Public Works, Housing, Territorial Planning and Tourism)
Contact person:	Carmen Caballero Cáceres
Position:	
E-mail:	carmen.caballero@juntaextremadura.net
Telephone:	(34) 924332166 Fax: (34) 924332162
Role:	Co-administrator of the Infraestructura de Datos Espaciales de Extremadura (SDI of Extremadura) Co-ordinator of the Comisión temática de la Infraestructura de Datos Espaciales de Extremadura (Thematic Commission of the SDI of Extremadura) Representative of the OTALEX SDI at the CODIIGE
Co-ordination structure:	Consejo de Información Cartográfica y Territorial de Extremadura (Cartographic and Territorial Information Council of Extremadura) Thematic Commission of the SDI of Extremadura. Cartographic and Territorial Information Centre of Extremadura (CICTEx) SDI of Extremadura. ideex@juntaextremadura.net www.ideextremadura.com
Responsibilities of the co-ordination structure:	The aim of the Cartographic and Territorial Information Council of Extremadura is to co-ordinate the cartographic and territorial needs of Extremadura and regulate this activity. The Thematic Commission of the SDI of Extremadura reports to the Cartographic and Territorial Information Council of Extremadura, providing guidance and proposals for action in this area. The main functions of the CICTEx include: the management and maintenance of the Sistema de Información Territorial de Extremadura (the Territorial Information System of Extremadura); the creation, structuring and organisation of the geospatial information database of Extremadura; the promotion, maintenance and co-ordination of the SDI of Extremadura; the provision of technical assistance to the Cartographic and Territorial Information Council of Extremadura; and the representation of Extremadura at the CSG.

Organisation:	Galicia Consellería de Medio Ambiente, Territorio e Infraestruturas (Department of

	the Environment, Territory and Infrastructures) Instituto de Estudios del Territorio (Institute of Territorial Studies) San Lázaro s/n 15781 – Santiago de Compostela
Contact person:	Manuel Gallego Priego
Position:	Geographical information management officer
E-mail:	mgallego@xunta.es
Telephone:	Tel: 981545817 | Fax: 981541757
Role:	Administration of the Spatial Data Infrastructure of Galicia (IDEG) Representative of the Xunta de Galicia (the Government of Galicia) on the CODIIGE
Co-ordination structure:	Comisión de Coordinación de Sistemas de Información Geográfica y Cartografía (Commission for the Coordination of Geographic and Cartographic Information Systems) sitga.xunta.es
Responsibilities of the co-ordination structure:	The Institute of Territorial Studies is the body charged with compiling and processing territorial information in Galicia, along with the production of cartographic materials for the different departments and public organisations of the Autonomous Community of Galicia, and its functions include: 1. Co-ordinating and disseminating the necessary geographic and cartographic information for the performance of territorial and town planning studies by the different departments and public organisations of the Autonomous Community of Galicia, while also providing technical support for the dissemination and training with regard to geographic information activities undertaken by the Government of Galicia or in co-ordination with it. 2. Managing the territorial information systems of the region through the use of the cartographic and spatial databases held by the departments and other bodies of the Government of Galicia, as required by them, along with any other type of information which can be geographically located and is compatible with its incorporation into the IDEG. In this area, particular attention will be paid to the exhaustive collation and appropriate processing of toponymic data. To this end, the Institute of Territorial Studies will provide all of the technical support necessary to the department of the regional government with responsibility for toponymy and to the Toponymy Commission, and will take especial care to ensure that place-names are used correctly in the cartographic materials produced by the Government of Galicia. 3. The creation, maintenance and updating of the necessary geographic and cartographic information for the performance of studies by the government department it reports to, while also undertaking other tasks on behalf of other departments or bodies of the Government of Galicia, or other government agencies with responsibilities in this area. 4. The archiving and processing of data from the territorial indicators established by the instruments of territorial planning. 5. The incentivisation of innovation, adoption and development of geographic information-related technologies and infrastructures in Galicia. The planning and development of value-added services and new geographic information-related systems and applications for Galicia also fall within its remit. 6. Facilitating public access to the geographic information and technology in order to promote knowledge of the land and its values, thus contributing to the conservation, protection and sustainable development of Galicia.

Organisation:	Comunidad de Madrid (Community of Madrid) Dirección General de Urbanismo y Estrategia Territorial (Directorate-General for Town Planning and Territorial Strategy) Consejería de Medio Ambiente y Ordenación del Territorio (Department of the Environment and Territorial Planning) c/ Alcalá, 16 28014 Madrid
Contact person:	Rafael Herrero García
Position:	Head of Area for the Centro Regional de Información Cartográfica (Regional Centre for Cartographic Information)
E-mail:	rafael.herrero@madrid.org
Telephone:	914382797
Role:	Responsible for the IDEM and the official topographic and thematic spatial data sets of the Community of Madrid
Co-ordination structure:	Centro Regional de Información Cartográfica (Regional Centre for Cartographic Information) Dirección General de Urbanismo y Estrategia Territorial (Directorate-General for Town Planning and Territorial Strategy) c/ Alcalá, 16 28014 Madrid E-mail: cartografia@madrid.org Web map service: www.madrid.org/cartografia IDEM: www.madrid.org/cartografia/idem
Responsibilities of the co-ordination structure:	Decree 11/2013 of 14th February of the Consejo de Gobierno (the Governing Council) of the Community of Madrid (BOCM 20/02/2013). The creation, updating and publishing of photogrammetric imagery, orthophotographic series, topographical cartographic materials and thematic maps produced by the Community of Madrid, including the creation and maintenance of the digital topographic databases; the co-ordination of the cartographic activities of the regional government, with exclusive responsibility over the official cartographic material of the Community of Madrid, along with the representation of the Community of Madrid in the cartographic co-operation bodies on which other governmental bodies have a presence. The creation of town planning and territorial databases and the maintenance of a regional town planning information system.

Organisation:	Murcia Consejería de Obras Públicas y Ordenación del Territorio (Department of Public Works and Territorial Planning) Plaza de Santoña, 6. 30071 Murcia
Contact person:	Ramón Pablo García García
Position:	Head of cartography for the Comunidad Autónoma de la Región de Murcia (CARM, Autonomous Community of the Region of Murcia)
E-mail:	ramonp.garcia@carm.es
Telephone:	Tel: 968 362435 | Fax:

Role:	Co-ordinator of the Infraestructura de Datos Espaciales de la Región de Murcia (IDERM, SDI of the Region of Murcia).
Co-ordination structure:	Contact: Directorate-General for Transport and Ports. Address: Plaza de Santoña, 6. Telephone: 968 362435 Fax: E-mail: ramonp.garcia@carm.es Website: http://www.iderm.es Contact Person: Ramón Pablo García Garcia Telephone: 96 342 59 79 E-mail: ramonp.garcia@carm.es
Responsibilities of the co-ordination structure:	The functions of the CARM's Servicio de Cartografía (Cartography Service): a) Undertaking the necessary work for the implementation of the geodetic networks and lower order levelling which can provide, due to their density and proximity to the user, the necessary geodetic and topographic infrastructure for the creation, maintenance and updating of cartographic materials and the georeferencing of any territorial work, study or project. b) Undertaking basic and thematic mapping, whether by conventional means or via remote sensing, and the computerisation of the cartographic and thematic data for their input into a database. c) Publishing, recording and disseminating graphically, photographically or numerically the documents generated by the aforementioned activities. d) Co-ordinating cartographic activities with the relevant agencies of central government. e) Co-ordinating with local authorities on cartographic issues and providing advice to them when the authorities call upon the service. f) Provision of the cartographic format which is appropriate to the needs of the different territorial stakeholders. g) Any other activities which the service is called upon to undertake which lie within its remit.

Organisation:	Navarra Comisión de Coordinación del SITNA (Co-ordination Commission of the SITNA) Parque Tomás Caballero, 1, 3ª 31005 PAMPLONA
Contact person:	Andrés Valentín
Position:	Head of Sistemas de Información Territorial (Territorial Information Systems)
E-mail:	sitna@navarra.es; idena@navarra.es
Telephone:	(34) 848 427956 / 630 080101
Role:	Secretary of the Co-ordination Commission of the SITNA (Territorial Information System of Navarra) Member of the CODIIGE Member of the Specialised Commission on SDI of the Geographic High Council (CE IDE)
Co-ordination structure:	Co-ordination Commission of the SITNA Permanent

	Technical Committee INSPIRE workshop INSPIRE working groups http://idena.navarra.es
Responsibilities of the co-ordination structure:	Co-ordination Commission of the SITNA was created by means of an agreement by the Gobierno de Navarra (Government of Navarra) on 19th March 2001. In 2005, the SDI of Navarra (IDENA) was made publicly available. Co-ordination Commission of the SITNA exercises the following functions: The approval, development and assessment of the Plan Estratégico del SITNA (SITNA Strategic Plan). For this purpose, it will approve the Annual Action Plans and the corresponding reports. The co-ordination of the different bodies of the Autonomous Community of Navarra, with regard to geographic information. The promotion of the availability of the necessary financial, technological, human and educational resources for the implementation of the SITNA. The co-ordination and optimisation of these resources. The approval of the methodology, classification, codification and other specific instruments necessary for the implementation of the SITNA. The undertaking, monitoring and assessment of the Annual Action Plans, of the maintenance of the SITNA information, of the necessary actions for its updating and of the required technical work for fulfilment of the SITNA objectives. The deployment of the data, metadata and services required by Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) and by Law 14-2010, on Geographic Information Infrastructures and Services in Spain (LISIGE).

Organisation:	Gobierno de La Rioja (Goverment of La Rioja)
Contact person:	Gonzalo López García
Position:	Head of Section for Sistemas de Información Geográfica y Cartografía (Geographic Information Systems and Cartography)
E-mail:	gonzalo.lopez@larioja.org
Telephone:	(34)941.291.100 ext 33578
Role:	Administrator of the SDI of La Rioja
Co-ordination structure:	Sección de Sistemas de Información Geográfica y Cartografía (Section for Geographic Information Systems and Cartography) Servicio de Ordenación del Territorio (Territorial Planning Service) Dirección General de Urbanismo y Vivienda (Directorate-General for Town Planning and Housing) Consejería de Obras Públicas, Política Local y Territorial (Department of Public Works and Local and Territorial Policy)
Responsibilities of the co-ordination structure:	Decree 47/2011, of 6th July, establishing the organic structure of the Department of Public Works and Local and Territorial Policy and its functions, as an amendment to Law 3/2003, of 3rd March regarding the organisation of the public sector in the Autonomous Community of La Rioja. Article 6. Administrative functions 2.5. For the Directorate-General for Town Planning and Housing d) The planning, development and management of cartographic policy and

	the geographic information systems of the Autonomous Community of La Rioja

Organisation:	Gobierno Vasco (Government of the Basque Country (Euskadi))
Contact person:	Maria Elena Lete Garcia
Position:	Director of Territorial and Town Planning
E-mail:	me-lete@ej-gv.es
Telephone:	Tel: 945 019824 | Fax:
Role:	Director of Planificación Territorial y Urbanismo (Territorial Planning and Development) President of the Comité Directivo de la IDE de Euskadi (SDI Management Committee of Euskadi) President of the Comisión Informativa Interdepartamental de la IDE de Euskadi (Interdepartmental Informative Commission of the Euskadi SDI)
Co-ordination structure:	Contact: Dirección de Planificación Territorial y Urbanismo (Directorate of Territorial Planning and Development) Address: C/ Donostia - San Sebastián, 1. Telephone: 945 019824 Fax: E-mail: me-lete@ej-gv.es Website: http://www.geo.euskadi.net Contact person: Maria Elena Lete Garcia Telephone: 945 019824 E-mail: me-lete@ej-gv.es
Responsibilities of the co-ordination structure:	The Directorate of the Territorial Planning and Development, in the form of the Servicio de Cartografía del Gobierno Vasco (the Mapping Service of the Basque Government) is responsible for the exercise of the following functions: - To promote and co-ordinate the SDI of Euskadi and its geoportal, www.geo.euskadi.net, through dissemination and re-use of the geographic information and services. - To produce the basic official cartographic materials of the Basque Government and to provide this to the SDI of Euskadi, while exercising control over the maintenance of the cartographical and geodetic infrastructure of Euskadi. - To co-ordinate the production of geographic information by the Government of the Autonomous Community of the Basque Country, in order to ensure the availability of harmonised and quality geographic data. Identifying current and future needs and ensuring the observance of the European regulations with regard to the spatial data infrastructure of the European Union (INSPIRE). - To undertake disseminatory work and provide technical assistance in the areas of cartography, geodesy and geographic information, promoting the effective use and distribution of the geographic information and SDI services of Euskadi.

10.2 List of references for the compilation of the report

Documents cited

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Garcia, Pilar; Moix, Montse; Queraltó, Pau. 2008: Impacto Socio-Económico de la Infraestructura de Datos Espaciales de Cataluña. In Massimo Craglia (ed.) *EUR-Scientific and Technical Research Series*. Luxembourg: Office for Official Publications of the European Communities (link)

Muñoz, Jenny; Capdevila, Joan. 2012: Trayectoria de la implementación de INSPIRE en España. Paper presented at the *Jornadas Ibéricas de las Infraestructuras de Datos Espaciales (JIIDE),* Madrid, 17-19 de octubre de 2012 (link)

Vandenbroucke, Danny & Biliouris, Dimitrios. 2011: *Spatial Data Infrastructures in Spain: State of play* K.U.Leuven (link)

Legislation cited

European legislation

- Directive 2007/2/EC of the European Parliament and of the Council, of 14th March 2007, establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) (link)
- Commission Decision 2009/442/EC, of 5th June 2009, implementing Directive 2007/2/EC of the European Parliament and the Council as regards monitoring and reporting (link)
- Commission Regulation (EC) 976/2009, of 19th October 2009, as regards Network Services (link)
- Commission Regulation (EU) 1088/2010, of 23rd November 2010, amending Regulation (EC) 976/2009 as regards download services and transformation services (link)
- Commission Regulation (EU) 1089/2010, of 23rd November 2010, as regards interoperability of spatial data sets and services (link)

National Spanish legislation

- Law 14/2010, of 5th July, on geographic information infrastructures and services in Spain (LISIGE) (link)
- Royal Decree 1545/2007, of 23rd November, regulating the National Cartographic System (SCN) (link)
- Ministerial Order FOM/956/2008, of 31st March, approving the public dissemination policy of the geographic information generated (link)

Regional Spanish legislation

- Decree 141/2006, of 18th July, regulating cartographic activity in the Autonomous Community of Andalucía (link)
- Plan Cartográfico de Andalucía (Cartographic Plan of Andalucía) 2009-2012, approved by agreement of the Council of the Government of Andalucía on 16th September 2008 (link)
- Decree 208/2010, of 16th November, of the Government of Aragón, approving the Reglamento de Ordenación de la Información Geográfica (Regulation for the Planning of Geographic Information) in Aragón (link)
- Plan Cartográfico de Aragón (Mapping Plan of Aragón) 2013-2016, approved by Agreement of the Council of the Government of Aragón on 6th March 2013 (link)
- Law 16/2005, of 27th December, regarding geographic information and the Cartographic Institute of Catalonia (ICC) (link)
- Decree 398/2006, of 24th October, approving the amendment of Law 16/2005, of 27th December, regarding geographic information and the Cartographic Institute of Catalonia (ICC) as regards the official status and the use of cartographic services, inter-administrative relations and planning (link)
- Decree 62/2010, of 18th May, approving the Plan Cartográfico de Cataluña (Cartographic Plan of Catalonia) (link)
- Decree 27/2012, of 19th July, regulating the usage conditions of the cartographic materials and the geographic information produced by the Government of the Community of Castile and León and setting the public prices for the provision of the service in a physical format. (link)

ISO standards of the 19100 family

- ISO 19113: Geographic information -- Quality principles
- ISO 19114: Geographic information -- Quality evaluation procedures
- ISO 19115: Geographic information -- Metadata
- ISO 19119: Geographic information -- Services
- ISO 19131: Geographic information -- Data product specifications
- ISO 19138: Geographic information -- Data quality measures
- ISO 19139: Geographic information -- Metadata -- XML schema implementation

Websites cited

INSPIRE

- INSPIRE portal: http://inspire.jrc.ec.europa.eu/
- Monitoring and reporting page for INSPIRE: http://inspire.jrc.ec.europa.eu/index.cfm/pageid/182

- INSPIRE metadata validator: http://inspire-geoportal.ec.europa.eu/validator2/
- INSPIRE client catalogue: http://inspire-geoportal.ec.europa.eu/discovery/
- INSPIRE catalogue register: http://inspire-geoportal.ec.europa.eu/INSPIRERegistry/

European Projects

- OTALEXC : www.ideotalex.eu
- EUREF: http://www.euref-iag.net/
- EURADIN: https://www.euradin.eu/default.aspx
- GIS4EU: http://www.gis4eu.eu/default.asp?l=5
- Project eWater: http://ewater.geolba.ac.at/
- Project OneGeology-Europe: http://www.onegeology-europe.org/
- HLANDATA: http://www.hlandata.eu/
- GMES – Copernicus: http://copernicus.eu/
- EIONET: www.eionet.europa.eu
- ETC/SIA: http://www.etcsia.uma.es/
- HELM: http://www.fp7helm.eu/

NSDI

- NSDI Geoportal: http://www.idee.es
- NSDI web location service: http://www.idee.es/csw-inspire-idee/servicio
- NSDI Blog: http://blog-idee.blogspot.com.es
- SobreIDEs bulletin: http://www.idee.es/web/guest/boletin-sobre-ides
- Monitoring and Reporting website (S&I): http://gestorsi.idee.es
- Wiki for INSPIRE 2010 monitoring: http://seguimientoinspire2010.wikispaces.com/
- Wiki for INSPIRE 2011 monitoring: http://seguimientoinspire2011.wikispaces.com/
- Catalogue of regional geoportals: http://www.idee.es/web/guest/regional
- JIIDE wesbite: http://www.idee.es/web/guest/jornadas

Geoportals managed by the CSIC

- SILEX: SDI of Casa Montero: http://www.casamontero.org/wui/geo/map.html
- IDEZAM: SDI of the Archaeological Area of Las Médulas: www.idezam.es/
- SigMayores: Mapping Server of Social and Health Resources: http://sigmayores.csic.es/visor/visor.html

- Anthos: System providing information on the flora of España: www.anthos.es
- GBIF: Global Biodiversity Information Facility in Spain: www.gbif.es/
- Biogeography geoportal: www.mncn.es
- Digital Cartography for the Monitoring of the Doñana National Park: http://mercurio.ebd.csic.es/seguimiento/
- IMEDEA geoportal: http://www.imedea.uib.es/gis/geoportal/

Other portals and national projects

- SDI portal of MAGRAMA: http://www.magrama.gob.es/es/cartografia-y-sig/ide/
- Hydrocarbons portal of the Ministerio de Industria (Ministry of Industry): http://geoportal.mityc.es/hidrocarburos/eess/
- Housing Atlas: http://atlas.vivienda.es/
- Cartociudad project: http://www.cartociudad.es/visor/
- PNOA project: http://www.ign.es/PNOA/
- SIOSE project: http://www.siose.es/siose/
- Website of the CENG: http://www.csg-cnc.es
- FEGA : http://www.fega.es
- Jornadas de Nombres Geográficos (Conference on geographic names) (link)

IDEC:

- Geoportal: http://www.geoportal-idec.cat/
- IDEC catalogue: http://www.geoportal-idec.net/geoportal/cas/index.jsp
- Earth observation SDI: http://www.geoportal-idec.cat/geoportal/ideot/
- Sensor catalogue in Catalonia: http://www.geoportal-idec.cat/geoportal/sensors/cat/
- IDEC Univers: http://www.geoportal-idec.cat/ideunivers/local.jsp?lang=en
- IDEC Litoral: http://www.geoportal-idec.net/idecostes/index.jsp
- IDEC Local: http://www.geolocal.cat/idelocal/

Tools

- CatMDEdit program: http://catmdedit.sourceforge.net/
- MetaD program: http://www.geoportal-idec.cat/ideunivers/es/metad.html
- Geonetwork program: http://geonetwork-opensource.org/

Forums

- ILAF website: http://external.opengeospatial.org/twiki_public/ILAFpublic/
- SIG e-mail list: http://www.rediris.es/list/info/sig.html
- NSDI e-mail list: http://www.rediris.es/list/info/idee.html

Private projects

- Goolzom: http://www.goolzoom.com/
- Wikiloc: http://es.wikiloc.com