



# INSPIRE

## Infrastructure for Spatial Information in Europe

# Member State Report: Spain, 2015

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# 1 Executive summary

The implementation of the INSPIRE Directive in Spain began upon its publication in 2007, as the Spanish SDI had already been introduced with the publication of the national geoportal in 2004. In the 2013-2015 period its standardisation has progressed as has the compliance of a large number of resources available, several thousand data sets and services, in all the spheres of Spanish administration. With the exception of some INSPIRE themes, such as CP and AU, the Organization of the NSDI reflects the three levels of government in Spain: national, regional and local.

A significant effort has been made in the development of the attributes and functions of the CODIIGE (Executive Board of the Geographic Information Infrastructure of Spain) and in the setting up of the 31 thematic technical working groups (some INSPIRE topics have been split, others have been joined) and the 4 technical working groups (TechWG) of a transversal nature (Architecture and standards, Metadata and catalogues, Monitoring and reporting and Data and services policies).

The Organizational structure of the NSDI (known in Spain by its Spanish initials, IDEE) is fundamentally based on the 8 national and 17 regional nodes, and it receives the technical support of the TechWGs, coordinated and managed by the CODIIGE. In the case of the TechWGs coordinated by the Ministry of Agriculture, Food and the Environment (MAGRAMA), there has been an emphasis on the use of existing coordination bodies that decide on the matters for which they are responsible, which include all the stakeholders involved in the application of the environmental Directives and in 2015 they were assigned the responsibility for coordinating the Monitoring of environmental topics to ensure coordination with other Directives. All the Autonomous Communities are implementing their own SDIs pursuant to INSPIRE and they have established their own Organizational structure according to their needs and the available resources. They are responsible for interacting and coordinating with the local Administration.

Furthermore, the Working Group of the Spatial Data Infrastructure of Spain (WG NSDI) serves as an ample forum for debate and the exchange of experiences. It is open to private enterprise, universities and citizens and includes 7 Working Sub-groups and 3 Forums, all intended to be specific forums for discussion and debate.

Almost all the metadata of data and services are compliant with INSPIRE (more than 90 %). However, despite the efforts made, only approximately half of the spatial data sets available comply with the INSPIRE specifications. Much remains to be done, especially regarding the themes of Annex III. Still less favourable is the situation with regard to network services, of which only a few are compliant with the Implementing Rules of Inspire. However, we are already taking measures to achieve compliance in the established terms.

During the 2013-2015 period, we have suffered the consequences of the unfavourable economic situation and the challenge, which has been overcome to a large extent, has been to prevent the deterioration of the quality of the services or the supply of available resources.

This report has been coordinated by the TechWG for Monitoring and Reporting which has prepared a first draft, launched a round of consultations requesting contributions from the national and regional nodes, a second round of consultations with members of the CODIIGE, and has prepared the final version. The availability of a template for guidance has been very useful, although some sections have been detected that are too similar and almost repeated, and perhaps it would be a good idea to have feedback from the European Commission with regard to the length, quality and focus of these three-year reports.

To be able to speak accurately of the quality assurance of a national SDI it would be necessary to have a quality model (taken from the various models proposed which are covered in the literature) that describes it in terms of well-defined qualitative aspects and indicators. The issue is handled by describing, beyond the monitoring indicators, the quality of spatial data sets, services and metadata and some general considerations are added on other aspects.

In general lines, as standard methods of quality assurance, verification with the available gml templates is used for data, verification with the available xml template and the INSPIRE validator are used for metadata, and the existence of *Extended Capabilities* and the INSPIRE validator are used for services.

With regard to data quality, on many occasions acceptable quality thresholds are established and control is transferred to the contractor company when the mass production of data is performed via public procurement and this is subsequently verified. It is standard practice to implement a series of quality controls in the production processes that serve as a management system of final quality.

The National Geographic Institute (IGN), among other Organizations, performs continuous monitoring of the availability and performance of the services by means of a request every 3 minutes and it has performed sporadic capacity tests, not very frequently owing to the stress that this causes to the services in production. In future the results will be published and regular capacity tests will be performed. Several Autonomous Communities, such as Aragón and Andalucía, have approved their own Technical Quality Rules for data and/or services and they are applying them systematically.

It is difficult to assure the quality of some of the components of an SDI, since INSPIRE does not include metadata quality elements and there is little experience regarding how to determine and control the semantic quality of their contents. This is an important problem because the lack of standardised criteria when completing them means that on some occasions they are not very useful. Furthermore, there is no ATS for the INSPIRE services.

Furthermore, more general problems have been detected such as: lack of protocols that compensate or prevent the stoppage of a service, grey areas owing to the inexistence of data on key topics or areas, gaps or overlaps because there are no, two or more Organizations responsible for generating the same geographic data, the lack of interoperability of licences for use and the problem of harmonisation and horizontal interoperability between neighbouring SDIs (data that match, services that match). Often simply the name and a different service granularity on both sides of a border make it difficult to interoperate (1 service compared to n services for information on the same topic).

A cross-border SDI project that should be mentioned owing to its special relevance is OTALEXC, a cross-border SDI set up in 2007 with information and collaboration between the regions of Alentejo and Centro in Portugal and Extremadura in Spain. Since 2012, it has included 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. In addition, the three years covered by this report have seen the implementation of a semantic viewer and a semantic search intended for the exploitation of *Geolinked Data*. OTALEXC has for many years been a cross-border SDI project of reference thanks to its being an example of collaboration between public Organizations on both sides of the border, the direct utility to both societies of the system of indicators defined and its continuity over time. It is significant that during the last year (2015) the SoS service received a total of 252,051 requests.

In the regional nodes a wide variety of measures has been implemented with the aim of ensuring and guaranteeing the quality of their SDI resources. It is necessary to mention the existence of the Central Cartographic Register and the Cartographic Register of Catalonia, which record not only data but also network services, which entails a certain quality control and there are some bodies responsible for spatial data sets in Catalonia that submit their data to ISO certification bodies.

Furthermore, the NSDI is based on a healthy and cooperative stakeholder community, formed by members of the public and private sectors and universities, which publish and share geographic information in a very positive and open atmosphere of collaboration. Major decisions are taken by seeking the greatest possible consensus and there is a general climate of trust.

Furthermore, there is a very positive synergy with Open Data. To give some examples: the Open Data portal of Spain (datos.gob.es) includes a viewer that uses the WMS of the NSDI; the catalogue of the NSDI has been federated with the Open Data catalogue, and joint dissemination actions have been undertaken.

In the more general scope, the NSDI is coordinated by the aforementioned CODIIGE, which includes members of the Commissions of the Geographic High Council (CSG) who are experts on both SDI and on standards for geographic information, and it must include representatives of the three levels of Administration and various Specialised Commissions of the CSG:

- a) A President, who will be the President of the Specialised Commission on SDI (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.
- d) A third Vice-President, who will be the President of the Specialised Commission of the National Cartographic Plan.
- e) A Secretary, who will be a senior civil servant of the National Geographic Institute (IGN).
- f) 13 members, all experts on SDIs, elected by bodies of the CSG: 3 representatives of the General State Administration, 6 representatives of the Autonomous Communities, 2 representatives of the Local Administration, 3 members from nodes or geoportals integrated in the NSDI.

The current members can be consulted on the following page:  
<http://www.idee.es/resources/documentos/MiembrosCODIIGE.pdf>.

With regard to dissemination, a great effort has been made with regard to the Organization of courses, seminars, conferences, speeches and congresses. The Iberian Congress of Spatial Data Infrastructures (Jornadas Ibéricas de IDE, JIIDE) is held every year to open the NSDI to the SDIs of Portugal and Andorra. The WG NSDI meets at least twice per year and there are also similar joint events on a regional and even local scale. A blog ([blog-idee.blogspot.com.es](http://blog-idee.blogspot.com.es)), a mailing list and a monthly electronic bulletin, *SobreIDEs*, are maintained.

The existence of major projects for collaborative production of geographic data, such as the PNOA (National Aerial Orthophotography Plan), CartoCiudad, the PNOT (National Plan for Land Observation, the SIOSE (Information System on Land Cover and Use of Spain), the LiDAR production and the future production of basic themes of what is known as Geographic Reference Information, has contributed considerably to the sharing of data. In practice there are no difficulties or obstacles to the sharing of data between public administrations. Another fundamental boost has been the definition of the National Cartographic System, defined in Royal Decree 1545/2007 and promoted by Law 14/2010, which establishes the coordination of data production via the National Cartographic Plan and the sharing of data between the Autonomous Communities that sign the generic agreement and the General State Administration.

With regard to distribution among the general public, the publication of network services is open and free of charge, with the exception of services for the downloading of spatial data sets, and for data. In a study of a sample of 50 public Organizations that allow the downloading of files it was seen that: 32 % publish open data (BY), 20 % semi-open data (BY-NC), 12 % closed data (©) and the remaining 36% make no declaration regarding the conditions of use, which is a problem.

The metadata catalogues of the national and regional nodes are associated with the catalogue of the NSDI in most cases via automatic *harvesting* and in some cases via the exchange of xml files. All the metadata of the Inspire spatial data sets and the attached services of Spain are accessible in the INSPIRE catalogue. Some problems have been detected owing to the proliferation of metadata of units in some cases, errors in the contents of the metadata and repeated metadata records, which have been solved with the occasional case pending solution.

There is no systematic monitoring of the use of the spatial services of the SDIs in Spain, among other reasons, because users of standard services are essentially anonymous and it is difficult to establish contact with them. However, the statistical data handled by the main nodes of the NSDI indicate massive and very generalised use: 132 million individual requests for services of the MAGRAMA in three years; in the SDI of Catalonia more than 950 million requests for services during these three years; in the services of the IGN more than 7 000 million requests in 2013-2015, and 6 000 million

requests per week to the WMS service of the Directorate General for Cadastre. Use of the catalogue services is much more restricted.

With regard to cross-border use there are significant cases such as the SDI of Aragón which detects that 10 % of requests come from abroad and that of the IGME (Geological and Mining Institute of Spain) with 80 %.

There are several very significant cross-order projects:

- OTALEXC, an observatory which includes the Alentejo and Centro regions of Portugal and Extremadura in Spain. It manages physical-environmental and socio-economic indicators and has published OGC services since 2012. It is currently publishing very interesting resources in the field of Geolinked Data and sensors (SoS). During the year 2015 it received somewhat more than 250,000 requests.
- *European Location Framework* (ELF), in which the Directorate General for Cadastre and the National Centre for Geographic Information (CNIG) participate as partners. Led by EuroGeographics, it is developed by a consortium of 40 Organizations and is implementing a pan-European cloud platform and Inspire network services (WMS, WMTS, WFS, download...) to enable access to official cross-border and harmonised geographic data, available as reference data for all kinds of applications.
- The GIBF project which is managed in Spain by the CSIC. GBIF is an intergovernmental Organization which was set up in 2001. It includes 53 countries and 43 international Organizations and its aim is to publish open access biodiversity information on the Internet.
- HLANDATA is a project within the INSPIRE framework which covers Land Cover and Land Use. It has a Geoportal with services and applications for query and analysis on these subjects. It was coordinated by the Government of Navarra and benefited from the participation of the IGN, the company Tracasa and partners from Austria, Holland, the Czech Republic, Slovakia, Latvia and Lithuania. Its objectives are the analysis of the needs of users on the subject of land cover and land use and the application of the INSPIRE specifications on these two subjects.
- Other cross-border projects in which the nodes of the NSDI have participated and which have created links with other countries are those already mentioned in 6.2: EUREF, Projects promoted by *EuroGeographics*, COPERNICUS, EIONET, HELM, OneGeology, INGENIO and EAGLE.

The cost/benefit balance of the NSDI seems to be fairly positive, despite the fact that investments during recent years have been large and the benefits in many cases intangible and difficult to assess.

A complete and detailed study of the costs of the NSDI has not been made, but some figures may help to give a general idea, although the investments vary considerably between different nodes: the annual cost during the last three years of maintenance and operation of the Geoportal of the NSDI, in which all the initial investments have already been made, has been € 100,000/year; the average annual cost of the MAGRAMA, which was launched recently, with regard to the geoportal, data, metadata and services has been € 260,000/year, and the average annual cost for each one of the nodes of the 9 River Basin Authorities, with far fewer resources implemented, has been some € 34,000/year.

With regard to benefits, it is estimated that the Hydrocarbon Geoportal of the Ministry of Industry, Trade and Tourism allows citizens to save some 60 million €/year. A significant case is that of the Directorate General for Cadastre which, via a voluntary survey in its Download Centre, estimates that the saving represented for the citizen thanks to the downloading of cadastral details compared to the costs of doing so analogically amounts to around 1 billion euros and 55 million person-hours of work.

If we look at the figures for files downloaded in the other 112 official mapping download centres, we take into account not only the savings for the citizen but those of the Administration, which does not need to provide resources to attend to the public, the benefit generated by the use of these data and other intangible benefits, it is easy to understand that the figure for the total benefit may be very high, perhaps several billion euros annually, and also very difficult to estimate.



Other more widely occurring benefits are: that the SDI and network services have become a tool used daily in the work of many of the units of the Administration, the appearance of a generalised culture for the sharing of data, the proliferation of open data, the incentive for the generation of very costly data, such as the LiDAR coverage which has been completed for the whole of Spain, etc.

## 2 Abbreviations and acronyms

ADIF	Administrador de Infraestructuras Ferroviarias (Administrator of Railway Infrastructures)
AGC	Administración de la Generalitat de Catalunya (Administration of the Regional Government of Catalonia)
AGE	Administración General del Estado (General State Administration)
AGILE	Association of Geographic Information Laboratories for Europe
AOC	<i>Consorci Administració Oberta de Catalunya</i> (Consortium for Open Administration of Catalonia)
BTA	Base Topográfica Armonizada (Harmonised Topographic Database)
BB. DD.	Databases
CC. AA.	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)
EC	European Commission
CE IDE	Comisión Especializada en IDE (Specialised Commission on SDI of the Geographic High Council)
CENG	Comisión Especializada en Normas Geográficas (Specialised Commission on Geographic Standards)
CICTEx	Centro de Información Cartográfica y Territorial de Extremadura (Cartographic and Territorial Information Centre of Extremadura)
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 Soporte de la Infraestructura de Dades Espacials de Catalunya (Support Centre for the Spatial Data Infrastructure of Catalonia)
CSW	Catalog Service for the Web
C4	<i>Comissió de Coordinació Cartogràfica de Catalunya</i> (Cartographic Coordination Commission of Catalonia)
CTP	Comisión de Trabajo de los Pirineos (Working Commission of the Pyrenees)
DGC	Directorate General for Cadastre
EAGLE	Eionet Action Group on Land monitoring in Europe
EC/EEA	European Commission/European Environment Agency
EIONET	European Environment Information and Observation Network
EGDI	European Geological Data Infrastructure
ELF	European Location Framework
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
GIT	Geographic Information Technologies
GIS4EU	GIS4EU project
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
ICGC	<i>Institut Cartogràfic i Geològic de Catalunya</i> (Cartographic and Geological Institute of Catalonia)
ICV	Instituto Cartográfico Valenciano (Valencian Cartographic Institute)
IGEAR	Instituto Geográfico de Aragón (Geographic Institute of Aragón)
IDEAS	Infraestructura de Datos Espaciales de Asturias (Spatial Data Infrastructure of Asturias)
IDEAragon	Infraestructura de Datos Espaciales de Aragón (Spatial Data Infrastructure of Aragón)
IDEAndalucía	Infraestructuras de Datos Espaciales de Andalucía (Spatial Data Infrastructure of Andalucía)
IDEC	<i>Infraestructura de Dades Espacials de Catalunya</i> (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	<i>Infraestructura de Dades Espacials de les Illes Balears</i> (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)
IDERM	Infraestructura de Datos Espaciales de la Región de Murcia (Spatial Data Infrastructure of the Region of Murcia)
IECA	Instituto de Estadística y Cartografía de Andalucía (Institute of Statistics and Cartography of Andalucía)
IEPNB	Inventario Español del Patrimonio Natural y de la Biodiversidad (Spanish Inventory of Natural Heritage and Biodiversity)
IET	Instituto de Estudios del Territorio (Galicia) (Territorial Studies Institute)
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)
IHM	Instituto Hidrográfico de la Marina (Hydrographic Institute of the Navy)
IIGE	Infraestructura de Información Geográfica de España (Geographic Information Infrastructure of Spain)
IJSR	International Journal for SDI Research
ILAF OGC	Iberian and Latin-American Forum of the Open Geospatial Consortium
INIG	Infraestructura Nacional de Información Geográfica (Geographic Information National Infrastructure)
INSPIRE	Directive 2007/2/CE 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
IR	Inspire Report
ISO	International Organization for Standardization
JIDEE	Jornadas de la Infraestructura de Datos Espaciales de España (Congress on Spatial Data Infrastructure of Spain)

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 Organizations
MAGRAMA	Ministerio de Agricultura, Alimentación y Medio Ambiente (Ministry of Agriculture, Food and the Environment)
MIG-P	Maintenance and Implementation Group-Permanent Policy sub-group
MIG-T	Maintenance and Implementation Group-Permanent Technical sub-group
MNE	Modelo de Nomenclátor de España (Spanish Gazetteer Model)
MS	Member State
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 Catalunya (Mapping Plan of Catalonia)
PNOA	Plan Nacional de Ortofotografía Aérea (National Aerial Orthophotography Plan)
RCC	Registro Cartográfico de Catalunya (Cartographic Register of Catalonia)
RCA	Registro Cartográfico de Aragón (Cartographic Register of Aragón)
RSS	Really Simple Syndication
SCN	Sistema Cartográfico Nacional (National Cartographic System)
SDI	Spatial Data Infrastructure
SDIC	INSPIRE Spatial Data Interest Communities
SGT	Subgrupos de Trabajo (Working Sub-Groups)
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)
STIG	Stress Test for Infrastructure of Geographic information
TechWG	Technical Working Group
TechWG M&R	Technical Working Group for Monitoring and Reporting
TRACASA	Trabajos Catastrales, SA
TWG	Thematic Working Group
UNSDI	United Nations Spatial Data Infrastructure
VIG	Validación de Información Geológica (Validation of Geological Information)
WFS	Web Feature Service

WG NSDI	Working Group of the Spanish National Spatial Data Infrastructure
WMS	Web Map Service
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 Organizations of the General State Administration.
- The regional level, represented by the governments of the Autonomous Communities.
- The local level, represented by Provincial, Inter-Island, Island and City councils.

In the majority of the INSPIRE themes management of the information is organised according to these three levels, although there are some exceptions, such as in the case of Cadastral Parcels and Administrative Units.

In any case, the development of the SDIs has mainly been led by the public sector and, especially, by the agencies that produce geographic information. The 2013-2015 period 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 and forum for the exchange of experiences.

From the Organizational point of view, this period stands out due to the expiry of a considerable number of deadlines for compliance with the INSPIRE Implementing Rules with regard to the making available of the spatial data sets of Annex III via discovery, viewing and download services on 2013-12-03, which has required a great effort with regard to coordination, training and investment of resources to achieve this, although the results in some cases are still partial and uneven.

A considerable effort has been made to organise and launch the national Technical Working Groups (TechWG) for the themes of Annex III, in some cases building on the foundation of already existing working groups that include stakeholders involved in the application of the Environmental Directives, as has been the case of the TechWGs coordinated by MAGRAMA. Considerable efforts have also been made to participate in the *Thematic Clusters* and in all the events and projects that have arisen around the Directive.

From the point of view of the offer of spatial data sets, metadata and services, during the 2013-2015 period it is worth emphasising that the effective coordination has commenced of the Organizations responsible for the production of official data in each one of the INSPIRE themes, with the intention of generating a community of stakeholders in each theme. All the themes have evolved positively, although at very different rhythms. The leadership and promotion role played by the Ministry of Environment, Agriculture and Food (MAGRAMA) has been very relevant in order to try to ensure coherence between the details reported to the European Commission and the European Environment Agency – which plays a fundamental role in the application of INSPIRE – and those reported to INSPIRE. The Executive Board of the Geographic Information Infrastructure of Spain (CODIIGE) has acted as organiser and promotor of the activity performed.

Furthermore, the major projects for harmonisation of geographic information developed under the auspices of the Geographic High Council (CSG) and with the leadership of the CNIG (BTA, PNOA, CartoCiudad, SIOSE, NGBE...) have incorporated the data models of INSPIRE and their specifications.

Other producers of geographic reference information, such as the Directorate General for Cadastre (DGC), the Geological and Mining Institute of Spain (IGME), some Autonomous Communities and others have likewise adapted their data and services to the requirements of the INSPIRE framework.

Currently, practically all the metadata of data and services are INSPIRE compliant (more than 90 %). However, despite the efforts made, only approximately half of the spatial data sets available comply with the specifications of INSPIRE. Much remains to be done, especially regarding the themes of Annex III. Still less favourable is the situation with regard to network services, of which only a few comply with the Implementing Rules of Inspire.

During the 2013-2015 period, we have suffered the consequences of the unfavourable economic situation and the challenge, which has been overcome to a large extent, has been to keep available, as a priority, the same level of services and resources, with the same quality of service and not to suffer setbacks. This has been possible thanks to a notable effort of concentration of resources and preservation of the essential aspects, although it is true that, on the other hand, the speed of evolution and progress of the SDI of Spain has been affected negatively, especially with regard to compliance of data, metadata and services, therefore the current situation is not as good as was hoped.

### **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 Organizations and bodies that form part of the monitoring network of the INSPIRE Directive and which participate every year in the monitoring campaigns: 9 Organizations of the General State Administration, 17 Autonomous Communities and 2 Autonomous Cities. In addition, the 27 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 Write-up of a first draft. During the month of February and part of March, the head of the TechWG for Monitoring and Reporting, Paloma Abad, with the support of two experts from the CNIG, Emilio López and Antonio F. Rodríguez, who form the TechWG for Monitoring and Reporting, prepared a full-length first draft, using as a foundation the data of the successive monitoring reports, the minutes of the meetings of the WG NSDI, CODIIGE and the meetings held to monitor the work of the TechWGs.
- Phase 2 First consultation round. From the middle to the end of March a comments round was held, aimed at enabling the regional SDI nodes to put forward all kinds of comments and suggestions on the initial text and to cooperate by responding to a questionnaire regarding a list of points on which their point of view was necessary in order to obtain a complete description of the situation.
- Phase 3 Write-up of a version 1. From the beginning to the middle of April, the TechWG for Monitoring and Reporting wrote up version 1 of the Monitoring Report, incorporating and harmonising all the contributions received.
- Phase 4 Second consultation round. From the middle to the end of April, a second round of comments and suggestions was held by the members of the CODIIGE.
- Phase 5 Write-up of the final version. From the beginning of May and until 15 May, the TechWG for Monitoring and Reporting prepared the final version of the 2015 Report incorporating all the contributions received, the data of the 2015 Monitoring Report and making the necessary consultations when necessary.

## 4 Coordination and quality assurance (Art. 12)

### 4.1 Coordination (Art. 12.1.)

The development of the SDIs 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 network 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 Organizations to achieve compliance.

Simultaneously, both the Organizations of the General State Administration related with the production of geographic data and the Autonomous Communities have developed their own Organizational structures. The following sections provide an overall description of the set of Organizational structures and list the Organizations involved individually, with summaries.

#### 4.1.1 Member State Contact Point

##### Name and contact information

Member State Contact Point	
Name of public authority	Consejo Superior Geográfico (Geographic High Council)
Contact information:	
Mailing address	Secretaría Técnica del Consejo Superior Geográfico Instituto Geográfico Nacional General Ibáñez de Íbero, 3 28003 – Madrid
Telephone number	+34 91 5979646
Fax number	+34 91 5979764
Email address	
URL of the Organization's web site	<a href="http://www.fomento.es/MFOM/LANG_CASTELLANO/ORGANOS_COLEGIADOS/MASORGANOS/CSG/">http://www.fomento.es/MFOM/LANG_CASTELLANO/ORGANOS_COLEGIADOS/MASORGANOS/CSG/</a>
Contact person	Emilio López Romero
Telephone number	+34 91 5979646
Email address	elromero@fomento.es
Contact person (substitute)	Antonio F. Rodríguez Pascual
Telephone number	+34 91 5979661
Email address	afrodriguez@fomento.es

## Role and responsibilities

The Geographic High Council (CSG) is the management body of the National Cartographic System <sup>1</sup> (SCN). 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 Law 14/2010, on geographic information infrastructures and services in Spain (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:

- a) Proposing to the competent Authorities the actions to be performed by the Administrations or Organizations 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 Coordination structure

#### Name and contact information

Coordination structure that supports the Member State contact point	
Name of the coordination structure	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 Ibáñez de Íbero, 3 28003 – Madrid
Telephone number	+34 91 5979646
Fax number	+34 91 5979764
Email address	
URL of the Organization's web site	<a href="http://www.fomento.es/MFOM/LANG_CASTELLANO/ORGANOS_COLEGIADOS/MASORGANOS/CSG/ORGANOS/CDirectivolGeografica.htm">http://www.fomento.es/MFOM/LANG_CASTELLANO/ORGANOS_COLEGIADOS/MASORGANOS/CSG/ORGANOS/CDirectivolGeografica.htm</a>
Contact person	Emilio López Romero
Telephone number	+34 91 5979646
Email address	elromero@fomento.es
Contact person (substitute)	Antonio Rodríguez Pascual
Telephone number	+34 91 5979661
Email address	afrodriguez@fomento.es
Date and period of term of office	29/10/2014 -

Representatives on the MIG-T	
Contact person	Emilio López Romero
Telephone number	+34 91 5979646
Email address	elromero@fomento.es
Contact person (substitute)	Soledad Gómez Andrés
Telephone number	+34 91 3475172
Email address	msgomez@magrama.es

<sup>1</sup> The SCN is the obligatory framework for action by the General State Administration 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

Representatives on the MIG-P	
Contact person	Emilio López Romero
Telephone number	+34 91 5979646
Email address	elromero@fomento.es
Contact person (substitute)	Elisa Rivera
Telephone number	+34 91 5976751
Email address	eriveram@magrama.es

## Roles 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. Furthermore, 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 Organizations 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 incorporation and effective operability of the IIGE, as well as proposing its funding model and the participation in it by each Administration or public sector Organization.
- 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 the 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.
- d) A second Vice-President, who will be the President of the Specialised Commission on the National Cartographic Plan.
- e) A Secretary, who will be a senior civil servant of the National Geographic Institute.
- f) 14 members, all experts on SDIs:
  - a. 3 representatives of the General State Administration, at the proposal of the Permanent Commission.



- b. 6 representatives of the Autonomous Communities, at the proposal of the Territorial Commission.
- c. 2 representatives 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.

### Graph showing the structure

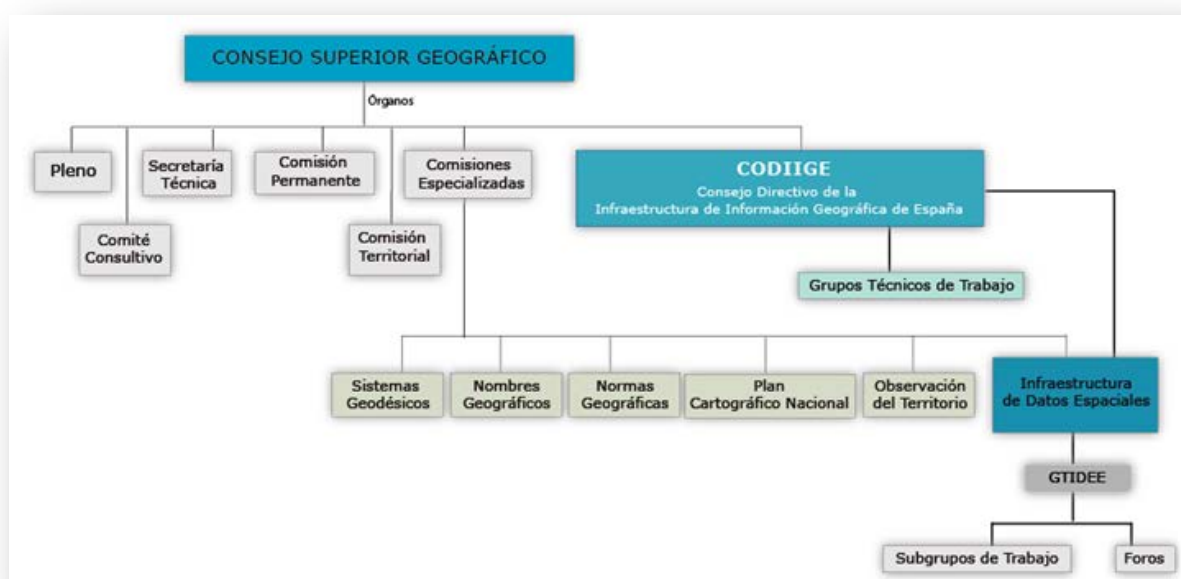


Figure 1. Structure of the CSG after the LISIGE. The position of the CODIIGE and its relationship with the CE IDE is highlighted.

### Relationship with third parties

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 relationships between public Organizations, 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 Organizations 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 regularly between twice and three times per year, sometimes with the coordinators of the technical working groups (TechWG), standardisation groups responsible for analysing the application of the Implementing Rules of INSPIRE by the Spanish Public Administrations and assisting their bodies and Organizations 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 it to follow its usual approval procedure. The TechWGs include representatives of all the stakeholders with responsibility for both the data and services required by INSPIRE.

Thematic Working Groups	
Working group	Coordinating Organization
Geodetic Reference System	Geographic Centre of the Army
Territorial and administrative boundaries	National Geographic Institute
Geographic names	Regional Government of Castile and León
Cadastral parcels	Directorate General for Cadastre
Digital elevation models	National Geographic Institute
Transport facilities, networks and infrastructure	Ministry of Public Works
Hydrography	Directorate General for Water. MAGRAMA
Orthoimagery	National Institute for Aerospace Technology
Protected sites (historic and cultural)	Cultural Heritage Institute of Spain
Protected sites (environment)	Directorate General for Environmental Quality and Assessment
Land use and occupation	National Geographic Institute
Geology	Geological and Mining Institute of Spain
Addresses and street plans	National Statistics Institute
Population entities	National Statistics Institute
Statistical units	National Statistics Institute
Buildings	Directorate General for Cadastre
Soil and subsoil	MAGRAMA
Human health and safety	Ministry of Health
Utility and governmental services	Directorate General for Coordination of Competences with the Autonomous Communities and Local Authorities.
Environmental monitoring facilities	Directorate General for Water. MAGRAMA
Agricultural and aquaculture facilities	Directorate General for Rural Development and Forestry Policy. MAGRAMA
Population distribution and demography	National Statistics Institute
Area management/restriction/regulation zones and reporting units	Directorate General for Environmental Quality and Assessment. MAGRAMA
Natural and antropic risk zones	Directorate General for Water. MAGRAMA
Physical atmospheric conditions	State Meteorological Agency. MAGRAMA

Meteorological geographical features	State Meteorological Agency. MAGRAMA
Oceanographic and sea region geographical features	Hydrographic Institute of the Navy.
Bio-geographical regions	Directorate General for Environmental Quality and Assessment. MAGRAMA
Habitats and biotopes	Directorate General for Environmental Quality and Assessment. MAGRAMA
Species distribution	Directorate General for Environmental Quality and Assessment. MAGRAMA
Energy infrastructures for generation and distribution of energy, and availability of existing energy resources	Ministry of Industry, Energy and Tourism
Mineral resources	Geological and Mining Institute of Spain

Transversal groups	
Working Group	Coordinating Organization
Metadata and catalogues	National Geographic Institute
Architecture, standards and network services	National Geographic Institute
Monitoring and reporting	National Geographic Institute
Data and services policy	National Geographic Institute

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.

In the case of the TechWGs coordinated by the MAGRAMA, there has been an emphasis on the use of existing coordination bodies that decide on the matters for which they are responsible, which include all the stakeholders involved in the application of the environmental Directives.

This is the case of the TechWGs relative to biodiversity themes (Protected Sites, Habitat and Bio-geographical regions and Species distribution), which report to the Directorate General for Environmental Quality and Assessment (MAGRAMA), integrated in the Committee of the Spanish Inventory of Natural Heritage and Biodiversity. This is the body responsible for coordination between Administrations, with authority for reporting and proposals, belonging to the State Commission for Natural Heritage and Biodiversity, compatible with the functions of the other specific Committees set up. One of the duties of this Committee, created by Royal Decree 556/2011, of 20 April, for the development of the Spanish Inventory of Natural Heritage and Biodiversity, is to establish the procedures for the development and functioning of the Inventory, especially the technical rules that will regulate each component including adaptation to INSPIRE. Coordination is thus ensured with the producers of the spatial data sets (the Autonomous Communities) which guarantees the principles of dissemination, technical rigor, coherence and interoperability. This Committee also forms part of EIONET (European Environment Information and Observation Network) of the European Environment Agency, as a stakeholder, Main Component Element, linked to the National Reference Centre with regard to Biodiversity Data and Information and Indicators and the National Reference Centre for Assessment of Ecosystems and Biodiversity.

Furthermore, the TechWGs 15 and 16, Oceanographic and sea region geographical features, coordinated by the Hydrographic Institute of the Navy, benefit from the cooperation of MAGRAMA to facilitate coordination via the Inter-Ministerial Commission for Marine Strategies, created by RD 715/2012, of 20 April.

## II. The WG NSDI

The WG NSDI currently enjoys the participation of 400 individuals linked to more than 160 Spanish Organizations belonging to the public sector, business and universities, 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 six occasions during the 2013-2015 period:

- 2015
  - Seville (06/11/2015)
  - Madrid (24/04/2015)
- 2014
  - Lisbon (07/11/2014)
  - Madrid (11/04/2014)
- 2013
  - Toledo (15/11/2013)
  - Madrid (12/04/2013)

In the 2013-2015 period the Iberian Congress of Spatial Data Infrastructures (JIIDE) has been held annually. Specifically, in November 2013 in Toledo (Spain), in November 2014 in Lisbon (Portugal) and in November 2015 in Seville (Spain).

The following Working Sub-Groups of the WG NSDI are currently constituted:

- SGT1. Metadata and Catalogue
- SGT2. Architecture and Standards
- SGT3. Data Policy
- SGT4. SDI Observatory
- SGT5. Legal Security in Territorial Information
- SGT6. Cartographic Heritage in the SDI
- SGT7. Local SDI

The Working Sub-Groups are free to choose their composition, the matters to be dealt with, their way of working and their 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, which are much more open and participative structures. Furthermore, the Organizational 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 by 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 2013-2015 period the following forums have been active:

- ILAF OGC
- Addresses Forum
- Forum on Engineering in Geodetics and Mapping

## III. Coordination Structures of the General State Administration

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

- 1) 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.

## 2) Inter-institutional coordination structures

The backbone for coordination of the NSDI is based, on the one hand, on the nodes of the General State Administration:

- Spanish National Research Council (CSIC, Min. Education, Culture and Sport)
- Geological and Mining Institute of Spain (IGME, Min. Economy and Competitiveness)
- Oceanographic Institute of Spain (IEO, Min. Economy and Competitiveness)
- ENAIRE (Ministry of Public Works and Transport)
- AENA (Ministry of Public Works and Transport)
- DG for Cadastre (Min. of Finance)
- Ministry of Justice
- MAGRAMA

And, on the other hand, on the SDI nodes of the 17 Autonomous Communities and the two Cities with Statute of Autonomy (Ceuta and Melilla). Each regional SDI node establishes the coordination mechanisms that are necessary in each case with the nodes of the Local Administration and other agents of its Autonomous Community, as detailed later in this document.

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

For example, since the European Environment Agency plays a determining role in the adaptation of the environmental directives to INSPIRE (recital 29 and article 19.1 of the INSPIRE Directive), a specific role has been given to the EIONET for Spanish environmental information and observation as the main body for inter-institutional cooperation on the subject of environmental information. The network and the Spanish focal point of the Spanish Environment Agency are working actively with the Agency on the preparation of coordinated technical specifications for the whole EU.

Another similar case is that of the Cultural Heritage Institute of Spain (Ministry of Culture, Education and Sport) which has coordinated the actions of the Autonomous Communities with regard to protected sites of historical and cultural heritage since before commencement of the implementation of the INSPIRE Directive.

It should be noted that although in the majority of the INSPIRE themes inter-institutional coordination is structured according to the three levels of government in place in Spain (national, regional and local), this is not so in all cases. There are themes, such as that of Cadastral Parcels, in which coordination takes place horizontally between the five cadastres (DG for Cadastre, the Community of Navarra and the Provinces of Álava, Guipúzcoa and Vizcaya).

## 3) 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 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.

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 Organization.

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 for Fishing, and the Autonomous Community Organizations involved. One of the first tasks they have performed is the identification of the spatial data sets that the Ministry must provide in order to comply with INSPIRE.

#### 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 for coordination 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. By way of summary, three main types can be mentioned.

I) 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 Consejo 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 Regional and Urban Planning, via the Mapping Service of the Basque Government.

II) The Autonomous Communities that have assigned this coordination to a specific institution or unit:

- In Asturias, the Servicio de Cartografía (Cartographic Service).
- 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).

III) 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).

The relationship with the representatives directly related with the environmental activities is maintained in three ways: on the one hand, via the SDI nodes of the Autonomous Communities that centralise the regional information, including the corresponding Environment Departments. On the other hand, via the SDI node of the MAGRAMA, which publishes services on the basis of the information previously collected from the Autonomous Communities via regulated procedures. Lastly, via the coordinators of the technical working groups of the CODIIGE, responsible for the implementation of the INSPIRE themes of a marked environmental nature, which use existing coordination structures deriving from environmental regulations.

There is a close relationship with neighbouring countries, regarding which the following initiatives can be highlighted:

- Every year the Iberian Congress of Spatial Data Infrastructures is held, one year in Portugal and two in Spain, with the participation of representatives of Portugal, Spain and Andorra.
- The OTALEX project funded by the European INTERREG III A, a programme which is developed by the border regions of Alentejo in Portugal and Extremadura in Spain. As a result, the IDE OTALEX (OTALEX SDI) has been created thanks to the collaboration between institutions on both sides of the border, with the involvement of the three administrative levels: State, Regional and Local.
- Currently, Spain is working together with France and Portugal on the *European Location Framework* project.

Spain participates in various data sharing projects on a European Community scale. It is appropriate to emphasise the UNECE working groups for the implementation of SEIS, the work of the European Environment Agency for the exchange of data in real time and the initiatives of the Commission for *Better Regulation* in which Spain participates actively, such as the *Fitness Check on Monitoring and Reporting* in which INSPIRE will play a fundamental role as a tool for simplification and improvement of efficiency in the reporting for community directives.

Other initiatives include:

- EUREF
- HLANDATA
- SIGPAC
- *European Location Framework*
- Projects promoted by *EuroGeographics*
- OTALEXC
- COPERNICUS
- EIONET
- HELM
- INGENIO
- EAGLE

Furthermore, local authorities participate in the Spatial Data Infrastructure through different approaches:

- They are represented in the CODIIGE via the Spanish Federation of Municipalities and Provinces.
- They are connected to the NSDI either directly or via the regional SDI nodes.
- There is a WG NSDI dedicated to the Local SDI to meet the needs and solve the problems to be confronted by the municipalities.

The main form of ensuring that the public authorities are able to link their data sets and services to the network services is via the discovery service of the National Spatial Data Infrastructure. This catalogue is used by the INSPIRE Geoportal to obtain the metadata of the data sets, series and services of Spain. At present, around 30 state and autonomous community level catalogues are accessed and their metadata are collected: <http://www.idee.es/csw-inspire-idee/srv/spa/main.home>.

Furthermore, for easier access the NSDI portal includes a page with a directory of INSPIRE network services classified according to type (discovery, viewing, download, transformation...): <http://www.idee.es/web/guest/directorio-de-servicios>.

### 4.1.3 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.

At an Organizational 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 Technical Working Group for Monitoring and Reporting (TechWG M&R) was constituted, and has assumed that mission. The monitoring process has varied along with the creation of the new Organizational structures.

The monitoring for 2014, carried out in 2015, was performed with a web tool, the Gestor S&I, developed in 2013 with the aim of being a tool for coordination between the TechWG M&R and the participating Organizations. The Gestor S&I allows control of the times of the different phases of the monitoring calendar and incorporates a system for validation of the format of the information provided, which reduces the number of incidents of this type detected in previous years. The following process is adhered to:

1. The CODIIGE prepares the criteria and recommendations and reviews the documentation relative to monitoring and reporting.
2. The TechWG M&R sends to the SDI nodes of the General State Administration and to the SDI nodes of the Autonomous Communities the recommendations, criteria and the list of data sets and services reported in the previous monitoring campaign.
3. The SDI nodes of the Autonomous Communities and the General State Administration review the list of data sets and services and update them (delete, add, amend) according to the criteria of the CODIIGE.
4. The TechWGs of the CODIIGE review the information provided by the SDI nodes and provide comments and observations.
5. The SDI nodes issue the appropriate allegations regarding the comments of the TechWGs and, finally, in the event of discrepancy, the CODIIGE makes a final decision prior to sending the results to the European Commission.

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

- There is a considerable heterogeneity between the different INSPIRE themes. There are themes, such as administrative units, in which the data sets to be reported are very well defined. However, in general, the data sets of Annex III for which information has been received are difficult to classify, there are gaps and overlaps, etc. The best example is the theme "Area management/restriction/regulation zones and reporting units" in which there is such disparity of spatial data sets that greater definition is necessary in the data specifications to avoid duplication with other groups.
- Many network services are available but few of them are adapted to the requirements of the INSPIRE regulations.
- Many data sets are still reported that do not have metadata.
- In all the monitoring and reporting processes coherence should be ensured between the reports for the environmental directives and the INSPIRE monitoring.

The CODIIGE has established the following requirements for the Spatial Data Sets and Network Services to be reported:



- Only the spatial data sets that have metadata that can be located in a catalogue service will be reported.
- The metadata must be compliant with the Metadata Regulations.
- Depending on the theme, the corresponding TechWG will propose whether the spatial data set should cover the whole of Spain (or be planned as such), alone or in conjunction with other spatial data sets of other nodes.
- For the 2017 campaign for Annexes I and II and in the 2018 campaign for Annex III all the spatial data sets will be required to be compliant with the Regulations on Interoperability of Spatial Data Sets and Services.
- Spatial data sets that form part of a spatial data set for a larger territorial area which includes them may not be reported. (Examples: PNOA, SIOSE, CartoCiudad...)
- With regard to versions, a single spatial data set will be reported and information will be included in its metadata on its temporary versions should they exist. (Land cover is an exception defined in the Inspire specifications).
- Depending on the theme, each TechWG will decide whether a spatial data set can be divided, to report even on spatial data sets that contain only one spatial object of a specific theme. Eg: administrative unit, address, dam.

The Organizations of the General State Administration have reported on the basis of the documentation provided by the TechWG M&R in the initial request for data for monitoring.

With regard to the Autonomous Communities, information is contributed using different approaches. Some different cases are as follows:

- In Andalucía the INSPIRE monitoring and reporting process is carried out via the Working Group of the Andalucía SDI (GTIDE Andalucía). 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 Geographic Institute of Aragón (IGEAR) which performs the task of reporting on the data sets and mapping services managed by any department or public Organization of the Government of Aragón.
- In Catalonia, the Cartographic and Geological Institute of Catalonia (ICGC), in 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 Organizations of Catalonia, 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 services to the network. 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 by the Institute for Territorial Studies to the SDI nodes of other departments and 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 performed 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 Organizational 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 performed 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 Directorate for Regional and Urban Planning through the Mapping Service of the Basque Government, as presidents of the Interdepartmental Management Committee of the Euskadi SDI. Data sets and services of the Administration of the Basque Country are reported subsequent to filtering according to the recommendations of the CODIIGE and its TechWGs. In turn, all those reported by the Provinces of Alava, Vizcaya and Guipúzcoa are reported.
- In Asturias, the Mapping Service of the Principality of Asturias (Directorate for Regional and Urban Planning) performs the process.

The following are considered as suggestions for the European Commission in order to facilitate the monitoring and reporting process:

- It would be very positive if the report could be prepared on the basis of the national metadata catalogues. In Spain the Official Catalogue of INSPIRE Data and Services (CODSI) is being prepared to make a clear differentiation between the INSPIRE resources and the other resources of the NSDI. In this way monitoring could be continuous, the updating of the information would be maximum and the process would be much more agile.
- It would be very interesting if the MIG were to establish some clearer criteria regarding what should be reported and what should not be reported. In Spain, the number of spatial data sets has diminished significantly owing to a greater rigidity and precision in the selection criteria, always seeking greater quality and usability of the information reported.
- It would be advisable to have a logical link between metadata and the resource they describe, whether a data set or a service, between a data set and the services that publish it and vice versa. This would reduce errors and facilitate automation.

## 4.2 Quality assurance (Art. 12.2.)

To speak accurately of quality assurance of an SDI it would be necessary to previously establish a quality model to describe it according to quality parameters that could be evaluated by choosing a set of measures to describe them and some measurement procedures. In this way we would have a general model and a set of parameters, measures and measurement methods that would make it possible to describe the quality of one SDI comparable with others and which would also allow a description of its evolution.

There are various proposals of quality models for an SDI, however none can be said to have become the generally applied standard model and neither has any been adapted or defined in the European scope. An article<sup>2</sup> has recently been published in the IJSDIR by *Nushi, Van Loenen and Cromptvoets* that includes a compilation of the main quality models for SDIs and the presentation of a STIG (*Stress Test for Infrastructure of Geographic information*) related with what is known as FI (*Financial Infrastructure*). In any case, this article recognises that the problem remains unsolved and it proposes commencing a line of long-term research and continuous improvement.

On the other hand, from all the requirements defined in the INSPIRE implementing rules a pseudo-model of quality can be abstracted based on the availability of compliant data, metadata and services, and services that satisfy the required quality of service.

In this section we will look at the quality of data, metadata and services, in default of a standard SDI quality model and knowing that the quality of an SDI is something more than the quality of its components:

- 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 between quality in the performance, availability and capacity (requirement for compliance with the INSPIRE regulations for network services) and those of the functionalities corresponding to each type of INSPIRE service (basically, the requirements established to guarantee interoperability).

We will finish with some considerations that aim to go further, towards some overall aspects of the quality of the NSDI as a whole.

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. For example, the TechWG for Geographic Names assumes as quality criteria those recommended by INSPIRE and adds that of thematic accuracy (spelling errors and variants).
- Regarding the data of Cadastral Parcels and Buildings, the data producers comply fully with the requirements defined by INSPIRE and the TechWGs are studying the need to expand them and reflect them in metadata. This occurs for example with the time parameters for updating.

<sup>2</sup> [“The STIG – A new SDI assessment method”](#) by B. Nushi, B. Van Loenen and J. Cromptvoets. IJSDIR 2015, Vol 10, 55-83.

- Quality thresholds are yet to be established for these parameters and, in general, for the procedures to evaluate them. However, the TechWGs observe 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 external producers of data in the case of subcontracting 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 which serves as a de facto first level of quality.

Some matters worth highlighting in the scope of the regional SDIs, as an example of their initiatives and actions in these aspects, are:

- 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 82/2015<sup>3</sup>, 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 SDI node of Aragón.
- In Catalonia, the Law 16/2005, of 27 December, on geographic information, and Decree 398/2006, of 24 October, which implements it, together with Decree 62/2010, of 18 May, on 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 Catalan administrations for the formation of new cartography, as well as in the exercise of the competences of the Catalan 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

<sup>3</sup> <http://www.boa.aragon.es/cgi-bin/EBOA/BRSCGI?CMD=VEROBJ&MLKOB=853401245555>

#### 4.2.1.1 With procedures implemented

- The IGN systematically uses the INSPIRE validator for WMS metadata and services, and the available GML schemas for the data of each one of the INSPIRE themes. These three measures are applied in a generalised manner in the whole NSDI, as is logical. It also uses an interactive check for each service by an expert other than the one responsible for its implementation and systematically monitors the quality of the services with a request every 3 minutes to determine the performance and availability. Isolated capacity tests have been performed with production services, the results of which have been uneven. It is considered that the absence of an *Abstract Test Suite* in the Technical Guides for metadata and for services is an important obstacle to assuring compliance of both metadata and services.
- The MAGRAMA uses the validators available in the INSPIRE geoportal to ensure the compliance of the WMS metadata and services it publishes via its SDI node. A set of rules has been established to be complied with in the scope of the GIS of the Ministry including delivery formats, geodetic reference systems and the use of official data sources. For metadata, the MAGRAMA has developed a web editor on Geonetwork common to the whole Ministry, based on the editor published in the INSPIRE geoportal, the ISO standard and the NEM. This editor incorporates a work flow that includes the validation of the metadata and their compliance with INSPIRE. The Nagios platform is used to monitor the correct functioning and to be able to guarantee the quality of the services.  
Furthermore, the data coordinated by the TechWG for Protected Sites (Environment) are subjected to INSPIRE validation for metadata and GML schemas. Moreover, a document has been generated with technical specifications for this spatial data set and a similar system is under development for Habitat and Bio-regions and Species Distribution. In addition, the technical rules have been published, including that corresponding to quality, for data (geographic or otherwise) generated by or on behalf of the public administrations, subject to incorporation in the Spanish Inventory of Natural Heritage and Biodiversity. Likewise, the spatial data set of the SIGPAC is submitted annually by the FEAGA to a quality assessment test, established in article 5 of Commission Delegated Regulation (EU) No. 640/2014. The procedure for performance of this test is developed in the JRC of the EC, based on the standards ISO 19157:2013 (*Geographic information – Data quality*) and ISO 2859-2:1985 (*Sampling procedures for inspection by attributes, Part 2: Sampling plans indexed by limiting quality (LQ) for isolated lot inspection*). It consists, in summary, of calculating six parameters (or “quality elements”), divided into two classes of compliance, on a sample of reference parcels (lots) selected by the JRC from the population of the SIGPAC. These parameters evaluate whether the reference parcels are defined in such a way as to represent the agricultural area, they can be measured, they allow the unique and unequivocal location of each agricultural parcel declared annually and they comply with the principle of remaining stable over time. The procedure can be consulted on: [https://marswiki.jrc.ec.europa.eu/wikicap/index.php/LPIS\\_TG\\_ETS](https://marswiki.jrc.ec.europa.eu/wikicap/index.php/LPIS_TG_ETS).
- 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.
- The Directorate General for Architecture, Housing and Land performs control procedures on the data sets, relative to positional quality, thematic coherence with other data sets, reference system, and the appearance of gaps or overlaps.
- The quality of Cadastral Parcel and Buildings data produced by the Directorate General for Cadastre, the Government of Navarra and the Provincial Councils of Alava, Guipúzcoa and Vizcaya, is established by the cadastral regulations and is also included in the conditions established for the preparation of cadastral documentation. For example, [http://www.catastro.meh.es/esp/contratacion\\_pliegostipo.asp](http://www.catastro.meh.es/esp/contratacion_pliegostipo.asp) and, as we have commented, they comply amply with the requirements established for INSPIRE

- A distinction should be made between data quality and service quality.  
Data quality can in turn be divided into matters such as: completeness, absolute and relative metric precision, how up-to-date they are, linear and topological consistency between objects, etc. The processes to achieve these quality levels in each one of their sections are purely instrumental and procedure-based. In data uploading, updating and maintenance operations the quality requirements defined in the actual computer validation processes are ensured.  
Service quality is provided fundamentally by the response capacity in requests for services. These are aspects such as average response time, volume of transferred data, service down time, etc. This quality is achieved with the potential of the physical media (servers) and the human resources with regard to the monitoring of use of the services.  
Regarding the data for Cadastral Parcels and Buildings, we fully comply with the requirements defined by INSPIRE and the TechWGs are studying the need to expand them and reflect them in metadata. This occurs for example with the update time parameters.  
The quality of the Cadastral Parcel and Buildings data produced by the Directorate General for Catastre, the Government of Navarra and the Provincial Councils de Alava, Guipúzcoa and Vizcaya, is established by cadastral regulations and is also included in the conditions established for the preparation of cadastral documentation. For example, [http://www.catastro.meh.es/esp/contratacion\\_pliegostipo.asp](http://www.catastro.meh.es/esp/contratacion_pliegostipo.asp) and, as we have commented, they comply amply with the requirements established for INSPIRE
- The Spanish Oceanographic Institute (IEO) facilitates the creation and editing of the metadata of the IEO itself via the Geoportal application (native Esri open-source code and customised by the IEO) thus ensuring that the metadata comply with INSPIRE. Furthermore, in relationship with the quality of the data included in the GIS, on which the Data Infrastructure of the IEO is based, a set of rules has been established that affect the delivery formats, geodetic reference systems, year of acquisition of the data, methods of acquisition and its own quality controls in the acquisition of the data.
- 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, 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 Organizations 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:
  - o The C4 officialises the technical specifications of each product, which incorporate the quality requirements for each one. At 31/12/2015 a total of 35 technical specifications of spatial data sets are officialised, corresponding to 25 spatial data sets, all written according to the ISO 19100 standard.
  - o 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 ICGC, which determines its final qualification, after review of the geographic information, the technical specifications and the metadata file.
- The ICGC 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 4.0.2, for the editing and exporting of metadata with the profile defined by the Spatial Data Infrastructure of Catalonia (IDEC) (subset of the ISO 19115 standard 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:
  - 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, use of the Inspire validator.
  - For services: monitoring for detection of faults and alarm system of the corporate system and monitoring of response times.
- In Galicia contributions are validated in relationship with the requirements established in the corresponding contracting specifications. The quality levels of the data sets are established in the setting of each project for acquisition and updating of information. Always in the production stage, a series of basic criteria is contemplated to assure quality pursuant to the ISO19113 and ISO 19114 standards.

In general, the following aspects are considered:

- Positional accuracy: according to the scale and precision of each product.
  - Quality assurance of the existing specifications
  - Use of official information sources
  - Control and updating using orthophotos and other higher-precision mapping sources
- Completion: via the use of gazetteers and official catalogues
  - Manual review of at least 10 % of the area
- Logical consistency: both domain and punctual consistency
  - Checking of domain consistency 100 %
  - Editing of rules or geometrics depending on the type of product and its use
- Thematic accuracy
  - Manual review of at least 10 % of the area covered

Data provided by third parties have been validated in relationship with the requirements established in the corresponding contracting specifications, verifying such quality and sending, if applicable, the errors detected for subsequent correction.

For services, a series of operations is performed within the Testing and Validation Plan of the IDEG platform:

- Data and database integrity: ensure that the methods of access and processes work adequately and without corrupting the data.
- Validation of response time for transactions or business functions under the following conditions: Normal anticipated volume and Maximum anticipated volume.
- Recovery and fault tolerance: verify that the recovery processes (manual or automatic) appropriately restore the database, applications and systems, and take them to a known or desired state.

In the generation and validation of metadata the CatMDEdit application has been used. The corresponding validation operations of the NEM profile and INSPIRE have been performed.

- In the Community of 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 the "IDENA Profile" and the INSPIRE and national NSDI validators (NEM + INSPIRE). 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. Network services are generated following the standards of the OGC and technical documentation provided by the TechWG for architecture, standards and network services. To ensure 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. The availability of a shared and distributed storage system makes it possible to ensure that the data are edited in the appropriate department by personnel who are competent in such subject. 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 and via the use of the validation tool of the INSPIRE geoportal. 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 in the same way as the WMS services, with the INSPIRE validator. 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: gazetteer, 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.
- In Asturias, the contributions are validated with the available INSPIRE tools. For metadata, CatMDEdit is used.
- In the Region of Murcia the procedure to validate the quality of the spatial data sets is performed with the assurance that the spatial data set is supported by a legal mandate, backed by the Law 13/2015 on Regional and Urban Planning (LOTURM). Furthermore, the incidents and/or suggestions of external users and the administration itself are received via the contact form of the web [www.sitmurcia.es](http://www.sitmurcia.es) or by e-mail [sitmurcia@carm.es](mailto:sitmurcia@carm.es). For metadata standard templates are used and they have been validated by the INSPIRE validator and the NSDI validator. A procedure has been established to appoint the UUID of the spatial data sets: "carm\_abbreviation of the Organization responsible for the spatial data set\_service\_abbreviation (two letters) of the theme of the spatial data set\_name of the spatial data set". For services: "carm\_iderm\_abbreviation of the service (csw, wms, wfs)\_name of the service".



#### 4.2.1.2 No procedures implemented but with technical quality standards

- The CNIG, which is responsible for the national NSDI node, the Geoportal and National Contact Point, is assessing the possibility of verifying the quality of the NSDI services, or at least a representative sample, for example one or two especially representative and important services of each node. We have designed automatic procedures to check the response time and availability with a request every 3 minutes and capacity tests. Furthermore, the process of preparation of the annual Monitoring report includes a verification process in which the head of each Technical Working Group verifies the resources reported for the corresponding theme and the CNIG verifies the *ExtendedCapabilities* of each service, and the *name* and *title* of each layer.

#### 4.2.1.3 With technical quality standards in the preparation phase

- In February 2014, Aragón published the NCA to be complied with obligatorily by the Departments and Public Organizations of the Government of Aragón, including all the Centres, Institutes, and Public Bodies of the Government of Aragón and to be communicated to all the Administrations or Public Organizations with competences in the preparation and maintenance of mapping information in the territory of Aragón. Url: <http://www.boa.aragon.es/cgi-bin/EBOA/BRSCGI?CMD=VEROBJ&MLKOB=781047622424>

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

### 4.2.2 Analysis of quality assurance problems

After consultation with the official producers of data included in the NSDI, the following conclusions have been reached:

- 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 assurance procedures and many of the contracting specifications or technical requirements for spatial data sets lack this chapter.
- c) Diversity in the 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) Lack of definition of *Abstract Test Suites* relative to compliance with the Implementing Rules of the services of Viewing, Discovery, Downloading and Transformation beyond the aspects of Performance, Availability and Capacity.
- f) Lack of definition of an *Abstract Test Suite* that verifies the compliance of metadata with the corresponding Rules. These last two deficiencies mean that there is no standardised method, as objective as possible, that can be used to ensure compliance, or that the results of the verification of compliance performed by different stakeholders are comparable and no certification bodies are established. All of this means that the interoperability between resources cannot be guaranteed 100 %.
- g) A large volume of multidisciplinary geographic information to be integrated, with heterogeneous characteristics and problems of propagation of errors not sufficiently studied.
- h) The need for continuous updating.
- i) The metadata, which are key, are costly to generate and maintain, in view of the large quantity and variety of services available in some Organizations, and with the circumstance that there are no metadata quality elements.

Other more general problems, which should be taken into account, thinking about the quality of the infrastructure more than that of its components and which we have not resolved in the NSDI, are:

- The problem of establishing protocols that make up for and solve the problem of stoppage of a service. This problem appears when an Organization publishes some services and, subsequently, owing to budget problems, for example, is obliged to stop providing them. This situation dents the trust of the users in the other nodes and must be considered in a contingency plan.
- The problem of grey areas or, to put it another way, the problem of completeness of the SDI, which presents deficiencies when there are resources which for some reason are not visible in the national geoportal.
- The problem of gaps and overlaps, which appear when there is no official Organization responsible for mapping a thematic field or when there are two.
- The problem of the lack of interoperability of licences, which will be mentioned below in points 7.4 and 9.1.3, owing to the failure to use standard licences.
- The problem of harmonisation of one SDI with the neighbouring SDIs with which it has a physical boundary, which includes, of course, data, and furthermore the mapping of models, resolutions and products, update periods, the establishment of crossed links and everything that contributes to horizontal interoperability.

With regard to data, in the case of cadastral mapping, the fundamental problem to ensure uniform quality in the whole data set is the great variety of origins of collection, for such a wide expanse of territory and with such a high level of detail. Throughout the history of the collection of information, different studies have been performed, at different times, with different methodologies, highly influenced by the technological developments of the time, and they have produced data with significant differences in quality. The technical specifications for cadastral mapping, and those of other cadastral studies, have defined both the quality requirements and the working procedures to be followed. Despite this, although an effort has always been made to follow and comply with the contracting specifications, which are quite strict and precise, the level of quality in some areas does not reach the required specifications. However, it is important to point out that the requirements of INSPIRE are more than complied with for scale, resolution, completeness, updating frequency, etc.

In general, the main problem that has slowed the adaptation process of data sets in recent years lies in the intrinsic difficulty of the process, a very complex task involving the re-engineering of very heterogeneous data sets, from very diverse sources, often without a good description in the form of standardised specifications and a well-documented application schema. In addition, some problems such as, for example, extending the INSPIRE models, have not been clearly documented.

In the case of services, the greatest problem regarding the provision of quality services is directly related with the technical capacity of the hardware equipment. Other factors are computer attacks and the incorrect use of services owing to lack of specialised technical knowledge.

It should be pointed out that the high technical level required, both for the preparation and transformation of the spatial data sets and in the generation/maintenance of the services, their extensiveness and the volume of processing and storage, require considerable investments in specialised personnel and technical resources, investments that have been difficult to maintain during these years owing to the economic situation we have been through and the rigidity of the public sector, which takes a long time to adapt the volume of its human resources to the new tasks defined.

### **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 the quality of a spatial data set and its components (data, metadata and services). As a result of this, quality assurance procedures are scarce and are not always applied systematically and consistently.

- The CNIG has developed a methodology for verification of the practical interoperability of geoportals, which analyses aspects of interoperability, accessibility, usability, multilingualism, use of standards, etc., and has performed some studies in the geoportals of the NSDI in which it has

been seen that the pressure of an external Organization that verifies interoperability is essential in order for due attention to be given to essential aspects that, otherwise, may pass unnoticed.

- A web seminar has been organised with the SDI nodes of the Autonomous Communities and the General State Administration to explain the procedure for compilation of data for the Monitoring Report, while reviewing all the problems related with the quality of the components of the NSDI and its overall functioning.
- In the Directorate General for Cadastre it can be said that the measures taken to improve the quality of the data have been carried out at different times and different solutions have been implemented, such as metric analyses, greater control in data delivery, increasingly strict validation applications and more controlled updating procedures. Currently there is no formally defined quality control plan for data. The implementation of any of the above solutions, independently or all together, requires a considerable increase in human and material resources. The maintenance processes include mechanisms to ensure topological, semantic, thematic, etc. consistency.

For the quality of services, mechanisms have been established to minimise the frequency of programmed stoppages. To avoid attacks software solutions have been implemented to restrict access in the light of mass requests. The servers have been made more powerful to create greater response capacity and minimise times. There is a working group dedicated to maintaining the efficiency of the services together with the integrated system of the electronic office of the Directorate General for Cadastre.

- In recent years the MAGRAMA has promoted various actions aimed at improving quality assurance based on the standardisation and integration of both the geographic information existing in the Ministry and of the systems used for its management. One of the greatest difficulties of this process has been the large volume of geographic databases existing in different formats and the great variety of systems. Below are some of the quality assurance practices and measures taken by the MAGRAMA for their improvement:
  - A) Development and implementation of a corporate GIS platform, which has been key to this process. The Corporate GIS is supported by standard technologies such as XML, SOAP, Network services, INSPIRE and OGC standards for access to spatial data. The technological infrastructure that supports the corporate GIS is based on an open-source architecture with requirements for high availability, load balancing, security and scalability.
  - B) Development and implementation of the MAGRAMA SDI geoportal.
  - C) Unified coordination in the Committee of the Spanish Inventory of Natural History and Biodiversity (IEPNB), which has identified the spatial data sets handled in the Inventory, their relationship with each one of the INSPIRE themes and with the reporting obligations in this respect with regard to the European Environment Agency, European Commission and other international Organizations. All the technical specifications, adoption of standards, template lists, etc., necessary for the interoperability of the spatial data sets once agreed with the Autonomous Communities in the Committee, are communicated to the State Commission for official approval.
- An interesting development is that carried out in Catalonia via Decree 62/2010 which defines and identifies the spatial data sets that the Regional and Local Administrations produce and use. It determines the structure, quality, availability, interoperability, updating and access conditions of each 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 the responsibility of the data producers for filling in these metadata was established at the outset. To facilitate this process they have been provided with training and assistance regarding knowledge of the elements of the metadata profile and on how to fill in and consult the information in the catalogues. The gradual implementation of coordination structures will also allow the improvement of quality assurance since these problems will be approached in a much more specific manner. 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, for which the implementation of a Corporate GIS platform supported by standard network services is key.
- In some Autonomous Communities, such as Aragón or Navarra, data quality is established by the Mapping Standards of Aragón (NCA).
- The documentation on lineage and quality of the products is essential, owing to which special emphasis is placed on this in Andalucía, Navarra and the majority of the Autonomous Communities.
- The participation of the users in the improvement processes is considered very valid by the Balearic Islands, La Rioja and Euskadi, where it is considered that one of the best strategies for assuring the quality of SDI data and services is to promote the integration of this geographic information in different sectoral applications, for which an important effort is being made to offer viewers or services for easy integration by third parties.
- In the case of Galicia, all the information of the different data producers covered by the Spatial Data Infrastructure of Galicia (IDEG) passes the quality control performed by the IET prior to being provided via services and applications. Assessment tasks are being performed in different departments of the Government of Galicia, users or generators of geographic information, for the production of data and metadata. There is no mechanism for quality certification.
- In La Rioja, in the case of metadata, the work of reviewing and editing is performed exclusively by highly specialised personnel. In the case of data, crossed checks are performed by different departments that use or generate information of the same type. For example, in the field of health centres and infrastructures, the information produced by the Rioja Health System is crossed with the Local Infrastructures and Equipment Survey. In the field of services, there is a re-use of OGC services within the daily management and information procedures of the institution, which allows almost continuous checking of all the services.

#### 4.2.4 Quality certification mechanisms

There are currently no Organizations or mechanisms in Spain for the certification of compliance with the Implementing Rules of INSPIRE or for such essential aspects as service quality (performance, availability and capacity). Some of the stakeholders involved suggest that, since this is a pan-European problem, perhaps the solutions should be implemented on a European scale, in line with the developments made in the form of the Inspire Validator available on the European Geoportal.

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 ICGC with regard to the data, the specifications and the metadata. On 31 December 2015, this Register had a total of 32,403 official items registered in its official section.

Likewise, some bodies responsible for spatial data sets in Catalonia, RCC submit their data to ISO standards certifying bodies.

In general, it is appropriate to assume the comment made by the Andalucía SDI: "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 (Art.13)

### 5.1 General description of the SDI

The Spatial Data Infrastructure project (NSDI) commenced in the year 2002 as a reflection of the activity that was beginning in Europe in the form of the first steps in preparation for the INSPIRE Directive.

From the outset, the NSDI was conceived as a voluntary project and managed by a community of stakeholders, with the cooperation of the Public Administration, private companies and universities, for the purpose of sharing geographic information on the web so that it could be used both by the users, interactively, and by the systems, automatically, for all kinds of applications and in any field of activity.

The optimisation of this objective led to the basic principles of the SDI: the need to have interoperable systems, and therefore the requirement to adapt to standards, and Service-Oriented Architecture (SOA) as the essential architecture. In this respect, we are fully aligned with the principles and contents of the *European Interoperability Framework* (EIF).

In this sense, there are two core ideas of maximum importance:

- The NSDI must be supported by a healthy, balanced and collaborative community of stakeholders, in which the fundamental decisions are reached by consensus. In this respect it appears that on many occasions collective intelligence is greater than that of individuals, as occurs with creations such as language or artistic creation.
- The ultimate objective is to share geographic data, following the philosophy of the business management bestseller "Good Luck": "If you share, you always earn more". Indeed, if every Organization publishes its data, even if this measure does not favour it directly, it will contribute to enriching a large virtual repository of interoperable services that we all fill together and sooner or later it will find some utility or application that is useful to it.

We are convinced that geographic information is a key resource in the advent of the information society, since everything happens somewhere, and that it provides an engine for development, owing to which the free circulation of geographic information is positive for society as a whole.

Returning to the idea of Service-Oriented Architecture, we believe that SDIs are based on the idea of Open Services and therefore they are one step ahead of the Open-Data initiatives with regard to the technological concept, very interesting and necessary in any case.

As a vision, we can say that the intention of the NSDI is that, some day, reference and thematic geographic data will be ubiquitous, that it will be technically, semantically and Organizationally interoperable, and available as another horizontal resource via open network services for all kinds of users and on all kinds of applications.

In this respect, the strategy that has always encouraged us consists of offering services to the extent that it is possible to satisfy with them the needs of the users and to offer download services so the user can work locally when the remote functionalities are not sufficient for what is intended.

The LISIGE establishes that the NSDI or 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 or under the responsibility of the Public Administrations.

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 creation 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 2010-2012 period was characterised by the continuation of this dynamic and the 2013-2015 period has maintained the continuity together with the creation of coordination structures for the implementation of INSPIRE, such as the CODIIGE and the TechWGs whose missions include the generation and cohesion in the long term of a healthy, balanced, collaborative and well-oriented thematic community of involved authors.

The same *State of Play* report 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 (...)”. This collaborative spirit is maintained and there is an atmosphere of cooperation, often without the support of a formal agreement, that allows many interesting activities to be performed.

Furthermore, the different stakeholders are defining their roles in greater detail, taking shape in the form of geoportals, network 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 reference node at national and European level for geographic information of an environmental nature as well as that related with agricultural, livestock and fishing resources.

To quote a significant example, in the case of the Directorate General for Cadastre, it has offered viewing of all its data free of charge since 2004, downloading of data for registered users since 2007, downloading for all users, also free of charge, via licence since 2011 and INSPIRE WMS and WFS of Cadastral Parcels and Buildings open and free for all users since 2015.

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 82/2015) and Navarra (Provincial Decree 255/2015).

In the Valencian Community there is concern to train technicians of the autonomous community government for 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 Organization, conception and contents vary between them.

Let us look at three disparate examples:

1. SDI development in Catalonia is stimulated by the Support Centre for the Spatial Data Infrastructure of Catalonia (CSIDEC), a member of the ICGC, which provides the necessary technical support for its Organization, 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 and accessible by Internet, 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 metadata catalogues of other bodies and Organizations. 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 mapping configured via 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 the 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.
- 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.

2. 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.
3. Aragón, over recent years, has carried out the logical transformation of the Territorial Information System of Aragón 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 INSPIRE network services with the objective of improving the provision of services by this Public Administration.

## 5.2 INSPIRE stakeholders

To describe this group the following structure is considered according to their role in the development and use of SDIs in Spain: coordination Organizations, producers of data and services, research centres and users.

### 5.2.1 Coordination Organizations

As has been described in section 6.1.2, the coordination, control and management of the IIGE corresponds to the CODIIGE. Furthermore, the CODIIGE is responsible for proposing the actions to be taken by the Public Administrations or public sector Organizations for the establishment of the IIGE and for acting as a contact point with the European Commission in relationship with the INSPIRE Directive.

The CODIIGE includes members of the Commissions of the Geographic High Council (CSG) who are experts on both SDI and on the standards for geographic information, and it must include representatives of the three levels of Administration. In this respect, the CODIIGE is formed by:

- a) A President, who will be the President of the Specialised Commission on SDI (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.
- d) A third Vice-President, who will be the President of the Specialised Commission of the National Cartographic Plan.
- e) A Secretary, who will be a senior civil servant of the National Geographic Institute (IGN).
- f) 13 members, all experts on SDIs:



- a. 3 representatives of the General State Administration, at the proposal of the Permanent Commission.
- b. 6 representatives of the Autonomous Communities, at the proposal of the Territorial Commission.
- c. 2 representatives 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 current members can be consulted on the following page: <http://www.idee.es/resources/documentos/MiembrosCODIIGE.pdf>.

The Technical Working Groups (TechWG) report to the Executive Board of the Geographic Information Infrastructure of Spain. These are standardisation groups whose duty is to analyse the Spanish implementation of the Inspire Rules by the Spanish Public Administrations and help their bodies and Organizations to achieve compliance.

The web page <http://www.idee.es/resources/documentos/GruposTecnicosDeTrabajo.pdf> shows the different working groups and their responsibilities.

The Committee of the Spanish Inventory of Natural Heritage and Biodiversity (IEPNB) is the body responsible for coordination between Administrations for the themes regulated in Royal Decree 556/2011. It is composed of a representative of each autonomous community and of the cities of Ceuta and Melilla, two representatives of the Ministry of Science and Innovation, one representative of the Ministry of Public Works and Transport, and four representatives of the MAGRAMA, one of which will be president.

Its duties include the establishing of procedures for the development and functioning of the Inventory. Especially the technical rules that regulate each one of its 30 components, according to the principles included in article 4: dissemination, technical rigor, coherence and interoperability. The Committee forms part of the EIONET (European Environment Information and Observation Network) of the European Environment Agency.

## 5.2.2 Data and service producers

The bodies and Organizations 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 Organizations are included as nodes. All the levels of Administration that produce data and provide services are being encouraged to publish them via interoperable network services.

Sometimes, this activity is centralised or coordinated via a network of autonomous community and General State Administration SDI nodes that represent the different regions and ministerial departments.

In the case of data that correspond to reporting obligations contracted by the Kingdom of Spain in compliance with European or international regulations, although the production is carried out in a decentralised manner by the Organizations responsible, mainly autonomous communities and river basin authorities, the data are aggregated at national level to comply with such obligations as a Member State. In this case most of the data produced by the MAGRAMA are included.

The following tables list the departments and the contacts:

Ministry	Body	Name
Min. of Economy and Competitiveness	CSIC	Isabel del Bosque
Min. of Economy and Competitiveness	IGME	María Jesús Mancebo Mancebo
Min. of Economy and Competitiveness	Spanish Oceanographic Institute	Olvido Tello Antón
Min. of Public Works and Transport	D. G for Architecture, Housing and Land	Juan Luis Quesada
Min. of Public Works and Transport	D.G for the National Geographic Institute	
Min. of Finance and Public Administrations	D.G for Cadastre	Fernando Serrano
Min. of Industry, Energy and Tourism	Undersecretariat	
Min. of Justice	D.G Relations with the Admin. of Justice	Jesús Gallego
MAGRAMA	Technical Office of the Undersecretariat	Carlos Mediavilla García
Min. of Defence	Hydrographic Institute of the Navy	Andrés Millán Gamboa
Min. of Education, Culture and Sport	Cultural Heritage Institute of Spain	Alfonso Muñoz Cosme

Autonomous Community	Body	Name
Andalucía	Institute of Statistics and Cartography of Andalucía	Agustín Villar Iglesias
Aragón	Geographic Institute of Aragón	Rafael Martínez Cebolla
Principality of Asturias	D.G. for Regional and Urban Planning	María Pellón Revuelta
Canary Islands	Sub-department of Territorial Policy	Manuel Blanco Bautista
Cantabria	Department of the Environment, Regional and Urban Planning	Gabriel J. Ortiz Rico
Castile and León	D. G. for Housing, Architecture and Development	Alberto Monsalve González
Castilla-La Mancha	Cartographic Centre of Castilla-La Mancha	Manuel López
Catalonia	Cartographic and Geological Institute of Catalonia	Joan Sendra i Tarrida
City of Ceuta	Department of Public Works	Pedro Sierra García
Valencian Community	Valencian Cartographic Institute	Santiago Yudici
Extremadura	D.G. for Regional and Urban Planning	Carmen Caballero
Galicia	Territorial Studies Institute	Manuel Gallego Priego
Balearic Islands	D.G. Territorial Planning	Fèlix Escalas van Nouhuys
La Rioja	D.G. Territorial Policy	Gonzalo López
Community of Madrid	D.G. Territorial Development and Strategy	Rafael Herrero
City of Melilla	Department of Public Works	Fco. Javier González García
Region of Murcia	Subdirector General for Territorial Planning. Department of Public Works and Infrastructures.	Antonio Ángel Clemente García

CF of Navarra	SITNA Coordination Committee	Pedro Lerendegui	Mendive
Basque Country	Department of Regional and Planning	Juan Carlos Barroso	

### 5.2.3 Other stakeholders, research centres and users

The CODIIGE is also responsible for managing the Specialised Commission on SDI (CE IDE), the activity of which is focused via the Working Group of the Spatial Data Infrastructure of Spain (WG NSDI).

The WG NSDI is characterised by being an open group, of a technical nature, formed by experts and representatives of producers of geographic information, both for reference and thematic, at state as well as regional and local levels, in which universities and the private sector also participate.

The web page <http://www.idee.es/resources/documentos/MiembrosGTIDEE.pdf> includes the members of the WG NSDI and the Organizations to which they belong.

There are currently around 50 members who belong to the academic sector and universities, 80 to the private and business sector and 280 to the public sector.

### 5.2.4 Conclusions

Below is a series of conclusions drawn from the data obtained:

- In general, there is considerable awareness and knowledge in the public sector of the INSPIRE directive and the implications and need for compliance. Likewise, in the academic sector, spatial data infrastructures form part of the subjects taught in degrees related with the world of geographic information. Lastly, the participation of companies of the GI sector is also notable. However, there is a considerable lack of knowledge of SDIs outside the GI field. In particular, companies of the ICT sector are not making ample use of the network services and GI of the data and service producers. Furthermore, although there are good practices among users of the public sector, a great deal remains to be done among the institutions and the breach with the potential users of the private sector is simply abysmal.
- It is necessary to close the gap between the producers of data and network services and the users by means of training and dissemination campaigns, via the development of libraries, API, viewers, applications etc. that simplify and facilitate the use of GI resources by ICT companies and, of course, by improving the quality of the products, their harmonisation and the performance of the services.
- The MAGRAMA wishes to express its concern regarding the coherence between the information sent to comply with the obligation to deliver officially prepared monitoring reports required by the directives to the Commission and the European Environment Agency, and the INSPIRE information services. The spatial data sets offered by the official information of the Member State should be identified unequivocally.

## 5.3 Role of the different stakeholders

The following structure is considered according to their role in the development and use of SDIs in Spain: coordination Organizations, data and service producers, research centres and users.

## Coordination Organizations

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, as well as the main inter-administrative coordination Organizations such as, for example the Committee of the IEPNB.

Each TechWG has its own coordination dynamics, which often coincide with Specialised Commissions of the CSG, or with existing coordination agents, such as the national reference centres of EIONET or the Cultural Heritage Institute of Spain. 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 Organization 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.

One of the duties of the TechWGs is to analyse the Spanish implementation of the Inspire Rules by the Spanish Public Administrations and to assist their bodies and Organizations to achieve compliance. The guidelines, methodologies, classifications, gazetteers, codes, etc. defined by the TechWGs to favour the standardisation of the contents of the Geographic Information Infrastructure of Spain will be proposed to the CODIIGE so that, if it considers them adequate, it will communicate them to the Geographic High Council to enable it to follow its usual approval procedure. In the case of thematic spatial data sets with their own regulations the approval procedures of the inter-administrative collaboration bodies, such as the Sectoral Conferences, will prevail.

The TechWGs also perform the following tasks:

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

At the level of state and autonomous community Organizations, these mechanisms are supported by Organizations 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 Organizations that provide support for the performance of these tasks (such as, for example, the case of La Rioja).

## Data producers

The bodies and Organizations 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 Organizations are included as nodes.

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

There are still few spatial data sets that comply with INSPIRE. But in some themes the data sets have already been transformed, as is the case of the data of the themes of Cadastral Parcel, Addresses and Buildings coordinated by the Directorate General for Cadastre, the data of Administrative Units, Geographic Names produced by the IGN and some other cases.

Some Autonomous Communities (such as 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 Organizational approach to the production of data gives rise to a certain complexity. For example, in the case of the Geographic Names theme, we find:

- Mapping producers: Organizations 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 Organizations:

- Academia Valenciana de la Lengua (Valencian Academy of 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 (Department of Health)
- Conselleria de Justicia y Bienestar Social (Department of Justice and Social Welfare)
- Conselleria de Educación, Formación y Ocupación (Department of Education, Training and Employment)
- Instituto Cartográfico Valenciano (Valencian Cartographic Institute)

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 by various public and private Organizations, all of which are data producers. The available records are divided into 4 main groups: uploads performed by the ICGC itself, those performed by the local bodies, those performed by the universities and research centres and the uploads made by the different departments of the Government of Catalonia.

In the case of the MAGRAMA the services publish official spatial data sets sent to the international Organizations in response to the reporting obligations arising from European regulations. As has been stated previously, most of these data are not produced by the MAGRAMA but in compliance with the obligations, as a Member State, they must be sent or offered in interoperable services in a single spatial data set that covers the whole national territory.

### Service providers

In general lines the data producers themselves are implementing the corresponding services. For example, the majority of the main nodes of the General State Administration, such as the Directorate

General for Cadastre, the IGME, the MAGRAMA and the IGN, have already implemented viewing and downloading services compliant with INSPIRE, that cover the themes of Annexes I and II. In Annex III the situation is more irregular, but INSPIRE services are also being introduced by themes.

In some cases, the Organizations that support the SDI activity of an Organization 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. This has also been the case of Andalucía, although recently it has split off the environmental part of the catalogue, thanks to the scope of the environmental information catalogue managed independently by the Environmental Information Network of Andalucía (REDIAM).

In the case of Catalonia, the metadata of services are prepared using an 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.

Owing to the large quantity and diversity of the metadata it manages, in Catalonia the strategy for the development of the IDEC was based on the promotion of thematic SDIs, or those specialised in specific domains, so that, maintaining their own identity and services, they provide their resources to the IDEC, enlarging the overall network of providers of geodata and services, whilst offering their end users the specific, sectoral and specialised version they require. At the end of the 2015 (31/12/2015) these thematic SDIs are: IDEC Sensors (network of sensors that, for the most part, capture environmental data), IDEC Univers (georeferenced information produced in a network of universities and research centres), IDEC Litoral (geodata of the Catalan coast, in collaboration with the EUROSION project), IDE-OT (satellite images of Earth observation) and IDEC-Local (geoportal created by the AOC to host the SDI services of the Catalan local administrations)

### **Technology based university centres and users**

In Spain the technological research and development centres linked to universities and to other governmental Organizations 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 usually constitute a good control system for the quality of the services provided. At the general level there are two mailing lists hosted in RedIris, where comments are usually raised regarding problems of bad functioning of network services: these are the GIS RedIRIS List and the NSDI RedIRIS List.

An important group of users is formed by the Public Administrations, which consume the data they produce themselves via the SDIs. Examples are the viewers of the different national and autonomous community SDI nodes, the petrol station geoportal of the Ministry of Industry, Energy and Tourism, viewers of local government departments, etc.

There also are various mashups which benefit from the existence of interoperable data services as a source of data: Goolzoom, Wikiloc, Mapadebolsillo, etc.

Lastly it is appropriate to emphasise the mobile applications and, specifically, OruxMaps, or those developed by the MAGRAMA such as *Naturaleza Magrama (Magrama Nature)* or the *Guía de Playas (Beach Guide)*.

## 5.4 Measures established to facilitate sharing

In Spain, several strategic projects carried out have served as drivers for the efficient use of public resources and the coordinated management among public administrations.

Thus, for example, the National Plan for Territory Observation (PNOT) aims at obtaining coverage of photogrammetric flights, digital terrain models, orthophotos, satellite images and land occupation data bases. To this end, various government agencies, both at state and regional level, are involved, providing funding, information and production jobs.

Another paradigmatic case is CartoCiudad project, a production and publication collaborative project that operates through national coverage spatial data web services, with information about the continuous road network, urban cartography and Toponymy, postcodes and districts and census sections. It is led and coordinated by the National Geographical Institute (IGN) and generated from official data by the IGN, the General Directorate of Cadastre, the Post Service and the National Institute of Statistics. In addition, the autonomous communities of the Basque Country, Navarra, Valencian Community, La Rioja, Balearic Islands and Andalucía contribute to its development.

The General Directorate of Cadastre has established mechanisms to make all its information available without restriction and free of charge, in the most effective way possible, based on standards, according to European directives and enhancing web services and massive downloads as a solution for the transfer of information. At the moment, as a result of the implementation of INSPIRE services, outreach and use among potential users will be expanded. The fact that the coordination between Cadastre and Land registry is based on INSPIRE cadastral parcel GML is a measure that will certainly contribute to this process.

In the case of the IEPNB (Spanish Inventory of Natural Heritage and Biodiversity), information technologies available today are used to constitute an integrated information system for storage, harmonization, quality and implementation of information relating to Natural Heritage and Biodiversity, according to RD 556/2011, of April 20, for the development of the Spanish Inventory of Natural Heritage and Biodiversity as basic regulation to achieve the establishment of the mechanisms necessary to access information held by public authorities. As already mentioned, the IEPNB Committee is responsible for coordinating all works necessary with the AC. to achieve the objectives set under RD 2011-556.

The IEO (Oceanographic Institute of Spain) is currently updating its data policy, so as to shortly publish it on its website. This policy stands for providing accessibility and public dissemination of the information produced by the IEO. On the other hand, an update of the GeoPortal and the SDI of the IEO, to improve access to the marine information from that institution, has been discussed lately.

However, these works involve a series of agreements which involve shared ownership of the resulting products, enabling each participant to distribute and publish the obtained data sets. In many cases, cooperating agencies publish this information without restriction and free of charge, it therefore makes no sense for this same information to be marketed by other bodies.

In terms of data policies, although the vast majority of autonomous communities publish their geodata under semi-open licenses that do not allow commercial use, there is already a large number of them (Autonomous Community of Navarre, Aragon, Andalucía and the Basque Country) which publish their reference geographic data as open data. With regard to the policy of data dissemination applicable in Catalonia, the CCP (Cartographic Plan of Catalonia) urges those entities responsible for the SDSs included therein to facilitate and simplify access to them, in accordance with the criteria established for that purpose by the C4 and pursuant to Act 37/2007, of 16 November, on the re-use of public sector information. In this regard, the C4, at a meeting held on December 21, 2009, approved the adoption of the following data dissemination policy: "With the applicable exceptions, geo-information produced by public administrations and Organizations, and specifically spatial data sets, which comprise the PCC, will benefit from free distribution and universal access".

The study carried out by the National Centre for Geographic Information for the Jornadas Ibéricas de las Infraestructuras de Datos Espaciales (Iberian Conference of spatial data infrastructure), held in Spain in 2015, is also worth mentioning. This study gives an overview of open data and services in the

field of geographical information in Spain. A representative sample of public agencies in the three levels of Spanish administration, national, regional and local, was taken. These samples were obtained from the list of download centres posted on NSDI geoportal, which collects more than 110 web sites where official geodata are available for download. Though the complete accuracy of this directory cannot be guaranteed at any given time, due to the rapid evolution of the sector, it should be stated that it is reviewed periodically. It is also the most popular page of the whole NSDI (IDEE (Spanish acronym for Spatial Data Infrastructure of Spain)) portal and, therefore, it gives a good approximation for describing an overview of official geographic data download centres in Spain.

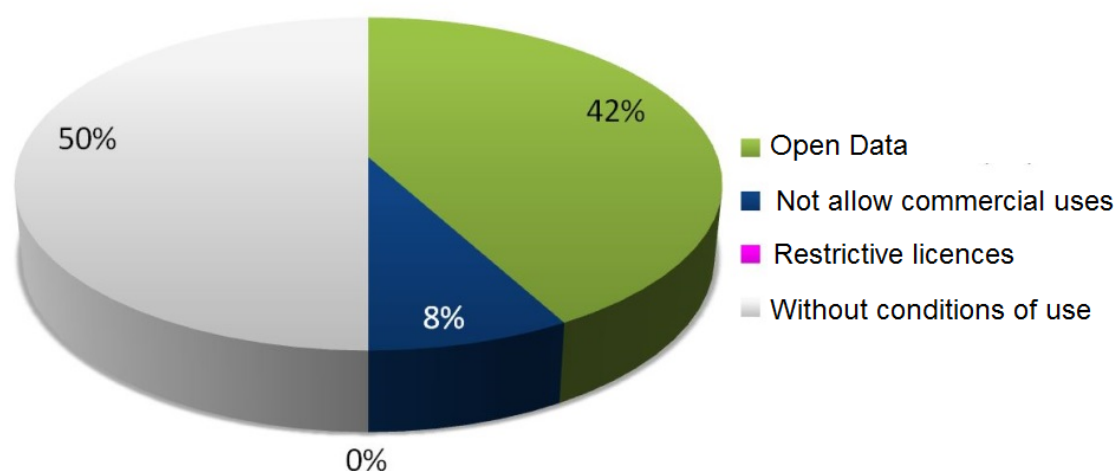
In particular, some AC have adopted open data policies with all the consequences this fact entails. For example, in Catalonia, ICGC set conditions for the use of all its geographical information produced by means of the Creative Commons Attribution 4.0 (CC-BY 4.0) International licence, whose main aim is to foster data reuse and the creation of value-added products or information services based on these data.

Regarding the AGE, there are agencies that also publish open data. The General Directorate of Cadastre is particularly noteworthy, since it offers all cadastral information free and without charge, with more than 145 million maps consulted per year and more than 278.000 downloaded files, which will be also available through GML INSPIRE as of 2015.

### Situation within the General State Administration

The terms of use published on the same download page of 12 government agencies out of a total of 20 agencies registered in NSDI geoportal, under five Ministries, were analysed. Results can be found in the following figure, where four categories have been considered: centres publishing open data, centres that do not allow commercial uses, centres with restrictive licences and centres that publish data without specifying the permitted conditions of use.

**12 Government Agencies**



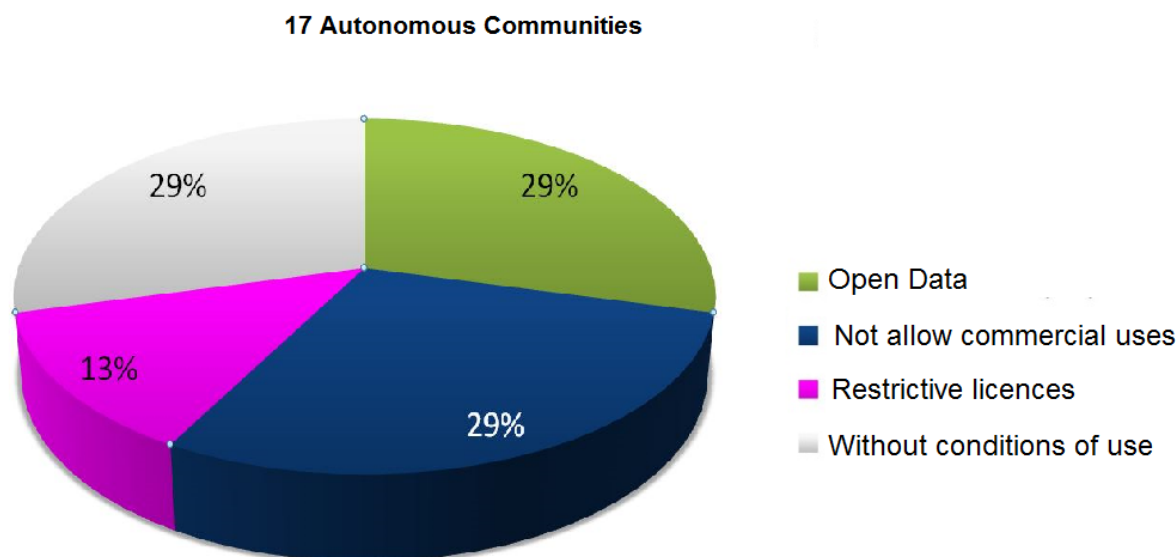
Results have shown that, first, half of the download centres does not state the permitted uses, with the problems that this fact entails: legal uncertainty, data reuse companies that do not exploit these data for fear of possible infringement of applicable rules, companies that understand that, since there are no limitations, all uses are allowed without even recognising them, etc. It is also worth mentioning that



no body uses restrictive licences and that when conditions are stated, either simple recognition (BY) is sufficient or commercial uses (NC) are not allowed. In no case are type licences used.

### Situation within the Regional Administration

The conditions of use published on the download pages of the 17 autonomous communities were studied, considering the four categories already mentioned. Results can be found in the following figure.

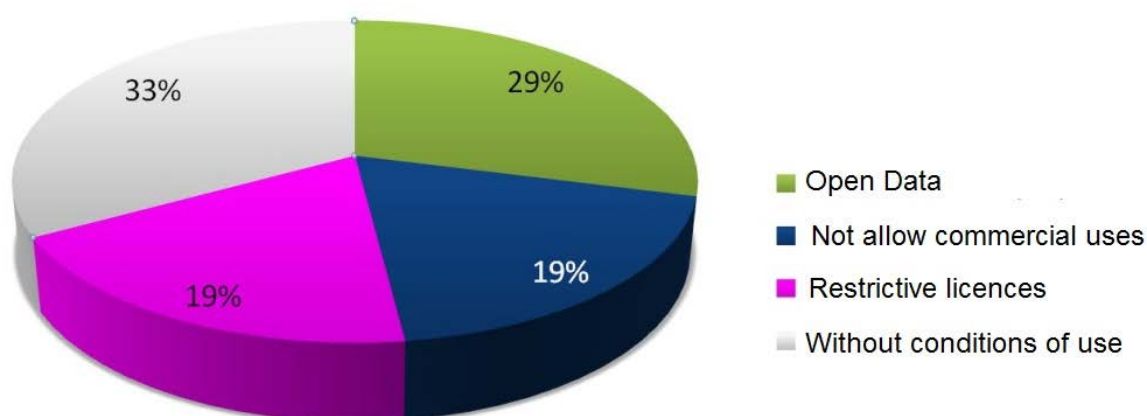


It should be noted that the number of occasions on which conditions of use were not specified has been greatly reduced. On the other hand, restrictive licences that allow only for private use of this information, usually for non-commercial purposes, appear in some cases (13 %). Nonetheless, data can be classified as open or semi-open (NC) in 58 % of all cases. It should also be highlighted that type licences, which happen to be *Creative Commons* and correspond to autonomous communities of the northern half of Spain, are used in 35 % of all cases. In particular: in Catalonia, ICGC set conditions for the use of all its geographical information produced by means of the *Creative Commons Attribution 4.0 (CC-BY 4.0)* International licence, whose main aim is to foster data reuse and the creation of value-added products or information services based on these data; GeoEuskadi SDIRioja, IDEG, Castile-Leon SDI, Extremadura, and IGN, among other nodes, are covered by the same type of licence or equivalent.

### Situation within the local administration

A sample of 21 download centres of the local administration, of a total of 38 identified in the NSDI geoportal within the four regular categories, was examined. Results can be found in the following figure.

### 21 download centres of the local administration

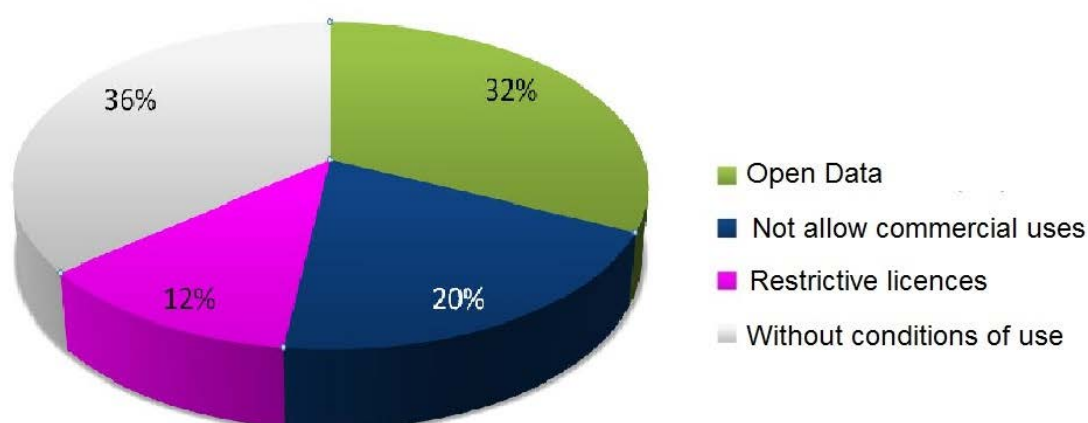


The percentage of bodies that do not restrict conditions of use is similar to the one of the regional administration, the proportion of sites that publish open or semi-open data (NC) is slightly lower, a total of 48%, slightly less than half, and the percentage of download centres with restrictive licences increases to a small extent, around 19 %. Situation is very similar to the one of the regional administration; percentages are quite similar, except for cases in which type licences, such as the *Creative Commons*, are used, which amount to only 10 % of cases.

### Global situation in Spain

By adding data collected from the three levels of Spanish Administration, a very interesting overview of the situation of conditions of use of geographic data in our country is obtained, based on data from 50 agencies from a total of 75, which allow their data to be downloaded on the web. Results can be found in the following figure.

### 50 Agencies

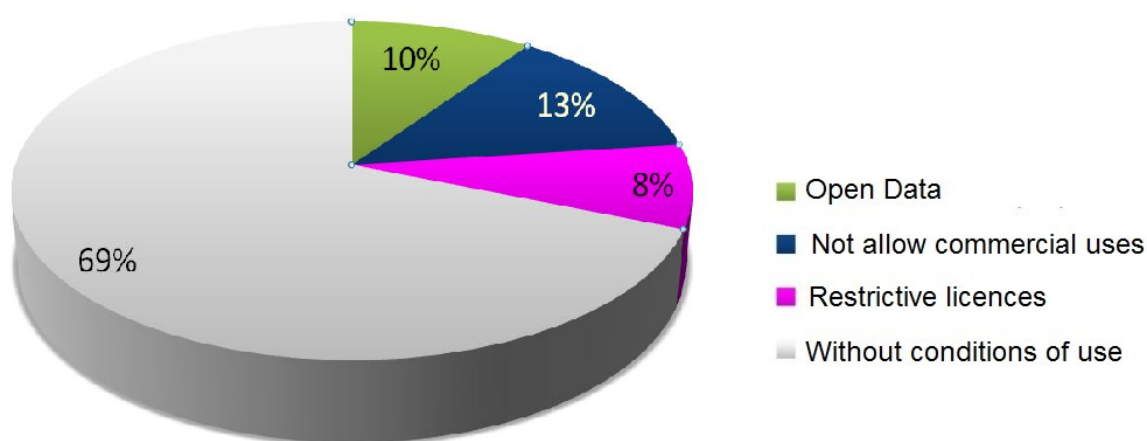


It must be emphasised that in more than one-third of cases, 36 %, data are published without information on conditions of use. Again, open and semi-open (NC) data are just over half of cases (52 %) and that type licenses, such as *Creative Common*, are used in only 8 cases out of 50 (16 %).

### Conditions of use of the services

An analysis of the content of the following labels <Abstract>, <AccessConstraints> and <Fees> of the *capabilities* of 83 *Web Map Services*, from the 1925 ones that were identified and added to the NSDI web services directory, was conducted. Results can be found in the following figure.

### 83 *Web Map Services* from the 1925



It is shocking that the majority of services, either do not contain any information concerning conditions of use in their description or associate the value 'none' to the label <AccessConstraints>, thereby declaring that there is no restriction of access or use and recognition is not even asked. On the other hand, it seems that the 8 % that impose restrictive conditions do so unintentionally and mistakenly. When trying to simply indicate the authorship of the service, they include expressions such as «© Body» or «copyright of such bodies», which actually mean 'all rights reserved' or can be easily misinterpreted as well. Therefore, it can be seen that in approximately 77 % of cases the service provider seems not to properly express restrictions on access to its service. Finally, it should be mentioned that in approximately 2 5% of WMS services it is specified among the conditions of use of the service that massive download of cartography is not allowed.

The following conclusions can be drawn:

- 1) It is recommended that public bodies, which allow the online download of geodata, observe the following general rules:
  - a) To consciously adopt a data policy, so that it is sustainable and sustained in the long term.
  - b) To disseminate and advertise such policy, so that its users are aware of it. In any case, it should appear clearly described online on the web pages where the download is possible.
  - c) To use well-known type licenses that make interoperability of licences possible, particularly *Creative Commons* 4.0 licenses, which are widely used and whose conditions are well known.
- 2) It is recommended that public bodies, which publish OGC web services based on geographic data for which they are responsible, observe the following general rules:
  - a) To also consciously adopt a data policy, so that it is sustainable and sustained in the long term.
- 3) To properly document it on the related self-description labels (*capabilities*) of the service, or that

they can be related to the conditions of use: <AccesConstraints>, <Abstract> and <Fees>.

In some cases, it is always advisable to publish conditions of use at least in the local language and English, so that not to forget that when publishing something on the network, action is being taken at a global level where all users should be able to understand it without having to rely on automatic translation.

Should these recommendations be followed, at least there will be clear conditions of use and reuse and users will certainly know what to expect. On the other hand, their implementation can contribute to the creation of a culture of copyright and data policies that does not yet exist in Spain.

In this regard, we are convinced that a job well done together with constant diffusion is the best way to encourage the departments responsible for geo-information to share it through the SDI (Infrastructure for Spatial Data), and different users to ask for it.

For example, the CICTEX (Cartographical and Territorial Information Centre of Extremadura) carries out training courses for public employees in the regional administration and external courses for groups of interest: Professional associations, groups of companies (clusters), University, etc.. In addition, it also maintains communication channels with users to answer queries and provide information on social networks. In this last respect, the CICTEX has noted that great impact news on social media are directly related to the increase in users of Extremadura SDI.

## 5.5 Stakeholder cooperation

Cooperation between the different stakeholders that make up the Infrastructure for Spatial Data of Spain is performed and promoted through multiple channels:

- **Collaboration agreements**

Through various collaboration agreements of the National Geographical Institute with different national (for example, the General Directorate for Cadastre, the Spanish Agricultural Guarantee Fund) and regional institutions, joint actions for the production and update of the GIS vector and raster information related to INSPIRE themes (hydrography, transport network, orthoimagery...) have been taken. In fact, 12 agreements related to this production were signed in 2013, 15 ones in 2014 and 9 more in 2015.

- **Common projects**

There are several collaborative projects that represent the realisation of good practices in terms of geographical information generation and joint funding, including:

- National Plan for Territory Observation (PNOT)

PNOT comprises four large national plans. Two of them allow for the obtaining of regular complete coverage of the Spanish territory with aerospace images of high, medium and low resolution, the National Aerial Orthophotography Plan (PNOA, aerial imagery and digital terrain models) and the National Plan for the use of Remote Sensing (PNT, satellite images). Another one allows for obtaining periodic complete coverage of the Spanish territory with LIDAR data, and based on the latter, high precision digital elevation models are created). The fourth national project, which uses the territory coverage obtained by the previous two, is the Information System on Land Cover and Use of Spain (SIOSE), which defines urban, agricultural, forest, natural and wet areas of Spain with precision and homogeneity.

Its national coverage is multidisciplinary used by all public administrations and is applied in such crucial areas as, among many others, the periodic renewal of the SIGPAC (Geographic Information System for Agricultural Plots, managed by the FEAGA (Spanish Agricultural Guarantee Fund)), the update of the bases and institutional map series of the AGE and the AC, the update of the Urban Information System of the General

Directorate for Architecture, Housing and Land, the maintenance of the geometric base of the cadastre by the General Directorate for Cadastre and the implementation of European directives on water and flood management, coordinated by the River Basin Bodies of the General Directorate for Water.

PNOT management model, based on consensus, coordination and inter-administrative collaboration, received the UN Public Service Award in 2013, the most prestigious international recognition of excellence in the public sector.

- CartoCiudad

CartoCiudad is a road network continuous database with information coming from the General Directorate for Cadastre, which provides its cartographic information at a scale of 1:1 000, as well as the geographical location of the plots; the National Institute of Statistics, provided by the Census and the road name sections; the Sociedad Estatal Correos y Telégrafos (post service), which provides postal districts, and the National Geographic Institute which provides the road network of the National Topographic Base at a scale of 1: 25.000 and integrates and processes all of the above information. It allows the location of addresses and navigation throughout the Spanish territory. It has been designed to be exploited on the internet using standard web services: map (WMS), tessellation maps (WMS-C), nomenclator (WFS), and geoprocessing (WPS). Several Autonomous Communities also participate in CartoCiudad, by making the production corresponding to their territorial areas in accordance with the data model of the project.

- Collaboration laid down in the regulations

The Spanish Natural Heritage and Biodiversity Inventory is a good example of the generation of information with a bottom-up approach. Act 42/2007, of December 14, creates the inventory and sets that it will be carried out by MAGRAMA, the AC and all institutions and organizations of a scientific nature, following the principle of partnership. The Spanish Legal System depicts collaboration as the duty to act between administrations for the achievement of common goals. Therefore, the exchange of information is not subject to any contractual arrangement. This is provided for in all areas of the Spanish Government, which, generally, share data and services without the need for any collaboration or specific formal agreement.

- **CODIIGE and its working groups**

Further developed in section 6.1.1

- GTIDEE (Working Group of the SDI)

Further developed in section 6.1.1

- Mailing lists, social networking



Different forms of communication are used for the distribution of information related to the INSPIRE directive and spatial data infrastructures, such as:

- Blog-IDEE (Blog of the NSDI)  
The blog of the IDEE (Spatial Data Infrastructure of Spain) is a mean of communication at the service of the Spanish SDI community formed around the Working Group of the NSDI, designed to exchange and publish news, experiences, good practices, launch of new resources, projects and information on the world of spatial data infrastructures.
- IDEE and SIG distribution list  
Mailing lists used to distribute information on spatial data infrastructures and geographical information systems.
- SobreIDEs (OnSDIs) bulletin:  
SobreIDEs is an initiative of the work subgroup SDI Observatory of the NSDI working group. It is a communication channel for the dissemination of developments, news and issues of interest to the growing SDI community in Spain. It provides monthly reports on news and developments related to the SDI World, which are published during the first five days of each month.  
The bulletin consists of several sections: Events, which contains information on conferences and meetings; News, which advertise job vacancies, presentations and projects with SDI themes; Training, with meaningful content about SDI; Agreements, which advises on legislation, norms, standards and recommendations related to the SDI; Portals; Resources, which deals with news in terms of nodes and services on the one hand and tools and applications on the other; Solutions, web development, and finally, Recent Publications.
- NSDI RSS channel  
NSDI Geoportal offers several RSS channels (*Really Simple Syndication*) which report on news and events related to spatial data infrastructures (SDI), as well as on the modifications made to the geoportal. By subscribing to these RSS channels, it is possible

to automatically receive the holders of updates or modifications and access the complete version of notifications.

- NSDI Geoportal:

NSDI Geoportal is the official portal of the Spanish national SDI and aims to spread SDI, promote interoperable developments, contribute to the implementation of the INSPIRE Directive, serve as a distribution point for information related to these issues and give visibility to all SDI resources existing in our country, such as web services, catalogues geoportals and download centres.

The National Center for Geographic Information (CNIG), an autonomous body of a commercial nature assigned to the Ministry of Public Works through the National Geographical Institute, is responsible for the creation and maintenance of the portal, as a result of its responsibilities as Technical Secretariat of the High Geographic Council.

## 5.6 Access to services through INSPIRE Geoportal

All INSPIRE services available in Spain can be located and used in the INSPIRE catalogue using the available client in the European Geoportal. In general, there is no high usage of the catalogue and metadata editor by NSDI users.

Services metadata records can be found in (1) the catalogue of the NSDI and (2) the catalogues of national and regional SDI cited in the year 2015 monitoring.

Services metadata records can be found in (1) the catalogue of the NSDI and (2) the catalogues of national and regional SDI cited in the year 2015 monitoring.

- (1) Metadata files of data sets, series and services from regional and local SDI nodes are located and consulted through the NSDI catalogue, by *harvesting* or manual loading of metadata. INSPIRE Catalogue is connected to the NSDI through 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 public administrations at all levels.

SDI Andalucía SDI Aragón SDI Cantabria SDI Castile-Leon SDI Castile-La Mancha SDI Catalonia SDI Autonomous Community of Navarre SDI Valencian Community SDI Extremadura	Ministerio de Agricultura Alimentación y Medio Ambiente (Ministry of Agriculture, Food and the Environment) Confederaciones Hidrográficas del Duero, Guadalquivir, Guadiana, Miño-Sil (Duero, Guadalquivir, Guadiana and Miño-Sil River Basin Bodies) Dirección General de Catastro (Directorate General for Cadastral) Instituto Geográfico Nacional (National Geographic Institute)
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SDI nodes that contribute with their metadata to the CSW service of the NSDI (at the end of 2015)

The abandonment of the management of metadata at series unit level, resulted in a breakthrough, since it led to the disappearance of repetitions and several errors and simplified management processes in general. The evolution in the last three years in the number of metadata records in the NSDI catalogue has been as follows:



Records stored in the NSDI catalogue		
Type	2012	2015
Data sets, series and units	470000	4289 4011 from SDS and 278 from series
Services	270	1350

(2) Indicators of metadata of services informed in the last 3 years and covering the themes included in annexes I, II and III, are:

- MDi1.4 indicator, which measure the existence of metadata
- MDi2.4 indicator, which measure the conformity of metadata

Service metadata		
Type	2012 MDi1.4 existence $MDi1.4 = MDv1.4 / SDSv\_Num$	Conformity MDi2.4 $MDi2.4 = MDv2.4 / SDSv\_Num$
2013	95 %	80 %
2014	99.5 %	85.5 %
2015	92.8 %	73 %

- MDv1.4: number of services with metadata
- MDv1.4: number of services with compliant metadata
- SDSv\_Num: number of services

#### Which obstacles have been encountered?

Not all Organizations create metadata files of their network services; metadata files of data sets remains the top priority.

Some problems and difficulties have been found in the *harvesting* performed from the INSPIRE catalogue in 2013 and 2014, which led to the adjustment of parameters in the definition of the catalogue service of Inspire Registration Service.

#### Are services provided by the national portal available in Inspire geoportal?

All NSDI catalogue metadata are available in Inspire portal through the Record Service of INSPIRE geoportal (registered in June 2012), therefore metadata records within the NSDI are available for searching through the catalogue client of the INSPIRE geoportal.

Monitoring reports are used in the National SDI node to extract the identifier of catalogue metadata files and services where they are found. These identifiers have been used to implement two types of measures:

- 1) SDI nodes that do not have a catalogue service (CSW): for those Organizations that have metadata but have not implemented a catalogue service, it was necessary for national node managers to get in touch with them. Contact has been made with those responsible for those nodes, so that they submit these metadata to the NSDI. These have been loaded into the NSDI catalogue.
- 2) SDI nodes that have a catalogue service (CSW): metadata have been obtained and loaded in the NSDI metadata catalogue, by means of a *harvesting* process applied to each one of those services and a subsequent filtering for "dataset, series & services". To assist in this task, the



CNIG (National Centre for Geographic Information) has created a program developed in JAVA that makes requests to remove metadata from these 3 levels from the catalogue.

National and regional nodes that have contributed their metadata through files and those that have made it by means of *harvesting* applied on their CSW are shown below, year by year:

Node	2013	2014	2015
<b>National-Cadastre</b>	File	File	File
<b>National-Duero River Basin Body</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>National-Guadalquivir River Basin Body</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>National-Guadiana River Basin Body</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>National-MiñoSII River Basin Body</b>	File	File	File
<b>National-Segura River Basin Body</b>	-	-	File
<b>National-CSIC (Centre of Scientific Research)</b>	-		File
<b>National-IGN (National Geographic Institute)</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>National-IEO (Oceanographic Institute of Spain)</b>	-	File	File
<b>Nacional-IGME (Geological and Mining Institute of Spain)</b>	-	File	File
<b>National-M. Industria-Energía-Turismo (Ministry of Industry, Tourism and Trade)</b>	-	-	File
<b>Nacional-M. de Justicia (Ministry of Justice)</b>	-	File	File
<b>National-MAGRAMA (Ministry of Agriculture, Food and the Environment )</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Nacional-M. de Vivienda (Ministry of Housing)</b>	-	File	File
<b>Regional-Andalucía</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Regional-Aragón</b>	-	File	<i>Harvesting</i>
<b>Regional-Cantabria</b>	File	File	File
<b>Regional-Catalonia</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Regional-Comunidad Foral de Navarra (Autonomous Community of Navarre)</b>	-	File	<i>Harvesting</i>
<b>Regional-Comunitat Valenciana (Valencian Community)</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Regional-Castilla-LaMancha (Castile-La Mancha)</b>	-	File	File
<b>Regional-Castilla y Leon (Castile-Leon)</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Regional-Euskadi (Basque Country)</b>	File	File	<i>Harvesting</i>
<b>Regional-Extremadura</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Regional-Galicia</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Regional-Illes Balears (Balearic Islands)</b>	-		File
<b>Regional-La Rioja</b>	File	File	File

<b>Regional-Región de Murcia (Region of Murcia)</b>	<i>Harvesting</i>	<i>Harvesting</i>	<i>Harvesting</i>
<b>Regional-Principado de Asturias (Principality of Asturias)</b>	-	-	<i>Harvesting</i>

### **Processes and tools developed to verify compliance with metadata, data, and services regulations**

#### **Data compliance:**

- Geobide (SL modules and modules with ©)
- Guidelines created by the TWG to transform data from each theme

#### **Compliance of network services:**

- Validador de servicios de Zaragoza (SL)
- INSPIRE Service creation guidelines with:
  - o MapServer, Geoserver, Degree, ArcGIS for Inspire, Geonetwork

#### **Metadata Conformity:**

- Validador de metadatos de Zaragoza (SL)
- Andalucía validation tool
- Metadata Creation guidelines:
  - o NEM, NEMS (Metadata Spanish Profile)
- IGN (National Geographical Institute) metadata Portal
- Metadata Edition Tool CatMDedit (SL)
- Metadata import Tool created by the CNIG (National Centre for Geographic Information) in JAVA
- Metadatada Validator of INSPIRE geoportal

## 6 Use of the Infrastructure for Spatial Information (Art.14)

### 6.1 Use of spatial data services in the SDI

There is no systematic follow-up of the use of spatial services of SDI in Spain, among other reasons, because standard users of these services are essentially anonymous and it is difficult to establish contact with them. In this chapter we can only provide the data compiled as a result of the INSPIRE monitoring campaigns for the years 2013, 2014 and 2015. 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.

Service Use						
	<b>Discovery NSi3.1</b>	<b>Viewing NSi3.2</b>	<b>Download NSi3.3</b>	<b>Transformation NSi3.4</b>	<b>Access NSi3.5</b>	<b>All NSi3</b>
2013	15407	702199	436	12417	1533	634050
2014	3053	2579	1265	18944	0	2477
2015	---	--	--	--	--	--

Probably, the values of service use indicators are not very reliable, since sometimes they were indirectly estimated and in other cases, different statistical metrics were applied, thus, we believe them to be unreliable data.

It should be noted that at the MIG meeting it was adopted that 'use' is an indicator that should be removed. We agree with this decision since use indicators are the result of adding measurements carried out in very different manners and we suspect that in some cases even the product of estimates.

These data were collected through the established process of data collection for Monitoring by means of the coordination structure, formed by the main national node, managed by the CNIG (National Centre for Geographic Information) and regional nodes, managed by the Autonomous Communities. In both cases, data are obtained from the utilities provided by the respective requests and access statistics systems, and in general terms, only the total number of requests received by each service is used.

Probably, the number of requests that did not receive an answer (due to error, time-out or any other circumstance) should be deducted, but this deduction has neither been done nor estimated.

Therefore, these indicators should be interpreted more as a measure of 'demand for use' rather than of actual use.

The use of discovery services is not very large and it should be said that, in general, catalogue clients are little usable and useful. In addition, catalogue services are usually accessed only from the client authorised for that purpose from the relevant geoportal. It is not common to do so from other clients.

The use of viewing services has grown significantly and, probably, these are the most widely used ones. It should be taken into account that the emergence of tessellation services (WMTS) has dramatically increased the use of requests and the result of this indicator widely depends on the number of implemented WMTS, so it is not directly comparable between countries. Also, for the use of these tiles in smart phones and other devices in areas without coverage, there are very interesting and useful applications (such as OruxMap) that download these tiles only once and then distribute them, thus masking the actual number of times that each tile is accessed. There are general reference viewing services, such as PNOA (National Aerial Orthophotography Plan) WMS, which is practically used in all viewers.

Regarding the use of download services, there is a mix of two very different cases, download services for geographical objects (typically WFS-Inspire) and download services for data sets (typically Atom-Inspire). These are very different cases. The use of WFS-Inspire services has not quite got off the ground, since it depends on the complexity of the UML class diagram of the objects; the greater the complexity, the greater the difficulty of exploitation and less use. The use of Atom-Inspire services has greatly increased in Spain thanks to the opening of data and in the CNIG (National Centre for Geographic Information) we have noticed that it has greatly increased, first when the prior user registration requirement was removed, and second, when downloading a whole series at once was made possible. Once again, the number of downloads here is masked by those users who download the data once and subsequently redistribute them.

To mention a few examples:

- In Andalucía visitor metrics that use SDI services have an estimated 1,150,000 views per year.
- In the case of Catalonia, for the 2013-2015 period, the service requests received by the different nodes and infrastructure bodies amount to more than nine hundred fifty million:

Type of service	Number of requests for service 2013-2015
Discovery services	79,695
Viewing services	829,131,689
Download services	128,452,372
Transformation services	782,598
Access services	0

## 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 the NSDI. In that regard, it should be said that there are not yet many SDI delivered in GML format according to the XML schema of data specifications, which represents a clear barrier for their extensive use.

Monitoring specific indicators that measure compliance of the SDI of the themes listed in annex I, II and III and the conformity of the corresponding metadata are respectively DSi2.1, DSi2.2, DSi2.3. Indicator DSi.2 provides the average value for all themes. DSv\_Num1, DSv\_Num2, DSv\_Num3 and DSv\_Num is the number of data sets available for each one of the annexes and the total.

The following table, which summarises the situation in these three years, shows that the number of compliant data sets with metadata in compliance with Inspire Regulations is still scarce.

	DSv_Num1	DSi2.1	DSv_Num2	DSi2.2	DSv_Num3	DSi2.3	DSv_Num	DSi2
2013	221	14 %	143	2 %	802	13 %	1166	11 %
2014	246	5.69.	168	0 %	1017	0.09 %	1431	1.05 %
2015	434	3.9 %	279	1.8 %	1254	0.6 %	1967	1.5 %

Nevertheless, the use of geographic data in Spain, regardless of their compliance with the requirements laid down within INSPIRE specifications, has seen a remarkable increase each year, as well as interoperable services, so that everything seems to indicate that the use strategy proposed to users is being followed: using web services as first solution, especially viewing services (WMS and WMTS) and download services for geographical objects (WFS), to meet their information requirements and only downloading data for its local operation if the former option does not succeed.

As an indication of this evolution, the following table shows the download data of CNIG (National Centre for Geographic Information) Download Centre, one of the nodes, among more than one hundred, where official geographic data can be downloaded.

Number of downloaded files in CNIG (National Centre for Geographic Information) Download Centre					
	PNOA (National Aerial Orthophotography Plan)	BTN100	BTN25	CartoCiudad	All Products
2013	91134	1991	89054	12936	1 107 851
2014	125508	4590	86111	13708	1 132 385
2015	555794	9006	369342	26642	8 710 785

It should be noted that the number of downloaded files greatly depends on the units in which each series is divided, thus figures of one product are not comparable with those of another and they only serve as an indication of the temporary evolution of a product.

There is a steady increase, which has soared during 2015, due mainly to two factors. On the one hand, new products have been made available to citizens and have been widely accepted, such as LiDAR data or raster data of the old cadastral minutes. On the other hand, the adoption of a series of measures has removed considerable barriers to the access to data, such as: removing the registration requirement to download data, implementing new measures that allow for the download of several files at the same time without limit and, finally, defining all IGN (National Geographic Institute) products as open data; though this change occurred in December, so there has not been enough time to notice all its impact.

In Andalucía, users requested 115,928 topographical mapping files at a scale of 1:10 000, 71,116 orthophotography files and 20,080 files from the Digital Terrain Model to the Information Download Geoportals. If the aforementioned figures are added to the rest of the series, more than 250,000 files were downloaded.

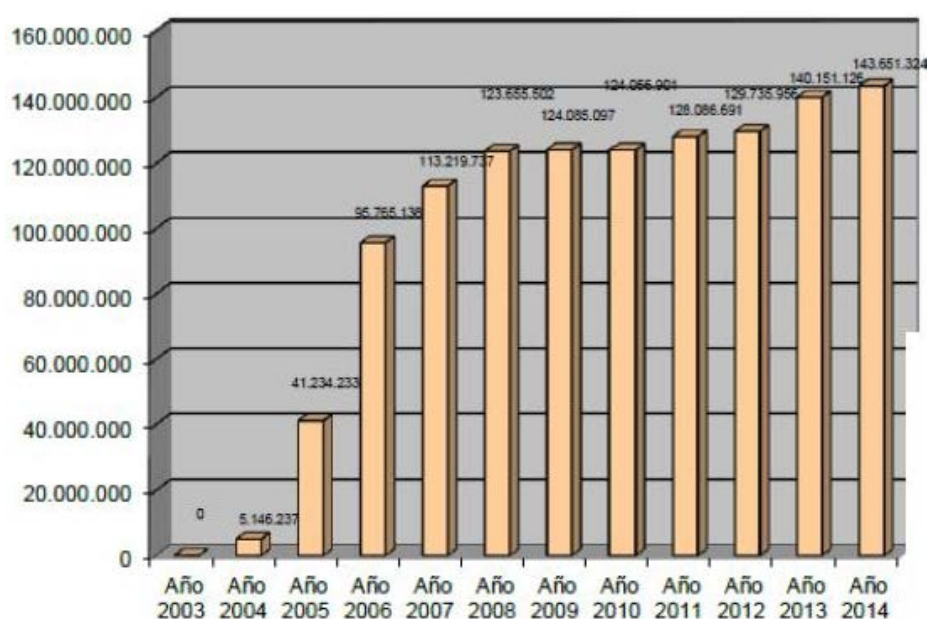
In Catalonia, to reflect the use of spatial data sets, information relative to accesses to the different SDI catalogues is available, classified according to annuity.

Accesses to catalogue	2013	2014	2015
IDEC (Spatial Data Infrastructure of Catalonia)	12,768	10,835	6,397

Local IDEC	516	501	438
IDEC Univers	96	77	53
IDEC Litoral	132	84	65
IDEC sensors	275	232	94
IDEC observation Terra	92	35	14

Another body that has experienced a dramatic increase in the use of its geographical information has been of the General Directorate of Cadastre, as detailed in the chart attached.

### General Directorate of Cadastre



And 278.000 graphic editable files downloaded in 2015.

The General Directorate for Cadastre is a good example of data use, since it has a series of quantitative indicators that provide knowledge on a daily basis of the evolution in the use of services of the Cadastre online site by both public bodies and general users. .

During the 2014-2020 period, the Common Agricultural Policy (CAP) has introduced the requirement to meet obligations related to the environment, so as to be entitled to receive the entire amounts of aid. This is called Greening. These requirements are of three types: diversify crops, keep existing permanent pasture and include areas of 'ecological interest' within the agricultural area. To monitor compliance, it has been necessary to create new layers in the SIGPAC (Geographic Information System for Agricultural Plots) database, such as the permanent pasture and areas of ecological interest layers. Likewise, to improve the control over the requirements of the so-called cross-compliance, the 'elements of the landscape' layer has also been created. To complete the information of these layers, using many SDS has been studied, through consultation and viewing services. It is also noteworthy that PNOA (National Aerial Orthophotography Plan) orthophotos, PNT (Transitional National Plan) images and the SIOSE (Information System on Land Cover and Use of Spain) cadastral plot divisions are available in the base of all SIGPAC (Geographic Information System for Agricultural Plots) layers, not only in those related to greening or cross-compliance. Due to their impact, the use of other SDS can be noted in the calculation of the Pasture Eligibility Coefficient

(CAP): DTM for the degree of slope, PNT for the soil factor and PNOA (National Aerial Orthophotography Plan) LIDAR for the vegetation factor.

SIGPAC (Geographic Information System for Agricultural Plots) data, created and maintained to serve as support for the declaration and control of those agricultural areas that receive aid from the Common Agricultural Policy (CAP), are also used for numerous purposes other than their main end. Some consist of systematic use of SIGPAC (Geographic Information System for Agricultural Plots) data, whereas others are specific requests that are received daily by the responsible units. Many examples can be cited:

- SIGPAC (Geographic Information System for Agricultural Plots) is used as a reference in the update of the various maps of land use produced at national level, such as MFE (Forest Map of Spain), SIOSE (Information System on Land Cover and Use of Spain) and MCA (Map of Crops and Utilisation), particularly to delimit the surface of arable lands and permanent crops.

- The mast-feeding coating and the calculator of the forested area covered by oaks in each plot are used to manage the mast-feeding period for those pigs whose meat products are to be marketed under the "Iberian pig" trade mark. Similarly, the coat of forested areas covered by oaks has been based on the MFE (Forest Map of Spain).

- SIGPAC (Geographic Information System for Agricultural Plots) is used as a source of information for sector studies on agricultural products and, particularly, in the nut and olive sectors, thanks to vector layers in which these trees are individually identified.

- SIGPAC (Geographic Information System for Agricultural Plots) is the reference base to declare the territorial base of holdings, so it serves the General Registry of Agricultural Production (REGEPA), which must include all agricultural holdings in Spain. It is also used as a cartographic database in the viewfinder of the General Registry of Livestock Holdings (REGA)

- SIGPAC (Geographic Information System for Agricultural Plots) works as a Cartographic base for the Crop Surface Area and Yields Survey (ESYRCE). In addition, SIGPAC (Geographic Information System for Agricultural Plots) information is used as a contrast in other thematic surveys (pastures, vineyards, olive groves).

- LIDAR flights and vegetation points classified by the FEAGA (Spanish Agricultural Guarantee Fund) for the calculation of the Pasture Eligibility Coefficient (CAP) are being considered to update the MFE (Forest Map of Spain) and increase its accuracy.

- SIGPAC (Geographic Information System for Agricultural Plots) is being used as a Cartographic base for the development ALBERCA project (GIS Water Registry) project, and it is also the Cartographic base used by River Basin Bodies for the processing of irrigated land concessions.

- Lately, initiatives are being launched from the European Commission (JRC) to use the SIGPAC (Geographic Information System for Agricultural Plots) as a source of information on carbon sinks (LULUCF), essentially pasture and forests.

- Cadastre uses SIGPAC (Geographic Information System for Agricultural Plots) data, and vice versa, for the purposes of performing assessments and investigate ownership, among others.

- The use given to SIGPAC (Geographic Information System for Agricultural Plots) by the chairs of many universities in numerous research projects is also noteworthy. Evolution of crops, precision agriculture, energy facilities, etc.

- SIGPAC (Geographic Information System for Agricultural Plots) is extensively used by companies and general citizens due to its easy and intuitive interface, because it contains simple tools that make the measurement of distances and surfaces possible, for an infinite number of other purposes, among which the following could be cited: simple consultation of the aerial orthophotos, planning hiking routes, disputes about boundaries, urban planning, etc.

### 6.3 Use of the SDI by the general public

No comprehensive study containing use indicators for the data and services published by the two hundred nodes comprising the NSDI has been performed. As a sample, we mention some use indicators and aspects of certain national and regional nodes, so as to try to provide an overview of the situation.

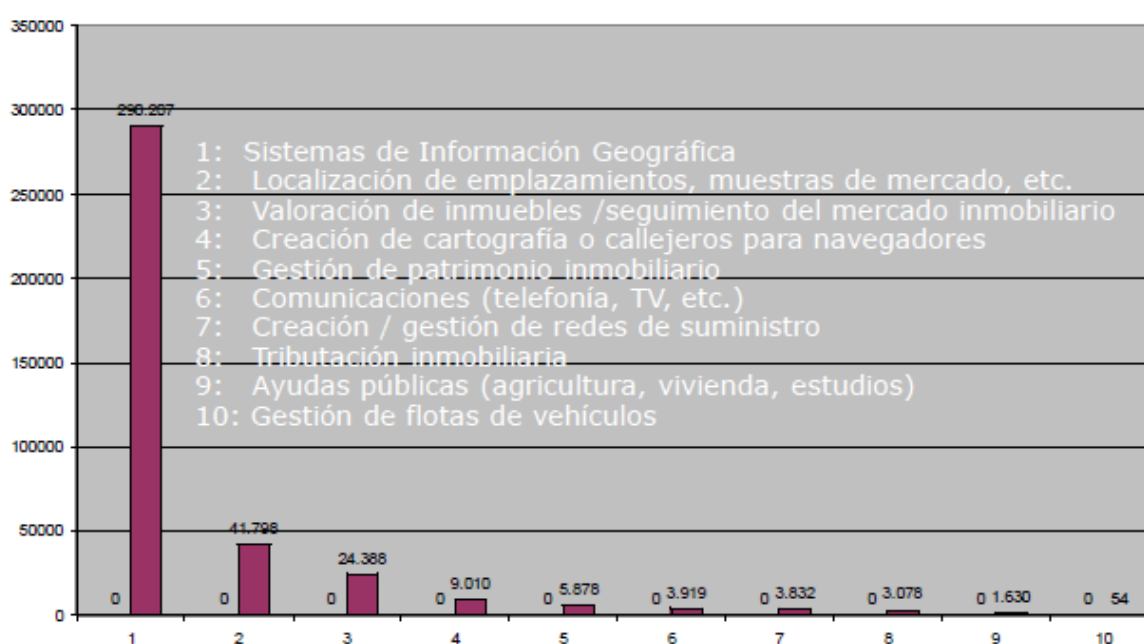
The total number of requests to web services published in the SDI node of the IGN (National Geographic Institute) has experienced a steady increase during 2013, 2014 and 2015, partly due to an increased demand and partly to the increased use of tessellation services (WMTS) that perform several requests to display a screen.

	2013	2014	2015
Total number of individual requests to the SDI node services of the IGN (National Geographic Institute) (millions of requests)	1718	2589	3492
Total number of individual requests to geoEuskadi services (millions of requests), without including tessellation services, since WMTS had not implemented in 2015.	11	17	28
SDI Extremadura	23,110,819	55,927,809	67,778,298

The use of the GeoPortal and the viewfinder are not monitored in the Region of Murcia. Since their introduction in February 2015, approximately one hundreds requests by users have been received through the contact form on the web.

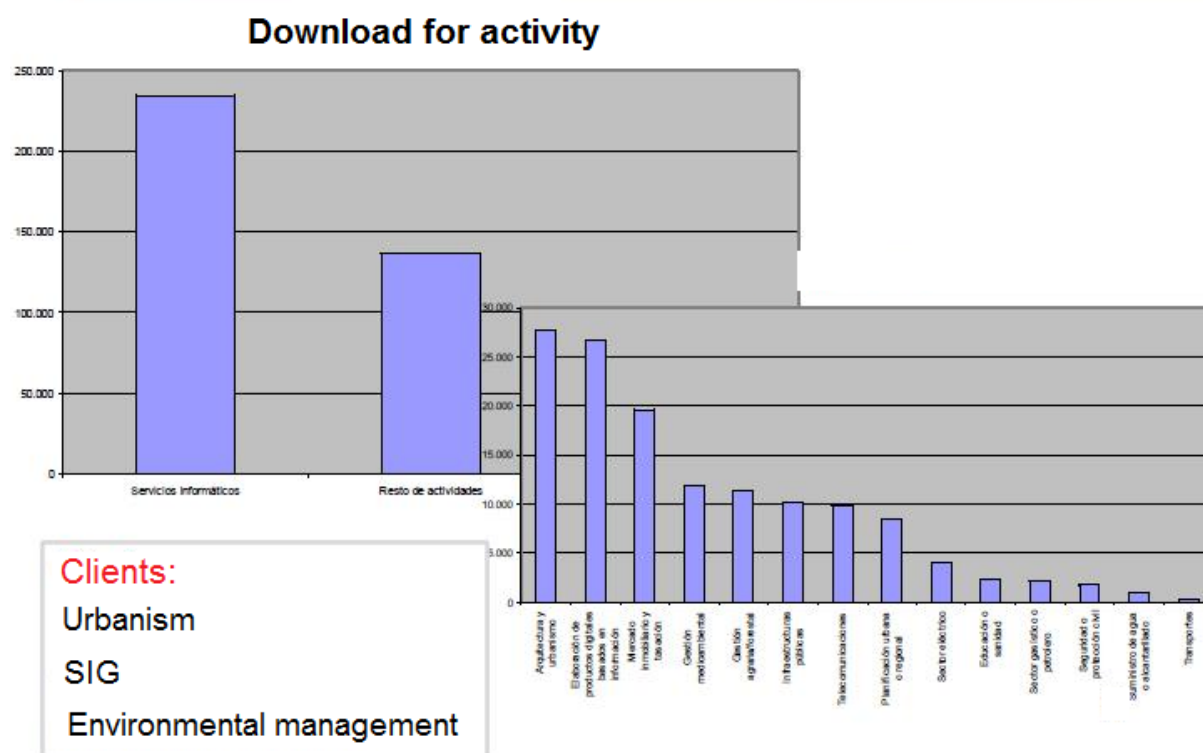
As mentioned, some Organizations such as the General Directorate for Cadastre have been able to observe, via their use indicators, the spectacular increase in accesses to the online site of the Cadastre which has risen from 270,000 visitors in 2003 to more 145 million accesses to cadastral cartography in 2015. Furthermore the Spanish Cadastre has been chosen by the *INSPIRE Data and Service Sharing Drafting Team* as “good practice” in public access and it thus includes it in the document on good practices published by INSPIRE in 2009.

Also, the General Directorate for Cadastre has been monitoring the use to which these data are dedicated, since 2011, when it launched mass downloading of data for all users





As well as the sectors of activity of those users who request them



The data set provided by the General Directorate for Cadastre to the NSDI, which citizens and public and private companies use, is highly relevant due to the inherent characteristics of cadastral maps. WMS service is present practically in all national geoportals. The number of accesses to this service amounts to more than 6,000,000 weekly requests.

The General Directorate for Cadastre, offers free viewing of its data since 2004, data download for registered users since 2007, free downloads for all users by means of licensing since 2011 and free INSPIRE WMS and WFS of cadastral plots, addresses and buildings for all users since 2015.

Finally, and with regard to legal aspects, it is important to point out the reform of the Mortgage Act and the Merged Text of the Act on Real Estate Cadastre, which entered into force in November 2015 and that means that graphic representations of cadastral plots can be registered in the Land Registration. This involves that all stakeholders in real estate transactions (citizens and companies, notaries, registrars, surveyors and other technicians, Cadastre) will exchange cartographic information, primarily and as indicated in the previous point, the INSPIRE cadastral parcel GML. This will disseminate and promote the use of SDI services among the general public.

On the other hand, the statistics of accesses to the MAGRAMA WMS services can be found below, classified by themes:

WMS MAGRAMA - Accesses	2013	2014	2015	TOTAL
<b>AGRICULTURE</b>	<b>59,232,311</b>	<b>42,693,188</b>	<b>18,991,985</b>	<b>120,917,484</b>
Agroclimatic characterisation	68,223	99,665	101,192	269,080
Agricultural districts	25,300	24,186	35,379	84,865
Map of crops and utilisation	452,175	417,052	297,454	1,166,681
SIGPAC (Geographic Information System for Agricultural Plots)	58,686,613	42,152,285	18,557,960	119,396,858
<b>WATER</b>	<b>538,131</b>	<b>751,214</b>	<b>1,518,976</b>	<b>2,808,321</b>
Groundwater	32,878	25,161	53,124	111,163
Gauged Flows Yearbook	15,945	6,624	11,215	33,784

Hydro-electric projects	56,131	37,179	20,737	114,047
ARPSIs (Areas where there is potential significant flood risk)	50,908	30,942	59,498	141,348
River Basins and Sub-basins	714	14,748	38,925	54,387
River basin districts	2,146	9,590	22,598	34,334
Public Hydraulic Domain	95,915	130,689	304,959	531,563
Surface water status and quality - ID-TAX	2,766	7,897	19,726	30,389
Inventory stretches	9,109	8,594	19,269	36,972
Risk Map	893	34,538	73,696	109,127
Hydrological Planning	4,619	11,591	32,150	48,360
EHRIN (Assessment of water resources coming from artificial snow) Programme	147	31,089	8,386	39,622
River Network	1,655	15,105	36,357	53,117
Renovation of the DPH (Public Hydraulic Domain)	92	2,408	13,814	16,314
Drainage and Water Treatment	712	5,679	19,418	25,809
Safety of Dams and Reservoirs	67,759	33,538	25,084	126,381
Flood Areas	193,936	334,379	731,442	1,259,757
Protected Areas	1,806	11,463	28,578	41,847
<b>BIODIVERSITY</b>	<b>3,910,867</b>	<b>2,216,754</b>	<b>2,414,097</b>	<b>8,541,718</b>
Important Bird Areas (IBA)	24,466	21,436	21,111	67,013
International Agreements	123,632	87,757	80,625	292,014
Erosion	188,963	131,400	129,341	449,704
Nature Protection Areas	409,765	192,362	171,936	774,063
Habitat	397,602	131,990	202,454	732,046
Wetlands	20,470	24,421	18,237	63,128
Forest Fires	129,767	41,955	26,773	198,495
Spanish Wetland Inventory	15,084	9,229	12,647	36,960
National inventory of ENP (Nature Protection Areas), Natura 2000 Network and International Protected Areas	168,913	56,980	88,717	314,610
National Inventory of Landscapes	218,291	57,643	176,145	452,079
Forest Map of Spain	412,089	336,299	233,491	981,879
Forest Map of Spain (according to formations)	529,488	114,484	108,947	752,919
Public Utility Hills	313,705	198,688	256,434	768,827
Natura 2000 Network	534,575	393,561	442,643	1,370,779
Region of Provenance	12,633	19,464	22,116	54,213
Species Richness	66,550	62,198	71,966	200,714
Cattle Trails	344,874	336,887	350,514	1,032,275
<b>ENVIRONMENTAL QUALITY AND ASSESSMENT</b>	<b>16,756</b>	<b>11,256</b>	<b>66,805</b>	<b>94,817</b>
Air quality: Historical evolution			52,284	52,284
Air quality: Historical evolution 2011	15,104	4,705	706	20,515
Air quality: Historical evolution 2012	1,652	6,551	826	9,029
<b>COASTS</b>	<b>314,681</b>	<b>352,217</b>	<b>1,095,838</b>	<b>1,762,736</b>
ARPSIs (Areas where there is potential significant flood risk)		1,960	11,189	13,149
Cartography of Flood Areas		6,232	70,329	76,561
Maritime-Terrestrial Public Domain	298,513	331,477	981,928	1,611,918
Beach Guide	16,168	7,080	16,742	39,990

Risk Map		5,468	15,650	21,118
<b>IRRIGATION</b>		<b>19,550</b>	<b>21,067</b>	<b>40,617</b>
Shock Plan		7,578	6,188	13,766
Irrigation		11,972	14,879	26,851
<b>Livestock farming</b>	<b>16,495</b>	<b>8,788</b>	<b>14,454</b>	<b>39,737</b>
Livestock Districts	16,495	8,788	14,454	39,737
<b>Overall total</b>	<b>64,029,241</b>	<b>46,052,967</b>	<b>24,123,222</b>	<b>134,205,430</b>

## 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. 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 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.

On the other hand, the work group community of the NSDI (*IDEE* (Spatial Data Infrastructure of Spain)) maintains the complicity with neighbouring countries in order to foster the cross-border use of interoperable resources: within the geo-portal of the *NSDI*, there are direct links to geo-portals of the *IDEs* (Spatial Data Infrastructure) belonging to Portugal, Andorra and France, and there are versions of the *NSDI*'s geo-portal in French and Portuguese. Since 2010, the formerly known *Jornadas de la IDEE* (*NSDI* Sessions) came to be known *Jornadas Ibéricas de IDE* (*SDI* Iberian Sessions). These are organized by including representatives from Spain, Portugal and Andorra in the Organising and Scientific Committees, and were jointly coordinated in Lisbon especially in 2010 and 2014. There are moderators, speakers and attendees from the three countries in all sessions.

With regard to cross-border projects the most emblematic one is OTALEXC<sup>4</sup>, 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 OTALEXC indicators. In addition, in the three years covered by this report, a semantic visual display and a semantic browser orientated to the exploitation of Geolinked Data have been implemented. OTALEXC has become a referential SDI cross-border project for years, as a consequence of being an example of collaboration of public bodies in both sides of the border, as a result of the direct utility that the defined system of indicators is providing to both societies and for its continuity throughout time. To mention a significant datum, the SoS service received a total of 252,051 requests over the last year (2015).

The General Directorate of Cadastre has taken part in some cross-border mapping project, such as the one known as OTALEX. However, the most remarkable use of the cadastral mapping, which is the mapping showing greater detail of the territory, is marked by the growing phenomenon of acquisition of real state by foreigners within the national territory, both residents and non-residents (or occasional or seasonal residents). The projection of this set of data towards users from other countries is growing and the fact of planning new strategies is required to facilitate the access to the information for those potential users, especially with regards to multilingualism. This is what INSPIRE model is about.

However, the most characteristic cross-border initiative over these three years has been the ELF (European Location Framework), with the participation of the General Directorate of Cadastre and the IGN (National Geographic Institute) of Spain as project partners. The ELF project was initiated in

<sup>4</sup> <http://www.ideotalex.eu/OtalexC/>

March 2013 and finished in October 2016. It provides a pan-European platform of official cross-border and harmonized geographic data in the cloud of Inspire web services (WMS, WMTS, WFS, downloads...), which are available as baseline data for all types of applications. 40 Organizations participate in this project, including people responsible of national and regional mapping and cadastre, companies developing software, providers of applications, research bodies and universities. The project is led by EuroGeographics, an association that includes 60 official mapping and cadastral agencies of 46 European countries. The project's total budget is €13m and is co-financed by the Competitiveness and Innovation Framework Programme of the European Commission. The General Directorate of Cadastre and the IGN, two of the most relevant nodes of the NSDI, are providing viewing services, download, and metadata and have been actively participating in the definition of the project and in the development of most implemented resources (utilities of borders, generalisation, quality control...). For further information see the project website (<http://www.elfproject.eu>) and the web of services (<http://locationframework.eu/>).

The CSIC highlights the GBIF Spain node which it manages. GBIF is an intergovernmental Organization which was set up in 2001 and which currently includes 53 countries and 43 international Organizations. 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.

HLANDATA project as an example of cross-border project including the compliance of INSPIRE Directive regarding two subjects (Land Cover and Land Use) and the generation of a web geo-portal using interoperable services and applications of consultations and analysis about them. This project was coordinated by the Government of Navarre and counted with the participation of the IGN, the company Tracasa, and partners from Austria, Holland, Czech Republic, Slovakia, Latvia and Lithuania. Its objectives were 1) analysis of the needs of European users regarding land occupation, 2) application of INSPIRE specifications on Land Cover and Land Use concerning the respective national data sets, 3) publication of these data in geo-portal environments allowing for the creation of valuable tools for users. The project reported the results to the European Commission on the knowledge of users at the European level, collecting productive experiences on the transformation towards INSPIRE, publishing the harmonized data of different countries on the same web environment and designing advanced tools for its treatment.

Other cross-border projects in which NSDI's nodes have taken part and which have left links with other countries are the previously mentioned in 6.2: EUREF, projects promoted by *EuroGeographics*, COPERNICUS, EIONET Network, HELM, OneGeology, INGENIO and EAGLE.

## 6.5 Use of transformation services

The existence of a transformation system capable of collecting data complying with INSPIRE execution regulations according to the transformation of the model is currently unknown.

There are only two transformation services of coordinates that do not comply with INSPIRE:

- WPS of transformation of CRS by the IGN

and a transformation service of addresses complying with INSPIRE:

- SDI Barcelona – CAE1M (OGC:WPS) – Addresses belonging to Barcelona Provincial Council

Mainly as referential transformations that allow for the change of the CRS of a few points of a data set and checking that the application of change of the CRS that is being used works perfectly and maintains the desired accurateness.

For the transformation of CRSs including complete files, the CNIG has made available to users an application that can be downloaded for free, the geodesic calculator. In addition, virtually every GIS (Geographical Information System) software of a certain entity has incorporated this functionality.

## 7 Provisions to share data (Art.15)

### 7.1 Provisions to share data among public authorities

Firstly, it should be remarked that, fortunately, there is a highly notable atmosphere of collaboration and cooperation between administrations in Spain, and even between different sectors. Sometimes this cooperation occurs between administrations and universities which collaborate and share data without the need of signing a specific agreement or establishing a specific legal framework. Basically a formal request is performed, data are facilitated and sometimes the conditions of use are indicated.

There is also a great amount of administrations that have released their geographic data and have published them as open data (approximately 32 %), as happened in the 2013-2015 period, in the case of Catalonia's Mapping and Geological Institute, Geographical Institute of Aragón and IGN. In Andalucía, the commercial use of this information is also allowed.

Sharing information between public bodies is perfectly defined by law, and it is made naturally and continuously. In addition, there are numerous conventions of collaboration to draft, update and maintain the mapping or facilitate the use of the mapping among different bodies. Some of the typical examples are the elaboration of the cadastral mapping from the basic mapping or topographic mapping from local governments and provincial councils, or the use of the cadastral mapping by the FEAGA (Spanish Agricultural Guarantee Fund) for the development of the SIGPAC (System of Geographical Information of Agricultural Plots). Other examples of collaboration such as the PNOA (*National Plan for Aerial Orthophotography*) or CartoCiudad must also be mentioned.

Regarding the environmental information, there is a long tradition of disclosing the data as indicated in Act 27/2006, dated on 18 July, regulating the rights of access to information, public participation and access to justice regarding environmental issues, incorporating Directives 2003/4/EC and 2003/35/EC. These Directives and the Spanish regulation include the commitments assumed by the European Union and by the Kingdom of Spain as signing parties of the Aarhus Convention of 1998, which provides citizens with the right to access the information in an open and free manner, as well as the obligation of competent authorities of facilitating and disclosing this access.

Lastly, the impact of the approval of Act 13/2013, dated on 19 December, regarding transparency, access to public information and creation of a good government, should also be considered. It recognises and guarantees the right of access to information for all scopes of the activity performed by public administrations and establishes the obligation of active advertising for all entities of the public sector, as well as private entities significantly funded with public funds.

Spain has actively participated in the EU's initiative since EMODNET (the IEO (Oceanographic Institute of Spain) actively participates in all lots), collecting marine data and disclosing these data by means of portals of data developed in the framework of this initiative. <http://www.emodnet.eu/>

The following two cases represent the general situation:

- In the case of La Rioja, there has traditionally been a great cooperation among administrations, both between the Regional Government and the General Administration of the State as well as with the Local Administration. However, the policy of open data complying with the license *Creative Commons* CC BY 4.0 assumes that it is not necessary to specify such collaboration by means of any formal agreement.
- In Galicia, SDS are used by the different levels of the administration, especially the data referred to orthophotographs and baseline mapping. The SDS of geographical names is also widely used and assumed as being official.

### 7.1.1 Sharing agreements without restrictions

Normally, agreements performed among different bodies of the administration in order to share data do not establish restrictions regarding the uses that are allowed, as long as the authorship of the information is appropriately recognised, since it is more common to exchange information among administrations for the development of their functions and the publication with economic return of some kind is often carried out by the producing body.

It is true that commercial uses are often excluded in conventions concerning the collaboration with universities, which are usually aimed at research purposes and it is common to ask for the recognition of the authorship in scientific publications, articles and presentations.

### 7.1.2 Framework agreements for sharing

As has been explained in previous chapters, the CSG (Geographic High Council) provides the Organizational 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 geographical information, and data exchange between different bodies. The LISIGE (Act on Geographic Information Infrastructures and Services in Spain) ( 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 geographical 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 geographical 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 geographical information services which must be accessible on the geographical 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 geographical 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 Administrations the obligation to ensure that the geographical information services can connect with each other and are interoperable. Finally, it establishes the limits on public access to geographic data and geographical information services which the Public Administrations may set and the conditions for the access to geographical 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/2508/2013, which approved the policy of public dissemination of the geographical information which the Directorate-General generates. All products and geographic data services of the IGN were made available in an open and free manner by means of that order, with the sole condition of recognising the authorship of that body.

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").

Two good examples are: MAGRAMA's SDI portal, which was launched in November 2011 with the aim of being the national and European reference node for geographical information of an environmental nature and for information on agricultural, livestock and fishing resources. The cadaster online site (virtual office) that offers the data of cadastral plots, addresses and buildings is [www.sedecatastro.gob.es/](http://www.sedecatastro.gob.es/).

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 Organizations.
- CartoCiudad project
- PNOA Project.
- SIOSE Project.
- BTA model created by the CENG of the CSG.
- Co-operation Agreement between FEAGA (Spanish Agricultural Guarantee Fund) and the General Directorate for Cadastre for the production of a shared map layer for land plots for SIGPAC and the land registry GIS.
- Spanish Inventory of Natural Heritage and Biodiversity.

With regard to the AC, 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 Council of Cartographic and Territorial Information of Extremadura created three Thematic Committees for the pooling of data: the Thematic Committee of Cartographic and Territorial Information of Extremadura, the Thematic Committee of Spatial Data Infrastructure and the Thematic Committee of Place Names, in which different departments of the Government of Extremadura take part, as well as other Administrations that are competent in geospatial information in Extremadura.
- 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 Públicas 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, a convention between the Department for the Environment, Territory and Infrastructures and the FEGAMP (Galician Federation of Municipalities and Provinces) for the definition and generation of exchangeable geographical and territorial information, and the organization of the shared management model of such information, as well as the establishment of the collaboration and coordination mechanisms of actions between the IET (Land Survey Institution) and the municipalities and other entities integrating the local Administration.



- In the 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 (Valencian Cartographic Institute). 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 geographical 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. 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 is undertaken on the basis of an agreement between the ICGC and the AOC. There are not any problems with the exchange and shared use of information among 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 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 Regional Government 1:5 000 BTA. Several co-operation agreements have been signed with the AGE in order to generate SDS within the SCN framework.

### 7.1.3 Other issues

We believe that there is the actual need to develop a specific legal framework obliging Public Administrations to disclose their digital data as open data. There are many reasons to do so. Suffice to mention that Public Administrations publish open geographic data in only 32 % of situations, despite the great number of initiatives that support and recommend the data to be open in the administration: the Open Data Charter, the International Open Data Charter, Aarhus Convention, Directives 2003/98/EC and 2013/37/EU on the Reuse of Public Sector Information, among others.

However, two aspects should be remarked in this regard:

- First, the legal framework defining their functions obliges some official mapping producers to finance themselves in a certain amount and thus, it would be necessary to modify their model of business and probably increase the public budget that they receive.
- Secondly, "Open Data" is one of the most widely used expressions recently in our sector and, in turn, one of the most inaccurately defined. The definition given by the Open Knowledge Foundation is the most detailed, clear and best one from a technical point of view and it would probably be a good idea to rely on this definition and endorse and support it.

It can be said that all licenses for the use of geographical information that has been published are electronically available when these actually exist. That is, when data or services are jointly published with a license of use or specific conditions. However, this does not always happen. In a study already mentioned in 7.4, it has been proved that from a sample of 50 public bodies of the three governmental

areas existing in Spain, which publish official geographic data and allow them to be downloaded, 36% did not publish either license of use or any conditions.

As for web services and conditions of use that are documented in the capabilities, the situation is similar. From the analysis of a sample of 83 WMS (Web Map Services), out of the 1925 available in Spain, which approximately represent something else than 4 %, it can be concluded that, in 69% of situations, the tags describing the restrictions on the use of services are indicated with a <none> which we consider to be wrong, since it is understood that recognition is at least requested in the event that a service with added value or resulting from a derived work is implemented.

Conditions or licenses of use are generally available in formats that can be understood by machines. This happens in the majority of cases, although there are exceptions in which a text of license is published by means of a closed and illegible pdf, or a copyright text is published on the margin of a map published by the WMS.

A fact that should be pointed out is that there is no interoperability of licenses as the use of standard licenses, as Creative Commons licenses, is not sufficiently extended. In the case of data sets that can be downloaded, only in the 16 % of cases a Creative Commons license or any other standard license is used. This entails that if the user or a company collects data from several bodies that use standard licenses and generates a derived work integrating these data, the user or company does not know exactly how the conditions of use of each license mix together and they sometimes have to use resources to hire a lawyer in order to find it out.

As for services, the situation is less favourable and the number of resources used by a standard license is still lower.

## **7.2 Provisions to share data between public authorities and European Community institutions and bodies**

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

- EUREF
- EURADIN      European Address Infrastructure
- Nature SDI+
- HLANDATA (see paragraph 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    European approach to the Global Earth Observation System of Systems
- 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.
- European Location Framework (ELF)
- 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.
- Air quality Portal
- MAES (Mapping and Assessment of Ecosystems and their Services).

Therefore, Spain has a certain tradition in sharing data with bodies and institutions of the EU.

In addition, in the particular case of the IGN's geographical information that is considered in the Ministerial Order FOM/2807/2015, the access to and use of this information by institutions and bodies of the European Community is open and free, as long as the authorship is properly recognised. This is the same case of Organizations like the ICGC and the Regional Government of Andalucía among others, which have opened their data. Likewise, the access of the Commission to all the cadastral information by means of the cadastre's website is free, which is available both in official languages of the Spanish State and English.

The IGME has actively participated in projects eWater and OneGeology-Europe, which were both co-financed by the European Union. These two projects, prior to the elaboration of data specifications from Annexes II and III, had the harmonization of data and metadata of geological and hydrogeological information of national scope as a primary objective. It should be remarked that the model of data and vocabulary of controlled terms established in project OneGeology-Europe marked the starting point for the development of specifications of the geology subdomain of the subject matter of "Geology". The IGME currently participates in EGDI project (pan-European Geological Data Infrastructure), in which the creation of a harmonized geological data infrastructure where, without any doubts, the resolutions resulting from INSPIRE Directive will be essential.

The Autonomous Community of Aragon has established a collaboration agreement for the exchange of data from GPS stations with France and participates in the Mapping Commission of the CTP.

In Catalonia, the ICGC participates in the Mapping Commission of the CTP, in EUREF and in IDEC Univers, which is formed by a network of universities integrating an SDI whose main objective is to boost the access, the exchange and interoperability of the great amount of geo-referenced information that is generated in universities and research centres thanks to the projects they develop.

In Andalucía, joint works with DGOT from Portugal and the IGN have been performed to design a Map of the Euroregion formed by Algarve/Alentejo/Andalucía/. In addition, the map of the cross-border regional environment of the lower Guadiana has been edited with the same institutions. Both data sets are available as WMS services in the SDI from Andalucía and both projects have been developed within the scope of the Cross-border Cooperation Program being Spain-Portugal sponsored by the European Union.

Lastly, and in general terms, the access and use of web services is open and free in all cases, except for downloading services in those data producers that have not completely disclosed their information.

In conclusion, the implementation of an agreement, convention or provision with European institutions and bodies does not seem to be needed in order to share data and services. In any case, and if an official request is sent by email, the data and services shall sometimes be used in exchange of a

simple authorship recognition. For other cases, the information will be provided in the best possible conditions and in the established period.

### 7.3 Barriers for data sharing and actions to overcome them

One of the main obstacles to share data and services in open conditions is basically the opposition to change, which is considered an obstacle in all processes of technological revolution and change of paradigm. A little over ten years ago, the generalised idea in all Europe was to commercialise geographic data with considerable prices and it is not easy to change cultures in such a short period. In order to overcome this drawback, the staff from the NCP has participated in regional and local sessions and seminars in Spain and the SDI philosophy has continued to spread throughout the electronic newsletter "SobreIDEs" and blog of the NSDI.

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. 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 geographical 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.

The barriers existing for sharing information may be marked by the scopes of competence on data responsibility. In the case of the DGC, the scopes of competence are very clear and the sharing of data with all bodies is highly fluid.

The MAGRAMA remarks as an obstacle to share data the difference in work scales. There is often a section of the mapping that would be adequate to solve a specific problem or requirement, but the scale is not sufficient to be integrated in a system requiring more accurateness. Thus, for instance, the SIGPAC could benefit largely from many existing SDS (SIOSE, MFE (Forest Map of Spain), etc.), but the high spatial resolution required for the SIGPAC is limiting.

In the IEO (Oceanographic Institute of Spain), as in the IGME, the problem derived from the adaptation of the information generated in the IEO for specifications of data from INSPIRE Directive has been assessed. Currently, the most relevant problems are the following two:

- The application program proposed in data specifications involves a loss of information regarding the information generated by the IEO.
- The scarce development of the UML data model in INSPIRE's data specification on the subject of Oceanographic Geographical Features impedes the adaptation of all the information generated by the IEO and related with this subject.

It is also true that sometimes there have been coordination difficulties in some activities after budgets of the different institutions have been approved. This also adds to difficulties derived from 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.

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, it can be observed that the main obstacles that appear can be summarised as follows:

- a) The existence of different specifications to define the same SDS, which does not facilitate the process of exchange between Organizations. In these cases, the maximum homogenisation possible should prevail, regardless of whether it is with the use of the same model of data or by generating transformation processes for the conversion of data.
- b) Lack of resources to normalise the geographical information of the SDS with the purpose of facilitating the interoperability of data and services.

Although the majority of Organizations state that there are not any big obstacles to share data, some Autonomous Communities believe that the main barrier to reach a complete interoperability of geographic data is precisely the adaptation of data from our region to specifications of INSPIRE data. This difficult work will last more than expected.

## 8 Cost/benefit aspects (Art.16)

### 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.

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 the geographical information to adapt it to the data specifications established by the INSPIRE implementing rules, and costs of generation and maintenance of metadata:
  - 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 to share costs.
  - In other cases, when the project does not involve other Administrations, the cost falls completely upon the data producer, as for example when an Autonomous Community integrates the BTA model in its production chain.
- Costs of implementation and operation of interoperable geographical information services:
  - The costs are met by the institutions that provide the interoperable services.
- Costs of implementation and maintenance of the NSDI Geoportal, [www.idee.es](http://www.idee.es):
  - The cost is assumed with the corresponding budget of the IGN, in the General Budget of the Spanish State, as Technical Secretariat of the CSG. €300,000 per year, on average during the 2013-2015 period.
- Costs of implementation and operation of the Geoportals of SDI nodes:
  - The costs are assumed respectively by the budgets of the AGE, the Autonomous Communities and the Local Authorities which set up the corresponding geoportals. For instance, the average annual cost assumed by the MAGRAMA for the implementation and maintenance of SDI's geo-portal at the level of services and metadata is 260,000 euros. However, the panorama of the situation is highly variable. In the case of the DGC, the implementation cost of INSPIRE Directive has been low. There has not been any change of the internal data model and the implementation of services has been carried out by their own means without assigning new specific resources aimed at this purpose.

These are some data that can be taken as a reference:

- For the generation of digital models of the land, a great amount of flights is performed over the whole national territory in order to obtain LIDAR data every 6 years. The price per km<sup>2</sup> is different depending on the density of points, the relief of the surface, etc. An approximate price is €40/km<sup>2</sup>. This would entail an investment of more than 3,000,000 euros annually. It is important to remark that this project is co-financed by different Organizations of regional and national scope.
- In order to generate orthoimages, a great amount of flights is performed over the whole national territory every 3 years. The price of the snapshot depends on the resolution. Flights are performed at 25 cm/pixel and 50 cm/pixel, although the resolution is gradually improving. The approximate price is € 24/km<sup>2</sup>. This would entail an investment of more than 3,600,000 euros annually. It is important to remark that this project is co-financed by different Organizations of regional and national scope.
- In order to generate and update the hydrographic and transport network at scale 1:25,000, a series of contracts are being developed, from which it can be concluded that the cost per km<sup>2</sup> for the hydrographic network is €0.54, and €2.43 for the transport network.
- On the other hand, the annual maintenance and adaptation costs of SDI nodes from the different hydrographic confederations is the following:

Annual investment in the maintenance and adaptation of the SDI node	
Confederation	€/year
Cantabrian	It does not have an SDI node
Miño Sil	€7,112.25
Duero	€16,894.00
Tajo	€131,600.00
Guadiana	€15,000.00
Guadalquivir	€19,000.00
Segura	€5,500.00
Júcar *	€14,771.50
Ebro	€31,933.77
<b>TOTAL</b>	<b>€234,699.27</b>

\*In this case, the expense of €15,500.00 on the acquisition of licenses and hardware is also included, which is not an annual but a single payment.

## 8.2 Observed benefits

It is not easy to economically quantify the benefits of the SDI, in general, and of the implementation of INSPIRE, in particular, since a great amount of obtained benefits are intangible, and in many situations, these are generated in the long-term. In addition, when we have been able to quantify, we are conscious that we are just quantifying the tip of the iceberg. It is also true that INSPIRE resources are often implemented in large systems, frequently in the Administration, and it is impossible to maintain in parallel two complete productive systems, one “inspired” and another one “not inspired”, in order to objectively compare the benefits of the first.

As an example, let us consider the geo-portal of hydrocarbons published by the Ministry of Industry, Trade and Tourism, based on interoperable systems and which, since 2008, has offered the citizen the possibility of finding in its locality or municipality the petrol station where he can purchase the fuel used by his vehicle at a lower price at any time. The number of users is highly variable every month, but statistics published in the portal show an average of at least 20 million consultations every year. If on each consultation the expected average saving is €3 (average saving when the tank is refilled), we obtain an estimation of around €60m in the year. In this case, citizens are the benefiting party.

However, even in this example, there is an important amount of benefit offered by the difficult application of quantifying, and it is the contribution made to service stations in order to maintain low and relatively homogeneous prices, given the existence and generalised use of this application caused by the effect of the competence.

Another interesting example is that of the General Directorate of Cadastre, whose service of unprotected cadastral data downloading had been running for five years the last month of April (2011-2016). During the 2013-2015 period there have been 33000 users who have downloaded around 2,782,000 files. The portal for downloads offers the possibility of filling in a voluntary questionnaire in which the user is requested to estimate the saving in hours-person or in euros invested to collect data on the internet, in comparison to doing so by means of analogic procedures. Not all users fill in that questionnaire, but those who do so estimate savings of € 362 m and around 19.92 million hours of work, with an average of € 392.87 of savings in every download and 19.75 hours. This allows for the estimation of an approximate total of savings of around 1,000 million euros in these three years and almost 55 million hours/person (see the following table).

Downloaded files from the DGC and estimation of savings based on questionnaires that have been filled in.

	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>Total</b>
Total number of downloaded files	814 169	914 203	1 053 491	2 781 863
Estimated saving in euros	319 862 575	369 162 933	413 885 009	1 092 910 517
Estimated saving in hours/person	16 079 838	18 055 509	20 806 447	54 941 794

If we consider that over the last three years (2013-2015) there have been over 20 million downloads of files by means of the download centre of the CNIG and that in the geo-portal of the NSDI there are currently 112 identified pages of official bodies in which it is possible to download digital geographic data, although in these 112 sites the number of downloads will not always be as high as those of the DGC, it is evident that quantifying the total saving that involves the existence of that network of download centres is a complicated and difficult work. However, in any case, it is evident that benefits are huge if these decrease more than 1 million euros in the case of the DGC.

Another example would be that of the legal security that exists when most contracts concerning the purchase-sale of real property, rural properties, plots and dwellings are signed, thanks to the fact that notaries and property registrars have cadastral WMS services and PNOA services that allow them to see on a screen the object of the transaction, including its dimension, situation, orientation and a recent orthophotograph. It is very difficult to quantitatively estimate the benefit that this new way of working involves for citizens and the derived saving for notaries and registrars when the number of claims and correction files decreases.

However, any estimation of the cost involved for Autonomous Communities if traditional methods were used to offer the citizen the same geographical information that can be obtained by means of web services would result in huge numbers. For instance, in the follow-up report from 2014, a global amount of 1,600,000,000 individual requests in the use of all web services was reported. If those requests had to be managed in a desk by means of traditional methods and assuming that a desk officer can attend a consultation every 5 minutes and works for 1,600 hours per year, it would result in 19,200 consultations per year. Therefore, around 83,000 people would be needed, and this would approximately involve an annual expense of 2,500 million euros only in salaries. General expenses would also have to be added to this amount.

Going back to the General Directorate for Cadastre, using models defined for the implementation of INSPIRE directive has represented a milestone that will have a very important repercussion in society. This milestone is the coordination between the Cadastre and the Property Registry. The object defined in INSPIRE as "cadastral plot" has been used as standard model to establish the mechanisms of coordination between the Cadastre and the Registry.

This is a very good example of how to put into practice the objectives pursued by INSPIRE directive.

Other benefits that affect the DGC are the following:

- The greater flow of information that allows for a greater control on data quality and make these data available for a greater number of citizens.
- The possibility of combining different sources of information of different products and identifying inconsistencies.
- More agile mechanisms for the exchange of information.

The benefits for third parties are very difficult to assess. There may be certain signs based on the increase in the use of services, surveys or in identifying the use of data and services based on INSPIRE directive in projects that have already been published.



In the case of Galicia, in addition to saving time and, consequently money, the main benefit of working by just focusing on a single point of reference to obtain geographical information in the administration of Galicia, has been the elimination of the different versions and duplicities of the same SDS, mainly in referential SDSs.

### 8.2.1 Efficiency

To mention a specific case that may serve as a representative example, the SDI of La Rioja supports itself on a corporative spatial database, which is the instrument of geographical reference used by the regional administration for its daily management and this provides a maximum efficiency. A series of applications interact with the geographical database, such as the Biodiversity Data Bank, the Survey of Infrastructures and Local Equipment and Health Databases, among others. These manage a considerable amount of geographical information and there is a centralised editing system for those thematic areas in which there is no a specific application. The whole set is designed based on the guideline of achieving the maximum efficiency in production and publication of information.

### 8.2.2 Effectiveness

Following the case of La Rioja, efficiency and effectiveness are interrelated parameters since spatial information is available for its internal and external use from the time it is produced, being OGC services directly connected with the Spatial Database.

### 8.2.3 Wider benefits

Finally, the clearest benefit of the SDI of La Rioja, and the same can be said of other nodes of the NSDI, is that in addition to being an information tool, it has been constituted as a work and additional tool for the administrative management.

In general, intangible and indirect benefits are so wide and general that it is very difficult to assess and enumerate them. Some of them are the following:

- Spreading of a sharing information culture, especially as standard web services, which has made available more than 2000 web services in the field of geographical information in Spain, all of them being of open and free use. In addition, there is such a generalised conviction that it is impossible to think that such services have to be paid.
- Presence of geographic data sets in the portal of open data, in which there is access to a great amount of data sets in specific geographical information formats.
- Increase of open geographic data available in the web, as can be seen in the portal of open data of Spain ([datos.gob.es](http://datos.gob.es)), where there are around 11,000 classified data sets and 115 open data portals (59 local, 22 regional, and 34 national portals) (see <http://mapa.datos.gob.es/>).
- The mutual synergy existing among open data, INSPIRE initiative and collaborative mapping production processes (PNOA, PNT, CartoCiudad, LIDAR, SIOSE, etc.).
- Just to mention one of INSPIRE subjects in particular, the interest raised by the subject of Administrative Units has provoked, together [with other factors](#), an increase in the need to precisely know the limits of municipalities in Spain, and the IGN is perceiving a notable increase in the demand of reassessment works of border lines and territorial delimitations, which makes emphasis on an evident, but difficult to identify, social benefit.

## 9 Conclusions

IDEE (NSDI) began its journey in 2002 with the creation of SDI Working Group and in 2004 when IDEE (NSDI) national geoportal was opened. Since then, the fact of Public Administrations publishing their responsibility data by means of standard services, which create metadata and allow for online downloads, has been decidedly fostered. This situation meant that, upon approval of these Implementation Rules, thousands of SDI resources in production in Spain did not comply with them, which, due to source re-engineering, involved added complexity to already complex. Thus, currently (2015), we still display compliance indicators regarding datasets and services that are too low.

However, we are preparing an Action Plan that will ensure having the INSPIRE spatial data sets for Spain available during the 2017 and 2020 forthcoming milestones. These sets will provide information with reasonable resolution and quality and will be surely updated. They will be differentiated in the metadata through a keyword chosen for these purposes and will include all the associated resources (services, metadata) required to form a fully compliant INSPIRE resource set.

At this point in time, the main problem to get this list of fully compliant key SDS is that identification of those INSPIRE layers and objects necessary to report on other Environmental Directives is still pending, since this task is holding back the progress of this process.

To achieve this goal, CODIIGE has taken several steps:

- Creating a CODSI (INSPIRE Data and Services Official Catalogue), which initially will only include those key SDS.
- Commissioning a Guide to turn already implemented OGC standard services (WMS, WMTS, WFS, CSW) into ones in compliance with INSPIRE to the Architecture and Standards TWG, according to the tool used for their implementation.
- Commissioning the creation of Guidelines that aid during the process of data transformation, so as to achieve conformity with INSPIRE specifications, to TWGs.
- Establishing clear criteria and support tools for Monitoring Processes.
- Commissioning the creation of key SDS lists to TWGs, according to their INSPIRE area.

Therefore, there are sufficient reasons to expect the Action Plan to be a success.

There are some Organizational dysfunctions at the time of coordinating those working groups structured by INSPIRE themes (TWG) and NSDI nodes, structured by territorial areas; however, we believe that CODIIGE, since it takes part in the process and has executive capability in accordance with Act 14/2010, will be able to take all necessary decisions to resolve them.

In any case, in Spain, most part of the stakeholders involved in the implementation of the INSPIRE directive agree that this has been a very positive process for the country, since it has generated:

- A highly important data and services sharing and releasing culture.
- The generation of a large ecosystem of interoperable and standard services (currently, around 3000).
- The emergence of several cases of useful application in various sectors: land registry, routing, mobile cartography, web applications...
- A stakeholder community collaborating fluidly, formed by public bodies from each of the three levels (national, regional and local), private companies, universities and citizens.

In addition, any estimate of the benefits resulting from the implementation of INSPIRE leads to huge figures, so it appears to be evident that the cost-benefit balance is deeply positive in any case.

There are other related initiatives, such as GeoLinked Data, Volunteer Geographic Information, Smart Cities or Open Data, which have shown their interest towards the Spanish SDI and very interesting bridges, synergies and feedback are to be established.

Therefore, despite some problems arising within the complex implementation process for a legal framework as complicated as INSPIRE, we are excited about the challenge posed by the fact of applying it with intelligence, so that it serves to satisfy both the EC information requirements and the geographic data demands of national stakeholders and the wider public.

## Annexes

### 9.1 List of Organizations – names and contact details

#### 9.1.1 General State Administration

Organization:	Ministerio de Fomento (Ministry of Public Works and Transport) Dirección General del Instituto Geográfico Nacional (Directorate-General of the National Geographic Institute)
Contact person:	Sebastián Mas-Mayoral
Function:	Deputy Director General of Geodesy and Cartography
e-mail:	smas@fomento.es
Telephone:	(34) 915979589
Role:	Official cartography producer and supplier of the corresponding web services
Coordination 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.

Organization:	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:	Emilio López Romero
Function:	Director of the National Centre for Geographic Information
e-mail:	elromero@cnig.es
Telephone:	(34) 915979646
Role:	Inspire National Contact Point Coordinating body of the IDEE
Coordination structure	President of WG NSDI and CODIIGE (S. Mas) Secretary of WG NSDI and CODIIGE Responsible for the GTT architecture standards and standards Responsible for the GTT 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	
Organization:	<p>Ministerio de Economía y Competitividad (Ministry of Economy and Competitiveness)</p> <p>Secretaría de Estado de Investigación Desarrollo e Innovación (Secretariat of State for Research, Development and Innovation)</p> <p>Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC, Spanish National Research Council)</p> <p>Vicepresidencia de Investigación Científica y Técnica (VICYT, Vice- Presidency for Scientific and Technical Research)</p> <p>Serrano 117</p> <p>28006 Madrid</p>
Contact person:	
Function:	
e-mail:	vicyt@csic.es ; <a href="http://www.csic.es">http://www.csic.es</a>
Telephone:	(34) 91 568 14 00
Role:	<p>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:</p> <p>a) Overall responsibility for the planning, supervision and co-ordination of scientific and technical research and knowledge transfer.</p> <p>b) Overall responsibility for the planning and co-ordination of the provision of scientific and technical staff to the centres, institutes and units.</p> <p>c) Overall responsibility for the co-ordination of the Scientific and Technical Areas and of the in-house and collaborative research programmes.</p> <p>d) Overall responsibility for the management of the large scientific and technical facilities and for scientific and technical assessment.</p> <p>e) Overall responsibility for the planning, monitoring and co-ordination of the activities for the recruitment and training of research staff and technical personnel.</p> <p>f) Overall responsibility for the management of the CSIC's participation in competitive tendering processes at a national and regional level.</p>
Coordination structure	<p>Centro de Ciencias Humanas y Sociales (Centre for Human and Social Sciences)</p> <p>Contact person: Isabel del Bosque González</p> <p>Email: <a href="mailto:isabel.delbosque@csic.es">isabel.delbosque@csic.es</a></p> <p>Tel: +34 91 6022576</p>
Organization:	<p>Ministerio de Economía y Competitividad (Ministry of Economy and Competitiveness)</p> <p>Secretaría de Estado de Investigación Desarrollo e Innovación (Secretariat of State for Research, Development and Innovation)</p> <p>Instituto Geológico y Minero de España (Geological and Mining Institute of Spain)</p>
Contact person:	Maria Jesus Mancebo Mancebo
Function:	
e-mail:	<a href="mailto:mj.mancebo@igme.es">mj.mancebo@igme.es</a>
Telephone:	

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".
Coordination structure	
Responsibilities of the co-ordination structure:	IGME is the national Organization 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.

Organization:	Ministerio de Economía y Competitividad (Ministry of Economy and Competitiveness) Spanish Oceanography Institute
Contact person:	Olvido Tello Anton
Function:	A2 Researcher.
e-mail:	Olvido.tello@md.ieo.es
Telephone:	(34) 915107535
Role:	
Coordination structure	
Responsibilities of the co-ordination structure:	

Organization:	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 (Subdirector-General of Land Policy)
Contact person:	Juan Luis Quesada
Function:	Technical Advisor
e-mail:	<a href="mailto:suelo@fomento.es">suelo@fomento.es</a>
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.
Coordination 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.

Organization:	Ministerio de Fomento (Ministry of Public Works and Transport) ENAIRE Division of Management and Safety Systems
Contact person:	Milagros Gutierrez Roman
Function:	Director

e-mail:	mgutierrez@enaire.es
Telephone:	
Role:	
Coordination structure	José Luis Llorente Pérez <a href="mailto:jllorete@aena.es">jllorete@aena.es</a> Chief of the division of General Management Support
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.

Organization:	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
Function:	Area Chief for Cadastre
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.
Coordination structure	Area of Computerised Cartography: <ul style="list-style-type: none"> <li>Luis Ignacio Virgós Soriano, <a href="mailto:luis.virgos@catastro.minhap.es">luis.virgos@catastro.minhap.es</a></li> <li>José Miguel Olivares García, <a href="mailto:jmiguel.olivares@catastro.minhap.es">jmiguel.olivares@catastro.minhap.es</a></li> </ul> Area of Institutional and International Relations: <ul style="list-style-type: none"> <li>Amalia Velasco Martín Varés, <a href="mailto:amalia.velasco@catastro.minhap.es">amalia.velasco@catastro.minhap.es</a></li> </ul>
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 telematics 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.
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Organization:	Ministerio de Justicia (Ministry of Justice) D.G Relaciones con la Administración de Justicia (Directorate-General for Relations with the Justice Administration)
Contact person:	Jesus Gallego
Function:	Director
e-mail:	jesus.gallego@mjusticia.es
Telephone:	
Role:	
Coordination structure	
Responsibilities of the co-ordination structure:	

Organization:	Ministerio de Agricultura Alimentación y Medio Ambiente (Ministry of Agriculture, Food and the Environment)
Contact person:	Grupo de Trabajo para la Coordinación de los Servicios de Información Geográfica (Working Group for the Co-Ordination of Geographical Information Services)
Function:	
e-mail:	<a href="mailto:gabinetesubsecretaria@magrama.es">gabinetesubsecretaria@magrama.es</a>
Telephone:	(34) 91 347 51 82
Role:	Coordinate the actions carried out by MAGRAMA management centres and agencies related to the production or use of geographical information data and services.
Coordination structure	Grupo de Trabajo para la Coordinación de los Servicios de Información Geográfica (Working Group for the Co-Ordination of Geographical Information Services)
Responsibilities of the co-ordination structure:	Guarantee the provision of information (data and metadata) by MAGRAMA units, bodies and agencies, so as to comply with the obligations set out within the Inspire directive.

Organization:	Ministerio de Defensa (Ministry of Defence) Instituto Hidrográfico de la Marina (Navy Hydrographical Institute) Armada Española (Spanish Navy)
Contact person:	Andres Millan Gamboa
Function:	Chief of CIS (Communications, Information and Systems) Section
e-mail:	<a href="mailto:amilgam@fn.mde.es">amilgam@fn.mde.es</a>
Telephone:	956545036
Role:	Responsible for the management of IHM information systems
Coordination structure	Alberto Fernandez Ros



Responsibilities of the co-ordination structure:	Study and development of the technical architecture for the future implementation of the IHM Spatial Data Infrastructure (DE-IHM).
Organization:	Ministerio de Educación, Cultura y Deporte (Ministry of Education, Culture and Sport) Spanish Cultural Heritage Institute
Contact person:	Pilar Barraca
Function:	
e-mail:	pilar.barraca@mecd.es
Telephone:	
Role:	
Coordination structure	
Responsibilities of the co-ordination structure:	

### 9.1.2 Comunidades Autónomas (Autonomous Communities)

Organization:	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
Function:	
e-mail:	agustint.villar@juntadeandalucia.es
Telephone:	(34) 900 101 407/955 033 800 Fax: 955 033 816
Role:	Administrator of the SDI of Andalucía Coordinator of the GT-IDEAndalucía working group Representative of the Regional Government of Andalucía on the CODIIGE
Coordination 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

<p>Cartografía de Andalucía (the Cartography Commission of Andalucía)."</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Facilitating the incorporation of information originating from different public and private Organizations</li> <li>• Ensuring compliance with the principles and standards</li> <li>• Monitoring the updating of the information and exercising quality control over the information which is added</li> <li>• Defining the functional requisites that the computer platforms must fulfil</li> <li>• Planning the growth and development of IDEAndalucía</li> </ul> <p>By Act 4/2011, 6 June, has been the statistical and cartographic system of Andalucía, which has meant the replacement of the Commission on cartography of Andalucía by the new Interdepartmental Commission statistics and cartographic, in addition to the reorganization of the old ICA as Institute of statistics and cartography of Andalucía.</p>
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Organization:	<p>Aragón</p> <p>Instituto Geográfico de Aragón (Geographical Institute of Aragon) Dirección General de Ordenación del Territorio (Directorate-General for Territorial Planning). Department for Territory Structuring, Mobility and Transport Gobierno de Aragón (Government of Aragon)</p> <p>Paseo María Agustín, nº 36. Edificio Pignatelli. Puerta 14. 3ª Planta. CP. 50.071 ZARAGOZA.</p>
Contact person:	Sergio Monteagudo Latorre
Function:	Secretary of the Consejo de Cartografía de Aragón (Cartographic Council of Aragón)
e-mail:	igear@aragon.es
Telephone:	976 71 56 04 / 976 71 56 05 Fax:
Role:	<ul style="list-style-type: none"> <li>• 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 <a href="#">Act 2/2015, Nov. 17, by the Government of Aragon, which approves the revised text of the Act on territorial planning in Aragón.</a></li> <li>• 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. [BOA No. 225 of 20/11/2015].</li> <li>• Key executive body of the Sistema Cartográfico de Aragón (Cartographic System of Aragón).</li> <li>• Creation of the Plan Cartográfico de Aragón (Cartographic Plan of Aragón).</li> <li>• Creation of the Spatial Data Infrastructure of Aragón (IDEAragón).</li> </ul>
Co-ordination structure:	Consejo de Cartografía de Aragón (Cartographic Council of Aragón).
Responsibilities of the co-ordination structure:	<ul style="list-style-type: none"> <li>• To advise the Government of the Autonomous Community, as well as other Public Administrations, with regard to all those issues related to geographical information and mapping.</li> <li>• To promote co-operation and collaboration between different Public</li> </ul>

	<p>Administrations and other bodies with regard to activities related to mapping and geographical information in Aragón.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• To provide information on the Cartographic Plan of Aragón project.</li> <li>• To provide information on the Cartographic Standards of Aragón.</li> <li>• To provide information on the Catalogue of Geographical Names of Aragón.</li> </ul>
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Organization:	<p>Principado de Asturias (Principality of Asturias)</p> <p>Consejería de Fomento, Ordenación del Territorio y Medio Ambiente (Department of Public Works, Territorial Planning and the Environment)</p> <p>c/ Coronel Aranda, 2 edificio de servicios múltiples</p> <p>sector izquierdo, planta baja 33005 Oviedo</p>
Contact person:	Álvaro Álvarez Rodríguez
Function:	Geographical Information Systems Area Manager
e-mail:	Alvaromanuel.alvarezrodriguez@asturias.org
Telephone:	Telephone: 985 108955 Fax: 985105714
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:	<p>Cartography Service</p> <p>Address: c/Colonel Aranda s/n</p> <p>Edificio Administrativo EASMU. Planta 0, sector izquierdo</p> <p>33005 – OVIEDO</p> <p>Telephone: 985105935</p> <p>Contact person: Maria Pellón revolt (Chief of the service)</p> <p>Email: MARIA. PELLONREVUELTA@asturias.org</p>
Responsibilities:	<p>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 Organizations with regard to the provision of general-use territorial graphic information, especially to those Organizations 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)</p>

Organization:	<p>Comunidad Autónoma de les Illes Balears (Autonomous Community of the Balearic Islands)</p> <p>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)</p>
Contact person:	Luis Antonio Corral Juan
Function:	Director General of Territorial Planning

e-mail:	
Telephone:	(91) 971177300
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:	<p>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.</p> <p>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).</p> <p>The contact person for IDEIB at SITIBSA is:</p> <p>Name: Fèlix Escalas van Nouhuys Email: fescalas@sitibsa.com Telephone: 971177870 Fax: 971177871</p>
Responsibilities of the co-ordination structure:	<p>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.</p> <p>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.</p> <p>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.</p> <p>The project members also made the following further commitments:</p> <ul style="list-style-type: none"><li>• To draw up a catalogue of the geographical information they possess.</li><li>• To exchange catalogues</li><li>• To facilitate the exchange of geographical information</li><li>• To agree on joint activities for the training of the Organizations' technical staff.</li></ul>

Organization:	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
Function:	Chief 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:	
Organization:	<p>Castilla-La Mancha (Castile-La Mancha)</p> <p>Junta de Comunidades de Castilla-La Mancha (Government of Castile-La Mancha)</p> <p>Consejería de Fomento (Department of Public Works)</p> <p>Paseo Cristo de la Vega s/n</p> <p>45001 Toledo</p>
Contact person:	Manuel López Castro
Function:	Chief of the Servicio de SIG y Cartografía (GIS and Cartography Service)
e-mail:	mlopez@jccm.es
Telephone:	925 26 69 80
Role:	<p>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.</p> <p>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.</p> <p>The functions of the Cartographic Centre include:</p> <p>h) The creation and maintenance of the catalogue of geographical information metadata of Castile-La Mancha.</p> <p>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).</p>
Co-ordination structure:	<p>Contact: Centro Cartográfico de Castilla-La Mancha (Cartographic Centre)</p> <p>Address: Paseo Cristo de la Vega s/n</p> <p>Telephone: 925 26 69 00</p> <p>email: <a href="mailto:centrocartografico@jccm.es">centrocartografico@jccm.es</a></p> <p>Web: <a href="http://centrocartografico.jccm.es/">http://centrocartografico.jccm.es/</a></p> <p>Contact person: Manuel López Castro</p> <p>Telephone: 925 26 69 80</p> <p><a href="mailto:mlopez@jccm.es">mlopez@jccm.es</a></p>
Responsibilities of the co-ordination structure:	<p>a) The creation of the Cartographic Plan, the Cartographic Standards and the Catalogue of Geographical Names of Castile-La Mancha.</p> <p>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.</p> <p>c) Creating, acquiring and managing satellite imagery, photogrammetric flights, orthophotographs, digital models of elevations and other products which facilitate</p>

	<p>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 Organizations may carry out in the fulfilment of their particular functions.</p> <p>d) The creation and updating of the topographic maps of the territory of Castile-La Mancha.</p> <p>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.</p> <p>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.</p> <p>g) The management of the Register of Cartography of Castile-La Mancha.</p> <p>h) The creation and maintenance of the catalogue of geographical information metadata of Castile-La Mancha.</p> <p>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).</p> <p>j) In general, technical support to the Cartographic Co-Ordination Commission of Castile-La Mancha in the exercise of its functions.</p> <p>k) The promotion of R&amp;D&amp;I co-operation projects on cartographical issues with other institutions and Organizations, especially with the Universidad de Castilla-La Mancha (University of Castile-La Mancha). Also the provision of training in, and dissemination and publication of, technological advances and developments with regard to territorial observation amongst public-sector geographical-information professionals.</p> <p>l) The promotion and encouragement of the use and development of free-to-use software for mapping and related areas.</p> <p>m) The preparation of the issues to be considered by the Cartographic Co-Ordination Commission of Castile-La Mancha.</p>
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Organization:	<p>Junta de Castilla y León (Government of Castile-Leon)</p> <p>Consejería de Fomento y Medio Ambiente (Department of Public Works and the Environment)</p> <p>C / Rigoberto Cortejoso, 14</p> <p>47014 Valladolid</p>
Contact person:	Alberto González Monsalve
Function:	Territorial Information Centre Manager
e-mail:	gonmonal@jcyl.es
Telephone:	983 41 91 90
Role:	<p>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.</p>

	<a href="http://www.cartografia.jcyl.es">www.cartografia.jcyl.es</a>
Co-ordination Structure:	<p>Consejo de Cartografía de Castilla y León (Cartographic Council of Castile and León)</p> <p>Consultative and advisory collegial body to the Public Administrations, consisting of representatives from all of the relevant government agencies.</p> <p>Comisión Técnica de Cartografía de Castilla y León (Technical Cartographic Commission of Castile and León)</p> <p>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 geographical information.</p> <p>Centro de Información Territorial (Centre for Territorial Information)</p> <p>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.</p>
Responsibilities of the Co-ordination Structure:	<p>One of the Cartographic Council's main goals is to foster co-operation and collaboration between government bodies and Organizations in order to promote and support the SDI in Castile and León.</p> <p>The main goals of the Autonomous Community's Technical Cartographic Commission include the promotion of the development, co-ordination and maintenance of the</p> <p>SDI in Castile and León, as well as ensuring the co-ordination of the geographical information systems of the Government of the Autonomous Community and promoting its territorial information system.</p> <p>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.</p>

Organization:	<p>Catalonia</p> <p>Comissió de Coordinació Cartogràfica de Catalunya (Cartographic Coordination Commission of Catalonia)</p> <p>Institut Cartogràfic de Catalunya (ICC, Cartographic Institute of Catalonia)</p> <p>Parc de Montjuïc, s/n</p> <p>08038 Barcelona</p>
Contact person:	Jaume Miranda i Canals
Function:	Acting president
e-mail:	<a href="mailto:jaume.miranda@icgc.cat">jaume.miranda@icgc.cat</a> <a href="http://www.icgc.cat">www.icgc.cat</a>
Telephone:	93 567 15 00
Role:	<p>The Cartographic Coordination Commission of Catalonia (C4) is the key Organization for the interaction, collaboration and co-ordination between the AGC, the Administration of the Regional Government of Catalonia) and the Administració Local de Catalunya (ALC, association of local government in Catalonia) with regard to mapping and geographical 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.</p> <p>Its functions are:</p> <ul style="list-style-type: none"> <li>To ensure that the relationships between the Public Administrations in Catalonia undertaking cartographical and geographical information activities proceed according to the principles established by Law 16/2005, and to resolve any problems that may arise.</li> </ul>

	<ul style="list-style-type: none"> <li>• To issue a report on the Plan Cartogràfic de Catalunya (PCC, Cartographic Plan of Catalonia) project and also regarding any modifications or reviews.</li> <li>• To establish the rules and standards that must be applied to the creation of cartographic materials and geographical information.</li> <li>• 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.</li> <li>• To make proposals to the Government of Catalonia with regard to the adoption of further co-ordination measures which it deems appropriate.</li> <li>• To issue a report on the procedures for the drawing up of regulations by the Government of Catalonia on mapping and related geographical information, based on the report which may be made by the ICC.</li> <li>• 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 Cartogràfic de Catalunya (RCC, Cartographic Register of Catalonia).</li> <li>• To inform the ICC of the position of local bodies with regard to the initiatives of national, EU, or international Organizations 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 Organizations.</li> <li>• 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.</li> </ul> <p>The C4, with the support of the ICC, co-ordinates and supports the implementation of the INSPIRE Directive in Catalonia.</p> <p>The ICC is the point of contact of the Consejo Superior Geográfico (CSG, Geographic High Council) in Catalonia.</p>
Co-ordination structure:	<p>Contact: Institut Cartogràfic de Catalunya (ICC, Cartographic Institute of Catalonia)</p> <p>Address: Parc de Montjuïc, s/n 08038 Barcelona Tel:</p> <p>Telephone: 93 567 15 00</p> <p>Fax: 93 567 15 67</p> <p>email: webmaster@icgc.cat</p> <p>Web: www.icgc.cat</p> <p>Contact person: Joan Sendra Tarrida</p> <p>Telephone: 93 567 15 00</p> <p>E-mail: joan.sendra@icc.cat</p>
Responsibilities of the co-ordination structure:	<p>The C4 is the key body for the co-ordination of geographical 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.</p> <p><u>Permanent supporting body</u></p> <p>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.</p> <p>The functions of the latter body, as described in Law 16/2005, include:</p> <ul style="list-style-type: none"> <li>• To create and propose the PCC, and also undertake, when necessary, any corresponding modifications or reviews.</li> <li>• To promote the C4, provide permanent support to it and implement the agreements it makes, when this implementation does not correspond to one of</li> </ul>



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 geographical 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 Organization.
- 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 geographical information

The RCC is the key Organization for cartographic and geographical 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 geographical information which has an official status and this must be catalogued in the IDEC.

The use of the officially recorded cartographic and geographical information is mandatory for the autonomous government and local authorities in Catalonia when

	<p>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 geographical information or are based on such information.</p> <p><u>Body for IDEC promotion, maintenance and dissemination</u></p> <p>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.</p> <p>The functions of the CSIDEC include:</p> <ul style="list-style-type: none"> <li>• Promoting and maintaining the IDEC.</li> <li>• To raise awareness, describe and publicise the geographical information in existence and the services based on it.</li> <li>• To provide information on the technology used in order to make the information accessible and interoperable and facilitate its sharing.</li> <li>• 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.</li> </ul>
Organizational structure	<p>In order to carry out its functions, the C4 has created 4 Technical Commissions:</p> <ul style="list-style-type: none"> <li>• Technical commission for the implementation of the PCC and the INSPIRE Directive (CT1)</li> <li>• Technical commission on the geographical information of the ALC (CT2)</li> <li>• Technical commission for the European Earth Observation Programme (CT3)</li> <li>• Technical Commission for Geology and Geophysics (CT4)</li> </ul> <p>In turn, CT1 created 5 Working Groups reporting to it with specific responsibilities:</p> <ul style="list-style-type: none"> <li>• Working group for the establishment of the technical specifications of the streets database</li> <li>• Working group for the co-ordination with NSDI and CODIIGE</li> <li>• Working group for the preservation of digital geographical information</li> <li>• Working group for the preparation of the technical specifications of Catalonia Land Cover Map</li> <li>• Working group for the implementation of INSPIRE Directive</li> </ul> <p>CT2 created 3 Working Groups reporting to it with specific responsibilities:</p> <ul style="list-style-type: none"> <li>• Working group for the establishment of the technical specifications</li> <li>• Working group for the implementation of the RCC</li> <li>• Working group for the establishment of the technical specifications of the streets database</li> </ul> <p>CT3 created 1 Working Group reporting to it with specific responsibilities:</p> <ul style="list-style-type: none"> <li>• Working Group in Catalonia for COPERNICUS programme</li> </ul>
Organization:	<p>Comunitat Valenciana (Valencian Community)</p> <p>Conselleria de Infraestructuras, Territorio y Medio Ambiente (Ministry of Infrastructures, Territory and the Environment)</p> <p>Francesc Cubells 7</p> <p>46011 Valencia</p>
Contact person:	Xavier Navarro i Garcia
Function:	

e-mail:	Navarro_xav@gva.es ; www.citma.gva.es
Telephone:	96 208 687
Role:	<p>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.</p> <p>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.</p> <p>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).</p> <p>By means of Decree 75/2011, of 24th June, by the Consell (the executive body of the Government of the Valencian Community), the 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.</p> <p>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.</p>
Co-ordination structure:	<p>Contact: Institut Cartogràfic Valencià (ICV, Valencian Cartographic Institute)</p> <p>Address: C/Santos Justo and Pastor 116, Valencia,</p> <p>Telephone: 902 200 428</p> <p>Fax: 96 342 59 51</p> <p>email: responde_icv@gva.es</p> <p>Web: www.icv.gva.es</p> <p>Contact person: Santiago Yudici Oliver</p> <p>Telephone: 96 342 59 79</p> <p>Email: yudici_san@gva.es</p>
Responsibilities of the co-ordination structure:	<p>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.</p> <p>The functions of the ICV include:</p> <p>a) Establishing strategic objectives for geodesy, photogrammetry and mapping in the Valencian Community, along with the creation of long-term geodetic and</p>

	<p>cartographic planning.</p> <p>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 Organizations in order to create a cartographic database.</p> <p>c) Creating, reproducing and distributing basic cartographic work, along with the publishing and disseminating other works that it deems appropriate.</p> <p>d) Co-ordinating and supervising the cartographic work of the public bodies of the Valencian Community.</p> <p>e) Improving the cartographic and geographical information systems of the public bodies of the Valencian Community.</p> <p>f) Training staff of the public bodies of the Valencian Community who are assigned to cartographic activities.</p> <p>g) Research and development of new techniques in geodetic, cartographic and topographic engineering.</p> <p>h) Maintaining relationships and co-ordinating with analogous regional, national or international Organizations.</p> <p>i) Creating, structuring and organizing the Cartoteca Valenciana (Valencian Cartographic Library).</p> <p>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.</p> <p>k) To propose the Plan Cartográfico de la Comunidad Valenciana (the Cartographic Plan of the Valencian Community), together with annual and multi-year plans.</p> <p>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 geographical information services.</p>
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Organization:	<p>Extremadura</p> <p>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)</p>
Contact person:	Carmen Caballero Cáceres
Function:	Chief of Bureau of Cartography and Images
e-mail:	carmen.caballeroc@gobex.es
Telephone:	34 924332166 Fax: (34) 924332162
Role:	<p>Co-administrator of the Infraestructura de Datos Espaciales de Extremadura (SDI of Extremadura)</p> <p>Co-ordinator of the Comisión temática de la Infraestructura de Datos Espaciales de Extremadura (Thematic Commission of the SDI of Extremadura)</p> <p>Representative of the OTALEX SDI at the CODIIGE</p>
Co-ordination structure:	Consejo de Información Cartográfica y Territorial de Extremadura (Cartographic and Territorial Information Council of Extremadura)

	<p>Thematic Commission of the SDI of Extremadura.</p> <p>Centro de Información Cartográfica y Territorial de Extremadura. (CICTEx, Cartographic and Territorial Information Centre of Extremadura)</p> <p>SDI of Extremadura.</p> <p>ideex@gobex.es</p> <p>www.ideextremadura.com</p>
Responsibilities of the co-ordination structure:	<p>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.</p> <p>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.</p> <p>The CICTEx's mission, among others: 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 Organization 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.</p>

Organization:	<p>Galicia</p> <p>Consellería de Medio Ambiente e Ordenación do Territorio (Department of the Environment and Territorial Planning)</p> <p>San Lázaro s/n</p> <p>15781 – Santiago de Compostela</p>
Contact person:	Manuel Gallego Priego
Function:	Geographical information management officer
e-mail:	mgallego@xunta.es
Telephone:	Tel: 981545817 Fax: 981541757
Role:	<p>Administration of the Spatial Data Infrastructure of Galicia (IDEG)</p> <p>Representative of the Xunta de Galicia (the Government of Galicia) on the CODIIGE</p>
Co-ordination structure:	<p>Comisión de Coordinación de Sistemas de Información Geográfica y Cartografía (Commission for the Coordination of Geographic and Cartographic Information Systems)</p> <p>mapas.xunta.es</p>
Responsibilities of the co-ordination structure:	<p>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 Organizations of the Autonomous Community of Galicia, and its functions include:</p> <ol style="list-style-type: none"> <li>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 Organizations of the Autonomous Community of Galicia, while also providing technical support for the dissemination and training with regard to geographical information activities undertaken by the Government of Galicia or in co-ordination with it.</li> <li>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</li> </ol>

	<p>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 toponymical 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.</p> <p>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.</p> <p>4. The archiving and processing of data from the territorial indicators established by the instruments of territorial planning.</p> <p>5. The incentivisation of innovation, adoption and development of geographical information-related technologies and infrastructures in Galicia. The planning and development of value-added services and new geographical information- related systems and applications for Galicia also fall within its remit.</p> <p>6. Facilitating public access to the geographical 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.</p>
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Organization:	Comunidad de Madrid (Community of Madrid) Directorate General of Urban Development 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
Function:	Chief of Area for the Centro Regional de Información Cartográfica (Regional Centre for Cartographic Information)
e-mail:	<a href="mailto:rafael.herrero@madrid.org">rafael.herrero@madrid.org</a>
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 Email: <a href="mailto:cartografia@madrid.org">cartografia@madrid.org</a> Web map service: <a href="http://www.madrid.org/cartografia">www.madrid.org/cartografia</a> IDEM: <a href="http://www.madrid.org/cartografia/idem">www.madrid.org/cartografia/idem</a>
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).

	<p>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.</p> <p>The creation of town planning and territorial databases and the maintenance of a regional town planning information system.</p>
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Organization:	<p>Región de Murcia (Region of Murcia)</p> <p>Consejería de Fomento e Infraestructuras (Department of Public Works and Infrastructure)</p> <p>Plaza de Santoña, 6.</p> <p>30071 Murcia</p>
Contact person:	Antonio Ángel Clemente García
Function:	Deputy Director of Town and Territorial Planning
e-mail:	aangel.clemente@carm.es
Telephone:	Tel: 968 395869   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:	<p>Contact: Dirección General de Ordenación del Territorio, Arquitectura y Vivienda (Directorate-General for Territorial Planning, Architecture and Housing).</p> <p>Address: Plaza de Santoña, 6.</p> <p>Telephone: 968395869</p> <p>email: aangel.clemente@carm.es</p> <p>web : <a href="http://www.sitmurcia.es/">http://www.sitmurcia.es/</a></p> <p>Contact person: Antonio Ángel Clemente García</p> <p>Telephone: 968395869</p> <p>Email: aangel.clemente@carm.es</p>
Responsibilities of the co-ordination structure:	<p>This service is responsible for the exercise of the following functions:</p> <ul style="list-style-type: none"> <li>• Creation and up-dating of the RTS (Sistema Territorial de Referencia (STR))</li> <li>• Developing GIS Information Sytem.</li> <li>• Preparing all necessary information for the undertaking of land-use and ocean planning tools.</li> <li>• 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.</li> <li>• 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.</li> <li>• Publishing, recording and disseminating graphically, photographically or numerically the documents generated by the aforementioned activities.</li> <li>• Co-ordinating cartographic activities with the relevant agencies of central</li> </ul>

government.
<ul style="list-style-type: none"> <li>• Co-ordinating with local authorities on cartographic issues and providing advice to them when the authorities call upon the service.</li> <li>• Provision of the cartographic format which is appropriate to the needs of the different territorial stakeholders.</li> <li>• Any other activities which the service is called upon to undertake which lie within its remit.</li> </ul>

Organization:	Navarra Comisión de Coordinación del SITNA (Co-ordination Commission of the SITNA) Parque Tomás Caballero, 1, 3ª 31005 PAMPLONA
Contact person:	Fernando Alonso Pastor
Function:	Chief 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/ LISIGE Working Group <a href="http://sitna.navarra.es">http://sitna.navarra.es</a> <a href="http://idena.navarra.es">http://idena.navarra.es</a> <a href="http://ww2.pcypsitna.navarra.es/SITNA/Organizacion/">http://ww2.pcypsitna.navarra.es/SITNA/Organizacion/</a>
Responsibilities of the co-ordination structure:	<p>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.</p> <p>By Foral Decree 255/2015, of 11th November, regulating the treatment of geographical information of the Administration of the Autonomous Community of Navarre, SITNA adapts to INSPIRE and LISIGE and the existence of the Geoportal of Navarre is consolidated as an access point to the information and geographic services of Navarre and IDENA, so as to ensure the interoperability of data, metadata, and those services of SITNA with other spatial data infrastructures.</p> <p>In 2005, the SDI of Navarra (IDENA) was made publicly available.</p> <p>Co-ordination Commission of the SITNA exercises the following functions:</p> <p>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.</p> <p>The co-ordination of the different bodies of the Autonomous Community of Navarra, with regard to geographical information.</p> <p>The promotion of the availability of the necessary financial, technological, human and educational resources for the implementation of the SITNA.</p> <p>The co-ordination and optimisation of these resources.</p> <p>The approval of the methodology, classification, codification and other specific instruments necessary for the implementation of the SITNA.</p>



	<p>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.</p> <p>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).</p>
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Organization:	Gobierno de La Rioja (Government of La Rioja)
Contact person:	Gonzalo López García
Function:	Chief 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 40 33578
Role:	Administrator of the SDI of La Rioja
Co-ordination structure:	<p>Sección de Sistemas de Información Geográfica y Cartografía (Section for Geographic Information Systems and Cartography)</p> <p>Servicio de Ordenación del Territorio (Territorial Planning Service)</p> <p>Dirección General de Urbanismo y Vivienda (Directorate-General for Town Planning and Housing)</p> <p>Consejería de Obras Públicas, Política Local y Territorial (Department of Public Works and Local and Territorial Policy)</p>
Responsibilities of the co-ordination structure:	<p>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 Organization of the public sector in the Autonomous Community of La Rioja.</p> <p>Article 6. Administrative functions</p> <p>2.5. For the Directorate-General for Town Planning and Housing</p> <p>d) The planning, development and management of cartographic policy and the geographical information systems of the Autonomous Community of La Rioja</p>

Organization:	Gobierno Vasco (Government of the Basque Country (Euskadi))
Contact person:	Fernando Uriondo Ispizua
Function:	Director of Planificación Territorial y Urbanismo (Territorial Planning and Development)
e-mail:	f-uriondo@euskadi.eus
Telephone:	Tel: 945 019824   Fax:
Role:	Director of Planificación Territorial y Urbanismo (Territorial Planning and Development)
Co-ordination structure:	<p>President of the Comité Directivo de la IDE de Euskadi (SDI Management Committee of Euskadi)</p> <p>President of the Comisión Informativa Interdepartamental de la IDE de Euskadi (Interdepartmental Informative Commission of the Euskadi SDI)</p> <p>Web: <a href="http://www.geo.euskadi.eus">http://www.geo.euskadi.eus</a></p> <p>Web: <a href="http://www.geo.euskadi.eus">http://www.geo.euskadi.eus</a></p>

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](http://www.geo.euskadi.net), through dissemination and re-use of the geographical 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.

-Coordinating the production of GIS in the management of the community autonomous of the Basque country, to have harmonised geographic data and quality, identifying current and future needs and ensuring the observance of the provisions of the European legislation on information infrastructure space of the European Union (INSPIRE).

To undertake dissemination work and provide technical assistance in the areas of cartography, geodesy and geographical information, promoting the effective use and distribution of the geographical information and SDI services of Euskadi.