



Spatial Data
Infrastructures in Italy:
State of play spring 2011

Report meta-information

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Creator	Danny Vandembroucke & Dimitrios Biliouris(SADL)
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Contributor	Danny Vandembroucke & Catharina Bamps (SADL), Katleen Janssen (ICRI), Joep Cromptvoets (OE)
Previous Contributor	Jos Van Orshoven, Danny Vandembroucke (SADL); Peter Beusen, Katleen Janssen (ICRI), Alessandro Annoni (EC-JRC); Monica Pasca (IT-MoE), Dimitrios Biliouris(SADL)
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This document does neither represent the position of the Member States and countries under study.

Executive summary

The Italian NSDI is built upon Law n.68 of the 2/2/1960 which mandates the National Mapping Agencies to produce, maintain and disseminate Geographic Information and on the protocol, 26/09/1996: 'Intesa Stato- Regioni ed Enti Locali per la realizzazione dei sistemi informative geografici' which is a GIS Agreement between State-Regions and Local Authorities for GIS implementation.

The five different Public Services in charge of the collection of Geographic Information are the 1)the Cadastre, currently converted into an Agency: Agenzia del Territorio (Ministry of Finance). 2) the Navy Hydrographical Institute (IIM), 3) the Air Force Geotopographical Informative Centre (CIGA),4) the Military Geographical Institute (IGM) and 5) the National Technical Services (STN). They are mainly in charge of GI at medium and small scales (1:25,000, 1:50,000 and above) whereas the Regions and Municipalities produce larger scale GI (1:5,000 or 1:10.000).

The GIS Agreement is an Agreement between local, regional and national state bodies (mapping agencies) to develop technical specifications to improve cartographic production and data capture methods. It follows the basic guidelines and methodologies described in the European Commission's INSPIRE Directive and is a major European SDI (Spatial Data Infrastructure) project. The GIS Agreement originated in 1996 and involves all the state cartographic offices (mapping agencies) and regional and local authorities such as Regions, Provinces and Communes. These authorities supply most of the large and medium scale cartography. The agreement was approved by the Conferenza Stato Regioni, the permanent organization which links the Government and local authorities under the aegis of the Ministry of the Environment which has provided most of the funding.

The development of the NSDI is also bolstered by the Italian e-Government policy and legislation: in 2006, the general decree on e-Administration with specific references to GI entered into force creating the Digital Administration Code ("*Codice dell'Amministrazione Digitale*"). Moreover, Art. 59 establishes the "*Committee for Technical Rules on Geographic Information*" (CTSGI, "Comitato per le regole tecniche sui dati territoriali delle Pubbliche Amministrazioni") whose task is to define technical rules to be applied by any public administration setting up a spatial database, as well as rules on the sharing of spatial data at the national and the sub-national level.

Most recently, the NSDI has been given a great advance thanks to the Legislative Decree 27.01.2010 n. 32 which transposes the INSPIRE Directive into national legislation. The Decree appoints the Ministry of Environment, Land Protection and Sea (MATTM) as the competent authority for the implementation of the INSPIRE Directive together with the The Institute for Environmental Protection and Research (ISPRA). The Decree appoints a National Council for Environmental and Spatial Information acting as institutional link between the governmental data producers and giving technical guidance to the Ministry of Environment.

Furthermore, the Decree defines that all public administrations dealing with geographic data have to make these data available by means of a geo-portal providing the procedures for services and standards. In addition, as required by European Directive on the reuse of governmental data and recent national legislation on guidelines for websites for the Public Administrations, it is necessary that the website of a governmental authority explains its content (geographic data, procedures or text documents) in open formats and free, as far as possible using the principles of open licences.

The national geoportal 'Portale Cartografico Nazionale' (<http://www.pcn.minambiente.it/PCN/>) aims also to be the INSPIRE national geo-portal. At the moment it is addressing information provided partly from the Ministry of Environment and some public administrations (e.g. Water Districts.) but it will be the point of access for the metadata catalogue, network services, and of the environmental information system. The system will address the broader NSDI that will include also datasets not required by INSPIRE (e.g. for different scales). Currently around 69 datasets are discovered in the geoportal and 50 of which can be used with WMS, WFS or WCS, 2D and 3D cartography.

Every Italian Region has established a geoportal providing mostly viewing, discovery, download services and in some cases transformation services. The regional geoportals are supported and monitored by a voluntary association called Interregional Center for Information Systems, Geography and Statistics (Centro Interregionale per i Sistemi informatici, geografici, statistici – CISIS) and its Permanent Committees for Information Technology, Statistics and Geographic Systems.

The MATTM and ANCI have set up a geoportal called: 'Il Portale delle Valutazioni Ambientali' (portal for environmental assessment) providing access to environmental and spatial data that are constantly updated by about 300 municipalities that are participating via a national catalogue service which includes WMS and WFS tools

The RNDT, the National Geospatial Metadata Catalogue, set up at DigitPA by art. 59 of the Digital Administration Code and confirmed by the Legislative Decree 32/2010 transposing the INSPIRE Directive, is the national catalog of metadata that are insured through the search services for spatial data sets and services related to them.

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Abbreviations and acronyms

AGILE	Association of Geographic Information Laboratories in Europe
AIC	Associazione Italiana di Cartografia
AIPA	Authority for the Informatics in the Public Administration, Regions and Provinces
AIT	Associazione Italiana di Telerilevamento
AM/FM	Automated Mapping Facilities Management
ANCI	National Association of Local Municipalities
ASITA	Federazione delle Associazioni Scientifiche per le Informazioni Territoriali ed Ambientali (Federation of Italian scientific associations for geographic and environmental information)
CAD	Codice dell'Amministrazione Digitale - Digital Administration Code
CIGA	Air Force Geo-topographic Information Centre
CIRCE	Centro di servizi Interdipartimentali di Rilievo, Cartografia ed Elaborazione
CISIS	Centro Interregionale per i Sistemi informatici, geografici, statistici (Center for Information Systems, Geography and Statistics)
CMS	Content Management System
CNIPA	National Centre for the Informatics in the Public Administration (Centro Nazionale per l'Informatica nella Pubblica Amministrazione), now transformed into DIGITPA
CNR	National Research Council
CRS	Cartographic Reference System
CT	Core Thematic Data
CTC	Coordination Technical Committee
CTSGI	Committee for Technical Rules on Geographic Information (Comitato per le regole tecniche sui dati territoriali delle Pubbliche Amministrazioni)
DCP	Department of Civil Protection
DIGITPA	National Agency for Digital Administration, formerly CNIPA
DSA	Directorate for Environmental Protection (Direzione per la Salvaguardia Ambientale)
EC	European Commission
EEA	European Environment Agency
EIONET	European Environment Information and Observation Network
EPRS	Extraordinary Plan of Environmental Remote Sensing
EUROGI	European Umbrella organisation for geographical information.
FIR	Further Investigation Required
GDSC	Geographic Data Service Centre

GEMET	General European Multilingual Environmental Thesaurus
GI	Geographical Information
GIIDA	Integrated Management of the Environmental Data
GINIE	Geographic Information Network in Europe
GIS	Geographical Information System
GISFORM	GIS Forum
GML	Geography Markup Language
HA	Hydrological Analysis
IGM	Italian Military Geographical Institute
IIM	Navy Hydrological Institute
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
IRPI	Institute for Geo-Hydrological Hazard Assessment
ISO	International Organization for Standardization
ISPRA	Istituto Superiore per la Protezione e la Ricerca Ambientale
ISTAT	National Statistical Institute
IUAV	University of Venice Faculty of Architecture,
JRC	Joint Research Centre
LABISTA	Environmental and Urban GIS Laboratory
MD	Ministry of Defence
MATTM	Ministry of Environment, Land Protection and Sea
NCP	National Cartographic Portal
NIA	No Information Available
NMA	National Mapping Agency
NSDI	National Spatial Data Infrastructures
OGC	Open Geospatial Consortium
PCN	Portale Cartografico Nazionale
PNC	National Cartographic Portal
PPP	Public-Private Partnerships
PSI	Policy and legislation on access to public sector information
REF	Reference data
RNDT	National Spatial Data Catalogue (Repertorio Nazionale dei Dati Territoriali)
SCR	Cartographic Reference System
SDI	Spatial Data Infrastructures
SDT –	Sistemi Informativi
SIFET	Società Italiana di Fotogrammetria e Topografia
SIGMA TER	Servizi Integrati catastali e Geografici per il Monitoraggio Amministrativo del TERRitorio
SITAD	Sistema Informativo Territoriale Ambientale Diffuso

SITR	Teritorial Information System of Sardinia
SPC	Public Internetworking System
STN	National Technical Services
TQA	Topographic Quantitative Analysis
UNCCEM	Unione Nazionale Comuni Comunita Enti Montane
UPI	Union of the Italian Provinces
UTM	Universal Transverse Mercator
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
WSI	Web Services Interoperability

1 GENERAL INFORMATION

1.1 Method

This report is summarizing the state of play of SDI in Italy, and reflects the degree to which the SDI situation in Italy is similar to the ideas set out in the INSPIRE position papers¹ and the more recent INSPIRE scoping documents.

For the 2009 update the survey report was used along with the information extracted from the web and the various presentations/publications from workshops and conferences. In this version obsolete information was removed, while a conclusion paragraph regarding the status of each indicator was added for each component.

For the 2010 update, the information available on internet and presentations/publications from workshops and conferences has been used, the INSPIRE Monitoring Report for 2010 is not yet available.

1.2 The NSDI-scene in Italy

1.2.1 INTESA GIS/GIS AGREEMENT

The Italian NSDI is based on the existing mandate (Law n.68 of the 2/2/1960) assigned to the national mapping agencies to produce, maintain and disseminate Geographic Information and on the GIS Agreement (26/09/1996) called “Intesa Stato- Regioni ed Enti Locali per la realizzazione dei sistemi informative geografici” (GIS Agreement between State-Regions and Local Authorities for GIS implementation) as a reaction on the increasing decentralisation.

In Italy the five official producers of medium to small-scale nation-wide GI (1:25.000, 1:50.000 and above), are:

- The Cadastral Agency, recently converted into an Agency: the Agenzia del Territorio of the Ministry of Finance;
- The Navy Hydrographical Institute (IIM);
- The Italian Military Geographical Institute (IGM);
- The Air Force Geo-topographical Information Centre (CIGA);
- The National Technical Services (STN).

In addition to those, also the National Statistical Institute (ISTAT) is actively involved in GI data collection and dissemination (e.g. census units). Large-scale topographic mapping (normally in scale 1:5.000, 1:10.000) is however undertaken by the municipalities, provinces and regions for their own territory. Traditionally, private

¹ INSPIRE position papers, final versions: RDM, ETC, DPLI, ASF, IST, IAS (latest version).

companies produce the data and the public authorities are responsible for the technical coordination and data dissemination.

In addition recently the responsibility to update cadastral data is given to local municipalities and the new Agenzia del Territorio has a more coordinating role.

The main objective of the 1996 GIS Agreement was to establish in a time frame of 6-8 years, the Italian Spatial Data Infrastructure, which was called 'Sistema Cartografico di Riferimento – SCR' (Cartographic Reference System – CRS), now "Sistema Cartografico Federato" (Federated Cartographic System) and which was considered a necessary element for good Governance at local, regional and national scale;

The GIS Agreement to better coordinate the creation of GIS in Italy was signed on 26th September 1996 called "Intesa Stato-Region ed Enti Locali per la realizzazione dei Sistemi Informativi Geografici di interesse generale" (Agreement between the State, Regions and Local Authorities for the implementation of Geographic Information Systems of general interest). The agreement was approved by the Conference of State regions and autonomous provinces and involves the various Central Government and State agencies like the Ministries (Ministry of Interior, Defence, Finance, Treasury and the Budget and Economic Planning, Environment, Public Works, Health, Agriculture, Food and Forestry, Transport and Navigation Regional Affairs), AIPA:the Authority for Information Technology in Public Administration, the National Institute of Statistics; furthermore: the Municipalities (ANCI), Provinces (UPI) and Mountain Communities (UNCEM), Companies for the management of public services (CISPEL) and the Conference of Presidents of Regions and Autonomous Provinces,

A Technical Coordination Committee (CTC) was established by the GIS Agreement to develop guidelines, common technical specifications, proposals for program agreements between the authorities interested in the implementation of spatial data bases and initiatives to improve the organisational and policy processes developing the NSDI. The main strategic goals are to raise awareness and to report on existing experiences and possibilities for funding (capacity building), integrating national and regional resources.

The Agreement for the implementation of the Cartographic Reference System was signed on December 30, 1998 by the Ministers of Environment, Defence, Finance, Treasury, by the President of the Conference of Presidents of Regions and Autonomous Provinces, the President of the Basilicata Region and Chairman of the Veneto Region. The subject of this Agreement is to define the lines of implementation and execution of an integrated mapping system capable of performing the activities of regional analysis and synthesis to meet the needs of different stakeholders involved in the implementation of this Agreement by making use of available databases and in synergy with the information systems already operating in the sector of land management. The project, provided that actions for the development and integration of national environmental information system would supplement and complement the various initiatives to achieve a cartographic system of reference national coverage through the interconnection with the information systems already in place. The implementing parties to this Agreement:

- the Military Geographical Institute of the Ministry of Defence;
- the Territory Department of the Ministry of Finance;
- the Department of the Prime - National Technical Services for the integration of the products produced with the programs being implemented in the field;
- the Veneto Region;
- Basilicata Region
- Regions and Autonomous Provinces for the actions assigned to them;

In 2000, the GIS Agreement was amended specifying three major objectives:

- The production of common technical specifications;
- The production of data compliant with the technical specifications;
- The production of activities aiming to publish GI or make GI available through the production of cartographic catalogues.

With regard to the third objective, the National Digital Mapping Portal and a nation-wide network infrastructure were developed to satisfy the need to guarantee the full functionality with every end-point (Client), avoiding complex and expensive customizations.

The network infrastructure (Federal Network Information System) is designed to exchange geo-spatial and other data efficiently between a central Body: the National Digital Mapping Portal and a network of peripheral nodes: the Federal Administrations initially limited to the Nation and then opened up to European and non-European countries. The approach adopted is the same used to establish a Federal Information System in which heterogeneous systems share the same conceptual model. The National Digital Mapping Portal hosts the CRS set of national information layers and a common database, while the Federal nodes offer the local informational layers and their own databases. Every single Federal system has a component which acts as an interface towards the Federation itself hiding the local complexity and data, translating their own scheme into the Federal scheme. This component guarantees the extensibility of data schemes, both local and Federal, being the two models not coupled.

The Federal architecture described above has been designed and developed by the Ministry of Environment, Land Protection and Sea to link the needs for data quality and data diffusion, in order to be compliant with the cooperation and integration guidelines, and at least to allow any update coming directly from the subject which controls the land.

An abstraction level was required and developed to avoid the pitfall of choosing a particular operating system, or a dedicated application, or a GIS platform that can reduce the accessibility to the data stored and provided by the National Digital Mapping Portal.

To accomplish this, the solution had to be based on an Internet multi-layer architecture, and had to follow and adopt the market standard protocols to exchange the needed information, according to local and European guidelines for cooperation and data integration.

At national level the Cartographic Reference System and the National Mapping Portal Federated Network (<http://www.pcn.minambiente.it/PCN/>) are put in place, while the Coordination Centre of Regions (Centro Interregionale di Coordinamento e Documentazione per le Informazioni Territoriali) (<http://www.centrointerregionale-gis.it/>) focuses its efforts on the construction of basic levels of topographic maps (DB Topografici Prioritari 10.000) from the various regional and local sources and on the metadata catalogue (<http://www.centrointerregionale-gis.it/script/documenti.asp>).

The Directorate for Environmental Protection (DSA, Direzione per la Salvaguardia Ambientale) of the Italian Ministry of Environment, Land Protection and Sea is responsible for several environmental assessment procedures and is committed to encourage policies of cooperation between private and public sectors, in order to propel the use, and above all the “re-use” of environmental information. The DSA in partnership with INVITALIA, the national Agency for Inward Investment Promotion and Enterprise Development, are developing an integrated platform of spatial and environmental data and information, with facilities and services to be specifically offered to enterprises and public administrations for all sorts of environmental assessments.

1.2.2 Other initiatives

With the development of the INSPIRE initiative, the work in and between regions, and at the national level has been intensified. Several initiatives have been taken. Some examples:

The SIGMA TER initiative (Servizi Integrati catastali e Geografici per il Monitoraggio Amministrativo del TERRitorio) is an inter-regional e-government project aiming at providing integrated cadastral information to the public and private stakeholders by using a standardized approach within a distributed and service oriented environment. The initiative is developed within the context of the decentralization of cadastral activities (L. 59/97, D.Lgs. 300/99, D.P.C.M. 19/12/00, D.P.C.M. 21/03/01), the e-government plans at the national and regional level and the standardization work of INTESA (Agreement) GIS, CNIPA, W3C, ISO, OGC and INSPIRE. The Cadastral Authority works with 6 regions² (Abruzzo, Emilia-Romagna, Liguria, Piemonte, Toscana and Valle d’Aosta), 5 provinces (Bologna, Genova, Parma, Piacenza and Pisa), 11 municipalities, 2 mountain communities and several technical boards (ANCI, UNCEM, ...). Also private partners are collaborating. The project budget is around 21,5 million €. There are 150 re-user bodies in the initial phase and 8 new regions will come on board during the project. SIGMA TER is also a SDIC. The initiative relies on the experience of

² There are 20 regions in Italy, 110 provinces and 8.100 municipalities.

the different partners in the field of SDI development (data, metadata, services, standards, ...). It aims now at implementing an inter-regional SDI. (<http://www.sigmater.it/>)

The SITR-IDT - Sardegna (Regional Land Information System - Spatial Data Infrastructure)- resolution of 11 June 2002, No. 18 / 4 - consists of two main components that are integrated and interact with each other: the Information System and the Spatial Data Infrastructure. The SITR-IDT provides the official environmental, urban and cultural-heritage geo-referenced data of Sardinia and makes them available to the public being governmental bodies, regional planning authorities, companies and private citizens.

The architecture is set up according to the INSPIRE Directive, the elements that make up the IDT of SITR include metadata (ISO19115 and CNIPA profile compliant), spatial data sets, spatial data services, network services, agreements relating to access, sharing and use of data, and finally, procedures and processes for coordination and monitoring. The geographical data are transferred to the DB Act of SITR-IDT by various data-providers accompanying the geographic information with descriptive metadata. The data providers, the creators of geographical data therefore provide clear rules to implement the data and the metadata, which are developed and published by SITR-IDT.

The geospatial data are managed and published by various services, procedures and applications developed according to advanced international standards and implementation rules as suggested by the INSPIRE Directive. This way the SITR-IDT takes the form of a highly interoperable infrastructure, easily accessible from the outside, and able to ensure the full sharing of geographic information. The geoportal of the SITR SDI (<http://www.sardegnameoportale.it/>) provides viewing services (Sardegna 2D, WMS services, sardegnamappe..), discovery service: metadata catalogue, transformation service, OGC Service– WFS, WMS, GIS Desktop client.

The standard project SITR refers to several international standards implementing the principles of treatment and sharing of geographic data issued by the INSPIRE (Directive 2007/2/EC) establishing an infrastructure of a spatial data community.

The SIT2COM is the project that extends the Spatial Data Infrastructure of SITR-IDT Local Authorities and the communities by providing regional official spatial data that are validated and updated and specialized software in order to provide enhanced support to the actions of the government and the monitoring of local entities.

The objective of the project is to produce technologically advanced webtools which can be used by local authorities and stakeholders so that they can populate and update the SITR-IDT large scale spatial data sets and hence help to improve land monitoring.

The local Spatial Data Infrastructure of the Piedmont region SITAD (Sistema Informativo Territoriale Ambientale Diffuso) has been set up by the regional GIS department as part of the regional AtoA e-Government program; during the first year (2003), the project was mainly focused on the collection of use cases of the stakeholders.

The need for a local SDI in Piedmont derived from three main factors:

1. the great involvement of local public authorities in activities regarding spatial information (Region Piemonte, Provincia di Torino, Città di Torino are three main examples of public sector bodies in Piedmont collecting, managing, distributing and using spatial data at regional, provincial and municipal levels);
2. the high fragmentation of public sector organisations, with more than 1200 municipalities (out of 8100 in Italy), 48 Mountain Communities, 8 Provinces;
3. the presence of CSI-Piemonte, a Consortium of 51 local Public Administration Authorities founded in 1977 by law (CSI is involved in several e-Government project and co-ordinates many activities among associated bodies on ICT, data-exchange and data-sharing services, geographic information systems)

The SITAD concept of the regional SDI aims to provide more than required by INSPIRE because it includes not only spatial data but also other multimedia information. Compared to INSPIRE greater emphasis has been given to the real use of the data and for this reason several services and web applications were specifically developed. All INSPIRE components are supported (catalogues, metadata, standards and interoperability, core data, ..), so it will be possible, to use the current regional SDI as building block of the NSDI. (<http://www.sistemapiemonte.it/serviziositad/>).

SITAD works on standardization for data and services and wants to promote the best local and regional practices and transfer them in coordinated dissemination actions. Collaboration is sought at international level (with the INSPIRE initiative, JRC, UNINFO) and at the national level (CNIPA, Intesa GIS (GIS Agreement),). A newsletter, forum, plug-ins and viewers etc., have been setup. SITAD general rules of use aims at setting the boundaries for collaboration with all the stakeholders.

Besides the well developed SDI initiatives, there are a lot of other GI-co-ordination efforts at the national and regional levels, with several associations aiming at bringing together GI players and promoting GI & GIS in particular sectors. Some important associations are:

ASITA, Federazione delle Associazioni Scientifiche per le Informazioni Territoriali ed Ambientali: the Federation of Scientific Associations for Territorial and Environmental Information, (<http://www.asita.it>).

The four scientific Associations composing the ASITA Federation operating in Italy, each with its own specific nature, in the fields of acquisition, processing, management and representation of the geographic information, are:

- [SIFET](http://www.sifet.org/), Società Italiana di Fotogrammetria e Topografia, (Italian Association of Photogrammetry and Topography, <http://www.sifet.org/>)
- [AIC](http://www.associazioneitalianacartografia.org/), Associazione Italiana di Cartografia, (Italian Association of Cartography, <http://www.associazioneitalianacartografia.org/>)

- AIT, Associazione Italiana di Telerilevamento, (Remote Sensing Italian Association) (<http://www.aitonline.it/>)
- [AMFM GIS Italia](http://www.amfm.it))(Automated Mapping/Facilities Management/Geographic Information Systems Italia, <http://www.amfm.it>)

These Associations are non-profit organizations, including together more than 2700 members in Italy, distributed among research institutes, producers of GI both public and private, the public administration (Ministry, Regions, Provinces, Municipalities) and the services.

ASITA organizes every year a conference on GI-GIS with thousand participants and a very large number (around 400) of communications/presentations;

- AMFM GIS Italia, Automated Mapping Facilities Management – GIS Italy (<http://www.amfm.it>).

AMFM GIS Italia is a non-profit organization that aims to promote GI & GIS in Italy, to disseminate information and knowledge of GI within Italy, to increase collaboration between partners in the GI & GIS sector and to foster coordination among the partners. AM/FM holds conferences, workshops and it publishes a newsletter. It does not deal directly with organizational or technical and data issues. It also encourages the necessary legislative and regulatory changes to ensure the development of 'National Spatial Data Infrastructure, in line with European programs in the industry, in particular with Directive [INSPIRE](#). Of interest is the yearly organization of National Geographic Information Portals (Geoportals) awards. The Geoportal Award reports best practise examples based on the criteria:

- wealth and quality of GI made available
- effectiveness of the user interface and communication mapping
- efficiency and consistency of the technological solutions adapted.

The organization is the Italian representative in EUROGI.

- Centro Interregionale per i Sistemi informatici, geografici, statistici (CSIS): Association between the regions and autonomous provinces formed to ensure effective coordination of information tools and geographic and statistical information;

The Interregional Coordination and Documentation Centre for Spatial Information, founded in 1980, is a voluntary association between the Regions and Autonomous Provinces, working in the field of spatial information in support of the Regions and Autonomous Provinces, for coordination of efforts, dissemination of information, cultural updates, the link with the central structures of the state. The Centre has participated actively in the work that led to the definition of the GIS Agreement. Over the years, several thematic working groups have been active including more recently the group "New techniques" and "use and land cover, which is particularly active

because of the continuing development of remote sensing technologies.
<http://www.centrointerregionale-gis.it/>

- INSPIRE-R (INfrastruttura dati SPazIali della Regione Emilia-Romagna) INSPIRE-R is a project (01/09/2003 - 31/12/2020) promoted by the Region of Emilia-Romagna to create an infrastructure for exchanging and integrating regional information produced at various scale levels. This infrastructure is designed to enable data to stay where they are produced and maintained but with a centralized catalogue that permits the data documentation (with 19115 metadata) and with search/identify-service compliant with the Inspire specification. All this permits to meet the need stated by the regional law mentioned in document (“Disciplina generale sulla tutela e l'uso del territorio (L.R. 20, 24 marzo 2000)”) ‘Every participant of the Planning Conference for the Regional/Urban planning must share their data with rules compliant to “Atto di indirizzo e coordinamento tecnico per l'attuazione della L.R. 20 (Direttiva A-27)” .To make this possible, it is necessary to establish an infrastructure that allows the sharing of information compliant with national and international standards.The INSPIRE-R project meets the requirements set in the framework of the National INTESA GIS (GIS Agreement): a protocol that states the general criteria for the implementation of geographical information of general interest and includes the framework for the realization of the geographic information systems with reference to the large scale database creation and the small scale databases and the e-government national plan setting the services that should be provided. The INTESA GIS protocol and the e-government plan are fully in line with the INSPIRE directive.

Some research initiatives can also be mentioned:

- University of Rome “La Sapienza” Faculty of Architecture:
 - Master “GIS for Land Planning” Research Laboratory (<http://www.gis-school.com>);
 - Environmental and Urban GIS Laboratory LABSITA (<http://nettuno.arc.uniroma1.it/>) Italian node of AGILE (Association of Geographic Information Laboratories in Europe) Network;
- University of Venice Faculty of Architecture, IUAV, CIRCE (Centro di servizi Interdipartimentali di Rilievo, Cartografia ed Elaborazione) centre for GIS and mapping (<http://circe.iuav.it>);
- University of Trieste - GEOLab Geomatic Laboratory (<http://www.univ.trieste.it/~geolab/>);
- TELEGIS Laboratory. University of Cagliari. <http://www.unica.it/telegis/> .

The Italian Ministry of Environment, in collaboration with ANCI, the National Association of Local Municipalities, has set up a system of projects: ‘Ambiente in Comune’, Small Municipalities and Environmental Monitoring’. The initiative is created with the objective of ensuring the availability of a system of environmental and spatial

data that are constantly updated and reliable and fuelled by some 300 municipalities that are participating. The system of territorial and environmental data a national catalogue service to discover spatial datasets and services and a view service, which includes WMS and WFS tools, tested with the INSPIRE geoportal. The metadata catalogue (more than 800 datasets) describes the data for their correct use and through a catalogue of mapping projects that allow to access the data in aggregated form through specific views and thematizations.

<http://www.uce.pd.it/progetto-ambiente-comune>

The system of territorial and environmental data is available through a **metadata catalog** that describes the characteristics of the data for their correct use, and through a **catalog of mapping projects** that allow viewing the data in aggregate form through specific views and thematizations . The infrastructure is constantly evolving in line with the provisions of Directive 2007/2/EC INSPIRE.

2 Details of the Italian SDI

2.1.1 Introduction

Main co-ordinator of the NSDI and appointed authority for the implementation of the Inspire legislation (Decreto Legislativo 27.01.2010 n. 32) is the Ministry of Environment, Land Protection and Sea (Ministero dell'Ambiente e della Tutela del Territorio e del Mare- MATTM).

With the decentralisation of the 1970s, the 20 Italian Regions became responsible for land-use planning and territorial management and in 1990 a second decentralisation gave powers to the 110 Provinces (composed of in total 8.100 municipalities) in respect to environmental management. At the same time, coordination remains a function of the central Administrations. The highly decentralised Italian organisation of society deeply marks the development of the Italian SDI. Given the strong regional dimension to the collection and maintenance of GI, coordination tends to be from the bottom-up rather than from the top- down.

2.2 Component 1: Coordination and organizational issues

A first step towards a more coherent GI policy was taken in 1996 when the national, regional and local authorities for territorial matters reached an 'intesa', Italian for Agreement: the GIS Agreement ('Intesa Stato- Regioni ed Enti Locali per la realizzazione dei sistemi informative geografici') for the development of a common Cartographic Reference System (SCR). This agreement also established the Technical Coordination Committee (CTC), a coordination body that consists of representatives from various Administrations: representatives of the NMAs, of the Authority for Information Technology in PA, Regions and Autonomous Provinces, ANCI, UPI and UNCEM CISPTEL.

The Agreement for the implementation of the Cartographic Reference System was signed on December 30, 1998.

A second major step towards the establishment of an SDI organisational framework was the multi-agency and multi-level agreement of 2000, signed inter alia by several ministries, the NMAs, the regions, provinces and municipalities. The core of this agreement is that state and regions agree on the necessity to concentrate all efforts towards the coordinated development of geographical databases which are essential for the creation of the GI systems of the public administrations at national, regional and local level.

Following step, Art. 59 of the "Digital Administration Code" - CAD (Decree n. 82, March 7 2005) establishes the "Committee for Technical Rules on Geographic Information" (CTSGI, "Comitato per le regole tecniche sui dati territoriali delle Pubbliche Amministrazioni"); The Committee for the technical data on the territorial government has the task of defining the technical rules for the implementation of spatial

data bases, documentation, usability and the exchange of data between central and local government in accordance with the provisions of the public system of connectivity. Its task is also to propose the technical and economic rules for the use of these data between the central and local government and by private individuals.

As specified in Regulation (DM 2 May 2006, n.237³) of the composition and functioning, the Committee uses DigitPA (formerly CNIPA, Centro Nazionale per l'Informatica nella Pubblica Amministrazione) for the Secretariat technical assistance and for tasks of inquiry, study and scientific and technical support.

The Committee deals with the technical specifications of:

- Cadastral data
- Directory of national spatial data
- The nominal scale 1:10,000 digital orthophoto
- National spatial data infrastructure
- National geodetic reference system
- DataBase Geotopografici
- Underground networks

The CTSGI meets usually monthly and has organized working groups involving representatives of other authorities and associations which, although not represented on the Committee, are playing a significant role in the context of geographic information and, therefore, are called to participate in the activities of CTSGI.

With particular reference to issues related to implementation of the Inspire Directive, the Committee established a WG about the national spatial data infrastructure (NSDI) whose aim is to define the logical, organizational and technological aspects about Italian NSDI and a WG about the "National Spatial Data Catalogue"(RNDT, "Repertorio Nazionale Dati Territoriali"), of which the CTSGI states the technical rules for the definition of the content, the composition and subsequent updates of RNDT.

RNDT is established by the same art. 59 and is operated by DigitPA (formerly CNIPA). It is a public register which is used to know, with full legal value, the availability of the spatial data of all Italian public sector bodies, which are their basic characteristics and how it is possible to use them; RNDT also aims at developing services based on the integration of data collected by different bodies, and it collaborates to Central Government, local and regional agencies in order to plan the collection of new data.

³ [DM 237/2006 - Composition and functioning of the Committee for Technical Rules on Geographic Information:
http://www.digitpa.gov.it/sites/default/files/normativa/DM%2002_05_2006%20n_237.pdf](http://www.digitpa.gov.it/sites/default/files/normativa/DM%2002_05_2006%20n_237.pdf)

DigitPA has developed a prototype of RNDT through the use of open source software; this prototype is currently being tested involving various authorities at central, regional and local levels.

The CTSGI, through the WG, is going to identify general interest data that will be documented in RNDT and to define the relevant technical requirements, taking into account the INSPIRE Implementing Rules about Metadata.

The RNDT will collect metadata on spatial data and related services and it could be configured as a discovery service as required by Inspire Directive. It also will include the technical possibility, for public authorities, to link their spatial datasets and services.

A specific working group has been established within the CTSGI aiming at defining the technical rules to improve the compliance to the requirements of the Public Internetworking System (SPC) and, in particular, to the "service agreements" in the context of cooperation (SPCoop). The results of this activity will be extended to other kinds of agreements between public administrations for the exchange of spatial data.

The service agreements SPCoop represent one of the elements of the cooperation model in order to improve the interoperability and the exchange of data and services between Administrations and to provide end-user services.

The service agreement defines service performance and service delivery mode, the functionality of the service, the messages exchange interfaces, the quality and security requirements.

Through the software component of the Registry Services, the agreements are recorded. Through the registry services are made available the features for recording, accessing, researching, updating and deleting the service agreements.

The Public Internetworking System, within which there are the service agreements and registry services, is the model identified in Italy as "the set of organizational structures, technological infrastructures and technical rules for the development, the sharing, the integration of the information assets of public administration, necessary to ensure interoperability and cooperation of information systems and flows, ensuring the security and confidentiality of information"

Next to defining the technical rules for exchange of spatial data, the CTSGI In addition, the CTSGI participates in the definition of the rules and costs for the use of data between the central and local governments and by private providers. CTSGI supports Public Authorities in order to define the agreements about the exchange of spatial data. As an example, in 2007 the CTSGI has participated in the definition of financing and technical rules for the use of cadastral data from the information systems of the other administrations (Art 59, paragraph 7-bis – Decree 82/2005) and for access to cadastral database (decree November 13th, 2007 available on the website of DigitPA at

<http://www.digitpa.gov.it/altre-attivit%C3%A0/regole-tecnico-economiche-1%E2%80%99utilizzo-dei-dati-catastali>).

In the meeting of March 4th 2008 the CTSGI (Comitato per le regole tecniche sui dati territoriali delle pubbliche amministrazioni – Committee for Technical Specifications on GI) decided:

- the CTSGI collects and updates every six months the information about data sets and services available in Italy;
- the CTSGI directly provides to Inspire information about the Italian situation;
- the CTSGI is the reference point for the coordination of activities related to implementation of the Inspire directive;

The CTSGI has recently approved the draft "Regulations on technical requirements for the content of the National Directory of spatial data, and the procedure of first setting up and updating of the same". With this measure they define:

- the contents of the Directory, through the identification of data of general interest that the government is obliged to document;
- technical rules for the formation and feeding of the Directory, which also take account of Regulation (EC) No 1205/2008 of 3 December 2008 implementing Directive Inspire regarding metadata.

Next, the Decreto Legislativo 27.01.2010 n. 32⁴ transposes the INSPIRE directive in national legislation with key objectives: public access to data and services, construction of an efficient SDI and re-use of data. The decree points out the Ministry of Environment, Land Protection and Sea is the competent authority for the implementation assisted by the The Institute for Environmental Protection and Research ("The Institute acts under the vigilance and policy guidance of the Italian Ministry for the Environment and the Protection of Land and Sea" - <http://www.isprambiente.gov.it>).

Art. 11 of the Decree deals with the coordination activities at national and regional level. The coordination scheme State-Regions for the national system of observation and environmental information which is already active within the already active within the Permanent Conference for Relations between State, Regions and Autonomous Provinces of Trento and Bolzano, is transferred to the Ministry of Environment and Protection of Land and Sea and renamed the "National Council for Environmental and Spatial Information - Consulta Nazionale per l'Informazione Territoriale ed Ambientale". The Council is the institutional link between the governmental spatial data producers but it also has a technical role in directing the action of the Ministry of Environment (MATTM) in the preparation of appropriate measures for the operation of the national infrastructure for spatial information and environmental monitoring. The Members are: one representative of each of the National mapping agency, each region and autonomous

⁴ <http://www.camera.it/parlam/leggi/deleghe/10032dl.pdf>

Provinces, Ministry for Defence, Ministry for Education, University and Research, Ministry for Infrastructures and Transportation, Ministry for Agriculture, Ministry for Cultural Good and Activities, Ministry for Economic Development, Ministry for Health, Ministry for Relations with Regions, ISPRA (the National Environmental Agency), Department of civil protection, DIGITPA (the national agency for digital administration), Union of the Italian provinces (UPI), Union of Italian municipalities (ANCI).

Some Directorates of the Ministry of Environment have already been active in complying with INSPIRE before the decree. There are a number of projects (DIVA project, Ambiente in Comune, <http://cart.ancitel.it/>, etc.) in which INSPIRE principles and rules have been applied in co-operation with ANCI (National Association of Municipalities) Some Regions have also been active in pushing their spatial infrastructures to comply with INSPIRE, also through the regional environmental agencies.

2.2.1 Conclusions of Component 1

The approach and territorial coverage of the SDI is truly national and a number of the SDI components have reached a significant level of operability. The INSPIRE Directive has been transposed into national legislation stipulating the Ministry of Environment as the competent authority for the implementation with the Institute for Environmental Protection and Research assisting. The Decree appoints a National Council for Environmental and Spatial Information acting as institutional link between the governmental data producers and as technically directing the Ministry of Environment. The composition of Consulta Nazionale per l'informazione territoriale ed ambientale involves members of the National mapping agency, each region and autonomous provinces, Ministry for Defence, etc.

Based on these conclusions we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national
- One or more components of the SDI have reached a significant level of operability (4)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (No)
- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users
- An organisation of the type 'national GI-association' is involved in the coordination of the SDI (No)
- Producers and users of spatial data are participating in the SDI

- Only public sector actors are participating in the SDI

2.3 Component 2: Legal framework and funding

2.3.1 Legal framework

Law n.68 of the 2/2/1960 assigns the mandate for the collection of Geographic Information to the five National Mapping Agencies :

- Agenzia del Territorio of the Ministry of Finance (former Cadastral Agency);
- The Navy Hydrographical Institute (IIM);
- The Italian Military Geographical Institute (IGM);
- The Air Force Geo-topographical Information Centre (CIGA);
- The National Technical Services (STN).

The 1996 GIS agreement (*Intesa Stato-Region ed Enti Locali per la realizzazione dei Sistemi Informativi Geografici di interesse generale*) (Agreement between the State, Regions and Local Authorities for the implementation of Geographic Information Systems of general interest) (amended in 2000) was an important step in the development of the Italian NSDI. The agreement was signed by various Ministries, the Regions and some other Local Authorities with the objective to set-up the Italian NSDI, to increase the availability of geographic data and to stimulate harmonisation by the adoption of specifications. Partners in the agreement included the Ministry of Environment, Land Protection and Sea, Ministry of Interior, the Ministry of Finance, the Ministry of Defence, Ministry of Treasury, Budget and Economic Planning, Public Works, Health, Agriculture, Food and Forestry, Transport and Navigation Regional Affairs, AIPA: the Authority for Information Technology in Public Administration, the National Institute of Statistics; furthermore: the Municipalities (ANCI), Provinces (UPI) and Mountain Communities (UNCHEM), Companies for the management of public services (CISPEL) and the Conference of Presidents of Regions and Autonomous Provinces,

The Italian e-Government policy and legislation has also been important for the development of the NSDI. The decree creating the Codex for Digital Administration (*“Codice dell’Amministrazione Digitale”*) was adopted in 2005 and entered into force on 1 January 2006. It is a general decree on e-Administration with articles specifically referring to GI. As was mentioned before, article 59 establishes the *“Comitato per le regole tecniche sui dati territoriali”* (Committee for technical specifications on GI) and the *“Repertorio Nazionale dei Dati Territoriali”* (National GI Repository). Next to its technical tasks, the Committee should also create rules on the sharing of spatial data at the national and the sub-national level.

In 2007, the Committee and the Agenzia del Territorio (the new Cadastral Agency) created technical and economic rules for the sharing of cadastral data between public bodies, compliant with article 59 of the Codex.

The INSPIRE Directive was translated into national law by Decreto Legislativo 27.01.2010 n. 32; main objectives: public access to data and services, construction of an efficient SDI and re-use of data. The Ministry of Environment, Land Protection and Sea is appointed as the responsible authority for the implementation and is supported by the The Institute for Environmental Protection and Research.

2.3.2 Public-private partnerships (PPPs)

The CTC manages to interact with private sector companies working in the data production sector. This is especially true for data production at regional and municipal level. At these levels, data production has traditionally been carried out by private companies under technical coordination of the public authorities.

2.3.3 Policy and legislation on access to and re-use of public sector information (PSI)

There is a general law for cost-free access to PSI (Act no. 241 of 7 August 1990) that provides for general access to government documents, although access in many cases depends on the existence of a legal interest. The specific conditions for access are regulated by the ministry involved.

Regional law mentioned in document (“Disciplina generale sulla tutela e l'uso del territorio (L.R. 20, 24 marzo 2000)”) states “Every participant of the Planning Conference for the Regional/Urban planning must share their data with rules compliant to “Atto di indirizzo e coordinamento tecnico per l'attuazione della L.R. 20 (Direttiva A-27)””

Directive 2003/4 on access to environmental information has been transposed into Italian legislation by Decreto Legislativo 19 agosto 2005, n. 195, "Attuazione della direttiva 2003/4/CE sull'accesso del pubblico all'informazione ambientale". Directive 2003/98 on the re-use of PSI has been implemented by the Act of 24 January 2006, n. 36, "Attuazione della direttiva 2003/98/ce relativa al riutilizzo di documenti nel settore pubblico". The Codex for Digital Administration (Codice dell'Amministrazione Digitale), previously mentioned, was then updated to be consistent with the implementation of the PSI Directive. The Codex foresees, in a generalized way, that any data managed by a public administration, with limited exceptions and whilst respecting personal data protection rules and for reasons of public security and national defense, can be accessed and re-used by any other public administration for the execution of their tasks, and this without any costs (excepted if "exceptional costs" may occur). However, Article 9, paragraph 8 states that data "may" be in a form preventing their re-use for commercial purposes. Paragraph 8 foresees the possibility of derogating from the free data and services offered and ensures that public authorities may, for reasons of self-funding, ensure access on payment of fees from users.

Art. 10 states guaranteed free access, exchange and then re-use of environmental data and related services between public authorities, without new or increased burden on public finances, precluding any limitation and obstacle to let this happen. For spatial data sets

already acquired, the date of entry into force of the decree, under conditions of license, public authorities are authorized to provide data sets and services provided for the second license. Even here, however, it is possible to derogate from the gratuity and, through appropriate orders to be issued, public authorities can be authorized to levy charges for the provision of spatial data to other public authorities.

The European Commission made a complaint against Italy by a letter of formal notice for not transposing the directive correctly. Early 2010, the Italian authorities announced changes to the law, in order to make it compliant with the directive. The law is currently under consideration by the Parliament.

The decree of the Director of the “Agenzia del Territorio” : decree November 13th, 2007 is available on the website of DigitPA at URL http://www.digitpa.gov.it/sites/default/files/normativa/Decreto%2013_11_2007.pdf states that the cadastral database, including administrative, cadastral, graphic and map information related to all cadastral parcels, are made available to Public Administrations. The decree defines the way Public Administrations can use cadastral data in accordance with the laws on privacy and on the re-use of data and cadastral information. Access to cadastral data is free of charge, except for exceptional costs if any related to the implementation and supply of special services related to special needs.

2.3.4 Legal protection of GI by intellectual property rights

The Italian Copyright Act of 1941 has been amended several times throughout the years. The Database Directive 96/9/EC was implemented into Italian law by Decree no. 169 of 6 May 1999. Legislative Decree No. 68 of 9 April 2003 has implemented Community Directive No. 2001/29 on the harmonization of certain aspects of copyright and related rights in the information society. The Decree came into force on 29 April 2003.

No copyright exists in the texts of official acts of the state or public administrations (e.g. laws and judicial decisions). The State and local government can however be copyright owners of works created and published under their name, account and at their expense. But it only enjoys a 20-year period of protection on its own creations. The state may of course renounce the right to royalties if it wishes to assure maximum public access.

Photographs that are original are subject to normal copyright. All other photographs are covered by article 88 of the Copyright Act. The photographer has the exclusive right to reproduce, publish and sell the photographs taken by him or her. The exploitation right on non-original photographs lasts twenty years after production.

2.3.5 Restricted access to GI further to the legal protection of privacy

The Italian Data Protection Act of 1993 was updated by Act no. 675 of 31 December 1996 (*Tutela delle persone e di altri soggetti rispetto al trattamento dei dati personali*) to comply with European Directive 95/46/EC. This Act entered into force on 8 May 1997.

Italy has transposed Directive 2002/58 on privacy and electronic communications in 2003.

2.3.6 Licensing framework

No information has been found nor provided.

2.3.7 Funding model and pricing policy

National funding stems from the Treasury, the Ministry of Environment, Land Protection and Sea and some European Structural funds. The initiative is now also framed within the e-Government policies coordinated by the new Ministry for Technological Innovation. Cost recovery exists, but is only a minor source of financing.

The Istituto Geografico Militare sells maps online and provides online access to data, A complete catalogue of products, the conditions of use, and the conditions for becoming a reseller are available on <http://www.igmi.org/vendite/index.php>. Every cartographic institution is currently ruled under a specific normative system and the distribution of the data only happens under payment both for public administrations and for the private sector. Amongst public administrations participating in the agreement of the year 2000 the data are however exchanged without any fees, while those outside the agreement are encouraged to participate by publishing their own data, in exchange for access to existing databases. Citizens and the private sector are allowed free access for consultation (viewing) but not for downloading.

Regions are collecting their data mainly with their own resources and some of them made accessible those both through the Italian GeoPortal and providing direct access. Some regions are giving free access to the data whereas other are still require some cost recovery.

2.3.8 Conclusions of Component 2

The INSPIRE Directive has been transposed into National Legislation.. No changes on the PPP initiatives have been found. There is a general law for cost-free access to PSI (Act no. 241 of 7 August 1990) that provides for general access to government documents, although access in many cases depends on the existence of a legal interest. It is unlikely that private companies will be permitted access if their interest relates to the commercial exploitation of information. The specific conditions for access are regulated by the Ministry involved. Access to cadastral data is free of charge, except for exceptional costs if any related to the implementation and supply of special services related to special needs. National funding stems from the Treasury, the Ministry of Environment, Land Protection and Sea and some European funds.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or – development
- There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects (No)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector
- GI can specifically be protected by copyright (No Information found)
- Privacy laws are actively being taken into account by the holders of GI (No Information found)
- There is a framework or policy for sharing GI between public institutions
- There are simplified and standardised licences for personal use (No Information found)
- The long-term financial security of the SDI-initiative is secured (Partially)
- There is a pricing framework for trading, using and/or commercialising GI (No)

2.4 Component 3: Data for themes of the INSPIRE annexes

2.4.1 Data sets of different resolutions covering the INSPIRES and other themes

Production of (digital) topographic maps and derived products at scales 1:25.000 and smaller is the mandate of IGM. The most up-to-date product is the 1:50.000 map series and database. Temporal heterogeneity of the map sheets is large.

Topographic (Technical) and derived maps at scales 1:10.000 and 1:5000 are produced under the authority of regions, provinces, counties and municipalities.

Cadastral maps are at scale 1:2.000 to 1:1.000 and are produced by the local authorities with a strong coordinating role for the Agenzia del Territorio, the new Cadastral Agency.

As a consequence of the *GIS Agreement*, geodatasets produced at various levels are now being harmonized while new data are produced increasingly according to common technical specifications enabling operational seamless integration.

Currently there are several digital spatial databases at different scale levels coming from different partners (at different levels) of the NSDI:

- A database with fundamental reference layers at scale 1:10.000. Vectorial layers include the administrative boundaries, hydrological grid and watersheds, railways and road network, urban centres and residential areas. In addition a gazetteer is available for the whole territory. The objective is to have the whole territory at this scale by 2006;
- Large scale maps in digital form will be available for around 10% of the territory at scales between 1:1.000 and 1:2.000, covering the main population centres. As is the case for the 1:10.000 database, basic layers are integrated including the road and river network, the geodetic framework and the administrative boundaries;
- Since 1986, a program was set up to digitize the cadastral map sheets (310.000). By 1993, 27% was done and since then the work proceeded (the exact figures of the status were not found in the literature) progressively, including some local surveys from which the digital information is included in the system;
- A Digital terrain Model (implemented using TIN data model derived from topographic digital maps 1:10.000 – 1:2.000);
- A geodetic network of reference points of the IGM. The IGM is also responsible for the 1:25.000 and 1:50.000 topographic maps and the small scales;
- Raster topographic maps at scale 1:10.000, 1:25.000 and 1:100.000;
- Orthoimagery, B/W as well as colour at scale 1:10.000 and at scale 1:2.000 for the most important cities. Aerial photo's and satellite are available exist as well;
- The National Statistical Institute (ISTAT) provides a lot of social-economic data at municipal level (including population figures), up-to the census track level (infra-communal).

Depending on the region, also other databases (and/or maps) are available. In the region of Emilia-Romagna for example, there are datasets available on geology, soil, land-use and land-cover, etc.

The information layers advertised by the National Digital Mapping Portal in Spring 2003 are:

<i>Information layer:</i>	Gray tones Digital orthophoto
<i>Features:</i>	256 gray tones / 8 bit resolution 1 meter per Pixel
<i>Coverage:</i>	National
<i>Utilization:</i>	

Digital orthophotos allow a direct territorial representation as it allows the user an immediate and realistic visualisation of the territory. Due to the complexity and detail this

data can be used as cartographic reference base for the control and updating of the vectorial information layers: road network, forests. Coastal lines, etc. Furthermore the possibility of immediate representation of the territory makes this data very useful as cartographic base for the visualisation of thematic maps. Digital orthophotos provide information about the real status of territory when filmed by airplane. The comparison between Digital orthophotos, filmed at different times, is useful for the analysis of geomorphology and evolution of human settlements.

Information layer: **Colour Digital orthophoto**
Features: 16 million colours / 24 bit;
 resolution 1 meter per Pixel
Coverage: National
Utilization:

Same as Gray tones Digital orthophoto.

Information layer: **Regular Grid Digital Terrain Model**
Features: Step 20 meters
Coverage: National
Utilization:

The three-dimensional numeric representation of the surface allows the complete altimetry characterisation of the territory as well as a detailed morphological description.

The digital model of the terrain is useful for territorial analysis where the height of the terrain, or its derived representation such as clivometrics, is very important information to be acquired. This information is the basis for studies on the valuation of hydrological risk, environmental impacts, etc.

Information layer: **Administrative Data and Boundaries**
Features: Up to the census sections
Coverage: National
Utilization:

The administrative limits surround the territorial area of various government bodies such as: Regions, Provinces, Communes, Coastal authorities, Mountain Communes, etc.

The statistical data associated to such areas, derived from population and industrial censuses, allow carrying out demographic, socio-economic, territorial vulnerability studies.

Information layer **Toponomastic**
Features: Toponyms derived by IGM maps 1:25000 organized in databases
 and vectorial entities
Coverage: National
Utilization:

The toponomastic information contributes, in an essential manner, to the synthetic representation of the territory, as it provides information on names of places or other cartographic elements enabling their immediate identification.

The structure of the information layer furthermore allows the search and identification of areas, places or single elements on the basis of their name and not of their geographical position.

Information layer: **Coastal and Lakes Line**

Features: Digital Orthophoto

Coverage: National

Utilization:

Shoreline is useful for change detection analysis and erosion risk analysis.

Information layer: **Digital IGM Paper-based Cartography 1:25.000**

Features: 256 colours / 8 bit;
resolution 2.5 meters per pixel

Coverage: National

Utilization:

Traditional IGM cartography implemented as a continuous information layer of all the national territory, thereby giving a synthetic representation of the essential topographic character of the territory. The use of cartographic symbols allow the identification of specificities connected to the territory or to the infrastructure that are not easily identifiable from the orthophotos found in the underground as well as supplying quantitative and descriptive information such as altitude, etc.

Information layer: **Digital IGM Paper-based Cartography 1:100.000, 1:250.000, 1:500.000**

Features: 256 colours / 8 bit;
resolution 10, 25, 50 meters per pixel

Coverage: National

Utilization:

The broad vision allowed by traditional cartography allow for the immediate identification of very important territorial information. The synthetic representation of the territory from such cartography is therefore adequate for the analysis and visualisation of the information layer at regional or national scale.

Information layer: **Digital Vector Terrain Model (TIN)**

Features: Derived by CTR data or IGM 1:25000

Coverage: 7 regions (National)

Utilization:

The digital model of the terrain, in triangular and irregular mesh network allows, in comparison to the regular network, a visualisation of the terrestrial surface in greater detail.

This is especially true for those terrains which have a great deal of morphological irregularity. High positional accuracy of these models makes them useful for detailed analysis like hydraulic hazard analysis, intervisibility analysis, RF impact maps, etc.

Information layer: **Street network**
Features: Vectorial graph adapted to the orthophoto
Coverage: National
Utilization:

The road network, improved in location precision through orthophotos head up digitizing and structured in a vectorial network GIS layer, allows carrying out studies on territorial viability, optimization of the routes to take in case of natural disasters for civil protection, as well as studies on the vulnerability of the infrastructure.

Information layer: **Three-dimensional Vector Model of buildings**
Features: High resolution urban maps, provided with base quote, roof quote, and building civic numbers.
Coverage: Provincial and Regional main cities
Utilization:

The vectorial detailed information of the main urban centres allows for a precise modelling of the constructed areas. On the basis of this information it is possible to conduct detailed urban studies. From this information it is also possible to derive the volume of buildings and generate high precision localisation digital terrain models.

The next tables give an overview of the organisations/stakeholders providing data sets covering the 34 themes of the INSPIRE annexes.

AdT	Agenzia del Territorio
AGEA	Agenzia per le Erogazioni in Agricoltura
AIMA	Azienda di Stato per gli interventi nel Mercato Agricolo
APAT	Agenzia per la Protezione dell' Ambiente e per i servizi Tecnici
CIGA	Centro Informazioni Geotopografiche Aeronautiche
CFS	Corpo Forestale dello Stato
CISIS	Centro Interregionale per i Sistemi Informatici Geografici e Statistici
CNR	Consiglio Nazionale delle Ricerche
Comuni	Riferimento ai Comuni d'Italia
COTIR – Abruzzo	Consorzio per la sperimentazione e la divulgazione delle Tecniche Irrigue - Abruzzo
DPC	Dipartimento della Protezione Civile
IGM	Istituto Geografico Militare

IIM	Istituto Idrografico della Marina Militare
INEA	Istituto Nazionale di Economia Agraria
INGV	Istituto Nazionale di Geofisica e Vulcanologia
ISTAT	Istituto Nazionale di Statistica
MATTM	Ministero dell' Ambiente e della Tutela del Territorio e del Mare
MBAC	Ministero per i Beni e le Attività Culturali
MIPAAF	Ministero delle Politiche Agricole Alimentari e Forestali
Regioni	Riferimento alle Regioni italiane e alle province autonome di Trento e Bolzano

The national geoportal (<http://www.pcn.minambiente.it>) gives access to 77 spatial data layers e.g. administrative boundaries, transport networks (road and train networks), etc.

2.4.2 Geodetic reference systems and projections

One reference system is used as the Geodetic Reference Cartographic System: UTM, zones 32 and 33 with WGS 84 as the geodetic datum. There exist some conversion algorithms to transfer data from former systems of the IGM into the new reference system. In this respect Roma40 and ED50 (INTESA) are mentioned. Cadastral data are still available in Gauss Boaga or local systems (with local projection centres).

For presentation purposes the Gauss Boaga projection system is sometimes used.

The spatial characteristics of the objects on the topographic maps are described in detail ("INTESA/WG01, Specifiche per la realizzazione dei Data Base Topografici di interesse generale). Some of the INTESA documents adopted draft versions of the ISO standards (when available) but they are not 100% compliant.

2.4.3 Quality of the data

The GIS Agreement foresees common technical specifications ("capitolato tecnico") to be adopted by all Public authorities in their call for tender to collect data of comparable quality: ' Art 1 : construction of the repertoire of basic information about the wealth of knowledge available in the form of paper (maps, orthophotos, photogrammetric flights, digital footage from aircraft or satellite), in numerical form and organized into logical information system, with characteristics to ensure the update in time, management and quality control of data by the parties involved'; Some Regions already adopted and used such common technical specifications for recent tenders. On the website of the GIS Agreement , it is described that all aspects of quality assessment should be envisaged: meta-information, precision, completeness, ...

With reference to the Digital Administration Code (Art. 59 Dati Territoriali) DigitPA (the National Agency for the scanning of Public Administration) publishes guidelines, standards, technical rules on its website on the quality of ICT goods and services which are valid for all Public Administrations, central and local and has set up different working groups for the implementation of the Digital Administration Code.

The Committee for Technical Rules on Geographic Information” (CTSGL, “Comitato per le regole tecniche sui dati territoriali delle Pubbliche Amministrazioni”) defines technical rules and recommends the use of standards to ensure the quality of spatial datasets http://www.digitpa.gov.it/sites/default/files/comitato_tabella_attivita_20101118.pdf

The Legislative Decree no. 32, 27/01/2010 which transposed the INSPIRE Directive 2007/2/EC provides guidelines and recommendations for quality measures.

2.4.4 Interoperability and harmonisation of data

The Digital Administration Code deals with interoperability and provides guidelines, technical rules and recommendations e.g. open standards published on the website of DigitPA.

The legislative Decree no. 32, 27/01/2010 transposed the INSPIRE Directive 2007/2/EC provides the definition of interoperability especially in the ways in which public authorities must **make spatial data sets available compliant with the provisions adopted at Community level**. If they are not compliant, the public authorities themselves need to adapt their spatial data sets or alternatively put in place appropriate conversion services, inter alia, as defined by the Decree art. 7, paragraph 1, letter d.

Also here are defined deadlines:

1. The public authorities shall make spatial data sets collected from scratch and / or reworked extensively and their counterparts available within two years after the adoption of Community provisions .
2. The public authorities make the remaining spatial data sets available and services shall still be in use within seven years after the implementation of those Community provisions .

2.4.5 Language and culture

The information available on websites and in publications is mainly/mostly available in Italian. International presentations and publications are in English.

Some websites are multi-lingual e.g. the national geoportal: Italian and French (<http://www.pcn.minambiente.it/PCN/index.php?lan=en>), TELEGIS laboratory: Italian, English, French and Portuguese and the site of the Sud Tyrol <http://www.provincia.bz.it/> Italian, German, Ladin (dialect) and English, Metadata Catalog of the geonetwork established by ANCI the and Ministry of Environment, Land Protection and Sea (<http://cart.ancitel.it/catalogometadati/srv/it/main.home>): Italian and English. Many Regional geoportals are multi-language.

2.4.6 Conclusions of Component 3

Spatial datasets covering most the 34 themes of the INSPIRE Annexes are available while the geodetic reference system and projection systems are standardised, documented and interconvertable.. Quality, harmonisation and interoperability are dealt with thanks to the Digital Administration Code and Legislative Decree transposing the INSPIRE Directive into National legislation. Most websites, geoportals and services are mainly in Italian.

Based on these conclusions we score the indicators as follows:

- Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components
- The geodetic reference system and projection systems are standardised, documented and interconvertable
- There is a documented data quality control procedure applied at the level of the SDI Partially
- Concern for interoperability goes beyond conversion between different data formats
- The national language is the operational language of the SDI
- English is used as secondary language (No)

2.5 Component 4: Metadata

2.5.1 Availability of metadata

Metadata of spatial and environmental data are made available via the National Geospatial Metadata Catalogue (RNDD) set up at DigitPA by art. 59, paragraph 3 of the Digital Administration Code and by MATTM and ANCI at the geoportal 'Il Portale delle Valutazioni Ambientali.

The Committee for Technical Rules on Geographic Information has approved the draft "Regulations on technical requirements for the content of the RNDD and the procedure of first setting up and updating of the same".

<http://www.digitpa.gov.it/altre-attivit%C3%A0/repertorio-nazionale-dati-territoriali>

2.5.2 Metadata catalogues

The National Geospatial Metadata Catalogue (RNDD) is the national catalog of metadata for spatial data sets and services already set up at DigitPA by art. 59, paragraph 3 of the Digital Administration Code and confirmed by the Legislative Decree transposing the INSPIRE Directive.

The Ministry of Environment, Land Protection and Sea (MATTEM) and the National Association of Local Municipalities (ANCI) have set up a geoportal providing access to a metadata catalogue of spatial and environmental data as indicated by the standards set by national and international standards and regulations (Directive 2007/2/EC INSPIRE D.Lgs.32/2010). The Geonetwork-catalog contains data prepared by the Municipalities under the various project initiatives MATTEM-ANCI and environmental management and spatial data for environmental assessments of MATTEM. The very elaborated metadata catalogue allows for a simple search, advanced search and mapping result: <http://cart.ancitel.it/catalogometadati/srv/it/main.home>

SINAnet, the National Environmental Information System set up and managed by ISPRA since the late 1990s provides a metadata catalogue which gives access to environmental datasets made available by the public authorities e.g. air quality, atmospheric emissions, soil etc...

Metadata on other geodatasets available at various institutions are catalogued to various extents. Regional geoportals like SISTR-IDT apply and use the ISO19115 metadata standard and the DigitPA guidelines.

Most of the regional geoportals contain well-established metadata catalogues; Some examples (<http://www.centrointerregionale-gis.it/Script/CartoRegionali.asp>):

- Infrastruttura Informazione Territoriale -Geoportal of Lombardia (<http://www.cartografia.regione.lombardia.it/geoportale/ptk>)
- Infrastruttura dei Dati Territoriali del Veneto - Catalogo dei Dati: <http://idt.regione.veneto.it/app/metacatalog/index?deflevel=1>
- Metadati at the geoportal of Valle d'Aosta (<https://geoportal.partout.it/geonetwork/>)
- Geoportal of SISTR-IDT, Sardinia (<http://www.sardegnameoportale.it/>)

Regione Siciliana – SISTR, Infrastruttura Dati Territoriali, <http://www.sitr.regione.sicilia.it/geoportale>

2.5.3 Metadata implementation

The National Geospatial Metadata Catalogue (RNDD) is monitored by the MATTEM and ISPRA: every six months they verify that the process of defining and populating the

metadata of is done in line with the development of national infrastructure for spatial information and environmental monitoring.

The MATTM and ANCI have set up a geoportal providing access to a metadata catalogue of spatial and environmental data as indicated by the standards set by national and international standards and regulations (Directive 2007/2/EC INSPIRE D.Lgs.32/2010).

The regional geoportals are supported and monitored by the Interregional Center for Information Systems, Geography and Statistics (Centro Interregionale per i Sistemi informatici, geografici, statistici – CISIS) which is a voluntary association and which holds Permanent Committees for Information Technology, Statistics and Geographic Systems - CPSG; CISIS plays an important role e.g. it developed the first prototype publishing data available in the Italian Regions.

Art. 4 of the Legislative Decree transposing the INSPIRE Directive deals with the precise conceptual definition of metadata (as already referred to by the Digital Administration Code, Art. 59, par.5). A timetable is provided according to which:

1. Public authorities have produced, maintained or updated spatial data sets corresponding to the themes listed in Annexes I and II⁵ of the Decree will have to provide metadata about these spatial data sets by December 24, 2010 .
2. Public authorities have produced, maintained or updated spatial data sets corresponding to the themes listed in ' Annex III will provide metadata about these spatial data sets by December 24, 2013 .
3. The public authorities that produce, manage or update the spatial data sets corresponding to the themes mentioned in the Decree itself, will update the metadata for spatial data sets and services corresponding or within ninety days of testing, validation and adoption of the sets New or updated spatial data.

Annex IV are instead defined the technical requirements for the metadata itself:

1. Metadata structure for spatial data.
2. Metadata common to all types of spatial data.
3. Additional metadata for raster data.
4. Metadata services.
5. Dictionary of metadata.
6. Dictionary of metadata for spatial data.
7. Lists of values for metadata for spatial data.
8. Dictionary of additional metadata for raster data.
9. Lists of values for the additional metadata related to raster data.
10. Dictionary of metadata for services
11. Lists of values for the metadata for the services.

⁵ The Annexes I, II and III of the Decree deal with identifying the themes of spatial data for which metadata are to be established accomplished in art. 4 within the deadline indicated.

http://www.centrointerregionale-gis.it/Distribuzione/2010/manuale_lavoro.pdf

2.5.4 Conclusions of Component 4

Metadata are produced for the geodatasets of the themes of the INSPIRE annexes. With The National Cartographic Portal and the new regional activities the metadata production is established. The National Geospatial Metadata Catalogue (RNMT) is a component of a wider organization ranging from an infrastructure for data sharing to the requirements for the production of new data.

Based on these conclusions we score the indicators as follows:

- Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes
- One or more standardised metadata catalogues are available covering more than one data producing agency
- There is a coordinating authority for metadata implementation at the level of the SDI

2.6 Component 5: Network Services

2.6.1 Geoportal

The Legislative Decree no 32/2010 was designed to implement the INSPIRE Directive defining that all public administrations dealing with geographic data have to make these data available by means of a geo-portal providing the procedures for services and standards.

In addition, as required by European Directive on the reuse of governmental data and recent national legislation on guidelines for websites for the Public Administrations, it is necessary that the website of a governmental authority explains its content (geographic data, procedures or text documents) in open formats and free, as far as possible using the principles of open licences.

The geoportals are set up compliant with ISO19115 and DigitPA (formerly CNIPA) standards and guidelines.

The national geoportal 'Portale Cartografico Nazionale' (<http://www.pcn.minambiente.it/PCN/>) aims also to be the INSPIRE national geo-portal. At the moment it is addressing information provided partly from the Ministry of Environment and some public administrations (e.g. Water Districts.) but it will be the point of access for the metadata catalogue, network services, and of the environmental information system. The system will address the broader NSDI that will include also datasets not required by INSPIRE (e.g. for different scales). Currently around 69 datasets

are discovered in the geoportal and 50 of which can be used with WMS, WFS or WCS, 2D and 3D cartography.

The MATTM and ANCI have set up a geoportal called: 'Il Portale delle Valutazioni Ambientali' (portal for environmental assessment) <http://www.dva.anci.it/> providing access to :

Catalog spatial and environmental data : contains the catalog of spatial data and environmental metadata as indicated by the standards set by national and international standards and regulations (Directive 2007/2/EC INSPIRE D.Lgs.32/2010). The catalog contains data prepared by the municipalities under the various project initiatives MATTM-ANCI and environmental management and spatial data for environmental assessments of MATTM. It contains spatial layers at regional and/or local level on Habitats, Boundaries, Climatology, Economy, Elevation, Environment, Farming, Geoscientific information, Health, Imagery base maps, Earth Cover, Inland Waters, Military maps, Location, Oceans, Cadastre, Society, Structure, Transportation, Utilities Communication.

Mapping project : it contains a complete list (249) of mapping projects carried out by the municipalities and those involved in the various project initiatives MATTM-ANCI and collaborations with the DVA-MATTM. From the map you can see projects through Web-GIS viewer, search and query the data associated with layers of information, upload data via WMS and WFS services.

Databases, documents, web resources : includes databases, documents and web resources that the municipalities are members of the various project initiatives MATTM-ANCI, decide to share internally or with other parties. The system used (SILOS) to enable individual communities to collect and metadocumentare all documents of interest to the sharing of spatial data and environmental issues.

The SINAnet network or the infrastructure of the National Environmental Information System, set up and managed by ISPRA since the late 90s. With the aim to make relevant information for the analysis of environmental policies and policies or activities which may affect the environment available, public authorities should provide ISPRA All necessary information to ensure the interoperability of spatial data sets and environmental monitoring and related services provided under the public system of connectivity and cooperation, according to the technical rules defined by the decrees referred to ' art. Article 59, paragraph 5 of the Digital Administration Code.

SINAnet gives direct access to databases, maps and GIS mapping (<http://www.sinanet.isprambiente.it/en>).

Most Regional geoportals are very well established providing a metadata catalogue, download service, 2D and 3D navigators, coordinate conversion tools, WMS, WFS, Interoperability services (W3C Web services and OGC Web Services), Open Source Software etc..

Example: the region of Sardinia (SITR-IDT) has developed a regional portal that includes standard services for geographical data access and publication.

There are two main groups of services in SITR-IDT:

- **application services**, having the specific capability of connecting the data to the applications using it (usually on the WEB). Specifically, this service grants the geographical data publications by mean of web services (WMS, WFS) and the relative metadata through the catalogue services (Metadata Catalogue ISO19115 and Feature Catalogue ISO 19110).
- **applications**, i.e. services with a human interface directly accessible through the Regione Sardegna Geoportal – www.sardegнатerritorio.it .

Throughout the Regione Sardegna Geoportal the following services are accessible:

1. **View** service: several simple and advanced cartographic navigators are available, that display basic cartography, such as aerial photographs, orthophotos, topographic databases, thematic maps. The OGC WMS services are also available, for map visualisation.
2. **download** service: when storing the dataset in the DB Unico through the ETL procedure, the data are compressed and archived in the file system. The compressed data can be retrieved from the system through a download service via web. Besides, an OGC WFS (Web Feature Service) is available, allowing a client to retrieve geospatial data.
3. **transformation** service: an important service for map reprojection of data in .GML and .SHP format, based on the IGM (Istituto Geografico Militare) grids including the most commonly used Italian and European geographical systems. The OGC WFS service applies an on the fly geographical system transformation to the data when locally downloading them.
4. **discovery** service: this service allows the metadata publication on the Internet forming the Catalogue of the Regional geographical data. It uses different modality for the searching (spatial, key words, data owner, date of data creation, ISO category, etc.) and gives the possibility to search the metadata datasets according to the ISO19115 and to download the related xml.

Furthermore, INSPIRE web services have been implemented and are freely accessible from the website:

Navigation:

Several cartographic navigators in 2 or 3 dimensions have been created, customized according to the different possible users; they are accessible from the page <http://www.sardegнатerritorio.it/j/v/275?s=6&v=9&c=1937&na=1&n=6&b=1> .

Download:

a service to make available all geographic data by direct download is available: <http://www.sardegnageoportale.it/catalogodati/download/>

Conversion:

a web application for converting data between different reference will be soon published on the web site; a work-in-progress version is at the moment accessible at http://webgis.regione.sardegna.it/raswebconverter/index?stato_quale=punto and http://webgis.regione.sardegna.it/raswebconverter/index?stato_quale=file;

Catalogue:

a Regional Catalogue of all geographic data of the Region, fed with metadata of all territorial data, has been created. It is available at <http://webgis.regione.sardegna.it/catalogodati/ricercaavanzata> and it allows searching for all the geographic data published by the Region of Sardinia. Its search criteria partially comply with the INSPIRE directive.

All geographic data present in the database are also accessible through the interoperability OGC services WMS (Web Map Service) and *WFS* (Web Feature Service). They allow viewing and downloading data of the SITR-IDT database by using a GIS client desktop or a WEB GIS application compliant to the OGC international standard.

The links for operating the interoperability connection are available at <http://www.sardegнатerritorio.it/j/v/239?s=6&v=9&c=2871&na=1&n=10>.

In 2010, the Portal of the Geological Survey of Italy and of Friuli Venezia Giulia Won National Award for Geographic Information 2010

2.6.2 Network services

This is the backbone of the entire national IDT as defined and designed by the Decree. Art. 7 are in fact identified:

1. research services that allow you to find, through RNDT , sets of spatial data and services on based on the contents of the corresponding metadata and view the contents of the metadata;
2. view services making it possible to perform the following operations: view, navigate, display scale (zoom in and zoom out), change in the portion of land framed (pan) or overlay viewable spatial data sets and visualization legends, and the information contained in any relevant content of metadata;
3. services for downloading (download) data that will enable you to download copies of spatial data sets or portions thereof, and, where practicable, accessed directly;
4. transformation services that enable to transform the spatial data sets in order to achieve interoperability;
5. Services allowing spatial data services to be invoked.

The services must be easily and freely usable by the public, available and accessible via the Internet or other means of telecommunication. Another important concept concerns the search capabilities of the services listed above, which must include:

1. keywords;
2. classification of spatial data and services relating thereto;
3. the quality and validity of spatial data sets;
4. the degree of compliance with the implementing rules adopted at Community level;
5. geographical location;
6. conditions applying to access and use of spatial data and services relating thereto;
7. public authorities responsible for the establishment, operation, maintenance and distribution of spatial data sets and services related to them.

SIGMA TER (Servizi Integrati catastali e Geografici per il Monitoraggio Amministrativo del TERritorio) is an inter-regional e-government project aiming at providing integrated cadastral information to the public and private stakeholders by using a standardized approach within a distributed and service oriented environment. An architecture based on services has been developed. There are services with cadastral information (18), metadata services (8), download services (4), gazetteer services (9) and services with fiscal information (5). General purpose applications were developed for: map browsing, municipal tax, cadastral data access, fiscal certifications, urban development certifications, house purchasing, housing permits, environment authorization, farm funding and more general metadata search and export.

2.6.2.1 Discovery services

The national geoportal, environmental geoportal, geological geoportal and all regional geoportals provide access to metadata catalogues.

<http://csw.nsd.it> (Catalogue Services)

2.6.2.2 Viewing services

In general, all geoportals on-line (national geoportal, environmental geoportal, geological, regional) give access to map viewing services.

The portal of the Geological Survey of Italy, Department of Soil, gives access to the databases of the Italian territory in the themes of Earth Science.

<http://sgi.isprambiente.it/geoportal/catalog/main/home.page>

<http://sgi.isprambiente.it/geoportal/catalog/main/home.page>

<http://sgi.isprambiente.it/geoportal/catalog/content/wmservice.page>

Regional viewing services

Abruzzo: <http://www.regione.abruzzo.it/xcartografia/>

Basilicata: <http://sirfo.regione.basilicata.it/geonetwork/srv/es/main.home>

Calabria:

<http://pr5sit.regione.calabria.it/web/pr5sit/home;jsessionid=50CCFA25997DE3FE8472A9E477293B3E> Campania: <http://sit.regione.campania.it/>

Emilia Romagna: http://geo.regione.emilia-romagna.it/catalogo_web/catalogo

Regione autonoma Friuli Venezia Giulia: <http://www.regione.fvg.it>

Lazio:

http://www.urbanisticaecasa.regione.lazio.it/cartografia_on_line/www/ric.asp?cat=1

Liguria: <http://www.cartografia.regione.liguria.it>

Parco Nazionale della Majella (progetto GISST): <http://www.gisst.eu/mappe/>

Toscana: <http://geoportale.lamma.rete.toscana.it/geonetwork/srv/it/main.home> Marche:
<http://cartografia.regione.marche.it>

Molise: <http://151.99.174.16/ctr/index.html>

Piemonte:

<http://www.sistemapiemonte.it/sitad/home.do?interfaccia=sispie&authType=guest>

Puglia: <http://www.cartografico.puglia.it/cartomdb/>

Trentino – Alto Adige: <http://www.siat.provincia.tn.it/>

<http://www.protezionecivile.tn.it/frame.asp?Site=6>

Umbria:

<http://www.umbriaterritorio.it/scripts/sisterims.dll?Run?svr=server21&Func=open&map="Mappa%20di%20Ricerca"&html>

Lodi: <http://cartografia.provincia.lodi.it/>

Liguria: www.cartografia.regione.liguria.it

The Catalogue Mapping Project (Web GIS) of the geoportal set up by the MATTM and ANCI, gives access to 249 different projects (UTM and Geographical coordinates) carried out by the municipalities. The Web-GIS viewing service allows also to insert WMS and WFS services (<http://cart.ancitel.it>).

2.6.2.3 Download services

M&R Report for 2010 reports 66 download services.

The SILOS website (environmental geportal (MATTM-ANCI) provides is the tool that allows participating municipalities to collect, review and publish all official documents and online resources relating to environmental monitoring. <http://www.silos.ancitel.it/SilosRisorse/Login.aspx>

Download services are provided by for example the Region of Abruzzo: Webserver for Global Navigation Satellite System-Reference stations, Region of Calabria: paid download services for aerial photography, mapping products, and geospatial databases owned by the Calabria Region, Region of Lombardia: download service for Geographical data (vector and raster data).

Abruzzo:

<http://www.regione.abruzzo.it/xcartografia/index.asp?modello=geodesiaInterno&servizio=xList&stileDiv=mono&template=default&msv=geodesia>

Lombardia: <http://www.cartografia.regione.lombardia.it/geoportale>

Sardegna: <http://www.sardegna.geoportale.it/catalogodati/download>

Regione Umbria Univ.Perugia: <http://labtopo.ing.unipg.it/labtopo/index.php>

Regione Veneto:

<http://www.regione.veneto.it/Ambiente+e+Territorio/Territorio/Sistema+Informativo+Territoriale+e+Cartografia/Accedi+al+GeoPortale.htm>

Provincia Autonoma di Bolzano: www.provincia.bz.it/urbanistica/cartografia/download-cartografia.asp

Umbria: <http://labtopo.ing.unipg.it/labtopo/index.php>

Veneto:

<http://www.regione.veneto.it/Ambiente+e+Territorio/Territorio/Sistema+Informativo+Territoriale+e+Cartografia/Accedi+al+GeoPortale.htm>

2.6.2.4 Transformation services

The geoportal of Lombardia provides access to a coordinates transformation service,

Services like download and GIS database transformation service and a conversion service from shapefile to another format are provided by the geoportal of the Region of Campania.

<http://wfs.nsd.it> (WFS Services)

2.6.2.5 Invoking services

The 'Catalogo Progetti Cartografici' - Web GIS viewer of the MATTM-ANCI geoportal, allows the invoking of WMS and WFS services.

2.6.2.6 Spatial data services and other services

The national geoportal for reference data is developed by the Ministry of Environment, Land Protection and Sea and is available online (<http://www.pcn.minambiente.it/PCN/>) providing: 2D and 3D Cartography:

- Black and white and colour photo;
- IGM cartography;
- Digital model of landscape;
- toponyms;
- Administrative limits;
- Protected areas;
- Soil description;
- Plan of territory;
- Sea bathymetric;
- Coastal erosion risk;
- Physical map of coast;
- railways;
- Orthophoto dates;
- Geologic data;
- CORINE Land Cover.

As also WMS, WFS and WCS services.

During the last years, the Italian Ministry of Environment, in collaboration with ANCI, the National Association of Local Municipalities, has set up a system of projects, among which the one called "Ambiente in Comune" that provides both a national catalogue with spatial datasets and services, and a view service, including WMS and WFS tools, tested with INSPIRE geoportal. All services have been designed according to the international

OpenGis standards. The datasets used in these analyses are shared through the Metadata Catalogue (<http://cart.ancitel.it/catalogometadati>) and different web service as WMS and WFS as well as web visualization of all the 249 projects – the Catalogue Mapping Project (<http://cart.ancitel.it>).

Furthermore, SILOS, is a web portal for data publishing and sharing of document and databases. Also in the case of documents, metadata (following Dublin Core) are included, in order to facilitate search and evaluation of available documents.

The Ministry of Heritage and Culture has signed a Memorandum of Understanding with the Ministry for the Environment, Land and Sea to join through the National Information Infrastructure National Geoportal.

2.6.3 Use of software

2.6.3.1 Open Source software for access services

Referring back to the Legislative Decree no 32/2010 that implements the INSPIRE Directive: it defines that all public administrations dealing with geographic data have to make these data available by means of a geo-portal providing the procedures for services and standards. Additionally, as required by European Directive on the reuse of governmental data and recent national legislation on guidelines for websites for the Public Administrations, it is stated that the website of a governmental body explains its content in open formats and free, as far as possible using the principles of open licences.

An example is the Geoportal of Emilia-Romagna which is build entirely with open source technology: Plone, OpenLayers, Ratman, web services are OGC and ISO compliant WMS, WFS, WCS, Catalog Service - Web (CS-W). Integration with the CMS- Moka GIS to access existing applications or enable detailed mapping analysis,. The decision to base the system of publication of the geospatial data of the Emilia-Romagna on open standards, Open Geospatial Consortium (OGC) and International Standardization Organization (ISO), means that the Regional Administration is counting on an interoperable platform for sharing their data both internally and with third parties in a manner consistent with the requirements of the INSPIRE directive.

Moka is a tool to create applications using GIS objects (maps, themes, legends, database functions) arranged in a shared catalog.

Objects can be used in applications of various types that , at the time of their use, are built dynamically based on the characteristics and set of user profiles, so users with different profiles can access the same application by providing, for example, maps and features different. The system is a CMS (Content Management System) GIS since it allows, to an occasional user of the software development environments, manage and organize the contents of GIS applications.

Moka is configured as a tool to organize the Territorial Information System of a Service, an institution or a community of organizations, particularly in the Community Network of Emilia Romagna, and to build applications that provide GIS services to institutions, individuals, professionals and businesses. Moka GIS is integrated with the architecture of the Emilia-Romagna, with the system SIGMATER and regional planning tools and model of the topographical database. Moka is available for reuse.

The metadata catalog of the MATTM, Directorate for Environmental Assessment is set up using the open source tool GeoNetwork.

The CCS is a technological infrastructure supporting the efficient exchange of geospatial, territorial and environmental metadata, characterized by a central entity, the National cartographic Portal (PNC), which collects all the metadata and peripheral entities to cooperation. Within the many projects, CCS (http://www.pcn.minambiente.it/pcn/progetto_scc.php?lan=en) has made several software applications on Open Source technology.

The software developed are:

- WEBGIS are a series of modules to visualize on the web data, management and publishing services, according to the OGC (MapServer + PHP).
- MetadataManager complete of any function for preparation and submission, according to the specifications of the envelope CNIPA e-government (Postgres + PHP).
- AdbToolBox (DeskTop GIS).

Adb Toolbox is a graphical application that can be used to display and process spatial datasets. The application, along with the typical features of Geographic Informative Systems, makes available specific functionality, including:

- subsystem "hydrological analysis "(HA) for the construction of hydrological analysis (hydrograph calculation of project);
- subsystem topographic quantitative analysis "(TQA) to realize some analysis of the geometry of river sections;
- subsystem "FIST" for defining, updating and technical and administrative management of framework needs for interventions aimed at territory security.

2.6.3.2 Spatial data services and other services

The PODIS project is conducted by the Soil Protection Direction - Ministry for the Environment, Land and Sea providing relevant GI data. The interesting aspect of this project lies in the MapServer ability to integrate local data on "the-fly" (from files and / or geographic RDBMS) with remote data obtained from a server-compatible with standard WMS thus obtaining the full data interoperability.

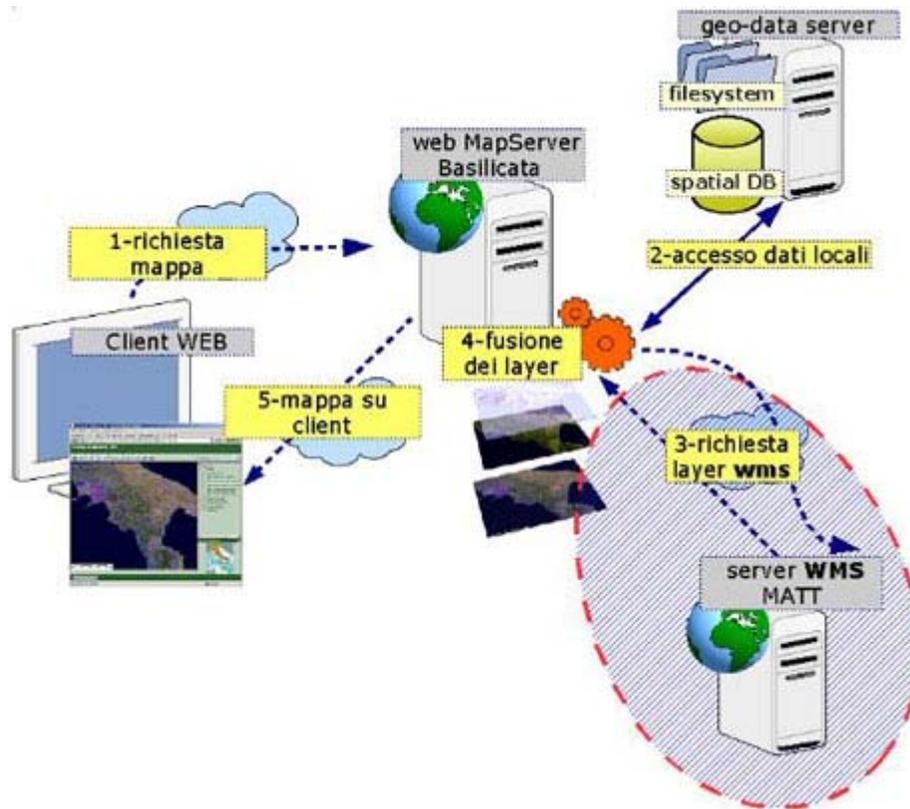


Figure 2. POCIS system overview

- **Map request:** the user sends the request to the remote MapServer through the web interface (in the example the server to the Basilicata Region).
- **Access to local data:** the MapServer of the Basilicata region collects the local data from typical storage systems for geographic data (file system and / or geographic RDBMS).
- **WMS layer request:** the MapServer of the Basilicata region requires to a remote server (in the example the central server to the METS) one or more geographical layers using the WMS protocol standardized by the Open Geospatial Consortium and by ISO.
- **Layers fusion:** The MapServer integrates the collected data (local and remote) and produces the final map
- **Map on the user:** The web user receives the map.

The geoportal of Calabria provides an on-line shopping service to view and acquire aerial photography and mapping products, and geospatial databases owned by the Calabria Region. A product list is provided with details on the type of product (vector or raster data), format (DXF or DWG, GeoTiff, Ascii, Shape, Tiff, Mdb, Ecw), scale and reference and price (varying from Euro 5 (Geological Map 25k raster), to Euro 15-20 and 100; most expensive item is Euro 500 Geological Map 25k vector). The service refers to the Regulations annexed to Resolution No. GR 9 / 2007 for the regulation of methods of

data access . **The Cartographic Center does not issue invoices, but certificates of deposit**

At National level some SDI applications are available for registered user of the National Portal (e.g. evaluation of impact assessment). Various systems are in place at local/regional such as the Province of Bozen that is providing customized web interfaces for environmental planners (<http://www.provincia.bz.it/umweltagentur/>) or urban planners. Similarly the Piedmont region has created the SITAD portal.

2.6.4 Conclusions of Component 5

The Legislative Decree no 32/2010 that implements the INSPIRE Directive stipulates that the public administrations that deal with GI are to make these data available by establishing a geo-portal providing the procedures for services and standards. The National Cartographic Portal (<http://www.pcn.minambiente.it>). gives access to 20 services that allow visualisation of the INSPIRE themes data. The WMS, WFS and WCS available services of the National Cartographic Portal allow the integrated data to be interoperable. Every Italian Region has developed a geoportal providing viewing, discovery, download services etc.

Based on these conclusions we score the indicators as follows:

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

2.7 Component 6: Environmental themes and activities

Since overall coordination of the *Intesa* GIS rests with the Ministry of Environment, Land Protection and Sea (MATTM -<http://www.minambiente.it>), the environmental component is expected to be pertinently present. The National Digital Mapping Portal offers thematic environmental data (see Section 2.6.2).

Using the coordination of the Ministry of Environment, all the Regions realized a complete coverage of the national territory with Land Use CORINE Land Cover Level 3.

At the time there is a work in progress to extend the Land Cover classification for parts of Italy to Level 4, i.e. at an equivalent map scale of 1:10.000)

The nation-wide information layer of the Environmental Protected Areas at different protection levels is now available for the national, regional, and municipal scales.

The Italian Ministry of Environment, Land Protection and Sea (Ministero dell'Ambiente e della Tutela del Territorio e del Mare: MATTM) in collaboration with ANCI, the National Association of Local Municipalities has set up a system of initiatives, in which about 300 municipalities participate:

- **Ambiente in Comune**: to allow municipalities to build and manage an integrated and shared management and use of data and environmental information and spatial maps that document is for planning and implementing interventions to safeguard and protect the environment;
- **Small Communes**: to meet the unique needs of small towns on the environment and land management through the use of a telematics infrastructure for the exchange of data and information from local government;
- **Monitoring of environmental expenditure**: a tool to assess the effectiveness of environmental costs;
- **Monitoring Shared Environmental Assessment**: supporting the municipalities in planning and spatial planning and Environmental Assessment, through more effective sharing of environmental information and use of appropriate methodologies and tools.

The MATTM and ANCI have set up a geoportal called: 'Il Portale delle Valutazioni Ambientali' (portal for environmental assessment - <http://www.dva.anci.it>) providing access to :

Catalog territorial and environmental data , a Mapping project: Web-GIS viewer, integrated with WMS and WFS services, Databases, documents, web resources and a sharing system (SILOS) to enable individual Municipalities to collect and download documents and data of interest to share spatial data and environmental issues.

2.7.1 Conclusions of Component 6

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

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

2.8 Standards

The RNDT, the National Geospatial Metadata Catalogue, set up at DigitPA by art. 59 of the Digital Administration Code and confirmed by the Legislative Decree 32/2010 transposing the INSPIRE Directive, is the national catalog of metadata that are insured through the search services for spatial data sets and services related to them. The Committee for technical data on the territorial government has approved the draft "Regulations on technical requirements for the content of the RNDT, and the procedure of first setting up and updating of the same":

With this measure it is defined:

- the contents of RNDT, through the identification of data of general interest that the government is obliged to document;
- technical rules for the training and feeding of the Directory, which also take into account the 1205/2008 Regulation (EC) of 3 December 2008 implementing the INSPIRE directive with regard to metadata.

Both national and international standards are applied: for data and spatial schema's (ISO19107, ISO14825), for metadata (ISO19115:2003, ISO/DTS19139:2005, ISO15836 and guidelines from DigitPA), for services (WMS 1.1.1, WFS 1.0, SLD 1.0, GML 3.1, CML – XML for cadastre). For data exchange XML is used, together with SOAP, XSD, J2EE (for applications development) and W3C for standard interfaces. The DigitPA national technical specifications are guiding the work (UDDI). SIGMA TER is a national leader on the use of international standards related to GI (ISO19100 series) and services (W3C, OGC) that allows the cooperation and interoperability between different systems and data

The use of a common language for cataloging issues and applications, aimed at facilitating dialogue between databases (through a system of keywords), was established starting from the identification of words semantically coherent and already structured into categories relations and hierarchies of importance. The GEMET thesaurus (General European Multilingual Environmental Thesaurus) issued by the European Environment Information and Observation Network (EIONET) which is part of the European Environment Agency (EEA) is used by DigitPA, RNDT, Intesa State Regions and local authorities or the national institutions setting up the spatial and environmental information structure.

AMFM GIS Italia is a non profit organization formed to promote the exchange of knowledge and experience between public and private sector Geographic Information and Spatial Information, and promote the development of applications for the territorial government and the management services and infrastructure. The Association promotes the standardization of methodologies and processes, communication, sharing of geographical data in order to promote interoperability and sharing application (<http://www.amfm.it/>).

The geoportals and websites build by the various stakeholders and regions are applying the INSPIRE implementing rules and implementing ISO 19100 standards. SITR-IDT for example is compliant to the ISO 19115 standard and is therefore interoperable with other Spatial Data Infrastructure. At the same time SITR-IDT interoperability services for data exposition and publication are made according to the Open Geospatial Consortium (OGC) standard; WMS (Web Map Service) and WFS (Web Feature Service) are exposed by SITR-IDT and can be used by all standard web and desktop clients for viewing and downloading data existing in SITR-IDT spatial database.

2.8.1 Conclusions of Component 7

DigitPA (formerly CNIPA) defines national technical specifications and guides the standards implementation; services are designed according to the international OpenGis standards.

Based on these conclusions we score the indicator as follows:

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

2.9 Use and efficiency of SDI

The Digital National Mapping Portal Federated Network is growing every day. The experimental Central Node (<http://www.pcn.minambiente.it/PCN/>) started by offering only few functions, but it is an amazing evolutive prototype and users can understand the potential of the system. In fact there are hundreds of requests of public administrations and private bodies to join the Network as “Federated Institution” (Ente Federato) or as simply “Supplying Institutions” (Ente Fornitore). Some data providers have been reluctant to adhere to the GIS Agreement and to get involved in the consequential actions.

Moreover, the Extraordinary Plan of Environmental Remote Sensing (EPRS-E) is an agreement program between the Ministry of Environment, Land Protection and Sea (MATTM), Chairperson of the Council of Ministers - Department of Civil Protection (DCP) and the Ministry of Defence (MD) in agreement with the Regions and Autonomous Provinces. The aim of the Extraordinary Plan of Environmental Remote Sensing is to undertake, for the first time, the establishment of a data base representative of national territory, with particular emphasis on its configuration, its relation to the environment. In particular, the project involves the acquisition by the Ministry, of data produced by remote sensing technique with laser-scanning LiDAR (by platform) and interferometric technique (by satellite) and the classification of these data in the database of National Cartographic Portal (NCP).

The databases will be a valuable contribution to the government activities on the territory, particularly supporting the activities of topography, mapping and digital photogrammetry, three-dimensional modelling, Geographic Information Systems and, above all, the Information Systems Supporting decisions. The first aim of the EPRS-E is

to create, as quickly as possible, a database to support decision making in all areas subject to hydrogeological risk and encourage the sharing of a data set of methodologies and results.

An interesting project is the system for the dissemination of geographical and thematic information on landslides and floods in Italy. In the framework of the Integrated Management of the Environmental Data project – GIIDA – of the Italian National Research Council (CNR), the research Institute for Geo-Hydrological Hazard Assessment (IRPI) has designed and implemented a new Spatial Data Infrastructure (SDI). The SDI is compliant to Open Geospatial Consortium (OGC) specifications for the publication, access, and discovery of dedicated services, including WMS, WFS, WCS and CSW services.

CNR IRPI is developing a national landslide warning system for the Italian Department for Civil Protection, DPC. The system is intended to provide spatially distributed daily (and potentially 3-hour) forecasts for the possible occurrence of rainfall-induced landslides in Italy. It consists of two main components: (i) a component for rainfall data analysis and processing, and comparison with existing empirical rainfall thresholds, and (ii) a component for information delivery and dissemination, using WebGIS technology (Marchesini et al., 2010).

Software used to implement the CNR IRPI Spatial Data Infrastructure for storing, managing, and publishing landslide and flood data includes:

- (i) PostgreSQL 8.2.11 + PostGIS 1.3.5, a powerful RDBMS with spatial extension,
- (ii) Geoserver 1.7.4, a Java server that allows users to share and edit geospatial data using a graphical frontend,
- (iii) Geonetwork OS 2.4, a catalogue application to manage spatially referenced resources,
- (iv) ExtJS 3.0 + GeoExt 0.6 + OpenLayers 2.8, a set of JavaScript libraries for building rich Web mapping applications,
- (v) UNM MapServer 5.0.2, a platform for publishing spatial data and interactive mapping applications on the Web, and
- (vi) GeoSDI ERA 0.1, a Web application designed by GeoSDI (www.geosdi.org) for the Italian national Department of Civil Protection.

3 Annexes

3.1 List of SDI addresses / contacts for Italy

Table: SDI contact list			
	Web address	Organisational mailing address	Over-all contact person: tel./fax/e-mail
National			
CTSGI: Comitato per le regole tecniche sui dati territoriali delle pubbliche amministrazioni		Comitato per le regole tecniche sui dati territoriali delle pubbliche amministrazioni presso CNIPA – Via Isonzo 21/b 00198 Roma (Italy)	Mr. Benzi Roberto, President benzi@cnipa.it
		Technical secretariat of the CTSGI: CNIPA	Mrs. Cappadozzi Elettra +390685264346 cappadozzi@cnipa.it Mr. Ciasullo Gabriele +390685264285 ciasullo@cnipa.it
	http://www.minambiente.it/	Ministero dell’Ambiente e Tutela del Territorio Via Cristoforo Colombo, n. 44 00147 – Roma, ITALIA Centralino: 06.57221	Ing. Bruno Agricola Director General +39-06-57223001 +39-06-57223042 dgab@minambiente.it
Regional			
Local			

3.2 List of references for Italy

Table: list of references used to compile the Country Report	
Web sites:	
	http://www.eurogi.org , presentation of AM/FM Italy

	http://www.EuroGeographics.org
	http://www.centrointerregionale-gis.it/ http://www.centrointerregionale-gis.it/script/scrp.asp?Pagecode=002
	http://www.provincia.bz.it/
	http://www.atlanteitaliano.it/
	http://cart.ancitel.it/
	http://www.cartografia.regione.lombardia.it/geoportale
	http://www.centrointerregionale-gis.it/script/documenti.asp
	http://sardegnaterritorio.it/
	http://www.amfm.it/
	http://www.digitpa.gov.it/
Publications:	
	University of Sheffield – USDF, Spatial Data Infrastructures: Country Reports, Final deliverable D 5.3.2(b) of the GINIE project, IST-2000-29493
	Annoni A., M. Craglia, P. Smit, Comparative analysis of NSDI, paper presented at the 8 th EC-GIS workshop, 2-5 July, 2002, Dublin, Ireland.
	Panunzi P., F. Guaralda, The Reform and the New Systems of Census and Classification of the Italian Cadastre, paper presented at the FIG XXII International Congress, April 19-26, 2002, Washington, USA.
	M., Pasca, L., Petriglia, F., Mattioni, M., Torchio, and C., Mariotti. 2009. Experiences in the Creation and Updating of INSPIRE Compliant Metadata Catalogue. GSDI 11, Rotterdam, 2009.
	I., Marchesini, V., Balducci, G., Tonelli, M., Rossi, and F., Guzzetti. Geospatial information on landslides and floods in Italy. Gi4DM 2010 conference, Geomatics for Crisis Management, Torino Italy.
	D., Pani, L., Manigas, M., Beneventi, M., Molinari, R., Vinelli, and M., Melis. INSPIRE – Practical Examples from Sardinia (Italy). Application of Recent Directives and Guidelines in Public Administration: the SITR-IDT of Autonomous Region of Sardinia (RAS - Italy) available at: http://www.cadcorp.com/pdf/PPT-inspire%20paper.pdf
	L. Garretti; S. Griffa; R. Lucà and M.T. Lopreiato(2009). Standard Licences for Geographic Information: the Development and Implementation in Local Government in Italy. SDI Convergence. Research, Emerging Trends, and Critical Assessment. B. van Loenen, J.W.J. Besemer, J.A. Zevenbergen (Editors).

	Nederlandse Commissie voor Geodesie Netherlands Geodetic Commission 48, 2009.
	R., Laffi, A., Piccin, and M., Panebianco. The Lombardia experience Advanced Regional SDIs Workshop Ispra – Monday 19th of May 2008.
	S., Crotta and S., Griffa. Piedmont Region Implementation of the INSPIRE Directive. Advanced Regional SDIs Workshop Ispra – Monday 19th of May 2008.
	M., Pasca, B., Agricola, A., Venditti, C., Mariotti, and D., Benotti. D.I.V.A. - Spatial Information for Environmental Assessments. GSDI 11, Rotterdam, 2009.
Other sources:	
	Rando G., F. Guaralda, The Professional Profile of the “Geometra” in the Third Millennium, paper presented at the FIG XXII International Congress, April 19-26, 2002, Washington, USA.
	Annoni, A., 2004. Lessons learnt from Italian NSDI. Draft report for the Extended Impact Assessment of the INSPIRE-initiative.