



INSPIRE

Infrastructure for Spatial Information in Europe

Implementing Structures and Funding Position Paper

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1 Purpose of this document

This document is the Position Paper from the working group Implementing Structures and Funding (ISF) and present the working groups considerations and proposals on how to implement and how to finance the INSPIRE initiative.

2 Introduction

(Chapter developed by the INSPIRE secretariate/ WG leaders)

2.1 What is the INSPIRE initiative and why is it needed?

Good policy relies on quality information. The increasing complexity and interconnectedness of issues that affect the quality of life today is recognized by the policy-makers and influences the way new policies are being prepared today. The Sixth Environmental Action Programme¹ for instance emphasises the need to base environmental policy-making on sound knowledge and participation, principles that will influence the Union environmental policy-making for the next decade.

INSPIRE is an initiative currently being prepared by the Commission to support the availability of spatial information for the formulation, implementation and evaluation of Union policies. It intends to set the legal framework for the gradual creation of a spatial information infrastructure. INSPIRE will initially focus on environmental policy needs but, being a cross-sectoral initiative, will gradually be extended to other sectors (e.g. agriculture, transport, ...) as other interested Commission services participate.

What is a spatial information infrastructure?

The INSPIRE initiative intends to trigger the creation of a European spatial information infrastructure that delivers to the users integrated spatial information services. These services should allow the users to identify and access spatial or geographical information from a wide range of sources, from the local level to the global level, in an inter-operable way for a variety of uses. The target users of INSPIRE include policy-makers, planners and managers at European, national and local level and the citizens and their organisations. Possible services are the visualisation of information layers, overlay of information from different sources, spatial and temporal analysis, etc.

The spatial information infrastructure addresses both technical and non-technical issues, ranging from technical standards and protocols, organisational issues, data policy issues including data access policy and the creation and maintenance of geographical information for a wide range of themes, starting with the environmental sector.

The INSPIRE initiative recognises the fact that most of the quality spatial information is available at local and regional level, but that this information is difficult to exploit in a broader context for a variety of reasons. The situation on spatial information in Europe is one of fragmentation, gaps in availability

¹ <http://europa.eu.int/comm/environment/newprg/index.htm>

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of geographical information², duplication of information collection and problems of identifying, accessing or using data that is available. As a result of these problems, effective Union policy actions suffer because of lack of monitoring and assessment capabilities that take into account the spatial dimension³.

Fortunately, awareness is growing at national and at EU level about the need of quality geo-referenced information for understanding the complexity and consequently for containing the negative impacts of the ever-increasing human activity on the EU territory. Many regional and national initiatives are being taken⁴ and numerous stakeholders both in the Member States and candidate countries collaborate with the Commission services for the preparation of the INSPIRE initiative.

Successful implementation of the INSPIRE initiative would contribute to reach the objectives set out in the Commission's White Paper on European Governance⁵. It would help the Commission to establish more coherence in its policies by better integrating the common territorial dimension. This will also help to improve policy co-ordination, an issue that is identified by the Community Sustainable Development Strategy⁶ as part of a new approach to policy-making. It will allow better participation by presenting information in a clear, understandable way at national and local level. Finally, it will help to make European governance more effective by supporting the evaluation of future impact and past experience for EU policies.

2.2 Context and vision

Recent global advances in moving from paper to digital data and information has created hitherto undreamed of opportunities to revolutionise access to data, communication of information and for informed decision-making at all levels of society. This move from back room to open door access to information presents new challenges for those acquiring, handling, and providing access to electronic data and information.

The data are often of unsatisfactory or undefined quality, based on proprietary geographic information systems and not accessible to the public or other users at local, regional, national and international level. Therefore, projects that combine data coming from various sources to provide policy-relevant information and tools are often time consuming and costly. Policies need to be put in place to reduce the duplication in collection, harmonisation efforts and to facilitate and promote wide dissemination of the data. These policies should free funds to be invested in improving the availability and quality of spatial information. The increased availability of data will in turn stimulate innovation among data and information providers in the commercial sector.

² For example, only a few pan-European geographical information layers exist, often designed for specific purposes that limit the possibilities of their wider use e.g. CORINE Land Cover and the SABE dataset (Seamless Administrative Boundaries of Europe) from EuroGeographics.

³ For example: insufficient monitoring capabilities are key obstacles to the further development of a range of priority themes of the 6th Environmental action programme, such as soil, bio-diversity, health and environment and marine policy.

⁴ See Examples of regional and national initiatives to create a spatial information infrastructure in GE, UK, PT on the Internet <http://www.ec-gis.org/inspire/>

⁵ COM(2001)428 – European Governance - a White Paper . The White Paper refers to five principles of good governance: openness, participation, accountability, effectiveness and coherence

⁶ Presidency Conclusions – Göteborg European Council, 15 and 16 June 2001

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INSPIRE Principles

The INSPIRE initiative intends to improve the current situation by triggering the creation of a European Spatial Data Infrastructure for the access and use of spatial information built on the basis of the following principles:

- √ Data should be collected once and maintained at the level where this can be done most effectively
- √ It must be possible to combine seamlessly spatial information from different sources across Europe and share it between many users and applications
- √ It must be possible for information collected at one level to be shared between all the different levels, e.g. detailed for detailed investigations, general for strategic purposes
- √ Geographic information needed for good governance at all levels should be abundant and widely available under conditions that do not restrain its extensive use
- √ It must be easy to discover which geographic information is available, fits the needs for a particular use and under what conditions it can be acquired and used
- √ Geographic data must become easy to understand and interpret because it can be visualised within the appropriate context and selected in a user-friendly way.

The INSPIRE policy vision is to make harmonised and high quality geographic information readily available for formulating, implementing, monitoring and evaluating Community policy and for the citizen to access spatial information, whether local, regional, national or international⁷. This vision is illustrated in the diagram at Figure 1.

⁷ The INSPIRE initiative will link with relevant initiatives at the global level such as the work to develop the Global Spatial Data Infrastructure (GSDI).

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INSPIRE Information Flow

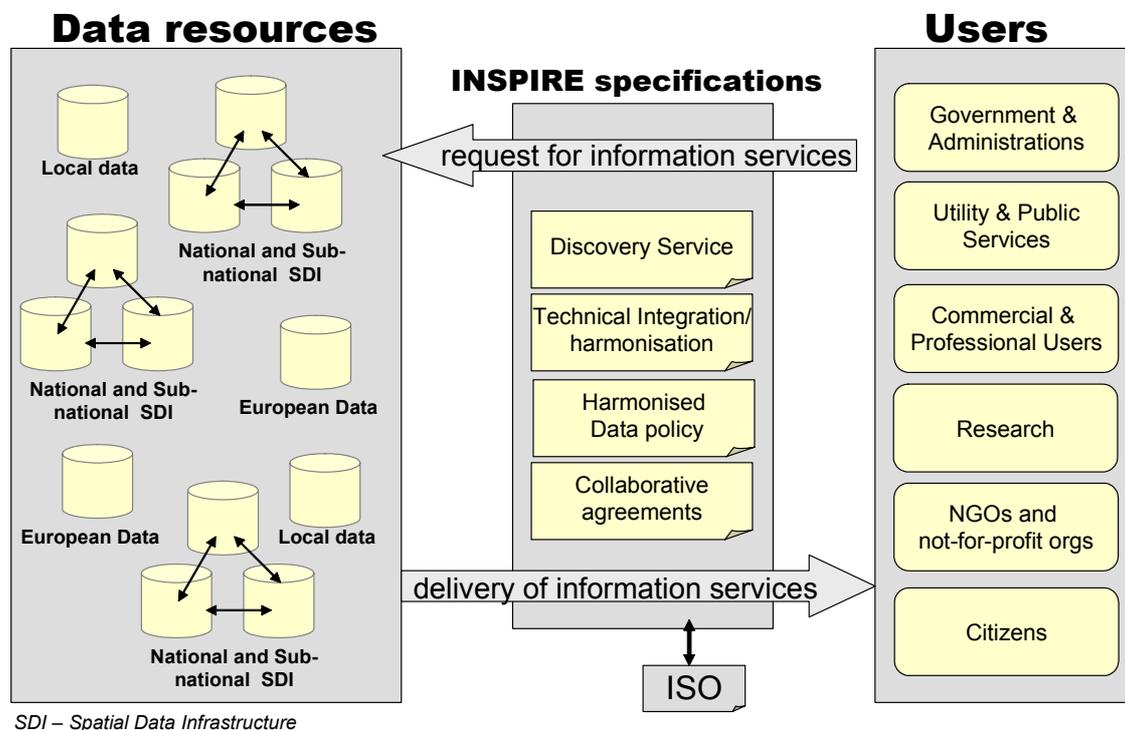


Figure 1: Diagrammatic View of the INSPIRE Vision

2.3 Stepwise approach

The INSPIRE implementation will follow a step-wise approach, starting with unlocking the potential of existing spatial data and spatial data infrastructures and then gradually harmonising data and information services allowing eventually the seamless integration of systems and datasets at different levels into a coherent European spatial data infrastructure. Achieving this objective will require the establishment of appropriate coordination mechanisms and common rules for data policies. Where relevant, synergies with the GMES initiative will be sought in order to ensure coherence between INSPIRE and GMES⁸.

The first step will focus on harmonisation of documenting existing datasets (metadata) and on the necessary tools to make this documentation accessible.

The second step will primarily aim at providing common ways to access the spatial data sets themselves allowing uncomplicated analysis of data on different themes coming from different sources. An example of such analysis is visual inspection of spatial relations between phenomena by overlay of datasets.

The third step will target the establishment of common models of the objects in the environment for which spatial data is collected, such as transport networks, forests, ... This will allow to map existing datasets to a common set of models, the start of the creation of a really harmonised spatial data

⁸ Sec(2001) 993 of 16/06/2001 Commission Staff Working Paper – Joint document from Commission services and European Space Agency

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infrastructure that will facilitate the combination of information of various sources and more advanced analysis work.

The fourth and last step will build upon the previous steps and concentrate on completing the common models and on providing the services to fully integrated data from various sources and various levels, from the local to the European level into coherent seamless datasets supporting the same standards and protocols. This step will allow real time access to up-to-date data across the whole of Europe.

These steps will partly be carried out in parallel, depending on user needs and degree of availability and harmonisation of existing information. All these steps involve actions of standardisation, of harmonisation and integration of data and services.

Towards an Infrastructure for Spatial Information

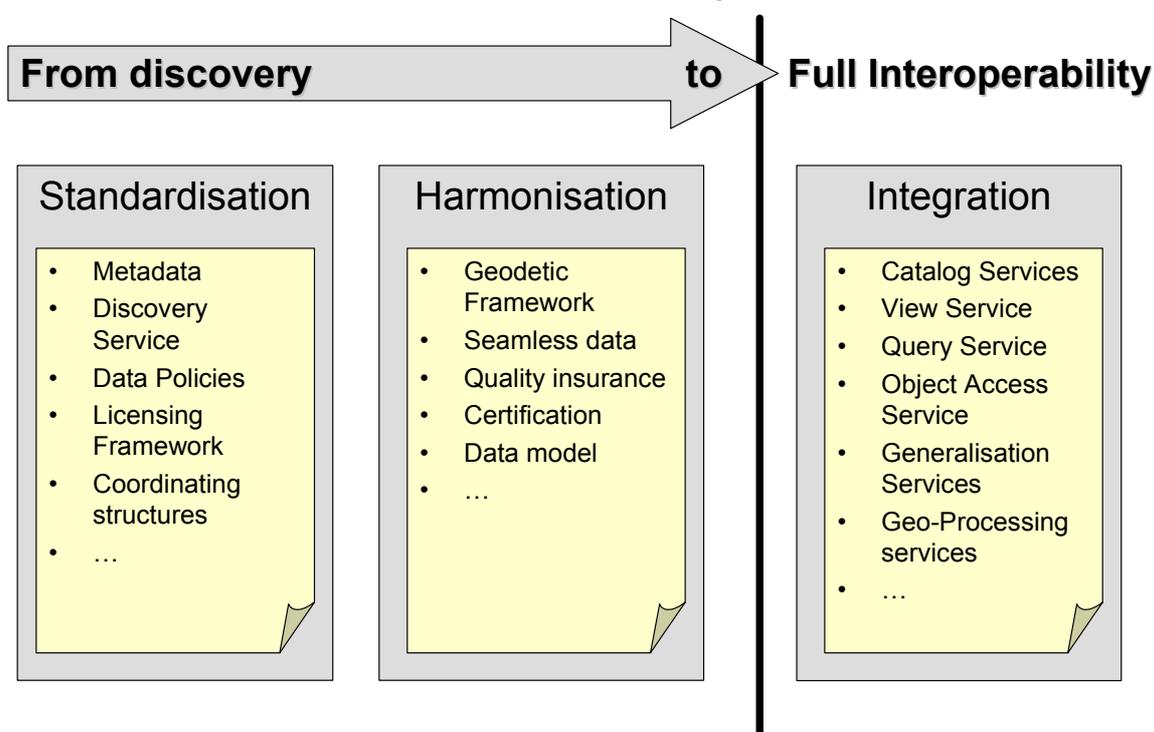


Figure 2: Towards an Infrastructure for Spatial Information

INSPIRE is conceived as a cross-sectoral initiative covering the main Community sectors with a spatial impact such as transport, energy, agriculture, ... but will target initially information needed to support environmental policy. Indeed the 6th Environmental Action Programme highlights the need for better knowledge and sound science in environmental policy-making and geographical information will therefore be increasingly required to achieve this. Therefore, a horizontal framework is needed in order to ensure a coherent approach to information collection and distribution. Moreover, the requirement by the Treaty for all policy sectors to integrate environment concerns will provide a first link from environmental policy to other policy sectors that can be further extended at later stages.

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2.4 Users, Producers and other Stakeholders

2.4.1 Users

Environmental users are many and various, and include users who need spatial data for planning, management, assessment, monitoring and reporting. Hence the user community is very broad and diverse and includes:

- Governments & Administrations
 - EU
 - National
 - Regional
 - Local
- Utility and Public Services, including
 - Transport
 - Health
 - Emergency services
 - Utilities (e.g. water, telecommunications, gas, electricity).
- Research and development
 - Universities
 - Public and Private Institutes
 - Application Developers for IT Systems
- Commercial & Professional End Users
 - Tourism
 - Value Added Resellers
 - Surveyors
 - Property Developers
 - Insurance
- Non Governmental Organisations (NGOs) and not-for-profit organizations
- Citizens

Different user categories must be considered because their requirements in terms of data access can vary significantly.

2.4.2 Producers

The producers of spatial information within the public sector include national environmental protection agencies, mapping agencies, national geological surveys, national maritime administrations, cadastral, land registration and other land administration organisations, local authorities and utilities.

It should also be noted that, under certain circumstances, private data producers may offer production capacity to public bodies, or possibly sell data directly onto the market themselves. In some Member States there is a thriving private sector geographic information industry supplying data and services directly to the commercial market.

Most spatially organised data and information are either used internally by public bodies, or are supplied to other public sector organisations under various types of agreement. A relatively small but growing number of government departments or agencies conduct commercial business with the private sector or with the general public. It is in the area of data use that it is important to recognise the difference between sharing data and trading data.

The simplified diagram at Figure 3 clearly shows this distinction in the context of three transaction streams which can be combined in varying proportions by any public sector body developing an overall information sharing and trading strategy, subject to common rules defined under INSPIRE.

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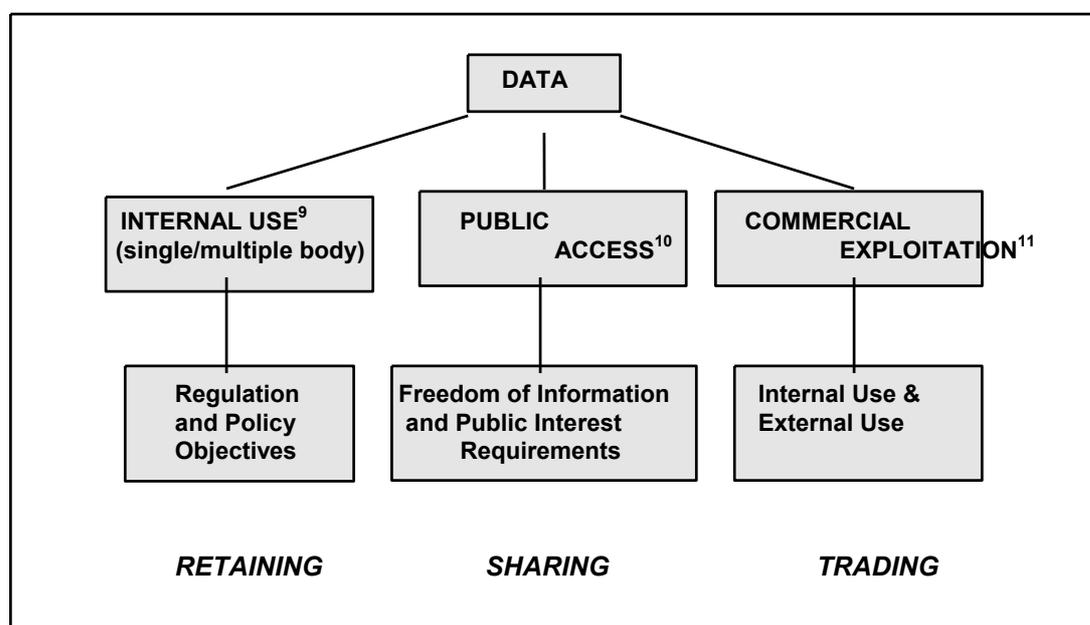


Figure 3: Simplified Diagram Illustrating Public Sector Data Uses

2.4.3 Other Stakeholders

The delivery of INSPIRE, like initiatives such as eEurope and eGovernment, is dependent on information technology. It will have a profound impact on a variety of disciplines and professions, affecting many individuals and organizations that cannot be categorised as users or producers. Conversely, this group of other stakeholders will also have an important role in the process of shaping the infrastructure. Examples of other stakeholders are:

- The Information and Communication Technology (ITC) sector, and in particular product providers who offer software, hardware, and related systems, and service providers who offer system development, database development operations support, and consulting services;
- Standardisation bodies like ISO, CEN, and national standardization organizations;
- Co-ordinators and regulators, including European and national associations.

⁹ **Internal Use** means spatial information used exclusively within the originating public body, or shared among any public body at local, regional, national or international level.

¹⁰ **Public access** means spatial information provided by public bodies free of charge or marginal cost of supply free of charge or marginal cost of supply for viewing or use by citizens of the European Union (including NGOs, academia, and research institutes).

¹¹ **Commercial exploitation** means the utilisation of public sector spatial information in commercial information products.

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3 Common baselines for implementation and funding

The access to relevant, quality information is also an important part of the main objectives. Input from other working groups and others on what technical infrastructure, organisational and administrative arrangements that are needed in order to give users access to relevant information, is also a base for considerations.

Users access to information is also depending on funding and pricing arrangements. Different models for funding and pricing is therefore an important part of the working group considerations.

Many member states have launched national SDI initiative. Experiences from these initiatives have been considered and existing arrangements shall be used as a base for the INSPIRE initiative.

The work has been carried out by information gathering, where the members of the group have contributed to different parts of the topics covered. The time and resources for this work has not allowed specific investigations to be carried out. The working group has had two face-to-face meetings and two virtual meetings. The orientation paper and the position paper have been circulated in the group for comments. Besides these procedures, the papers are reviewed by national expert networks and the INSPIRE expert group.

Some of the characteristics of spatial data infrastructures, both existing and envisaged, at local, national, and international levels, are

- user driven, focusing on the general user needs concerning data content, data access etc
- multi-user: all kinds of users are addressed, from EU policy making, via national and local agencies and companies to individual citizens
- multi-level, in the sense that local, national, European infrastructures need to be linked together
- pan-European, considering the needs both of member states and of accession countries
- building on existing data
- building on existing organisations and active partnerships
- combination of a EU top-down and active national bottom-up approach
- strong need for harmonisation and standardisation of data and systems
- a base for multi-sector use (transportation, agriculture etc)

INSPIRE and the European SDI is a combination of the national SDI's. The European dataset is a seamless combination of national datasets. The national SDI:s are the fundament of INSPIRE. Nevertheless, the national SDI's are a matter for the member states themselves (*how* SDI is achieved). The principle of subsidiarity will rule. Only the identification of the European reference datasets and the acceptance of the structure, standards, metadata, etc. are part of the European co-ordination (*what* European SDI means).

The ISF Working Group has taken a position on the co-ordination and set-up of collaborative agreements or bodies.

The Working Group has considered relevant aspects related to Implementing Structures and Funding. Most of these aspects are listed below.

- What overall institutional and management arrangements are needed for the implementation of a European SDI corresponding to the INSPIRE requirements?

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- What institutional arrangements are needed in the Member States for the establishment of a European SDI that fulfils the INSPIRE requirements on availability and usability of information?
- What procedures and co-ordination structures have to be implemented in order to harmonise information and manage interoperability within the INSPIRE initiative?
- What are the cost for data capture, management and dissemination within a National and European SDI that fulfils the INSPIRE requirements?
- What different kinds of models for funding are there for National and European level?
- New models for funding within the SDI concept.
- What kinds of pricing models can be implemented within the SDI for producers, users and the exploitation of Public sector information (PSI)? Details of this will be elaborated within the LDP group.

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4 Organisation

4.1 Roles needed in INSPIRE

What type of functions or services is needed, especially seen from the user point of view? Below are listed some important functions that should be included in a European spatial data infrastructure. An Organisational Model is introduced in the AST Orientation Paper.

Co-ordination at European level

Today, no single or distributed organisational body has overall responsibility for the co-ordination issues of SDI at the European level. For the success of INSPIRE, it is believed that there is a need for the set up of general management co-ordination bodies, both at EU (involving several DG:s) and at national level. The issues in establishing a SDI are complex and involve issues ranging from policy, legal, cultural, and technical, to financial and organisational matters.

The general co-ordination body at European level should be responsible for the further management and co-ordination of SDI activities at European level. This includes issues of funding, organisational issues, external contacts (EC, industry, stakeholders, users etc), technical specifications and guidelines, certification issues, and further implementation work. Important implementation issues are to stimulate and promote the vision of Inspire, to be the driving force in continuing the work with European harmonised data and system specifications, to hold responsibility for setting up the European INSPIRE portal or gateway, operational services and to provide technical co-ordination with the setting up of pilot projects, providing information and capacity building.

Co-ordination and management at national level

Clear co-ordination and strong management is needed at national level to assure the functionality of the national SDIs.

Data services (Clearinghouse) of European data

For this function a catalogue service or directory containing metadata is needed. The Clearinghouse concept is a decentralised system of servers located on the Internet which contain metadata. The network is the tool to give the community access to the reference datasets. The model anticipates that datasets are held on a number of independently maintained systems and not as a single central database. An important part of a distributed service is also to be able to access and process data at requested scale, projection, data format, geographic area etc. Mandate:

- Discovery services
- Data access
- Geoprocessing services, i.e. co-ordinate transformations, border matching etc
- Supporting services, i.e. information, education, helpdesk, technical support, guidelines, translations etc

Data collection and management (custodians) at national to local level

The datasets in a European SDI are decentralised at national, federal, regional or local level (referring to one of the six INSPIRE principles), but need to be part of a network, defined in terms of user availability etc.

User organisations

The users of the ESDI should be able to express their needs and comments through an independent body.

Research organisations

A network of research organisations is needed to produce new solutions for users and better methodologies for the SDI.

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4.2 Actor categories

The Community has, through the Commission and other bodies, to act as orderer, advisor, supporter and manager for the European SDI, and be responsible for its implementation. The Commission and related bodies are also main users of the information and services produced in the SDI.

On a national level (including local and regional level), Environmental Protection Agencies are the main users and can also act as co-ordinators on environmental and thematic information. National Mapping Agencies, Cadastral Agencies and others act as producers and can also act as co-ordinators of reference data (custodians).

Different organisations can act in different roles as presented below

<i>Category</i>	<i>Example</i>
Sponsors, stakeholders	EU, Governments, NMAs, EPAs etc
Managers, co-ordinators	EU, NMAs, EuroGeographics, EPAs etc
Producers, maintenance (custodian)	NMA, private data producers etc
Distribution, product & service providers (custodian)	NMA, private providers etc
Standardisation organisations	National, ISO, CEN
Academia	Universities, Research institutes etc
Users	EU, EPA, municipalites, citizens, companies, etc
Policy advice and consultation	National interdisciplinary GI association

4.3 Existing European organisations

A comprehensive list of existing organisations active in the field of spatial data infrastructure is not available.

4.4 Examples of other SDI

Several examples of SDI's exist that can demonstrate experience in implementation and setting up the organisation for a European SDI. Several surveys and case studies have been carried out on national and regional SDI activities within the GSDI initiative by Eurogi, the ETeMII project and others. Examples are also found in the United States, Canada, Australia and New Zealand (ANZLIC).

In addition, there are several European data sets, establishments and initiatives such as European Topic Centres (ETC), CORINE databases, the SABE databases, EuroGlobalMap and EuroRegionalMap etc that can add further ideas to this work. In the cases of CORINE and SABE, databases are kept at EU level, although produced nationally.

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5 Implementation

5.1 Implementation considerations for INSPIRE

Under this topic are included all activities outside the actual legislation, i.e. 'what needs to be done' to achieve the vision of INSPIRE, with a particular focus on organisational issues.

The implementation should be carried out stepwise or phased. Reasons for this are many, but include.

- considering the varying situation among the different countries, small steps must be taken at a time in order to have all countries on the track at the same time
- the inherent modular characteristics of INSPIRE, in terms of many different thematic and reference data components, and at different scales or levels of detail
- the dependency of the feasibility and speed in carrying out the different processes needed on accomplishing the resulting goals, such as developing INSPIRE specific standards based on commonly accepted international standards
- clearly phased in terms of looking at INSPIRE is the realisation of any large project with its well defined phases (see AST Position Paper), such as the need to initially carry out pilot studies and prototypes in preparing detailed specifications

The vision has the long term focus (2010-2015), but short and medium term goals are needed and should be pointed out in further work. (See also AST and ETC Position papers)

It is of the greatest importance that the work of implementation *starts without delay* after completion of the Position Papers, as it is likely to be a long process.

The implementation must consider findings from all parts of the INSPIRE initiative, i.e the specification of user requirements, reference data, thematic data, metadata, standards, techniques, organisation, legal issues and financing, and the realization of these parts.

Some implementation components that are important factors for further work in the near future are

- to set up the organisational structures, and to set up an implementation project
- information and setting up an INSPIRE website, education and capacity building
- setting up a European metadata catalogue
- to finalise the specifications of the European reference and thematic data, adapted to ISO standards, and in this work involving national experts. This could involve CEN Workshop Agreement (CWA) procedure of CEN/ISSS, as proposed by WG AST, or the setting up of committees linked to different thematic policies, as proposed by WG ETC.
- to consider the heterogeneous situation in the different EU countries, in terms of availability of data, whereas the actual data collection in these areas must be addressed concerning funding
- linking to other user initiatives, related to EEA, EIONET, Water Framework Directive etc.
- at an *early* stage, setting up and carrying out pilot studies, considering
 - priority reference data, for example administrative boundaries for Natura2000
 - both studies with same theme across several countries, and more in-depth studies e.g. at different resolutions
 - elaboration of existing pilots, and experiences of the existing European harmonisation projects, in particular focusing on actions to fulfil the needs of certain environmental policies such as the Water Framework Directive (see ETC Position Paper)
 - user specifications of metadata catalogue and access services

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The setting up of the spatial data infrastructure implies that this infrastructure is a long term sustained operation, both concerning the institutional and the technical structure. Long term plans will ensure the strategies for their maintenance.

Valuable ideas and proposals on implementation, especially concerning details on time frames are found in the Position Papers of AST and ETC .

5.2 Timing of INSPIRE

The implementation of INSPIRE will take a major effort on the part of the member states and the involved organisations. It will be a process lasting many years and will take major investments.

The definition of the more elaborated time frames for implementation, is one important aspect of the work of the proposed organisational structures.

The *first* proposed step is therefore to take actions to set up the organisational structure in 2003 or at the latest by 2004. It is essential that the further process will be professionally managed, through adequate resources put into the work. *At the same time*, and because of the time frame of the legislative process of setting up the organisations, it should be considered whether an implementation project could be initiated by DG-Environment, in order to carry on the work by the INSPIRE groups.

Important items, looking at when different parts of INSPIRE are in place, are the components of reference data, the components of thematic data, levels of spatial resolution, standardised data models and accessibility through catalogues.

User needs in terms of time frames are given in the ETC Position Paper. It is important to note that the time frames given in a legislative act, are valid for all countries, although the initial situation in the countries can be very different. Also the data standards needed are not in place today. For those reasons, the ETC WG proposes a stepwise implementation which firstly includes data at European level data but not fully standardised, secondly includes European standardised data, and finally includes data at regional and local level fully harmonised. Target dates are also given for data models, temporary and permanent metadata catalogues, reference data and core thematic data, which are also defined.

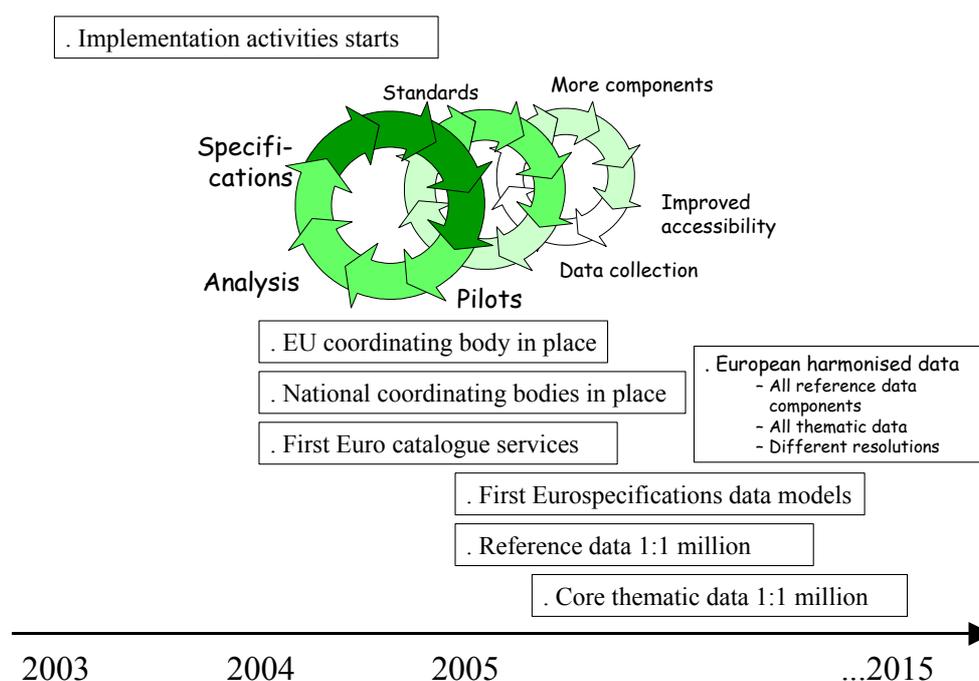


Figure. An idea of a stepwise or phased implementation, considering the inherent cycle or (in)spiral of improvements and movement towards the developed European Spatial Data Infrastructure. The AST WG points out that INSPIRE could be considered as being in the very early stage of a project phase description (initiative – definition – design – preparation –

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realization – introduction). It is also important to see INSPIRE as a continuous, flexible and improving process where pilot studies and experiences from the stepwise adding of components, give refined and improved specifications and ways of working and cooperating.

5.3 Examples of implementation of other related activities

The common implementation strategy of the Water Framework Directive (WFD) has set up a strategic co-ordinating group with working groups, for the implementation and further adoptions of guidelines, which should be considered in the further work.

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6 Funding

6.1 Funding models

This topic includes both the issue of funding or financing, and the issue of pricing – i.e. who pays and at what accessibility and price of the data?

There are basically three options for funding the SDI activities when discussing the European spatial data infrastructure. These are

- European Commission (grants)
- National, regional, local (grants)
- End users, citizens (cost recovery)

Looking at the initial investments, the options are two: EC or national/regional/local.

When it comes to accessibility and charging, i.e. when seeing these issues from the user side, there are two fundamentally different ways:

- Free or open access refers to free data for everyone at marginal production or dissemination costs
- The cost recovery system refers to the user contributing to the costs of collection, updating, quality control etc, not fully funded from elsewhere.

In addition to these, full market pricing principles could be the case when it comes to value added products.

According to Rhind (2000), there are four different models for SDI funding:

- Government Funding (funds derived from taxation)
- Private Sector Funding (funds derived from user fees)
- Public Sector Funding (funds derived from fees charged to public agencies)
- Indirect Funding (funds derived from advertising, sponsorship, etc.)

From these basic models, mixed models combining different funding sources can be defined.

Most of the existing SDIs evolved from National Mapping Agencies (NMAs), which means that a significant proportion of their funding came from the budgets of those agencies. Therefore, their funding models were a combination of Government Funding (grants derived from taxation and external funds) and to a lesser extent Private/Public Sector Funding (user fees and licensing charges to private and public customers). Indirect Funding has not been a usual model in the past and it does not seem to be able to generate significant resources in the near future.

In recent years, some of the European NMAs have been selling their data more efficiently and increasing the proportion of their budget which is funded through revenues generated by the user fees. Moreover, it must be pointed out that the implementation of a European SDI means an increase in the supply of spatial data in the format required by the customers, and thus may in the long term result in an increase in demand. This increase in demand may lead to increased revenues coming from user fees.

However, even though the proposed funding model for the European SDI is a combined model which encompasses grants (Government Funding) and cost recovery (Private/Public Funding) in an efficient way, most of the funds will have to be Government Funds, at least in the initial implementation stage.

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There are a number of reasons for that. The costs of SDIs are generally high and immediate, while the benefits, though potentially important, are far ahead and uncertain. Thus, the development of SDIs is not an attractive investment for the private sector. Besides, INSPIRE views the European SDI as being similar to any other infrastructure intended for the general public benefit. Since one of the functions of government is to provide such kinds of infrastructure, it follows that the Government should fund the implementation of the European SDI, or of a significant part of it.

In a decentralized Government Structure such as the European Union, the development of any kind of infrastructure is a shared responsibility and thus all the levels of Government must make a fair contribution to infrastructure funding. In the European Union there are up to four levels of government: The Community, the member countries, the regions and the municipalities.

According to the INSPIRE vision, the European Infrastructure shall be based on the corresponding infrastructures at the national level, that is, on the National SDIs. Although the responsibility for infrastructure development under this kind of approach lies in the hands of the National Governments, the important role of the Regional and Local Governments in many European countries must be recognized. The budgets of the different levels of government in the member states (Local/Regional/National) must allocate financial resources for the development of the NSDIs, even though financial support from the European Commission will be needed in many cases. A fair share of the costs must be agreed upon.

In this sense, a possible way to support the development of a spatial infrastructure at the Regional/Local level would be to design incentives such as matching grants to stimulate investment. Under this type of arrangement, the EC and the National Governments would match (according to the specified ratio) the amount of funds invested into the SDI by a Regional Government or a municipality, subject to compliance with the adopted standards.

These matching grants could work as a control mechanism to avoid data duplication (proposals to generate already existing datasets could not be eligible for the grants) and to guarantee adherence to the proposed standards.

This schema can be extended to support private initiatives. If data generated by a private organisation conforms to the standards agreed upon and is included in the clearinghouse network, this organisation can qualify for a grant, which matches its investment.

Some tasks included in a number of activities within INSPIRE, such as generalization, change-only updates, data conversion programs or interoperability issues, need the execution of some previous research. They must be addressed in the framework of pilot projects and demonstration projects, which could be eligible for the reception of research funds.

6.2 Key activities in INSPIRE needing funding

The activities for which funding is required are listed as follows:

Implementation phase:

- Setting up the institutional structures.
- Definition of SDI components, standards for data, metadata and processes.
- Data capture (Reference data and thematic data).
- Data harmonization.
- Standardisation of processes (Pilot projects implementation).
- Elaboration and publication of metadata catalogues.

Operation phase:

- Data maintenance and updating (including data collection and harmonisation).
- Maintenance of metadata catalogues.
- Follow-up of the INSPIRE initiative.

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The activities considered and their funding priority, as well as a possible funding source, are listed in the following table:

Table.

Areas for funding	Source of funding	Funding priority
Institutional structures		
Setting up the institutional structures	European Commission EC + National	Medium-high
Reference data (RD)		
Definition of 'minimum requirements' for RD	EC	High
Data collection:		
'Minimum requirements' data	EC + National/Regional/Local	High
Other reference data	National/Regional/Local	Medium
Historical		Medium
Data maintenance	National/Regional/Local	High
Thematic Data		
Definition and collection of thematic data	EC + National/Regional/Local	Low - medium
Standardisation and harmonisation		
Definition of standards for data (ISO?)	EC	High
Adherence to standards (Data harmonisation)	EC + National	Medium-high
Certified programs providing data conversion	EC + National	High
Definition of standards for processes	EC	Medium
Interoperability (Pilot projects implementation)	EC + National	Medium-high
Metadata		
Definition of standards	EC (+ National)	Very High
Elaboration of metadata catalogues	EC (+ National)	Very High
Publication of catalogues on Internet	EC (+ National)	High

6.3 A proposal for funding of INSPIRE

It has already been stated that there are a number of different activities involved in the development of the ESDI. The question to be answered is: Who pays for what? Looking at the initial investments, the options are two: EC or national/regional/local?. The following table relating activities with source of funding is probably a clear way to explain the origin of the funds for the different activities

Table.

Activities needing funding	Source of funding	
	Establishment	Operation
Institutional structures:		
Setting up the institutional structures	European Commission (EC)	
Reference data (RD):		
Definition of minimum requirements for RD	EC	

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Data collection *): Minimum requirements data Other reference data Data maintenance and updating	EC + National/Regional/Local National/Regional/Local	National/Regional/Local
Thematic data: Definition of thematic data Data collection *) Data maintenance and updating	EC + National/Regional/Local EC + National/Regional/Local	National/Regional/Local
Standardisation and harmonisation: Definition of standards for data (ISO?) Adherence to standards (Data harmonisation) Definition of standards for processes Interoperability (Pilot projects implementation)	EC EC + National EC EC + National	EC + National EC + National
Metadata: Definition of standards Elaboration of metadata catalogues Publication of catalogues on Internet Maintenance of metadata catalogues	EC (+ National) EC (+ National) EC (+ National)	EC + National/Regional/Local
Follow-up procedure: Follow-up of the INSPIRE initiative	European Commission (EC)	European Commission (EC)

*) Access to structural funds for data collection activities must be guaranteed.

No single organisation can build the National SDIs. Collaborative efforts are essential for its success. Specific funding programs to support and encourage the development of the National SDIs might be needed.

The EC should provide seed money to the Regional/Local Governments and to other organisations through specific programs.

The development of the National SDIs will become a legal mandate. Is this legal mandate enough?. Perhaps a mechanism should be implemented to guarantee long term financial security for those data services conceived as General Interest Services ?

6.4 Discussion on costs for INSPIRE

Establishing a national SDI is to a great extent a matter of co-ordination, information harmonization and implementation of common procedures, processes and other common technical arrangements. This calls for investment and resources for managing the co-ordination.

The base for the national SDI, the different databases and systems managed by custodians, represents considerable investment, and calls for large amount of resources for data collection, maintenance, management and dissemination etc. This base is normally financed through a combination of grants and cost recovery arrangements managed by the government and responsible agency (custodian).

The Working Group has not been able to gather exact figures on the existing situation in different countries. A hint to the dimension of annual resources for national datasets could be given based on information from National Mapping Agencies. These figures could be estimated to around 900 million Euro per annum. It should be noted that the figures do not include all the national datasets and that the estimation of cost is difficult due to differences in specifications, what to include and exclude etc.

An attempt to give a rough indication of the costs involved in SDI and a draft for funding is presented in the table below. This is despite the fact that it is not possible to come up with a figure for the data

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collection task, since the amount of resources for the work presented in this paper, is limited and because:

- The status of the reference data in the different countries is not sufficiently known
- The specifications on minimum requirements for the reference data sets needs to be finalised.

However, the components in the table refer to the recommendations following in section 8 of this document. **Note.** It must clearly be pointed out that figures are not exact and are given in rough intervals, and therefore the total sums given will not add up in an exact way. The figures are based on figures from EuroGeographics, and from various rough estimates discussed in the Working Group.

Table. Comments to the table

- The fact that some countries in Europe do not have national digital data at medium scale (1:10000-1:50000) needs to be further addressed by the Commission and ESDC, assessing the possibility of structural funds for supporting the building up of the national SDI:s. In Candidate Countries pre-accession funds should be also used to support NSDI building as facilitating tools for the accession-related tasks
- National costs depend on size of country and specifications of SDI
- European SDI harmonization costs depend on level of detail and resolution in Eurospecifications
- European SDI harmonization costs will initially be larger than in a maintenance stage

SDI Component	Costs (order of magnitude) MEuro per year		
	Funding total	Funding EC	Funding national, per country
A EU platform <i>Co-ordination</i> <i>Setting up a European 'technical focal point' for managing a spatial metadata catalogue , supporting services, technical services for border connection</i> <i>Etc</i>	1-2	1-2	-
A European Spatial Data Committee, ESDC, with participants from national level for implementation <i>Specifications of European SDI, Pilot projects, Co-ordination, funding, legal issues</i>	2-5	2-5	-
A national co-ordinating authority for European SDI	3-10	-	0,1-0,5
Additional activities at national level for European SDI (data collection, data modelling, metadata catalogue, technical systems)	10-100	5-50	1-5
<u>Existing</u> national SDI - <i>data collection by to national specifications</i> - <i>data maintenance incl technical systems</i> - <i>data distribution</i>	500-1500	-	10-150
Total MEuro	500-1500	10-50	10-150
Total MEuro, excluding existing costs, i.e. added costs following from INSPIRE	20-100	10-50	1-5

6.5 Examples of funding of other related activities

As far as is known, some initiatives like CORINE or SABE have been financed through a combination of EU and national funding. The central structures for co-ordinating the databases, and the actual data are typically financed on a co-funded basis, and giving the users free access to data. There is

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however no insurance concerning funding of the maintenance and updating on a long term basis. The Phare program, of course, focuses towards the accession countries.

One example of the cost recovery model is one of the most recent and largest European investments in the field of geographic information, the Galileo satellite navigation system. On March 26, 2002, the Transport ministers of the European Union approving funding took the decision. The price for the users will be based on a licence agreement, recovering parts of the initial funding.

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7 Recommendations

7.1 Recommendations for the legislation

7.1.1 Organisation

A European Spatial Data Committee (built on comitology procedures) will be established by the Council and Parliament framework legal act

The committee shall have the following role and mandates:

- Chaired by the Commission, participants are representatives (competent relevant specialists) of all MS, observers are candidate countries
- Advisory role in assisting the Commission in the preparation of implementation Commission legislation by weighted voting (when management or regulatory procedures are used)
- In addition to the comitology role:
 - promoting the co-ordination and the common implementation of the legislative act in the MS (c.f. the Water Framework Directive strategic co-ordination group)
 - promoting specific aspects (possibly through different sub-groups, to be built according to the internal rules of the committee), e.g. for 1) implementation & funding 2) standards 3) information harmonization, carrying out pilot projects, information services, producing guidance documents etc
 - correspondence with user and technology reference groups of representatives from EPA's, research organisations, other NGO's, stakeholders

The competencies of the Commission (the platform) for European Spatial Data Infrastructure

The body shall be competent in respect of:

- The role of the Commission in INSPIRE should be permanent
- Horizontal, long term mandate, small number of staff
- Co-ordinating of Community interests in relation to INSPIRE in the different sectors in the domain of spatial data
- Representing the Commission towards MS, candidate countries, actors outside EC including international bodies
- Mandate for managing, co-ordinating and further developing the SDI activities at European level, including the promotion of technical co-ordination and specifications
- Mandate for co-ordinate supporting activities (information, education, technical services - seamless data etc)

The Member States must mandate one national authority for relations with the Commission (included in the legislation)

The authority shall have the following role and mandates

- Empowerment to ensure the necessary input (data etc) by the national contributing sources within the SDI context
- Aspects like co-ordination of European specifications at national level for data, metadata, catalogue services, standards, certification procedures, the organisation of custodians and the relations to private organisations in the national infrastructure are subject to subsidiarity, and thus to be dealt with in national legislation (some generic requirements could be included in the framework legislative act to ensure that the necessary co-ordination takes place in the MS)

7.1.2 Funding

The basic principle for funding should be a model for funding which combines grants and cost recovery in an efficient and acceptable way. Details on pricing and access to data will be handled by

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the working group LDP, considering the principle of subsidiarity for handling of pricing issues at national level.

In addition to this the following can be said concerning funding of the European SDI.

The investments in national SDI's have either already been made at national level, or are foreseen to be handled by national investments.

An exception to this which should be considered is that countries which do not have some fundamental elements of SDI's already in existence might need support for their establishment, and an assessment of EU structural funds, research funds, e-content. etc. for this support should be made.

The costs needed 'on top' to develop the national SDI:s for the European SDI, should be funded by EC or by national co-funding:

- The EU body and a European Spatial Data Committee for specifying and promoting the European SDI should be funded by the EC, including the 'focal point' for user services and the technical infrastructure associated with this
- For additional activities at national level for European SDI (data collection, adaption, metadata catalogue etc) there could be, apart from the national funding, a need for co-funding by the EC in some areas. This should further be handled by the Committee for implementation.

7.2 General recommendations

7.2.1 Step-wise Implementation

Under this topic are included all activities outside the actual legislation, i.e. 'what has to be done' to achieve the vision of the infrastructure.

As recommended above, a European Committee with working groups should be set up, to promote the implementation phase. This phase includes both carrying out pilot projects and specification work, actually preparing further legislation and addressing the funding issues. The process should not hamper the subsidiarity principle.

Another important part, recommended above as being the responsibility of the EU 'platform', is the task of setting up the physical (or virtual) 'focal point' for the European SDI, i.e. the integrated interface towards the user. This focal point can consist, among other things, of the service of maintaining the European metadata catalogue, which will have links to the national catalogues. Other services could be the merging of national data sets together to form European data sets under specific agreements. Another mandate would be to co-ordinate the integration of INSPIRE principles into EU policy and funding programmes.

This focal point is for the EU body to decide on how it will be installed, but it is highly recommended to involve the experience of a similar metadata service today that is run by EuroGeographics and other organisations.

It is strongly believed, however, that the implementation of the European SDI cannot be carried out other than in a phased or stepwise manner, primarily because of the varying situation among the countries, but also in the sense that all data themes cannot be handled at the same time for practical and financial reasons.

The final specifications of the reference and thematic data to be included in the European SDI, will be prepared, prototyped and implemented theme-wise, accompanied by pilot studies, and promoted by the European Spatial Data Committee. An important success factor is the true commitment and participation of the involved actors (producers, stakeholders etc) in the various working groups, and the level of actual co-operation between them.

An additional recommendation is that a monitoring and follow-up mechanism to evaluate the success of the INSPIRE also should be considered.

One good and recent similar example of implementation is the implementation of the Water Framework Directive, WFD.

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The definition of the time frames for the implementation, is part of the work of the proposed organisational structures.

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9 Glossary

Term	Meaning	Source
Catalogue	Catalogue = Clearinghouse. Directory Distributed service to locate geospatial data based on their characteristics expressed in metadata. Clearinghouse allows one to pose a query of all or a portion of the community in a single session. Like a spatial AltaVista	DERM From AST Orientation Paper
Clearinghouse	A decentralised system of servers located on the Internet which contain metadata. A fundamental goal of Clearinghouse is to provide access to digital spatial data through metadata. The Clearinghouse functions as a detailed catalogue service with support for links to spatial data and browse graphics.	FGDC
Content repositories	Contains the data	AST

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Comitology	Under the Treaty establishing the European Community, it is for the Commission to implement legislation at Community level (Article 202 of the EC Treaty, ex-Article 145). In practice, each legislative instrument specifies the scope of the implementing powers granted to the Commission and how the Commission is to use them. Frequently, the instrument will also make provision for the Commission to be assisted by a committee in accordance with a procedure known as "comitology". The committees which are forums for discussion, consist of representatives from Member States and are chaired by the Commission. They enable the Commission to establish a dialogue with national administrations before adopting implementing measures. The Commission ensures that they reflect as far as possible the situation in each country in question. Three options: Advisory, regulatory or management procedures.	EU website glossary
Custodian	The principle of custodianship assigns to an agency certain rights and responsibilities for the collection of spatial information and the management of this on behalf of the community.	ANZLIC
'Eurospecifications'	<i>Needs to be defined. Involves both data and standards. Concerning data: ='minimum requirement' data =European reference data =a subset of national reference data</i>	RDM, AST
Foundation	<i>Base. In this context, and to avoid confusion, not used.</i>	Dictionary
Framework	<i>Structure. In this context, and to avoid confusion, a 'reserved word' for the legislative framework act.</i>	Dictionary
Horizontal/ Vertical	Horizontal meaning different user sectors; Vertical meaning in the local to global axis	Burrough et al
Harmonise	Be in line with, in accordance with. <i>In this context, refers to data, standards, policies etc being - as far as possible and relevant - in conformity across Europe</i>	Dictionary
Interoperability	Within the context of reference data, the term interoperability ("the ability to operate between") is used to describe the process of using the same data across different applications and/or the same application using data from different sources over the same territory.	ETeMII
Metadata	Metadata is the information and documentation, which makes data understandable and sharable for users over time. Metadata exists both for data and for services. Metadata is usually stored in catalogues, which are accessible to applications and services via catalogue interfaces.	ISO11179 Annex B From AST Orientation Paper
'Minimum requirement' data	<i>Needs to be defined. The reference data that is required by each country within the INSPIRE context. = European reference data</i>	RDM
Principle of subsidiarity	The subsidiarity principle is intended to ensure that decisions are taken as closely as possible to the citizen and that constant checks are made as to whether action at Community level is justified in the light of the possibilities available at national, regional or local level.	EU website glossary
Reference data	In general terms data that is basically application independent, and which gives an objective view of the real world. ETeMII has defined 6 components, these are evolved in the INSPIRE work. Synonyms: fundamental data, core data etc. Shown location of data, but not the state.	ETeMII project, and RDM group of INSPIRE
Stakeholder	Party having a beneficial interest	Dictionary
Thematic data	Application data. <i>In this context, environmental data.</i>	