INSPIRE:
Towards a European Spatial Data Infrastructure

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Objectives of presentation

To summarise the rationale for a European Spatial Data Infrastructure and the steps leading to the INSPIRE Directive

To give an overview of the scope and structure of the INSPIRE Directive

To highlight progress to date, and to illustrate how the INSPIRE process is encouraging stakeholder participation

To give a clear roadmap for future developments and to stimulate your thoughts on how this relates to the activities presented at this congress

JRC EUROPEAN COMMISSION

Structure of JRC

Staff: 2200 – Budget: 300 million Euro / year

7 Institutes in 5 Member States:

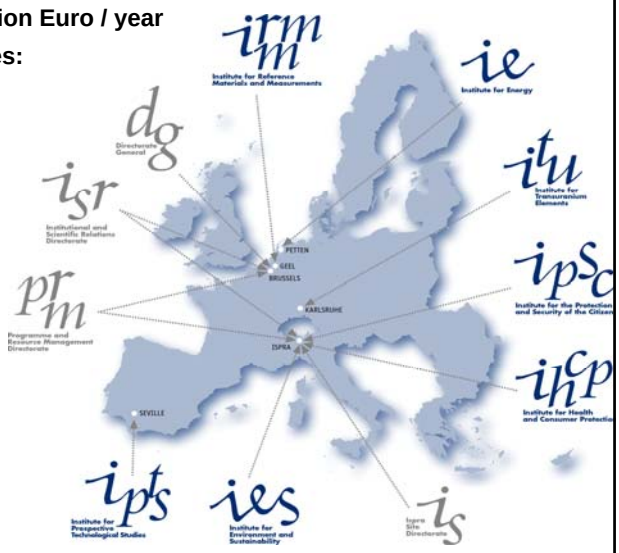
IE - Petten (The Netherlands)
- *Institute for Energy*

IRMM - Geel (Belgium)
- *Institute for Reference Materials and Measurements*

ITU - Karlsruhe (Germany)
- *Institute for Transuranium Elements*

IPSC - IHCP - IES - Ispra (Italy)
- *Institute for the Protection and the Security of the Citizen*
- *Institute for Health and Consumer Protection*
- *Institute for Environment and Sustainability*

IPTS - Seville (Spain)
- *Institute for Prospective Technological Studies*



SDI Unit : +30 staff working on INSPIRE and the Community Spatial Information Network (COSIN)

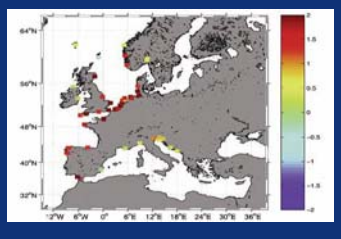
JRC EUROPEAN COMMISSION

Background

There is a growing awareness that we are living at a time when environmental changes have significant impacts on our economy and social well being, and urgent action is required.

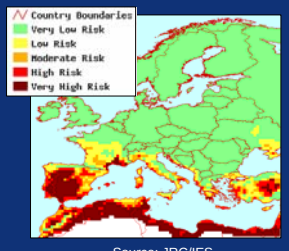
Understanding the complex interactions between natural and human systems requires reliable and timely spatial information.

Sea Level trends in mm/y



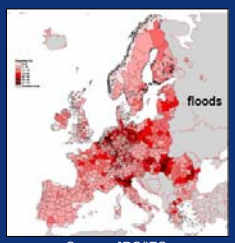
Source: Marcos & Tsimplis, as quoted in JRC/IES

Forest Fire Risk



Source: JRC/IES

Floods Risk



Source: JRC/IES

Technological evolution - from GIS to SDI

Move from project based, standalone GIS to federated, distributed, loosely coupled systems

The interaction between these systems depends on an infrastructure, which has technical, policy, data content and organisational components

Evolution of specific GI standards/specifications, and general IT standards which underpin interoperability (ISO TC211, CEN TC287, OGC, W3C…..)

What is a Spatial Data Infrastructure

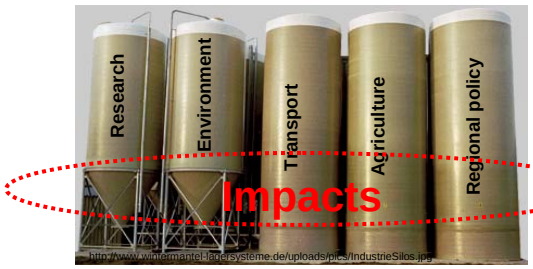
A framework of data, technology, policies, standards, and human resources, necessary to facilitate the sharing and using of spatial information.

The term infrastructure is used to emphasise not just hardware and data (equivalent in the rail system to carriages, power lines, rail tracks, stations) but also the need for coordinating structures and international standards and agreements (on gauges, timetables, safety rules, signalling, etc.) without which the system cannot operate consistently and safely.

Why do we need such infrastructure?

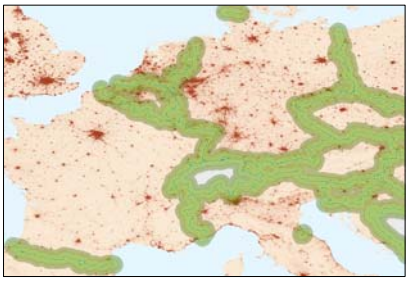
Increasing shift from sector-based (silos) policy making towards more integrated, cross-sectoral approaches.

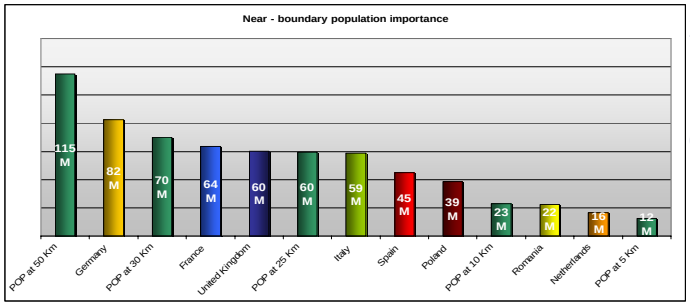
Recognised in the 6th Environmental Action Programme (2002-12)



- This new approach particularly important for environmental policy
- But very difficult to work across sectors and boundaries

Environmental phenomena do not stop at national borders!





20% of the EU citizens (115 million) live within 50 Kms from a border.

60 million EU citizens live less than half an hour (25 kms) from a border

Early initiatives

GI 2000

initiative by the Commission to establish a policy framework for a stable, European-wide set of agreed standards, procedures, guidelines and incentives for creating, updating, changing, accessing and using geographic information

INSPIRE (Infrastructure for Spatial Information in Europe) - Position papers 2002

Consultation, extended impact assessment 2003-4

INSPIRE Proposal for a Directive 2004

INSPIRE Directive General Provisions

INSPIRE lays down ***general rules*** to establish an infrastructure for spatial information in Europe for the purposes of Community environmental policies and policies or activities which may have an impact on the environment.

INSPIRE to be based on the infrastructures for spatial information established and operated by the Member States.

INSPIRE does not require collection of new spatial data

INSPIRE does not affect existing Intellectual Property Rights

INSPIRE is a Framework Directive - not prescriptive

Detailed technical provisions for the issues above will be laid down in Implementing Rules (IR)

Entry into force 15th May 2007

INSPIRE Principles

Based on existing infrastructures
Data maintained at the most appropriate level
Combine and share between different users and applications
Agreements to facilitate sharing
Support discovery and evaluation

Implies a federated architecture, interoperable components covering metadata, network services, data content and sharing arrangements

Scope - What Kind of Spatial Data ?

Whose ? - Spatial data held by or on behalf of a public authority operating down to the lowest level of government when laws or regulations require their collection or dissemination

Which data ? - INSPIRE covers 34 Spatial Data Themes laid down in 3 Annexes – (*required to successfully build environmental information systems*)

Structure of the INSPIRE Directive

Metadata

Interoperability of spatial data sets and services

Network services (discovery, view, download, invoke)

Data and Service sharing

Coordination and measures for Monitoring & Reporting

JRC is responsible for overall technical coordination of INSPIRE

Directive itself applies to Member States, but will be implemented within the Commission also

Scope of INSPIRE Data Themes

Annex I

- Coordinate reference systems
- Geographical grid systems
- Geographical names
- Administrative units
- Addresses
- Cadastral parcels
- Transport networks
- Hydrography
- Protected sites

Annex II

- Elevation
- Land cover
- Ortho-imagery
- Geology

INSPIRE Annex III

Annex III
- Statistical units
- Buildings
- Soil
- Land use
- Human health and safety
- Utility and governmental services
- Environmental monitoring facilities
- Production and industrial facilities
- Agricultural and aquaculture facilities
- Population distribution – demography
- Area management/restriction /regulation zones & reporting units
- Natural risk zones
- Atmospheric conditions
- Meteorological geographical features
- Oceanographic geographical features
- Sea regions
- Bio-geographical regions
- Habitats and biotopes
- Species distribution
- Energy Resources
- Mineral resources

From Commission proposal to Community Directive implementation

Preparatory phase (2004-2006)
- Co-decision procedure
- Start of preparation of Implementing Rules

Transposition phase (2007-2009)
- Directive entered into force **15 May 2007**
- INSPIRE Committee starts its activities
- Continuation of preparation of Implementing Rules
- Transposition into national legislation
- Adoption of Implementing Rules by Comitology

Implementation phase (2009-2013)
- implementation and monitoring of measures

Metadata

Member States shall create metadata and keep them up to date

Metadata shall include:
- Conformity with IR on interoperability
- Conditions for access and use
- Quality and validity
- The public authorities responsible
- Limitations on public access

Once Implementing Rules adopted:
- Created within 2 years for Annex I, II
- Created within 5 years for Annex III

Interoperability of spatial data sets and services

Implementing Rules shall be adopted for interoperability and where practical for harmonisation of spatial data sets and services

Harmonised data specifications
- Annex I, II, III:
  - definition and classification of spatial objects
  - geo-referencing
- Annex I, II:
  - common system of unique identifiers for spatial objects;
  - relationship between spatial objects;
  - key attributes and corresponding multilingual thesauri;
  - how to exchange the temporal dimension of the data;
  - how to exchange updates of the data.

3rd parties shall have access to these specifications at conditions not restricting their use

Cross-border issues shall be agreed on

Network Services

Member States shall operate a network of the following services available to the public for data sets and services for which metadata has been created:

Discovery services;	No charge
View services;	No charge (with exceptions)
Download services;	
Transformation services,	
Services allowing spatial data services to be invoked	

- Access to services may be restricted

- Services shall be available on request to 3rd parties under conditions

- Implementing Rules will be adopted for which cost-benefit considerations are to be taken into account

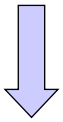
- INSPIRE Geo-portal shall be established – Member States geo-portals

Roadmap constraints

For some Implementing Rules, deadlines are explicitly mentioned in the directive

Some deadlines can be derived from combination of articles in the Directive

For others no explicit indication is given



Roadmap looks at interactions between components of the infrastructure, and at consistency of the overall approach

Excerpt from Roadmap

Milestone date	Relevant article	Description
2007-05-15		Entry into force of INSPIRE Directive
2007-08-15	22§2	Establishment of the INSPIRE Committee
2008-05-15	5§4	Adoption of IR for the creation and updating of metadata
2008-05-15	21(4)	Adoption of IR for monitoring and reporting
2008-05-15*	16	Adoption of IR for discovery and view services
2008-11-15*	16	Adoption of IR for download services
2008-11-15*		Adoption of IR for data exchange
2008-11-15*	16(a)	Adoption of IR for Coordinates Transformation Service
2009-05-15*	17(8)	Adoption of IR governing the access rights of use to spatial data sets and services for Community institutions and bodies
2009-05-15	9(a)	Adoption of IRs for the interoperability and harmonisation of spatial data sets and services for Annex I spatial data themes
2009-05-15	24§1	Provisions of Directive are brought into force in MS (transposition date)

Work Programme 2007-2009

Published on 16 May 2007

- http://www.ec-gis.org/inspire/

Driven by roadmap

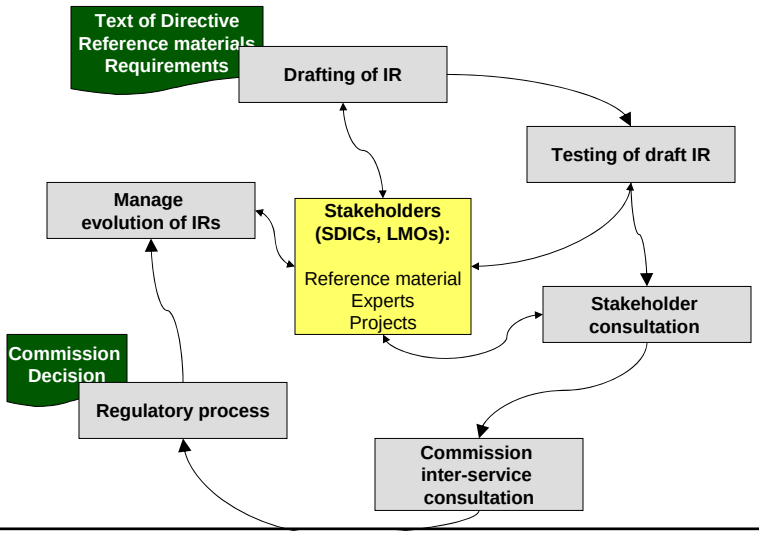
- Dates in Directive drive Implementing Rule development

Is intended as a tool for stakeholders resource planning

- Dates in calendar will change according to new developments (e.g., > 1200 comments on draft IR for Metadata)

Work Programme 2007-2009

Implementing Rule development cycle

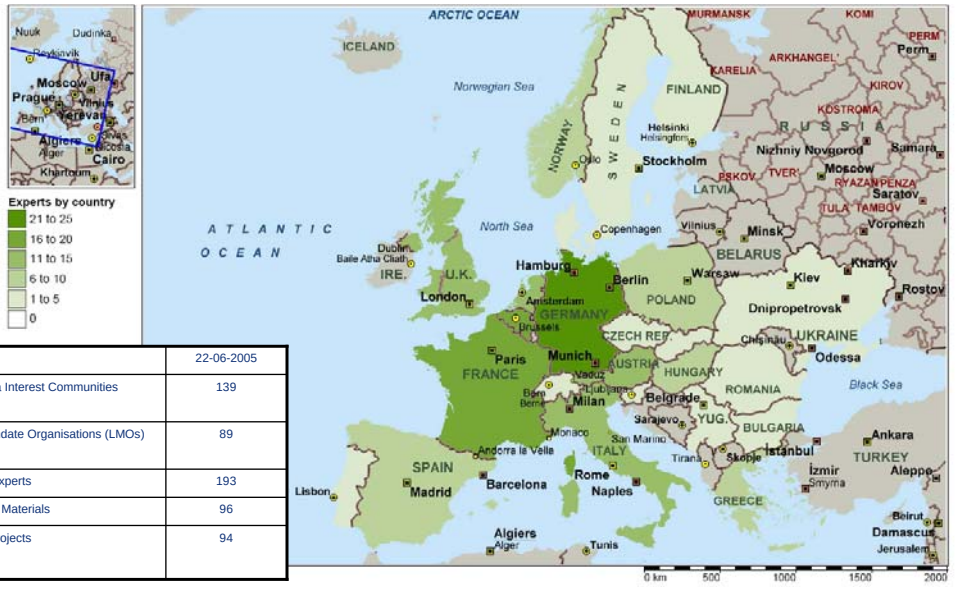


Implementing INSPIRE: a participatory approach to policy making

Open and transparent approach in:

- Formulating the policy (Experts from Member States writing position papers as input)
- Assessing likely impact (Expert from MS prepared Extended Impact Assessment)
- Advising on process (INSPIRE Expert Group with representatives MS)
- Mobilizing stakeholder through open registration of Spatial Data Interest Communities and Legally Mandated Organisations
- Providing input to drafting of Implementing Rules through experts, reference material, and projects
- Commenting on Drafts

Results of the call for Experts
Opened on 1 March 2005



	22-06-2005
Spatial Data Interest Communities (SDICs)	139
Legally Mandate Organisations (LMOs)	89
Proposed Experts	193
Referenced Materials	96
Identified Projects	94

Implementing Rules Development Process
Role of Spatial Data Interest Communities (SDIC)

collect and describe user requirements,
submit/develop reference materials
allocate experts to the drafting teams,
participate in the review process,
implement pilot projects
to test/revise/develop the draft Implementing Rules,
make cost/benefit analysis
to assess costs of the draft Implementing Rules,
contribute to awareness raising and training

The role of Legally Mandated Organisations (LMO)

To collaborate within the SDICs, or autonomously in providing technical specifications

To help identify user needs

To contribute to the analysis of the technical and operational feasibility of implementation of proposed draft Implementing Rules

To provide feedback on the cost/benefit consequences of Implementing Rules at Member State level.

Example of process for IR on Metadata

Call for experts March 2005

Drafting Teams established in October 2005

Draft IR for Metadata published on 2nd Feb. 2007 based on requirement of Directive, review of existing material submitted by SDICS and LMOs, international standards, and drafting team knowledge.

Open for comments by SDICs and LMOs over an 8 week period. 1200 comments received.

Revised Draft to be published in the October 2007 (ver. 3)

Public consultation went live Friday 26th October

Open for public consultation for an 8 week period

Commission develops its proposal based on all input received and submits to Regulatory Committee

Interoperability and harmonisation of spatial data sets and services

The development of INSPIRE Implementing rules for the interoperability and, where practicable, harmonisation of spatial data sets and services follow a two-step approach:

- Development of conceptual framework and specification methodology.
  - DS-D 2.5 *Generic Conceptual Model* (GCM),
  - DS-D 2.6 *Methodology for Specification Development*.
- Development of data specifications for each data theme
  - Based on the conceptual framework and specification methodology, and based on the INSPIRE roadmap

New actors in Data Specification development

Stronger involvement of EIONET

Introduction of Thematic Working Groups

- Bundle the expertise to develop and document the technical specifications necessary for the Implementing Rules of specific INSPIRE themes
- **will deliver**
  - Analysis of the reference materials
  - Analysis of the user requirements and documentation of the use-case development
  - Resolutions of the comments submitted by the stakeholders in frame of reviewing the draft data specifications
  - Data specifications to be included in the draft Implementing Rules
  - Easy to understand use example with illustration for INSPIRE

Short term actions

Start date	End date	Event	Category	Suggested actors
2007-05	2007-07	SDIC/LMO consultation of draft General Conceptual Model	DS	Experts in data modelling
2007-05	2007-07	SDIC/LMO consultation on draft Definition and scope of Annex Themes	DS	Thematic experts
2007-07	2007-09	SDIC/LMO consultation on draft IR for Discovery and View Services	NS	Experts in catalogue services and WMS
2007-07	2007-09	Call for candidate specifications for Annex I, II, and III spatial data themes	DS	Thematic experts
2007-07	2007-09	Call for SDICs/LMOs for participation in data specification development	DS	Thematic experts, experts in data modelling
2007-07	2007-09	User requirements survey	DS	Thematic experts
2007-07	2007-10	SDIC/LMO consultation on draft Methodology for Specification Development	DS	Experts in data modelling
2007-08	2007-10	Second feasibility test for monitoring indicators (3MS, full scope, call for participation SDICs and LMOs)	MR	Thematic experts

Network Services

General issues to address:

- Architecture
- Technical protocol
- Rights Management
- Service metadata
- Multilingualism

Discovery and View services

Download services

Transformation services

Services to Invoke spatial data services

Progress - Architecture

NS DT maintains a living technical document:

- to define in which context services have to run,
- to address technical issues,
- for internal use.

NS DT participates with MD, DS DT and CT to the creation of an Overview document about INSPIRE Architecture

- To provide an overview of the current understanding of the technical architecture of INSPIRE,
- To identify gaps and needs for additional collaboration,
- To help SDICs/LMOs better understand context of different deliverables.

Progress - Technical protocols

INSPIRE services shall be Web Services (W3C)

- for interoperability (applications ⇔ services, services ⇔ services),
- Using the SOAP protocol to exchange messages,
- and WSDL language to describe these messages,
- plus a possible entry in a UDDI directory.

Why SOAP binding instead of classical OGC type with URL encoding?

- Standard information technology,
- Smooth and complete integration in development environments,
- Full integration with Web Services environments (WSDL, UDDI, …),
- To support requirements from “horizontal services” (e-commerce, geoRM)

➡ **For each service type a specific SOAP binding and WSDL has to be defined:**

- Documents (not normative) and software exist for OGC services (WMS, WFS, WCS, CS-W),
- A pilot study to be launched by EC will help to clarify this task.

Progress - Multilingualism

What is concerned?

Documents (metadata, capabilities, feature info, error messages, …),

Maps.

From the NS point of view:

Requirement with a limited impact on services,

For an application: to be able to ask for results in a specific language (when available),

For a service provider: to inform users on supported languages.

➡ **An optional parameter LANGUAGE has to be introduced for each service**

Progress – Service metadata

Service metadata: to describe the operations and geographic information available at a server (ISO 19128)

Various possibilities to describe a service:

ISO 19119: available in a catalogue (defined by Metadata DT),

OGC Capabilities: available directly from the service,

+ W3C WSDL (to describe precisely service operations)

➡ **Need to harmonize the content of some common metadata fields:**

Contact information,

Access constraints,

Fees (when necessary).

Progress – Discovery & View Services

- A draft document on IR for Discovery & View services was sent for reviewing to CT and DTs
- This internal review has provided > 400 comments:
  - General comments related to the Directive
  - Technical comments:
    - Service metadata: capabilities / metadata IR
    - Link data sets / layers of a view service, useful scale
    - CRS, overlay capability, legend, temporal component of view service
    - Multilinguality
    - Protection, SOAP / WSDL
  - Comments being processed

INSPIRE Directive Governance Structures

- The Commission (Article 22)
  - Shall be assisted by a Committee -> Comitology Procedure
  - Coordinating INSPIRE at Community level assisted by relevant organisations and, in particular, by the European Environment Agency
- The Member States
  - Are members of the Committee (Article 22)
  - Contact points to the Commission supported by a coordination structure, taking account of the distribution of powers and responsibilities within the Member State. (Article 19)
- Other Parties
  - European standardisation bodies (Article 20)
  - Representatives of Member States at national, regional and local level as well as other natural or legal persons, including users, producers, added value service providers or any coordinating body (Article 7)
- The European Parliament and Council

Strengthening Governance:The INSPIRE Forum

NEW

An INSPIRE Forum will complement the Community-Member States governance structures.

Brings together multiple societal stakeholders to share experiences and best practices while fostering co-ordination.

Foster constructive dialogue on issues related to the implementation of the INSPIRE (Implementing Rules development, impact assessments…) .

Strengthen co-ordination with other Community and global initiatives (GMES, UNSDI, GSDI, GEO/GEOSS,etc.).

Foster a co-ordinated programme of communication and awareness raising events, such as conferences and publications and as well technical workshops organised at national, regional, sector or Community levels

Strengthening Governance:The INSPIRE Forum

NEW

Serve as a platform to exchange views on Community and national regulatory initiatives related to the environment, relevant or impacting on the implementation of INSPIRE

Provide guidance for Community and Member State research, development and funding programmes in support of the implementation of INSPIRE at all levels

Facilitate collaboration between the public and private sector helping in innovating governmental services as well as supporting the creation of value added services based on the INSPIRE infrastructure (accordingly to the Lisbon agenda)

The Forum will be established by June 2008.

Governance: Conclusions

Top-down: INSPIRE is a framework Directive with implementing rules to be adopted in the coming years

Bottom-up: Highest involvement of key stakeholders through the "Spatial Data Interest Community" concept is needed for development, implementation and sustained operation

Openness and transparency in drafting implementing measures a must

Pilots and Projects fundamental to define and validate the implementing rules

Links and interfaces with Community (GMES etc., GEO/GEOSS etc.) international initiatives essential for implementing a Global Spatial Data Infrastructure

An INSPIRE Forum will facilitate building and sharing a common vision

Conclusions

INSPIRE is a process, not just an EU Directive
Relevant at local, regional, national, European and global scale
Balancing long term vision with short term practical implementations
Already bringing benefits
Consensus based, with broad stakeholder involvement
Open to all - experts, communities, public consultations

JRC aiming to foster collaboration with Turkey on SDI-related issues
Specific opportunities to work with JRC
Tubitak (the Scientific and Technological Research Council)-JRC MoU
Hosting of PhD, post-doctoral scientists

Thank you for your attention !

…..to know more come to the 2nd INSPIRE Conference, Copenhagen, 24-27 June 2008!!

http://sdi.jrc.ec.europa.eu

http://ec-gis.org/inspire

http://geoportal.jrc.it

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