European Directive (2007/2/EC) INSPIRE – update on building European Spatial Data Infrastructure

UN Expert Group on Resource Classification, Fourth Session, 23-26 April 2013

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Serving society
Stimulating innovation
Supporting legislation
Why Europe needs a spatial data infrastructure (SDI)?
- Natural Disasters and as well as other environmental phenomena do not stop at national borders!
- 20% of the EU citizens (115 million) live within 50 Km from a border
- The EU needs a harmonised complete and reliable information knowledge base to facilitate better policy and access to critical raw materials in Europe
Building a European SDI is complex

- Europe is a patchwork of several countries with different traditions, cultures and socio-economic models.

- This is reflected in the different ways in which geospatial data is managed.
Infrastructure for Spatial Information in the European Community - INSPIRE Directive

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 is based on the infrastructures for spatial information established and operated by the Member States.

INSPIRE is a distributed infrastructure.

INSPIRE does not require collection of new spatial data.
INSPIRE does not affect existing Intellectual Property Rights in force since 15 May 2007(9).
INSPIRE Components

- INSPIRE is a **Framework Directive**
- Detailed technical provisions are laid down in **Implementing Rules** on
  - Metadata
  - Interoperability of spatial data sets and services
  - Network services (discovery, view, download, transform, invoke)
  - Data and Service sharing (policy)
  - Coordination and measures for Monitoring & Reporting

- Once adopted, Implementing Rules become European **legislative acts** and national law in 27 Member States and in some EFTA countries
INSPIRE in a nutshell

- Comprehensive **data inventory** (Monitoring & Reporting IR)
- **Facilitate data discovery** through standardised discovery services & metadata (IR on Network Services & Metadata)
- **Data sharing** (IR on Data and Service Sharing)
- **Facilitate data access** by allowing view, download and transformation (IR on Network Services)
- **Facilitate data use and interoperability** by adopting common cross-domain models to exchange data (IR on Data Interoperability)
## INSPIRE Thematic – Data Scope

### Annex I
1. Coordinate reference systems
2. Geographical grid systems
3. Geographical names
4. Administrative units
5. Addresses
6. Cadastral parcels
7. Transport networks
8. Hydrography
9. Protected sites

### Annex II
1. Elevation
2. Land cover
3. Ortho-imagery
4. Geology

### Annex III
1. Statistical units
2. Buildings
3. Soil
4. Land use
5. Human health and safety
6. Utility and governmental services
7. Environmental monitoring facilities
8. Production and industrial facilities
9. Agricultural and aquaculture facilities
11. Area management/restriction/regulation zones & reporting units
12. Natural risk zones
13. Atmospheric conditions
14. Meteorological geographical features
15. Oceanographic geographical features
16. Sea regions
17. Bio-geographical regions
18. Habitats and biotopes
19. Species distribution
20. Energy Resources
21. Mineral resources
INSPIRE - current Legal framework

- **Directive** 2007/2/EC of the European Parliament and of the Council (INSPIRE) **14.03.2007**
- **INSPIRE Metadata Regulation** **03.12.2008**
- Commission Decision regarding INSPIRE monitoring and reporting **05.06.2009**
- Regulation on INSPIRE **Network Services 19.10.2009** *(View and discovery)*
- Corrigendum to INSPIRE **Metadata Regulation 15.12.2009**
- Regulation on INSPIRE **Data and Service Sharing 29.03.2010**
- Commission Regulation amending Regulation (EC) No 976/2009 as regards **download services and transformation services 10.12.2010**
- COMMISSION REGULATION amending Regulation 1089/2010 as regards interoperability of spatial data sets and services **05.02.2011** *(code lists)*
Implementing Rules in preparation

On the 8th of April 2013 the INSPIRE Committee gave a unanimous favorable opinion on the proposed legislation for the harmonization and interoperability of remaining 25 data themes (INSPIRE Annexes II and III.)
## Implementation Roadmap

<table>
<thead>
<tr>
<th>What</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metadata available for Annex I+II spatial data</td>
<td>Dec 2010</td>
</tr>
<tr>
<td>Discovery and view services IOC</td>
<td>May 2011</td>
</tr>
<tr>
<td>Discovery and View Services operational</td>
<td>Nov 2011</td>
</tr>
<tr>
<td>Download and Transformation Services IOC</td>
<td>June 2012</td>
</tr>
<tr>
<td>Download and Transformation Services operational</td>
<td>end 2012</td>
</tr>
<tr>
<td><strong>Access to (newly collected / all) Annex I spatial data sets under harmonised conditions</strong></td>
<td>end 2012 / 2017</td>
</tr>
<tr>
<td>Metadata available for Annex III spatial data</td>
<td>Dec 2013</td>
</tr>
<tr>
<td><strong>Access to (newly collected / all) Annex II+III spatial data sets under harmonised conditions</strong></td>
<td>Sept 2015 / 2020</td>
</tr>
</tbody>
</table>
Development of data specification – step wise, managed process

- Data specifications for the 9 Annex I data themes (2009)
- Data specifications for the 25 Annex II/III data themes (2013)

Part of the legal framework → Implementation mandatory for European Member States

Interoperability of spatial data sets and services (Implementing Rule) (2009..2013)
Impl. Rules vs. Technical Guidelines

“What Member States must implement” (abstract specification)

Directive

Commission Regulation

Technical Guidelines

“How Member States might implement it” (implementation specification)

INSPIRE Directive 2007/2/EC

IRs for Metadata, Network Services Interoperability Spatial data sets and services

TG for the Implementation of Discovery Services

Implementation Requirements & Recommendations

TG – Data Specification on Addresses

Implementation Requirements & Recommendations

legally binding

not legally binding

e.g.
Data interoperability – INSPIRE’s aim

- Provide access to spatial data via network services and according to a harmonised data specification to achieve interoperability of data
  
  - Datasets used in Member States may stay as they are
  
  - Data or service providers have to provide a transformation between their internal data model and the harmonised data specification
Cross-theme data interoperability

PD: Population Distribution
EL: Elevation
SD: Species distribution
TN: Transport networks
ER: Energy Resources
US: Utilities and Governmental Services (Waste Management)
PF: Production and industrial facilities
AF: Agricultural and aquaculture facilities
SO: Soil
HB: Habitats and biotopes
AM: Area management/ restriction/ regulation zones & reporting units

Urban Planning
Waste Management Plans
Environmental Impact Assessment
Risk Management
...

Reporting
Waste
SEVESO
PRTR
Key pillars of data interoperability

**Conceptual data models**
- spatial objects and their properties and relationships for 34 data themes
- cross-domain harmonization
- based on a common modelling framework
- managed in a common UML repository

**Encoding**
- GML application schemas as standard encoding
- conceptual models independent of concrete encodings
- also possible to derive other encodings (e.g. based on RDF)

**Harmonised vocabularies**
- to overcome interoperability issues caused by free-text and/or multi-lingual content
- allow more specific terms from local vocabularies in addition to the harmonized terms

**Registers**
- provide unique and persistent identifiers for resources
- allow their consistent management and versioning
- items can be made unique and referred to unambiguously
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Described in INSPIRE Conceptual Framework documents
Coordination (DGs: ENV, JRC and Eurostat)

- Transparency and inclusiveness
- Stakeholder consultations
- **Support to Member States** on the implementation
- Extend INSPIRE to and ensure consistency of different policy domains
- Promote INSPIRE in international standardisation
Transparent not restrictive approach –

Public consultation / testing of V2.0 6 – 9/2011

6212 comments received
5218 from review; 994 from testing
INSPIRE Mineral and Energy Resources - Overview

Mineral Resources
“Mineral resources including metal ores, industrial minerals, etc., where relevant including depth/height information on the extent of the resource.” INSPIRE [Directive 2007/2/EC]

Energy Resources
“Energy resources including hydrocarbons, hydropower, bio-energy, solar, wind, etc., where relevant including depth/height information on the extent of the resource.” INSPIRE [Directive 2007/2/EC]
**Analyzed Legislation:**
- The Raw Materials Initiative (RMI)
- The Management of waste from extractive industries (Directive 2006/21)

**Existing global standards:**
- EarthResourceML (IUGS/CGI) - http://www.earthresourceml.org/
- GeoSciML (IUGS/CGI) - http://www.geosciml.org/
  + the work done in several European projects (ProMine, EuroGeoSource, OneGeology..)

**Developed Use cases:**
- Where to find germanium in Europe?
- What is the gold potential of Central and Southeastern Europe?
- Looking for the closest producers of Ground Calcium Carbonate (GCC), allowing elaborating filler for the paper industry
- Environmental uncertainties related to mining wastes
Mineral Resources

- Earth Resource: natural material of potential economic value
- Mining Feature: the working of the Earth Resource

Earth Resource:
- Mineral Occurrence
- Commodity and Commodity Measure
- Ore Measure
- Mineral deposit model
- Exploration Activity

Mining Feature:
- Mine
- Mining Activity

CORE MODEL

<table>
<thead>
<tr>
<th>28 Ni</th>
<th>29 Cu</th>
<th>30 Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 Pd</td>
<td>47 Ag</td>
<td>48 Cd</td>
</tr>
</tbody>
</table>
Mineral Resources

Used code lists
IUGS/CGI

Code List
ClassificationMethodUsedValue
CommodityCodeValue
EndusePotentialValue
ExplorationActivityTypeValue
ExplorationResultValue
ImportanceValue
MineStatusValue
MineralDepositGroupValue
MineralDepositTypeValue
MineralOccurrenceTypeValue
MiningActivityTypeValue
ProcessingActivityTypeValue
ReserveCategoryValue
ResourceCategoryValue
Mineral Resources – core IR

Earth Resource:
- Mineral Occurrence
- Commodity
- Commodity Measure
- Mineral deposit model
- Exploration Activity
- Ore Measure

Mining Feature:
- Mine
- Mining Activity

Mineral Resources – extended model TG only

Earth Resource:
- Earth Resource Material
- Supergene processes (ex. alteration)
- Mineral system

Mining Feature:
- Mined material
- Products
- Mining waste
**INSPIRE Energy Resources - Overview**

**Legislation:**
- Energy Statistics Regulation EC 1099/2008
- Energy 2020 - A strategy for competitive, sustainable and secure energy
- Overview of the secondary EU legislation (directives and regulations) that falls under the legislative competence of DG ENER and that is currently in force

**Use cases:**
- Energy crisis management
- County Development Plan (Wind energy resources data usage), Ireland
- Potential for photovoltaic power generation in EU countries
**Energy Resources**

**Scope**

- **Energy type**
  - Main on Primary energy resources
  - Links to Secondary energy (Energy carriers) via statistics

- **Energy resources**
  - Non-renewables (Fossil fuels)
  - Renewables & Waste

INSPIRE Energy Resources data model

In the Implementing Rules - 3 core application schemas:

- Energy resources vector
- Energy resources coverage (grid)
- Energy base (common types)

In Technical Guidelines also specific extension:

- Energy resources statistics
**Recommendation 7** The standardisation and harmonisation of classification of resources has been considered in great detail. In order to achieve a greater degree of interoperability, the use of the UNFC 2009 classification is recommended where its use is possible and feasible.
Looking ahead

- INSPIRE data specifications (to be legally adopted in 8/2013) are only the beginning
  - There will be requests for changes based on experiences from real implementation by data providers/users across Europe

- Need to ensure long-term sustainable maintenance and further development of the proposed infrastructure
  - This cannot be achieved by the EC INSPIRE team alone.

- Continuation with the involvement of relevant INSPIRE Stakeholders (e.g. Are3na - collaborative platform for sharing experiences and reusing SW tools, training material etc.).
Looking ahead – INSPIRE maintenance

- **Commission Expert Group on INSPIRE Implementation and Maintenance (MIG)**
  - to be set up by EC in May 2013
  - members nominated by INSPIRE national contact points

- **Pool of experts**
  - open-ended call for experts, open to all interested stakeholders
  - experts can be selected for sub-groups created by MIG to examine specific maintenance and implementation issues

![Diagram of INSPIRE maintenance process]
• **INSPIRE is now! MSs are implementing** Inspire compliant services. (MD, Geoportal-Network services, Annex I, reporting etc.)

• **INSPIRE is an opportunity** - widens the use of data held by thematic environmental communities.

• **INSPIRE is a multi-purpose infrastructure (innovative applications)**

• Activities on-going to **re-use INSPIRE in other policy areas** (Digital Agenda for Europe, WFD...)

• **INSPIRE facilitates** the use of international standards (ISO, CEN, OGC, **WRB, FAO, UNFC**) as well as taking active part in their development – e.g. OGC GWML 2.0 Interoperability experiment or EarthResourceML 2.0.
More information:

- INSPIRE
- INSPIRE data specifications
  - Overview
  - Data models
  - Schemas