INSPIRE
Data specification development

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EC-JRC INSPIRE Data Specification Team

Outline

- INSPIRE aim & scope
- Implementing Rules and activities overview
- Data specifications development
- Methodology for data specification
- Stakeholder participation, communication
- Challenges (Annex II&III)

What is INSPIRE?

"Infrastructure for Spatial Information in the European Community"

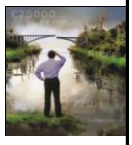
Distributed infrastructure

27 countries
21 languages

General rules for establishment

Environment

34 Spatial Data Themes
Entry into force 15/5/2007



European legislation

INSPIRE Thematic 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
10. Population distribution – demography
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

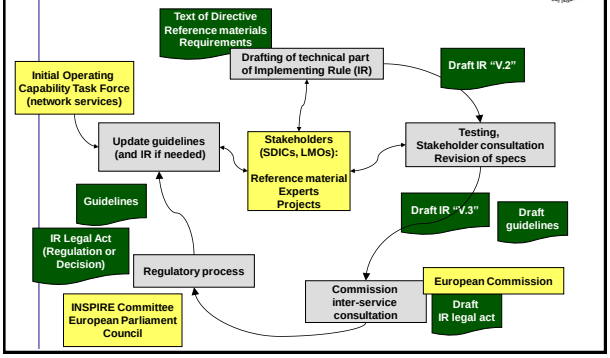
INSPIRE Directive

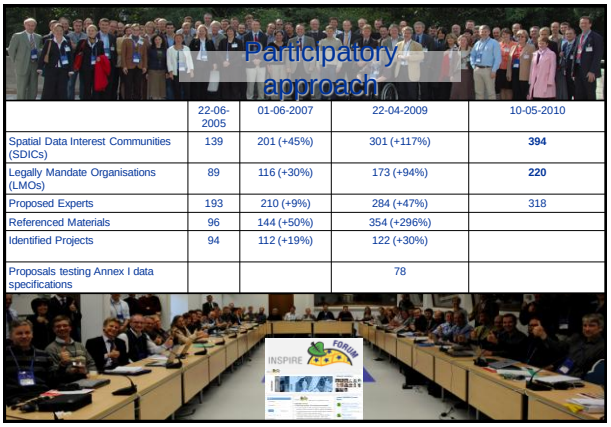
- INSPIRE lays down general rules to establish an infrastructure for spatial information in Europe
  - for the purposes of Community environmental policies and
  - policies or activities which may have an impact on the environment.
- INSPIRE to be based on the infrastructures for spatial information 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
- Entry into force 15 May 2007

INSPIRE Components

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

INSPIRE process and governance





	22-06-2005	01-06-2007	22-04-2009	10-05-2010
Spatial Data Interest Communities (SDICs)	139	201 (+45%)	301 (+117%)	**394**
Legally Mandate Organisations (LMOs)	89	116 (+30%)	173 (+94%)	**220**
Proposed Experts	193	210 (+9%)	284 (+47%)	318
Referenced Materials	96	144 (+50%)	354 (+296%)	
Identified Projects	94	112 (+19%)	122 (+30%)	
Proposals testing Annex I data specifications			78	

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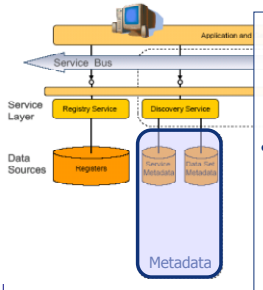
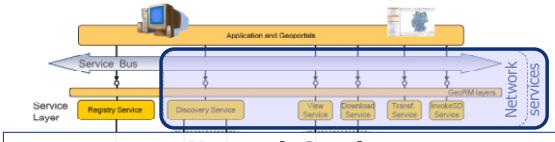
INSPIRE Components



Metadata

- Metadata Regulation published 4th December 2008
- 2-5 years for Member States to create metadata
- Metadata editor publicly available as part of prototype INSPIRE geo-portal

INSPIRE Components



Network Services

- Discovery & View Service Regulation published 2009
- Download & Transformation Service voted favorably by IC 2009
- Regulation on Invoke Service to be finalised by 2012

Metadata | Data specs

Initial Operating Capability

Task Force created to manage this process (June 2009) to help and support the implementation of INSPIRE in the MS

Scope

- architectural aspects and implementation of Network Services to ensure interoperability with the INSPIRE geoportal and among Member States

Focus

- implementation of the INSPIRE Discovery and View Services.

Composition

- representatives, from all Member States, responsible for the architecture design and the service implementation of the National SDIs.

Initial actions

- Update technical guidance (v.2.2 expected June 2010)
- Test interoperability within MS, and MS-EU services

INSPIRE Components

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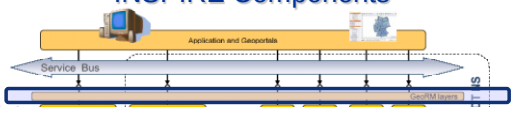


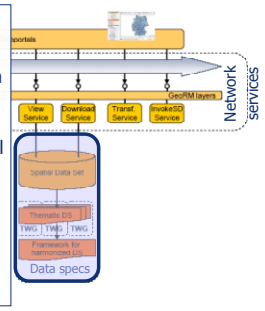
Data Sharing

- **COMMISSION REGULATION (EU) No 268/2010 of 29 March 2010**
- Member States shall provide the institutions and bodies of the Community with access to spatial data sets and services in accordance with harmonised conditions.
- Member States to adopt measures for the sharing of data and services between public authorities for public tasks relating to the environment without restrictions occurring at the point of use. Such measures are open to international bodies and Community institutions and bodies
- Best practice and guidelines being finalised to identify measures that are successful in ensuring and maintaining quality of data as well as increasing access and use.

INSPIRE Components

Data Interoperability

- Draft Regulation on data interoperability for Annex I data themes voted favorably by IC 2009
- Common UML data model for all themes
- 2-7 years (after adoption) for Member States to make data compliant
- Work on Annex II/III data themes started 19.3. 2010



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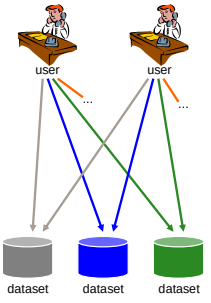
Data interoperability



The starting point …

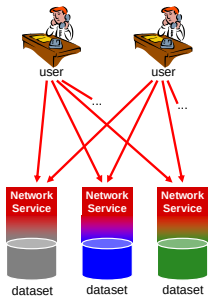
- Access to spatial data in various ways
- User has to deal with interpreting heterogeneous data in different formats, identify, extract and post-process the data he needs
  → **lack of interoperability**

Key requirements in the INSPIRE Directive

- Article 7(1) requires:
  - „Implementing rules laying down **technical arrangements** for the **interoperability** and, where practicable, **harmonisation** of spatial data sets and services, [...]“
- Article 3(7):
  - „‘interoperability’ means the possibility for **spatial data sets to be combined**, and for services to interact, **without repetitive manual intervention**, in such a way that the **result is coherent** and the added value of the data sets and services is enhanced“

Data interoperability

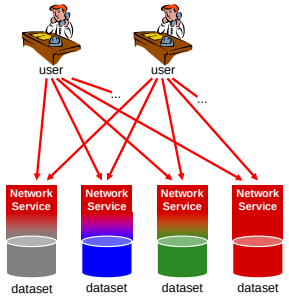
... and what INSPIRE is aiming at



- 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 models and the harmonised data specification

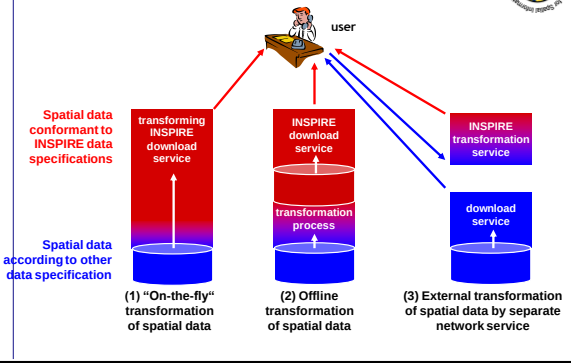
Data interoperability

... and what INSPIRE is aiming at

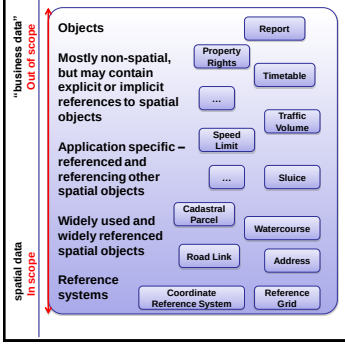


- Data providers may also choose to align their internal data model with the harmonised data specifications and extend these based on their requirements

Implementation alternatives



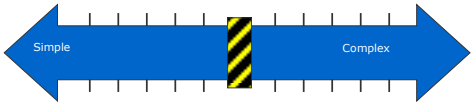
INSPIRE data scope



- The scope of INSPIRE is spatial data – not all kinds of thematic data
- INSPIRE should provide a consistent concept of space (and time) & provide reference systems and spatial objects that can be used in environmental applications to (re-)use spatial and temporal location

“The Balance Challenge”

Which level of interoperability is “just right”?

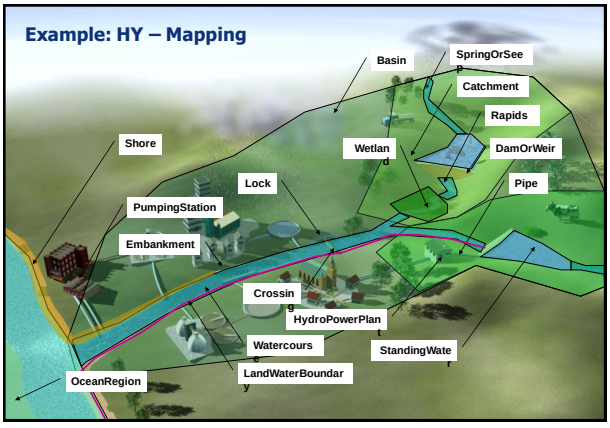


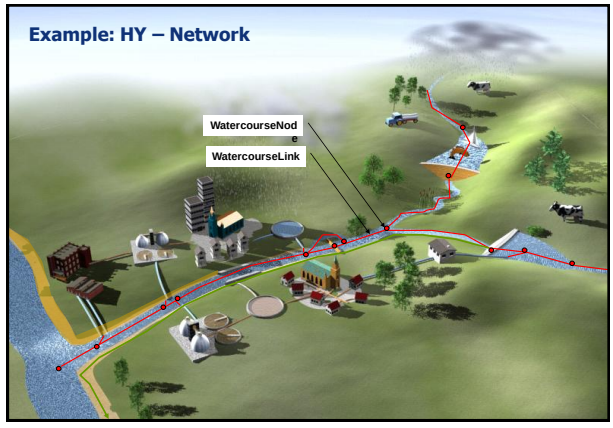
Too simple:
- Identified requirements can not be supported
- Insufficient harmonisation
- Few benefits

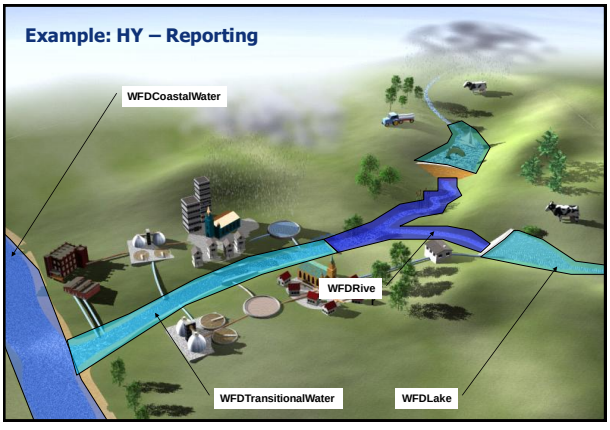
Too complex:
- Difficult to implement
- Substantial benefits available only to few users
- High costs

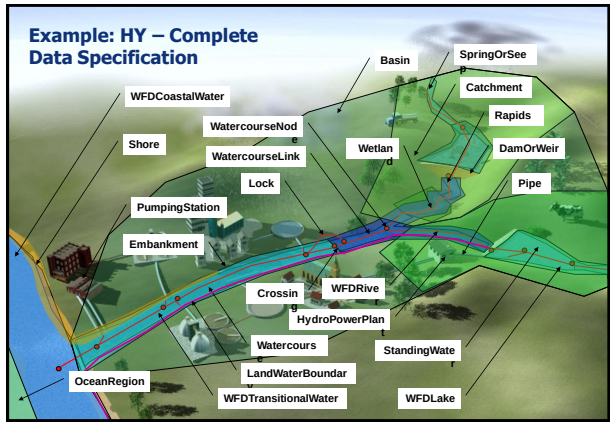
Extensions by Member States or information communities

- INSPIRE data specifications are not intended to cover all kinds of data requirements
  - Legally Mandated Organisations in Member States will typically maintain more data than covered by INSPIRE data specifications
  - Focus on the spatial aspects
- Member States are encouraged to re-use the INSPIRE data specifications for their own usage
  - Extend spatial object types and add new properties
  - Specify additional constraints applicable to the own data sets
  - Re-use of INSPIRE objects to spatially enable application data





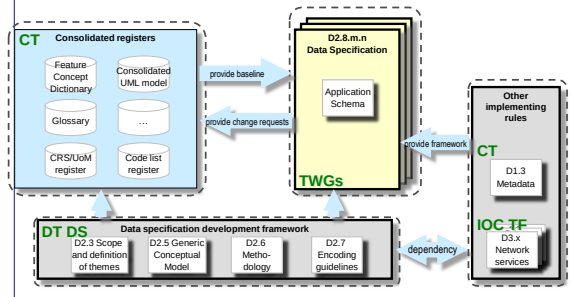




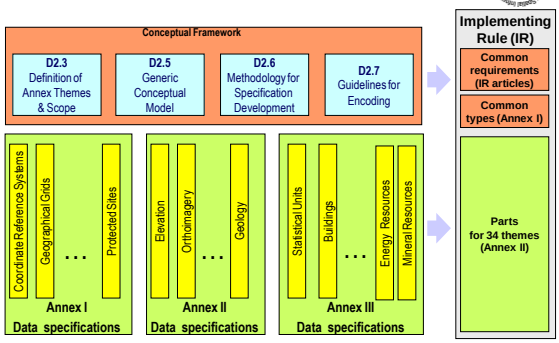
Why Data Specifications are Useful

- Member States make available data within the scope of INSPIRE using
  - the same spatial object types (and definitions), e.g. WaterBody, WatercourseNode, Wetland
  - the same attributes (and definitions, types, code lists) and relationships to other types
  - a common encoding (GML application schemas)
  - common portrayal rules
- This facilitates
  - pan-European/cross-border aggregation and analysis
  - application development (e.g. information systems, reporting systems, forecasting models)

Responsibilities



Data Specifications & Implementing Rules



Data Specifications & Implementing Rules

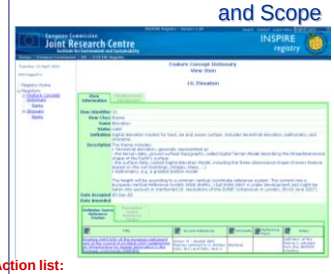
Data Specifications

- Each data specification developed by a TWG
- Contain requirements and recommendations (mandatory and optional elements), explanations and examples
- Full implementation not mandatory

Implementing Rule

- Takes into account cost-benefit considerations
- Expressed in natural language
- Includes **mandatory** elements of the specifications
- Implementation is mandatory within the period specified in the Directive
  - 2011 for newly collected or restructured Annex I data
  - 2016 for other Annex I data

Relation with D 2.3 - Definition of Data Themes and Scope



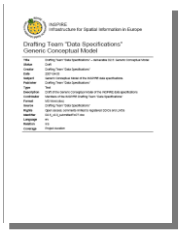
- Starting point for the development of data specifications (content is not binding)
- Helps to clarify the field of "competence" of the TWG
- Overview description (≈ 250 words)
  - In addition to the definition of the theme is included in the Feature Concept Dictionary
  - Initial version developed by the DS DT
  - Revision welcome – eventual changes should be reflected in the FCD

Action list:

•Read the section of D2.3 related to your theme
•Read the definition and overview description of the related themes
•If necessary initiate changes and involve in the discussion other TWGs that might be interested
•Document the eventual changes and forward it to the Commission for inclusion in the FCD (editor) till 15/06/2010

D2.5: Generic Conceptual Model

- Rules that apply to all INSPIRE spatial data themes
  - Common terminology and basic concepts
  - Components of spatial data interoperability
  - Requirements and recommendations
- Based on ISO 19100 standards
  - More specific requirements where needed
  - Extensions where needed
- Specification of cross-theme concepts
  - Including INSPIRE identifiers, Generic Network Model and Gazetteers
- Core thematic concepts maintained in INSPIRE registers and „copied" to INSPIRE data specifications



Data interoperability components

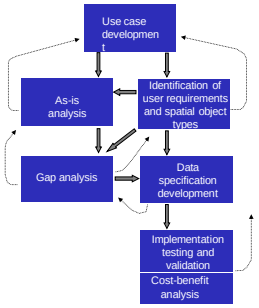
- Aspects that need to be addressed in the process
- The Generic Conceptual Model is structured according to these components and states requirements & recommendations for each one

(A) INSPIRE Principles	(B) Terminology	(C) Reference model
(D) Rules for application Schemas and feature catalogues	(E) Spatial and temporal aspects	(F) Multi-lingual text and cultural adaptibility
(G) Coordinate refe-rencing and units model	(H) Object referencing modelling	(I) Identifier Management
(J) Data transformation	(K) Portrayal model	(L) Registers and registries
(M) Metadata	(N) Maintenance	(O) Quality
(P) Data Transfer	(Q) Consistency between data	(R) Multiple representations
(S) Data capturing	(T) Conformance	

Action list:

- **Before starting the modelling of the theme read the GCM (especially the editor and the facilitator)**
- **Elements defined in the GCM (spatial and temporal schema, coordinate and object referencing, a generic network model, common code lists, etc.) shall be used in modelling the data theme**
- **In case the elements of the GCM need changes/updating document and forward the request to the JRC**

Relation with D 2.6 – Methodology for Data Specification Development



- A repeatable methodology enabling to arrive from user requirements to a data specification through a number of steps
- Each step requires specific practical action

D2.7: Guidelines for the encoding of spatial data

- The Generic Conceptual Model is independent of a particular implementation platform (SQL, GML, KML, Java, etc.)
- Technical arrangements on the implementation level are required for the communication between software systems
- The document specifies requirements and recommendations for the encoding of spatial objects
- Default: GML & ISO 19139 encoding rules
- Additional encoding rules may be specified in data specifications

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- INSPIRE aim & scope
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- Data specifications development
- Data specification methodology
- Challenges and communication

Data specification

follows ISO 19131

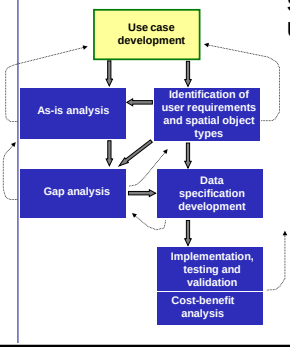
INSPIRE
Infrastructure for Spatial Information in Europe

D2.8.x.y. Data Specification on ……

1 – Scope
2 – Overview
3 – Specification Scopes
4 – Identification Information
5 – Data content and structure — Application schema
6 – Reference systems — Coordinate R.S, Temporal R.S.
7 – Data quality — Data quality elements
8 – Dataset-level metadata — Metadata elements
9 – Delivery — Encodings
10 – Data capture
11 – Portrayal — Layer types, default styles

Methodology

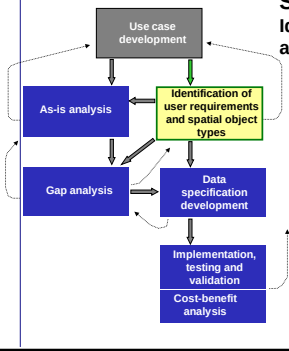
- proposed by the INSPIRE Drafting Team Data Specifications
- based on guidelines from OGC and results of the RISE project
- introduces step-wise methodology
- provides harmonisation guidelines
- serves as guideline for the INSPIRE Thematic Working Groups (TWGs)
- needs to be modified in some parts from experience with Annex1, but principles still apply for Annexes II and III



Step 1:
Use Case Development

responsibility of the Consolidation Team

Major sources are:
- European environmental policies
- user requirements survey
- SDIC/LMO reference material
- EU-funded initiatives and projects

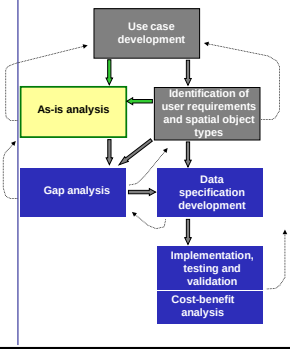


Step 2:
Identification of user requirements and spatial object types

responsibility of the TWG

identify requirements on
- the data content
- metadata, data quality, portrayal and the other elements of the data specification

Results:
- list of spatial object types
- first draft of application schema

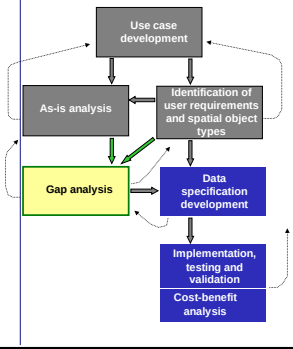


Step 3:
As-is analysis

responsibility of the TWG

analyse the current situation regarding spatial data sets for the theme, based on:
- the reference material submitted by SDICs + LMOs,
- existing internationally standardised data specifications
- expertise of TWG members

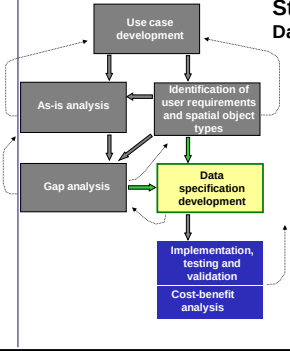
experience from Annex I: first draft application schema was built on as-is analysis rather then use cases



Step 4:
Gap analysis

Responsible party: TWG

compare
- identified data sources at the Member States with
- identified user requirements
- draft application schema



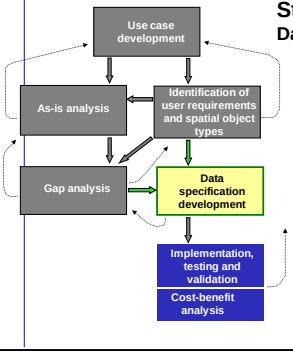
Step 5a:
Data specification development

The INSPIRE data specifications must be designed to ensure easy mapping between existing data and the harmonised data specification.

consider:

Recital 16: No excessive costs to Member States!
Article 4(2): No collection of new data!

Result:
Data specification version 1.0

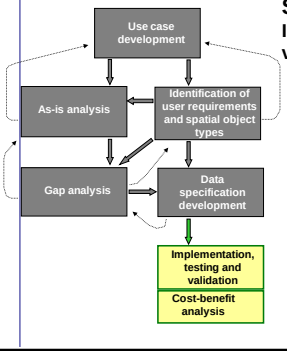


Step 5b:
Data specification development

Responsible party: TWG

Internal review of data specification version 1.0 by other TWGs, CT, DT DS, ….

Result:
Data specification version 2.0



Step 6:
Implementation, test and validation, cost-benefit analysis

responsibility of the Consolidation Team.

- **review by SDICs and LMOs**
- **test under real world conditions**
  (by selected projects, SDICs and LMOs)
- **costs and benefits**
  as required by Article 7(2) of the Directive

1. **TWG considers the comments from review and test**
2. **final round of harmonisation between themes**

Result:
Data specification version 3.0

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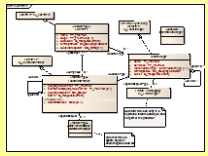
data specification v3.0
according to ISO 19131
which includes an application schema
in UML



Commission Services will split into:

1. Regulation
legal text. includes:
- **spatial object types and associated data types, enumerations and code lists**
- **identifier management**
- **encoding,**
- **updates**
- **metadata elements**
- **portrayal**

2. Guidance Document
not binding. Data specification in full as provided by the TWG

Data specifications – Annex I.

Eight Thematic Working Groups (TWG):

- **Kick-off meeting in February 2008**
- **Data specifications v1.0 for Themes of Annex I in spring 2008, based on:**
- ✓ **User requirements,**
- ✓ **Reference material from stakeholders,**
- ✓ **Standards and international initiatives**
- ✓ **Relevant use cases**
- ✓ **Supported by the relevant registers**
- ✓ **Feasibility and cost benefit considerations**
- ✓ **Testing results**
- **Internal Consultation (E.C. INSPIRE Team, Drafting Teams)**

Cross-theme topics as a result of consultation and testing (1/2)

- Theme complexity / simplification
- Consistency between data specifications, e.g.
  - Metadata and data quality
  - Identifiers and spatial object life-cycle
  - Portrayal
  - Abstract test suite
  - Phrasing of definitions (normative) and descriptions (informative)
  - Common attributes (names, definitions)
- Modelling practices
  - Bi-directional vs uni-directional associations
  - Initial models for Annex II/III themes
  - Placeholder types as stubs for Annex II/III work

Cross-theme topics as a result of consultation and testing (2/2)

- Clarifications on the distinction between
  - Missing information about a property (void)
  - Property does not apply (empty value set)
- Spatial resolution vs. level of detail
- Generic Network Model
- Encoding

Data spec. Annex II, III statistics

- Call for manifestation of interest was launched on 05/11 2009
  - > 318 experts proposed by 50 LMOs and 51 SDICs
  - > 23 countries (2 selected experts from CR)
- Setting up 19 Thematic Working Groups, some themes grouped under the same TWG
- Potentially 30 Facilitators and Editors in-kind contribution and 167 domain experts at present
- **Excellent results showing the continued commitment and dedication of stakeholders**

Grouping of Themes

Annex II

1. Elevation
2. Land cover
3. Ortho-imagery

4. Geology
21. Mineral resources (Annex III)

Annex III

1. Statistical units
10. Population distribution – demography

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

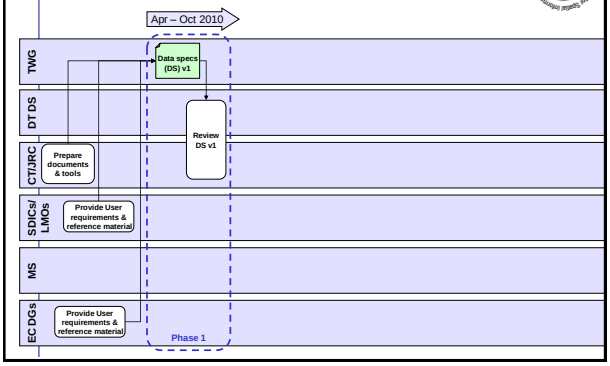
17. Bio-geographical regions
18. Habitats and biotopes
19. Species distribution

20. Energy Resources

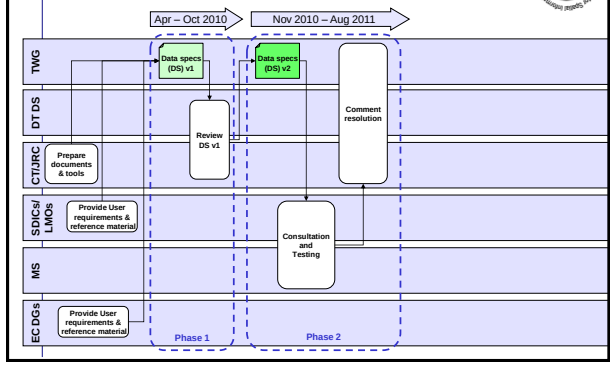
Data spec. - Preliminary Planning

- February 2010 — Set-up of Thematic Working Groups
- March 2010 — Workshop with National Contact Points
  - present the composition of TWGs
  - discuss proposal for Working Group on Data Interoperability & Harmonisation: implementation and maintenance
- March 2010 — Kick-off with Facilitators and Editors
- May – June 2010 — Theme specific Kick-offs
- October 2010 — Data Specifications v1.0
- Spring 2011 — Data Specifications v2.0
- Summer 2011 — Stakeholder consultation and testing on v2.0
- End 2011 — Data Specifications V3.0
- May 2012 — Drafting IR for Annex II and III themes

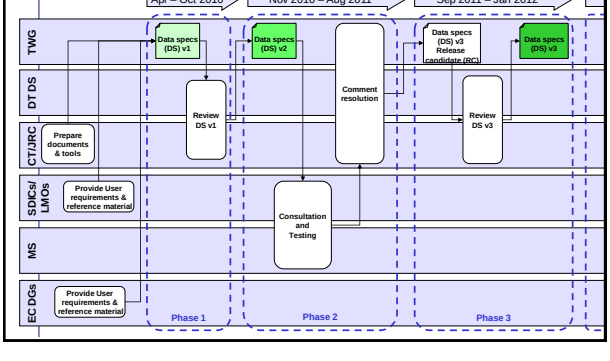
Roadmap Data Specifications



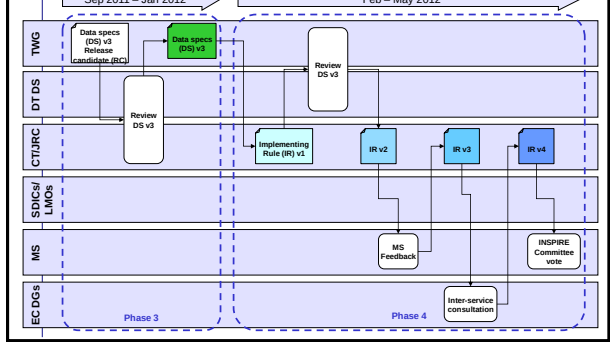
Roadmap Data Specifications



Roadmap Data Specifications



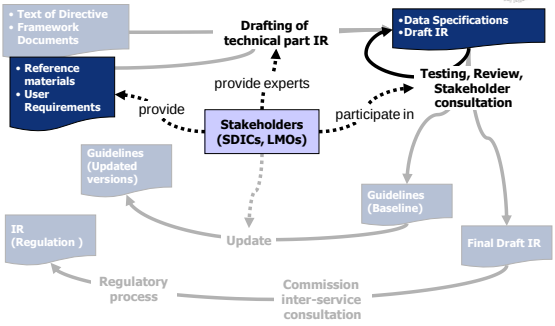
Roadmap Implementing Rule



Outline

- INSPIRE aim & scope
- Implementing Rules and activities overview
- Data specifications development
- Methodology for data specification
- Stakeholder participation, communication
- Challenges (Annex II&III)

Data Specifications – What **you** can do



Data Specifications – What **you** can do

- **Register as an SDIC**
  - to stay informed (INSPIRE web site, INSPIRE Data Specifications web site)
  - to get involved (experts, consultation, testing)
- **Propose an expert for TWGs**
  - in particular: ER, HH, PD, AM
- **Provide use cases and user requirements**
  ⇒ User requirements survey
- **Provide reference material**
  - Existing data models, data exchange standards
  - Legislation, systems, applications to be considered
- **Participate in reviews & testing**
- **Help scoping Annex II/III themes on**
  INSPIRE Forum – become an associated member of TWG

Communication Platforms

Platform	Main purpose	Accessibility
CIRCA	Document management system – for storing the final versions of documents http://circa.europa.eu/Members/irc/jrc/imaco2000/library	EC, TWGs, Drafting Team
JIRA	Issue tracking system for cross-theme and theme specific discussions. Also serves as a decision repository and comment resolution. http://inspire-twg.jrc.ec.europa.eu/jira/	TWGs, EC INSPIRE team, Drafting Team (SDICs/LMOs can create also issues)
INSPIRE Forum	External discussion platform to involve all potential stakeholders in the INSPIRE data specification development http://inspire-forum.jrc.ec.europa.eu/	Public, registered users

Communication

- Renewed EC INSPIRE website
- INSPIRE Forum

http://inspire-forum.jrc.ec.europa.eu/

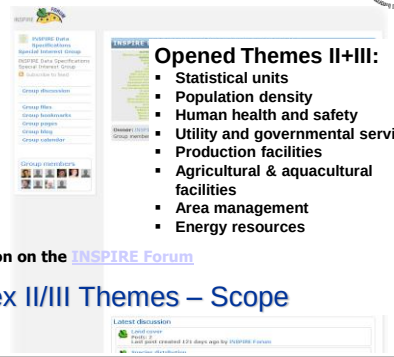
  - National and thematic workshops addressing INSPIRE aspects can work under Forum umbrella
  - Organizing an event relevant for INSPIRE development or implementation? Announce it on the INSPIRE Forum!
  - Supporting open, participatory and transparent transposition and implementation process

Communication

INSPIRE Forum

- Groups (open, private)
- INSPIRE News – direct from INSPIRE Site
- INSPIRE Forum News
- Recent discussions
- Group pages
- Blogs
- Events calendar
- Shared bookmarks

Communication



Opened Themes II+III:

- **Statistical units**
- **Population density**
- **Human health and safety**
- **Utility and governmental services**
- **Production facilities**
- **Agricultural & aquacultural facilities**
- **Area management**
- **Energy resources**

Open discussion on the INSPIRE Forum

Annex II/III Themes – Scope

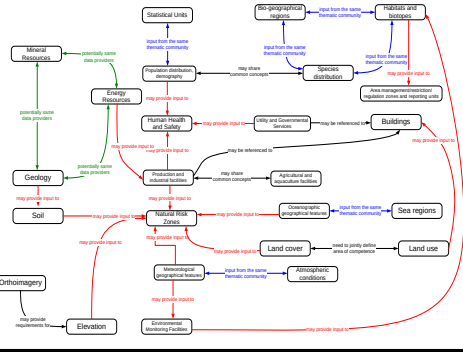
Outline

- INSPIRE aim & scope
- Implementing Rules and activities overview
- Data specifications development
- Methodology for data specification
- Stakeholder participation, communication
- Challenges (Annex II&III)

Data specification challenges

- **Number of Themes,** their diversity and their multiple interrelations
- Impossibility of cover **all domain expertise** within each TWG
- Some thematic communities and existing initiatives related with Themes not yet used to spatial data and **not involved in the INSPIRE process**
- **Short time frame** available for the development of data specifications, **its testing and consolidation**
- How to introduce min. **data quality requirements** and related MD
- **Maintenance** of Data specification Guidelines

Data specification challenges



Thank you!

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