## **INTRODUCTION TO INSPIRE**

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Sources:

VESTA-GIS project ,2009 (www.vesta-gis.eu/), Nature-SDIPlus project, 2010 (www.nature-sdi.eu/), EduServ programme, 2010 and 2011 (www.eurosdr.net), smeSpire project, 2014 (www.smespire.eu)



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## Structure

- 1. The use of geographic information in work processes and decision making
- 2. Spatial Data Infrastructures to facilitate access and sharing of data
- **3**. Overview of the INSPIRE Directive
- 4. Implementing Rules
- 5. Conformity of data and services
- 6. Trends, challenges and opportunities

<sup>3</sup> Part 1

# The use of Geographic Information in Work Processes and Decision Making

### Geographic Information for policy making

Geographic Information is needed in many policy domains Many spatial datasets exist, but ...

- Lack of reference and authentic data
- Difficult to obtain spatial data
  - Difficult to find
  - Cumbersome process to obtain
  - Often expensive
- Gaps in availability of spatial data and a lot of duplication at the same time

Natura 2000

- Data are sometimes of poor quality
- Spatial data not harmonised across borders
  - Between countries and within countries
- Difficult to interprete / understand
  - Often not documented





WFD



### **EUROSION:**

### Need for an European SDI and the role of spatial data within SDI



**Project funded by the European Commission** 



### **Objectives EUROSION**

"To provide the European Commission with a package of **recommendations on policy and management** measures to address **coastal erosion** in the EU.

These recommendations should be based on a thorough **assessment of the state of coastline** and of the response options available at each level of administration."









### Vulnerable areas and Monitoring indicators

In terms of

Lives at risk Economy at risk Nature at risk



- A large variety of formats exist
- Many geographical gaps still remain
- Reference systems are not harmonized
- Many data sources are not consistent
- Scales are not compatible
- All data are not interoperable
- Costs and access restrictions



- Satellite images
- Maps
- Aerial photographs
- Diagrams
- Statistics
- Reports
- Databases
- Etc.

Integration of various formats is time consuming and uncertain





Geological data at scale 1:50,000 (source: BRGM, France)

Need to identify the gaps and make priorities to bridge them



Reference system 1 : ETRS89 Reference system 2 : Clarke 80

Need to define a common terrestrial reference system for data production and processing



Need to build pan-european "seamless" data with standard specifications

#### Sources 1:

Coastline : SABE (EuroGeographics) Bathymetry : TCIFMS (SHOM) Topography : BDTOPO (IGN)

#### Sources 2:

Coastline : SABE (EuroGeographics) Bathymetry : GEBCO (BODC) Topography : MONA PRO 1:100,000 (source: SABE) 82 O 1:250,000 (source: WVS)  $\Im$ L.  $\mathcal{P}$ Ъ Need to adopt a common level of perception and representation of data



### **CORINE Land Cover 1990 SABE Coastline**

0 m < Difference < 50 m 50 m < Difference < 200 m Difference > 200 m



- Most existing datasets are "copyrighted": you do not buy information itself, but a right to use it ("license")
- Dissemination of end-products is restricted (sometimes, end-products have to be "degraded")
- Quality "label" are not commonly adopted : uncertainty about the products



#### **EUROSION database = 2 Millions Euros**

- **26% acquisition of licensed data (e.g. Elevation)**
- 17% update of existing data (e.g. Coastal Erosion)
- **33% production of missing data (e.g. Hydrodynamics)**
- **24%** Format conversion, integration, and quality control



## The absence of a European spatial data infrastructure results in:

- **Higher investment costs (2 to 3 times)**
- Delayed implementation (8 to 10 months)
- **G** Uncertain quality
- **Dissemination constraints**

# Policy cycle as basis

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### Many policy domains need geographic information

- Agriculture, environment
- Economy, tourism, ...
- Transport
- ••••
- Policy cycle
  - Problem statement
  - Policy definition
  - Policy implementation
  - Policy evaluation
  - Policy adjustment



## Example: policy "room for water"



### Summary – need for INSPIRE

#### **Environmental Needs**

- <u>Better information</u> needed to support policies [6EAP]
- Improvement of existing <u>information</u> <u>flows</u>
- <u>Diversity across regions</u> to be considered
- Revision of approach to reporting and monitoring, moving to concept of <u>sharing of information</u>

#### **Situation in Europe**

- Data policy restrictions
- Lack of co-ordination across borders and between levels of government
- <u>Lack of standards</u> incompatible information and information systems
- <u>Existing data not re-usable</u> fragmentation of information, redundancy, inability to integrate

#### **Environmental data**

- 90% of is linked to geography
- Out of 58 data components needed for environmental policy :
  - 32 are multi-sectoral
  - 16 are environmental only
  - 10 are related to other sectors
- These 32 components allow to:
  - link different ENV themes together: policy coherence
  - link with other sectors: integration

INSPIRE instructure for SPAtial Information

INfrastructure for SPatial InfoRmation in Europe

source EEA

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# Spatial Data Infrastructures: Facilitating Access and Sharing of Data

## SDI – definitions

Many attempts to define and conceptualise SDI

- Focus on the components (spatial data, technology, policies, standards and people)
- Recognising its dynamic nature (evolution)
- Recognising (data) sharing is a key issue
- Describing different views of SDI hierarchy

(Rajibifard, Masser, Chan, GSDI, ...)



## **SDI - definitions**

"A set of technological and non-technological set-ups within and between organizations to facilitate access, sharing and use of spatial data, thereby contributing to the enhanced performance of the business, policy making and service provision processes"

## SDI – definitions

### □ Few define SDI as a (dynamic) network

- Tulloch & Harvey (2007)
- Few operational set-ups to analyse SDI-networks



## SDI – definitions

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# **Overview of the INSPIRE Directive**

## **INSPIRE** vision

- 1. <u>Data should be collected once</u> and maintained at the level where this can be done most effectively
- It should be possible to <u>combine seamlessly spatial data</u> <u>from different sources</u> across the EU and share it between many users and applications
- 3. It should be possible for spatial data collected at one level of government to be <u>shared between all levels of government</u>
- 4. Spatial data needed for good governance should be available on <u>conditions</u> that are not restricting its extensive use
- 5. It should be <u>easy to discover</u> which spatial data is available, <u>to evaluate</u> its fitness for purpose and to know which <u>conditions</u> apply for its use

To deliver useful, standardised and high quality data in order to formulate, implement, monitor and evaluate European, National and Local Policy



Differences between Height Reference Levels

### Many phenomena do not stop at national borders!

- 20% of the EU citizens (115 million) live within 50 km from a border.
- 60 million EU citizens live less than half an hour (25 km) from a border





### Infrastructure for Spatial Information in Europe



### **Co-decision procedure**

#### 8. CO-DECISION PROCEDURE (Article 251)



### **INSPIRE** scope

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

- I. Metadata
- Harmonisation and interoperability of spatial data sets and services
- M. Network services (discovery, view, download, transform, middleware)
- IV. Data and Service sharing (policy)
- v. Coordination and measures for Monitoring & Reporting

## **INSPIRE** architecture

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The relation between the major components is presented in the Architecture diagram



SDS = Spatial Data Service

(EC JRC, 2014)
### **Geo-portals**

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Finland: open source viewer



France: CARMEN environmental info system



Germany: GDI-DE organisational structure



UK: Geohub Northern Ireland



Netherlands: Space for GeoInformation



Latvia: IACS-LPIS view services



Lithuania: LGII discovery service



Austria: 9 states,1 geoservice



Cyprus: National Land Information Systems



Slovenia: real estate market value register



Estonia: road and traffic information systems



Norway: Norge Digitalt

### **Geo-portals**

- Creation of a national geo-portal is not an obligation
  - Some Member States have one portal for all governmental data
- Linking national INSPIRE resources to the European portal is mandatory (http://inspire-geoportal.ec.europa.eu/)



### Geo-portals

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#### □ Example – France: http://www.geoportail.gouv.fr/accueil



# **INSPIRE Spatial Data Scope**

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#### **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





(Acts adopted under the EC Treaty/Euratom Treaty whose publication is obligatory)

#### DIRECTIVES

#### DIRECTIVE 2007/2/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 March 2007

establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

## **INSPIRE and other Directives**

- Access to environmental information held by public bodies in own country or in other Member States of the EU
  - The Aarhus Convention on Access to Information, Public Participation in Decisionmaking and Access to Justice in Environmental Matters, Aarhus, Denmark, 25 June 1998
  - Directive 2003/4/EC on public access to environmental information
- Access to environmental information held by the institutions and bodies of the EU
  - Regulation 1049/2001 regarding public access to European Parliament, Council and Commission documents
  - Regulation 1367/2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies
- Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information (the PSI directive)

# **INSPIRE and other Directives**

	INSPIRE	PSI	Access	
	2007/2/EC	2003/98/EC	2003/4/EC	
Objective	<ul> <li>Data sharing for public tasks with an impact on the environment</li> </ul>	Use for commercial and non- commercial purposes outside of the public task	<ul> <li>Access of the citizen on request</li> </ul>	
	<ul> <li>Public access to network services</li> </ul>		<ul> <li>Dissemination to the public</li> </ul>	
Scope	<ul> <li>Spatial Data sets and services</li> </ul>	<ul> <li>Public sector documents</li> </ul>	<ul> <li>Environmental information</li> </ul>	
	<ul> <li>Public authorities</li> </ul>	<ul> <li>Public sector bodies</li> </ul>	<ul> <li>Public authorities</li> </ul>	
Obligatory	Yes	No	Yes	
Electronic/paper	Only electronic	<ul> <li>Electronic/paper</li> </ul>	Paper/electronic	
		Electronic where possible	Electronic where possible	
Limitations	• Data sharing: e.g. national defence	• NA	Similar to INSPIRE	
	<ul> <li>Public access: also IPR, confidentiality,</li> </ul>			
Charges	<ul> <li>Not for reporting obligations</li> </ul>	Yes	Yes, but reasonable amount	
	Not for discovery and view services			
Time limits	NA	< 20 days of request	< 1 month of request	

## **INSPIRE and other Directives**

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### Revision of the PSI Directive (2013)

 DIRECTIVE 2013/37/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2013 amending Directive 2003/98/EC on the re-use of public sector information

#### Major changes, relevant for INSPIRE

- Introduction of genuine right to reuse
- Lowers the upper ceiling for charges to marginal cost
- Expands the scope of application of the Directive to certain cultural institutions such as libraries, museums and archives
- Reinforces the obligation to be transparent on conditions and on charges applied to reuse
- Invites Member State to make more documents available in machine-readable and open formats

### I Metadata

#### Member States shall create metadata and shall keep them up to date

- Metadata shall include
  - Conformity with IR on interoperability / harmonisation
  - Conditions for access and use
  - Quality and validity
  - The public authorities responsible
  - Limitations on public access
- IR to take into account existing and relevant international standards
- Once Implementing Rules adopted:
  - Created within 2 years for Annex I, II
  - Created within 5 years for Annex III

### Levels of metadata



In the mentioned INSPRE Spatial Data Themes are pointed out as examples to give an impression

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

Harmonised data specifications

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- Public authorities and 3rd parties shall have access to these specifications at conditions not restricting their use
- User requirements, existing standards, and cost-benefit considerations to be taken into account in developing the IRs
- Cross-border issues shall be agreed on

### **Data Specifications**

#### Data interoperability components

(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	

# Data specifications



# **III Network Services**

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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 (potential exceptions: large volumes and high update frequency)
- Download services
- Transformation services
- (Middleware) services allowing spatial data services to be invoked

Access to services may be restricted (conditions!)

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

#### **Network Services Reference Model**



**INSPIRE Network Service "bus"** 

# **IV INSPIRE Data Sharing Policy**

- Member States shall adopt measures for the <u>sharing</u> of data and services <u>between public</u> <u>authorities</u> for <u>public tasks</u> relating to the <u>environment</u> without restrictions occurring at the point of use
- Public authorities may charge, license each other and Community institutions provided this does not create an obstacle to sharing

# **IV INSPIRE Data Sharing Policy**

- When spatial data or services are provided to Community institutions for reporting obligations under Community law relating to the environment then this will not be subject to charging.
- Member States shall provide the institutions and bodies of the Community with access to spatial data sets and services in accordance with harmonised conditions.

## Data & Service Sharing issues



# V Monitoring & Reporting

- Member States shall monitor the implementation and use of their infrastructures for spatial information
- No later than 3 years MS shall send to the Commission a report including summary descriptions of:
  - Coordination between public sector providers and users
  - Organisation of quality assurance
  - Relationship with third parties
  - Contribution made by public authorities to the functioning of the infrastructure
  - Cost/benefits of the infrastructure



# **INSPIRE Implementing Rules**

# Implementing Rules Overview

### What are Implementing Rules (IR)?

- IR are usually used to translate a Framework Directive (like INSPIRE) into concrete rules on how to implement the Directive
- They are a piece of legislation and must be implemented by Member States (MS) without the obligation to transpose them into national legislation
- They enter into force once they are published by the EC (x number of days after)
- They avoid to refer to specific technical solutions and may be supported by guidelines and other documents

# Implementing Rules Overview

- Implementing Rules for INSPIRE
  - Developed for each major chapter in the Directive
    - Metadata
    - Interoperability of Spatial Data Sets and Services
    - Network Services
    - Data (and service) sharing
    - Monitoring & Reporting (as part of the Final Provisions)
  - They can be split up in different rules for different aspects

## Implementing rules



# Implementing Rules Overview

### Current status of the IR

- Published IR (Commission Decision [CD] or Regulation [CR])
  - Metadata + corrigendum
  - Monitoring & Reporting
  - Network Services (discovery and view)
  - Access to spatial data sets and services under harmonised conditions
  - Interoperability of Spatial Data sets and Services (annex I themes and Annex II & III themes)
  - Download and Transformation Services
- IR in preparation

## Implementing Rules Overview

CD 2009/442/EC – MR Monitoring & Reporting

CR 268/2010 – DSS Access Harmonised Conditions

CR 1205/2008 – MD Metadata + Corrigendum

CR 976/2009 – NS Network Services (Discovery + View)

CR 1088/2010 – NS Network Services (Download + Transform)

amending

CR 1311/2014 – INSPIRE Metadata Element

CR 1089/2010 – ISDS Interoperability (Data Specs A.I)

 $\rightarrow$  CR 102/2011 – ISDS Values Codelists

amending

CR 1253/2013 – ISDS Interoperability (Data Specs A.II and A.III)

CR 1312/2014 – ISDS Interoperability of SDS

Non-technological Implementing Rules = Monitoring & Reporting Data & Service Sharing

### Monitoring & Reporting

- COMMISSION DECISION of 5 June 2009 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards monitoring and reporting
- Additional supporting documents
  - Guidelines for monitoring and reporting the INSPIRE Directive (several versions)
  - Template for indicators and template for reporting (several versions)
  - Justification document of the approach for monitoring and reporting the INSPIRE Directive
  - Old versions of (draft) IR

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#### Monitoring & Reporting: content

- Continuous monitoring and 3-yearly reporting
- The appropriate coordinating structure shall collect the information and communicate the results of M&R through its National Contact Point (NCP); results of monitoring shall be made public
- All relevant stakeholders shall be involved to collect information to feed the indicators and to elaborate the report; how this is done is up to the MS
- The basis for monitoring is the establishment of a list of data sets and a list of services that are considered INSPIRE



Metadata MD i1 : Existence MD i2 : Conformity to INSPIRE

Which data sets? DS i1 : Extent of spatial data sets DS i2 : Conformity to INSPIRE



#### Services

NS i1 : Accessibility of metadata NS i2 : Accessibility of spatial data sets NS i3 : Use NS i4 : Conformity to INSPIRE

	Indicator set	Metadata			Data Sets		Services				
lember State	Indicator		Existence	Complian	Extend	Complian	MD Acce	DS Acces	Use	Complian	
		Indicator Name	MDP1	MDi2	DSi1	DSi2	NSM	NSI2	NSi3	NSi4	
		Indicator Value	74%	20%	97%	0%	34%	19%	214.046	0%	
		Numerator	185	49	2,863,395	1	84	46	5,993,276	0	
		Denominator	249	249	2,964,960	239	249	239	28	28	
patial Data S	Sets										
All Annexes		Subind, Name					NSI11				
		Subind, Value	-		-		31%			1	
		Numerator					74				
		Denominator					239				
Annex I		Subind, Name	MDi1.1	MDi2.1	DSi1.1	DSi2.1					
		Subind, Value	73%	27%	92%	1%	6 3		E.	1	
		Numerator	72	26	965,740	1					
		Denominator	98	98	1,050,770	98					
Annex II		Subind, Name	MDi1.2	MDi2.2	DSi1.2	DSi2.2					
li i i i i i i i i i i i i i i i i i i		Subind. Value	77%	20%	99%	0%	10			1	
		Numerator	34	9	629,381	Ó				<i></i>	
		Denominator	44	44	632,784	44		ollect	tion o	ot into	ormatic
Annex III		Subind, Name	MDi1.3	MDi2.3	DSi1.3	DSi2.3					_
		Subind, Value	71%	14%	99%	0%		feed	dina	indica	ators
		Numerator	69	14	1,268,275	0					
		Denominator	97	97	1,281,407	97					
patial Data Servic	es										
All services		Subind, Name	MDi1.4	MDi2.4			NSI1.2		NSi3	NSi4	
		Subind, Value	100%	0%			100%		214,046	0%	
		Numerator	10	0			10		5,993,276	0	
		Denominator	10	10			10		28	28	
Discovery set	rvices	Subind Name							NSi3.1	NSi4.1	
chocorory de		Subind, Value					1		0	0%	
		Numerator				-	1		0	0	
-		Denominator	-				-		1	1	
View services	S	Subind, Name							NSi3.2	NSi4.2	
Service Street States and Street		Cubind Value	-				-		000 404	0.0	1

- Monitoring & Reporting: content
  - Reporting is required on
    - Coordination and quality assurance
    - Contribution to the functioning and coordination of the infrastructure
    - Use of the infrastructure for spatial information
    - Data sharing arrangements
    - Cost and benefit aspects

#### Status of INSPIRE M&R

All member States have monitored since 2010 on an annual basis and delivered two reports

http://inspire.ec.europa.eu/index.cfm/pageid/182

- In 2013, 18,138 Spatial Data Sets and 7.088 Services reported
- Results are variable (example indicators ES)

	Metada	ta	Data Sets	Services				
	Existence	Complian	Extend	Complian	MD Acce	DS Acces	Use	Complian
Indicator Name	MDi1	MDi2	DSi1	DSi2	NSi1	NSi2	N Si3	NSi4
Indicator Value	95%	71%	95%	12%	83%	19%	634.050	9%
Numerator	3.646	2.748	113.258.732	134	3.190	221	1.609.218.387	233
Denominator	3.851	3.851	119.488.151	1.159	3.851	1.159	2.538	2.538
The second se								

#### Data and service sharing

- COMMISSION REGULATION (EU) No 268/2010 of 29 March 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards the access to spatial data sets and services of the Member States by Community institutions and bodies under harmonised conditions
- Additional supporting documents
  - Guidance document and document on "Examples of good practice in data and service sharing from various countries"
  - Old versions of (draft) IR

Data and service sharing: content

- "...to provide the <u>institutions and bodies of the</u> <u>Community</u> with access to spatial data sets and services in accordance with harmonised conditions." – (Art. 17)
  - Aims to have a coherent approach to the provision of access
  - Exceptions from data sharing are possible, but EC should be able to take security measure to preserve access
  - Spatial data sets and services should be available to contractors working on their behalf (to support Env. Policy)
  - Arrangements should comply with the IR 18 months after entry into force, existing arrangements should be modified accordingly when renewed or at latest 3 years after entry into force

#### Data and service sharing: content

- Restriction on access
  - MS shall give a reason for limiting sharing; MS may state under which conditions access is granted
- Arrangements
  - Any arrangement shall use the terminology of article 3 of the Directive
- Use of Spatial Data sets and Services
  - Avoid unauthorised use; Third Parties can not make it available to others

#### Data and service sharing: content

- Should be reflected in the Metadata
- Transparancy
  - Information for evaluation and use shall be made available on request of the EC (if reasonable to do so); shall include the basis for (eventual) charges
- Response times
  - "... Member States shall provide access to spatial data sets and services without delay and at the latest within 20 days after receipt of a written request ..."
- Best Practices regarding data & service sharing
  - Coordination (of data and service sharing)
  - Framework Agreements
  - □ Transparency (on the data)
  - Licences
  - Charging mechanisms
  - Public Access
  - Emergency Use
  - Third Party Data
  - http://inspire.ec.europa.eu/documents/Data\_and\_Service\_Sharing/ GoodPractice\_%20DataServiceSharing\_v3.pdf

- Example of Best Practice (Framework Agreement)
  - Administration Agreement on the provision of topographic data in Germany between Federal Ministry of Interior and the Länder (States)
    - Number of contracts minimised
    - License models harmonised
    - Quality Assurance as part of the framework
    - Central point of access



Technological Implementing Rules = Metadata Services Data Specifications

#### Metadata

COMMISSION REGULATION (EC) No 1205/2008 of 3 December 2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata

#### Additional supporting documents

- Corrigendum regarding the Regulation
- Guidelines based on EN ISO 19115 and EN ISO 19119 (version 1.2)
- Reports explaining the procedure to develop the IR
- Old versions of the (draft) IR

#### Metadata: content

- "… it is necessary for a user to be able to find spatial data sets and services and to establish whether they may be used and for what purpose …"
  - The mandatory versus the additional elements from ISO, thematic communities
  - The dynamic aspect and possibility to change guidelines
  - Conditions and expected multiplicity of metadata elements
  - Value domains for each metadata element (e.g. Free text, keywords from thesauri)
- Annexes: definitions, elements, value domains

Reference	Metadata elements	Multiplicity	Condition
1.1	Resource title	1	
1.2	Resource abstract	1	
1.3	Resource type	1	
1.4	Resource locator	0*	Mandatory if a URL is available to obtain more information or the resource, and/or access related services.
1.5	Unique resource identifier	1*	
1.7	Resource language	0*	Mandatory if the resource includes textual information.
2.1	Topic category	1.,*	
3	Keyword	1*	
4.1	Geographic bounding box	1*	
5	Temporal reference	1.,*	
6.1	Lineage	1	
6.2	Spatial resolution	0*	Mandatory for data sets and data set series if an equivalent scale or a resolution distance can be specified.
7	Conformity	1*	
8.1	Conditions for access and use	1*	
a and a second s		2010	

#### Metadata for spatial data sets and spatial data set series

#### Metadata for spatial data services

Reference	Metadata element	Multiplicity	Condition
1.1	Resource title	1	
1.2	Resource abstract	1	
1.3	Resource type	1	
1.4	Resource locator	0*	Mandatory if linkage to the service is available.
1.6	Coupled resource	0*	Mandatory if linkage to data sets on which the service operates are available.
2.2	Spatial data service type	1	
3	Keyword	1.,*	
4.1	Geographic bounding box	0*	Mandatory for services with an explicit geographic extent.
5	Temporal reference	1*	
6.2	Spatial resolution	0*	Mandatory when there is a restriction on the spatial resolution for this service.
7	Conformity	1*	
8.1	Conditions for access and use	1.,*	
8.2	Limitations on public access	1*	
9	Responsible organisation	1*	
10.1	Metadata point of contact	1*	
10.2	Metadata date	1	
10.3	Metadata language	1	
10.3	Metadata language	1	

### Metadata

#### Status of development

- Early 2014 284.686 resources described and discoverable through the European Geo-portal
  - Data sets and data sets series
  - Services

information material, the history, the requ	ired element of the Inspire metad	ata-in-the-
Conformity	Unique Resource Identifier	
Specification: KOMISSION ASETUS (EU) N:o 1089/2010, annettu 23 päivänä marraskuuta 2010, Euroopan parlamentin ja neuvoston direktiivin 2007/2/EY täytäntöönpanosta paikkatietoaineistojen ja -palvelujen yhteentoimivuuden osalta, Date of publication: 2010-12-08 Degree: Not Conformant	Code: 1000486, Namespace: F1	

#### Networks services

COMMISSION REGULATION (EC) No 976/2009 of 19 October 2009 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards the Network Services – (focus is on discovery & viewing services)

#### Additional supporting documents

- INSPIRE Viewing Service Technical Guidance (version 2.0)
- Technical Guidance Discovery Service (version 2.0)
- SOAP Primary for INSPIRE View and Discovery Services
- Proposal for the documentation of the view and discovery service using the Web Service Description Language
- Other technical reports
- Old versions of the (draft) IR

#### Network Services

- "… to ensure the compatibility and usability of such services on the Community level, it is necessary to lay down the technical specifications and minimum performance criteria …"
  - Give the technical possibility to link spatial data sets and services to the Network Services
  - Definitions related to: initial operating capability (IOC), performance, capacity, availability, response time, service request, publish, collect, layer
  - Requirements for network services; specific requirements for discovery and viewing services
  - Access to the network services: 9/05/11 discovery and viewing services with IOC; 9/11/11 – same type of services should meet performance criteria

#### Network Services: content

#### Quality of services (Annex I)

- Third party Network Services linked pursuant to Article 12 of Directive 2007/2/EC shall not be taken into account in the quality of service appraisal to avoid the potential deterioration due to the cascading effects
- Performance
  - Response time for a discovery service shall be < 3 seconds</p>
  - Response time for a Get Map Request < 5 seconds (470kb)</p>
- Capacity
  - Minimum number of similtanuous request shall be 30 for a discovery service and 20 for a view service
- Availability the probability shall be 99%

#### Network Services: content

#### Discovery services (Annex II)

- Search criteria
  - Minimum search criteria according to the Directive: e.g. The quality and validity of data sets and services; conditions applying to the access
  - Additional search criteria shall be available: e.g. URI, temporal reference
- Operations
  - Get Discovery Metadata
  - Discover Metadata
  - Publish Metadata
  - Link Discovery Service

Operation	Role
Get Discovery Service Metadata	Provides all necessary information about the service and describes service capabilities
Discover Metadata	The Discover Metadata operation allows requesting INSPIRE metadata elements of resources based on a query statement to be retrieved from the target Discovery Service

Operation	Role
Publish Metadata	The Publish Metadata operation allows editing INSPIRE metadata elements of resources in the Discovery Service (push or pull metadata mechanisms). Editing meaning insert, update and delete
Link Discovery Service	The Link Discovery Service function allows the declaration of the availability of a Discovery Service for the discovery of resources through the Member State Discovery Service while maintaining the resource metadata at the owner location

0	D	

Resource Title	Member State	Service Type	Last Updated Date
INSPIRE Geo-Portal Katalogservice BMLFUW/Österreich	AT	discovery	14-Nov-13
Geopunt-Metadatacenter zoekdienst	BE	discovery	30-Jan-14
CSW service of the belgian federal government	BE	discovery	30-Jul-14
GeoCataloque de la Région de Bruxelles-Capitale	BE	discovery	28-Nov-14
Czech Republic INSPIRE metadata catalogue	CZ	discovery	09-Dec-14
GeoDatenKatalog.De	DE	discovery	09-Jul-13
DK Service	DK	discovery	03-Nov-11
Estonia Discovery Service.	EE	discovery	16-Sep-14
ΚΑΤΑΛΟΓΟΣ	EL	discovery	09-Oct-13
IDEE Discovery service	ES	discovery	17-Oct-13
Paikkatietohakemisto	FI	discovery	12-Mar-13
Geocatalogue Catalogue Server INSPIRE	FR	discovery	11-Oct-12
Pilot kataloškog servera	HR	discovery	21-Feb-14
FÖMI catalog service / FÖMI katalógus szolgáltatás	HU	discovery	01-Dec-14
Geoportal IE - INSPIRE Discovery Service	IE	discovery	12-Sep-13
Iceland Service	IS	discovery	18-Nov-13
geocat.ch	LI	discovery	20-Oct-14
INSPIRE Geoportal CSW of the Grand-Duchy of Luxembourg	LU	discovery	10-Nov-11
ArcGIS Server Geoportal Extension 10 - OGC CSW 2.0.2 ISO A	<u>P</u> LV	discovery	29-Nov-11
Latvian metadata catalogue, GDC (Geospatial data connector	LV	discovery	23-Oct-14
Nationaal GeoRegister	NL	discovery	03-Nov-11
Geonorge - National CSW service for Norway	NO	discovery	07-Feb-14
Geoportal - Polska Usługa Wyszukiwania INSPIRE	PL	discovery	26-Mar-14
INSPIRE-PT Catalog Service	PT	discovery	10-Jan-12
ArcGIS Server Geoportal Extension 10 - OGC CSW 2.0.2 ISO A	P RO	discovery	03-Nov-11
Nationell svensk metadatakatalog	SE	discovery	13-Nov-14
Slovenski Inspire metadata katalog	SI	discovery	14-Sep-12
Katalógová služba Národného Geoportálu	SK	discovery	07-Oct-14
UK Service	UK	discovery	03-Nov-11

#### Status of development

- 29 discovery services from 26 countries defined as endpoint in the European Geoportal
- 246 discovery services reported

#### Network Services: content

#### View services (Annex III)

- Operations
  - Get View Metadata Service
  - Get Map
  - Link View Service
- Other characteristics
  - Coordinate Reference System
  - Image Format: at least PNG and GIF (without compression)

Operation	Role
Get View Service Metadata	Provides all necessary information about the service and describes service capabilities
Get Map	Returns a map containing the geographic and thematic information coming from the available spatial datasets. This map is an image spatially referenced

Operation	Role
Link View Service	Allows a Public Authority or a Third Party to declare a view Service for the viewing of its resources through the Member State View Service while maintaining the viewing capability at the Public Authority or the Third party location

### **Network Services**

#### Status of development

- Monitoring & Reporting: 7.088 services reported (2013)
- European geoportal: 22.939 services documented (2014)

http://demo.opengeo.org/geoserver/wms?SERVICE=WMS&REQUEST=GetMap&LAYE RS=topp:states&SRS=EPSG:4326&BBOX=-124.731,24.956,-

66.97,49.372&FORMAT=image/png&STYLES=&WIDTH=600&HEIGHT=255



### **Network Services**



- 91
- Download and transformation services
  - Commission Regulation (EU) No 1088/2010 of 23 November 2010 amending Regulation (EC) No 976/2009 as regards download services and transformation services (+ amendment)
  - Additional supporting documents
    - Draft Technical Guidance for INSPIRE Schema Transformation Service (version 2.0)
    - Schema Transformation Network Service: State of the Art Analysis
    - Draft Technical Guidance for INSPIRE Coordinate Transformation Services
    - Other reports and technical documents

- Download and transformation services: content
  - Download services are services which give users access to the information contained in the spatial data sets
  - Transformation services are services which may be used to put spatial data sets in conformity with that Regulation
    - Spatial data sets made available through download services should be in conformity with Commission Regulation

#### Download and Transformation Services: content

#### Quality of services (Annex I)

Third party Network Services linked pursuant to Article 12 of Directive 2007/2/EC shall not be taken into account in the quality of service appraisal to avoid the potential deterioration due to the cascading effects

#### Performance

- Response time for Get Download Metadata shall be < 10 seconds</p>
- Response time for a Get Spatial Data set and the Get Spatial Object < 30 seconds and get a sustained response of 0.5Mb/s or 500 objects/s
- Response time for a Describe Spatial Data set and the Describe Spatial Object Type < 10 seconds and get a sustained response of 0.5Mb/s or 500 objects/s

#### Capacity

- Minimum number of simultanuous request shall be 10 for a download and 5 for a transformation service
- Availability the probability shall be 99%

#### Network Services: content

Download Services (Annex II)

- Operations
  - Get Download Service Metadata
  - Get Spatial Data set
  - Describe Spatial Data set
  - Link Download Service
- Direct Access Download Operations
  - Get Spatial Object
  - Describe Spatial Object Type
- Search Criteria for the Get Spatial Object Operation
  - URI, key attributes (e.g. date of update), bounding box, spatial data theme

#### Network Services: content

- Tranformation Services (Annex III)
  - Operations
    - Get Transformation Service Metadata
    - Transform
    - Link Transformation Service

- COMMISSION REGULATION (EU) No1311/2014 of 10
  December 2014 amending Regulation (EC) No
  976/2009 as regards the definition of an INSPIRE
  metadata element
  - No 976/2009 sets out the rules for implementation of all network services except for the services allowing spatial data services to be invoked
  - "INSPIRE metadata element" means a metadata element set out in Part B of the Annex to Regulation (EC) No 1205/2008 or in Part B of Annex V, Part B of Annex VI and Part B of Annex VII to Commission Regulation (EU) No 1089/2010

#### **INSPIRE – Data Specifications Development**

#### Interoperability of spatial data sets and services

- Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services
- Additional supporting documents
  - D 2.3 Definition of Annex Themes and Scope
  - D 2.5 Generic Conceptual Model (GCM)
  - D 2.6 Methodology for Specification Development
  - D 2.7 Guidelines for Encoding
  - D2.8.I.1-D2.8.I.9 Data Specification on the other themes of Annex I Guidelines (also part of the Draft Implementing Rules)

#### INSPIRE – Data Specifications Development



#### Synonym to data product specification

DATA SPECIFICATION

detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party [ISO 19131]

### **Data Specifications**

#### Status of development

- INSPIRE M&R: 18.138 spatial data sets available (2013)
  - Many more can be accessed through the European portal
- Only a small fraction of these are conform the data specifications
- Existing data sets need to be transformed to reach INSPIRE conformant data sets
- Modules: "Data harmonisation", "Procedures for data and metadata harmonisation" and "Examples of data transformation"



- COMMISSION REGULATION (EU) No 1312/2014 of 10 December 2014 amending Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data services
  - Implementing Rules for Invocable Spatial Data Services
  - Implementing Rules for the Interoperability of Invocable Spatial Data Services
  - Implementing Rules for the Harmonisation of Interoperable Spatial Data Services



# **Conformity with INSPIRE**

#### What?

#### Against what?

- Metadata
- Network services
- Data sets

- Requirements in IRs: legal obligation
- Requirements in TG documents:
  help implementation +
  interoperability



#### Why?

- Conformity = metadata element
- Interoperability of data/services/metadata with INSPIRE geoportal
- Clarification on requirements
- Monitoring and reporting
- Certification
- Checking the progress in implementation

#### (CEN/TR 15449 – Part 5, 2015)



- Checking interoperability of MS discovery, view and download services with TG
  - to ensure connectivity from INSPIRE geoportal pilot
- INSPIRE Metadata validator
  - available at http://inspire-geoportal.ec.europa.eu/validator2/
  - replaces the former schematron validator and implements the same validation criteria applied during the INSPIRE Geoportal discovery process



- Abstract Test Suites (ATS) in the INSPIRE data specifications
  - focusing mainly on how to check the legal requirements
- Executable test Suites (ETS)
  - Developments by private sector

Module: "Metadata and data validation for INSPIRE"

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# Trends, challenges and opportunities

### Trends, challenges and opportunities

- INSPIRE delivers a rich infrastrucure
  - Spatial data sets become documented and harmonised
  - Data and services become interoperable
  - Data and services become accessible and usable
- But still much work needs to be done and many challenges exist ...
  - INSPIRE as a starting point, not an endpoint
## Trends, challenges and opportunities

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### □ Challenge 1

#### Support from private sector, European associations, ...

 Making INSPIRE an operational cross-border infrastructure by adding further components and cooperate at the European level



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Publications Events

Contact

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**Services Infrastructure** 

A multi-level interoperability stack including scalable services for

environmental data harmonization, thesauri, ingestion, workflow

management, validation, processing etc.

LEARN MORE

## Trends, challenges and opportunities

### Challenge 2

 Integrating INSPIRE components in existing e-Government work processes and expanding / linking to other communities (e.g. Statistics)



"More effective e-services, savings in time and money, and increased growth and employment will result from adopting a coherent European framework of guidance and actions to foster interoperable crosssector and cross-border sharing and use of location information"



## Trends, challnges and opportunities

Challenge 3

Geospatial technical platforms, testbeds and eco-systems

- Linking to other innovative developments in ICT and society at large
  - Linked Data
  - Sensor Web
  - Augmented Reality
  - Secure Access
  - Modelling



ISA programme







### Trends, challenges and opportunities

### □ Challenge 4

- Take into account and build further upon non-technological developments
  - Division of tasks
  - Dynamic settings
  - Streamlining
  - Geobrokering

Interdisciplinarity

Mediation, orchestration, choreagraphy, streamlining, ...



# <sup>113</sup> Interesting links and references

## Links and References

- <u>http://inspire.ec.europa.eu/</u>
- http://inspire.ec.europa.eu/index.cfm/pageid/182
- Crompvoets, J. & Vandenbroucke, D. (2013) Introduction to INSPIRE
- CEN/TC 287: TR 15449, part 5
- UN-GGIM: Future trends in geospatial information management: the five to ten year vision

### **115** Introcuction to INSPIRE

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#### Source:

VESTA-GIS project ,2009 (www.vesta-gis.eu/), Nature-SDIPlus project, 2010 (www.nature-sdi.eu/), EduServ programme, 2010 and 2011 (www.eurosdr.net), smeSpire project, 2014 (www.smespire.eu)

