6. DATA MODELS, UNDERSTANDING THE UML DIAGRAMS AND OTHER FORMALISED DESCRIPTIONS

Well-known principles of INSPIRE (1/2)

1. The infrastructures for spatial information in the Member States should be designed to ensure that spatial data are stored, made available and maintained at **the most appropriate level**;

2. that it is **possible to combine** spatial data from different sources across the Community in a consistent way and share them between several users and applications;

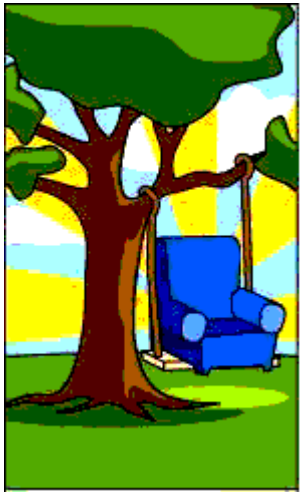
3. that it is possible for spatial data collected at one level of public authority **to be shared** between other public authorities;

Well-known principles of INSPIRE (2/2)

4. that spatial data are **made available** under conditions which do not unduly restrict their extensive use;
5. that it is **easy to discover** available spatial data, to evaluate their suitability for the purpose and to know the conditions applicable to their use.

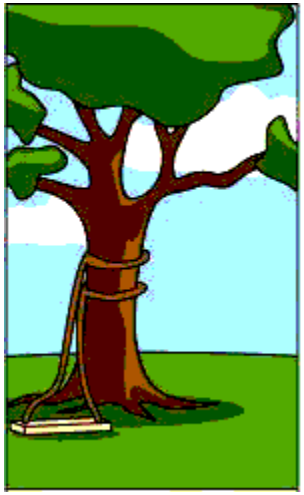
To not reach the bad feeling from INSPIRE…

requirements description



promised solution

proposed concept

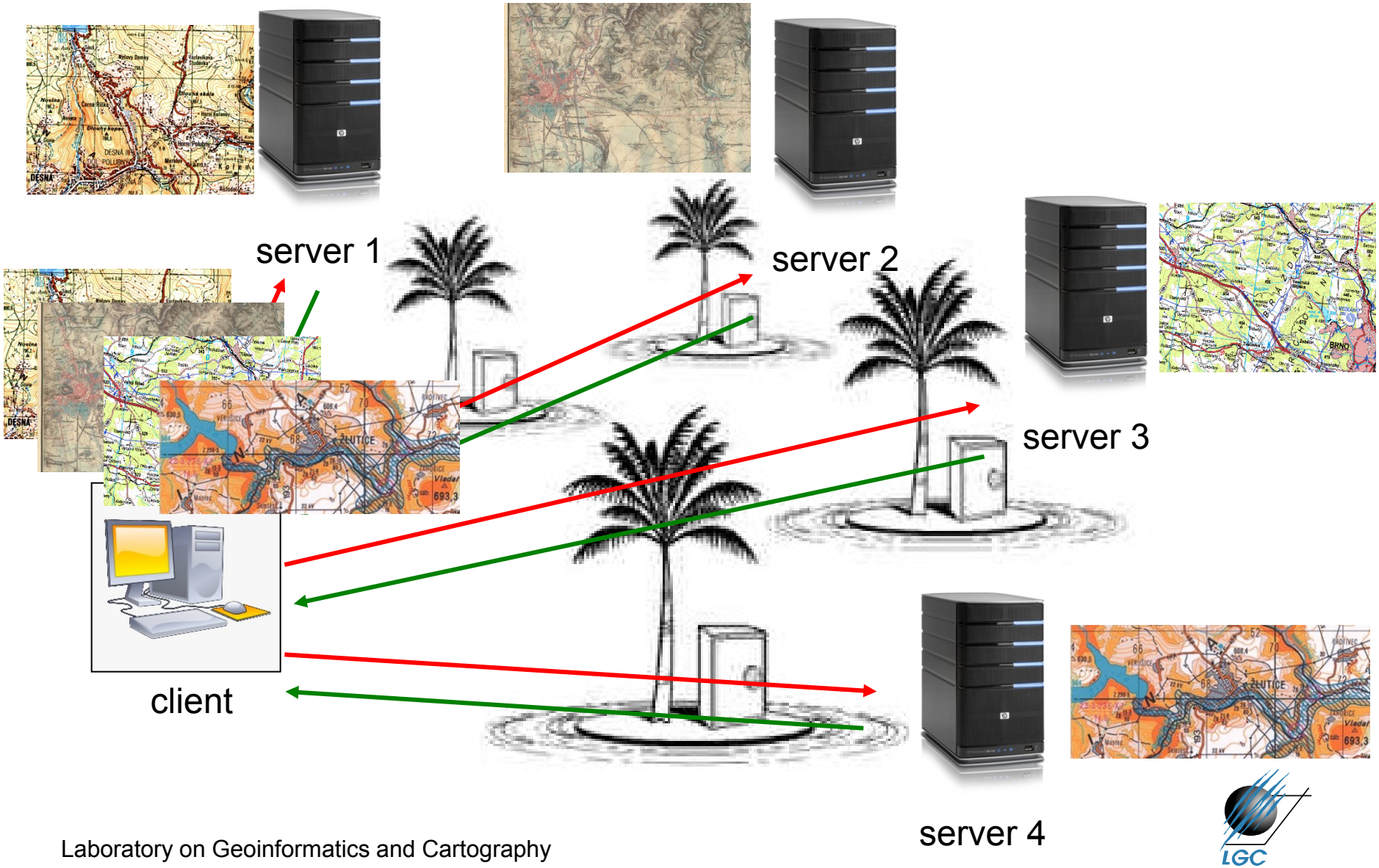


realisation

what user wants

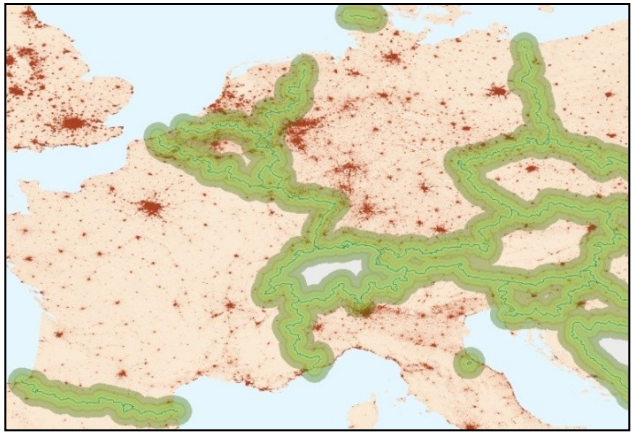
Adopted from: http://geekfun.pl/pm_build_swing.gif, modified

One of the main SDI goals

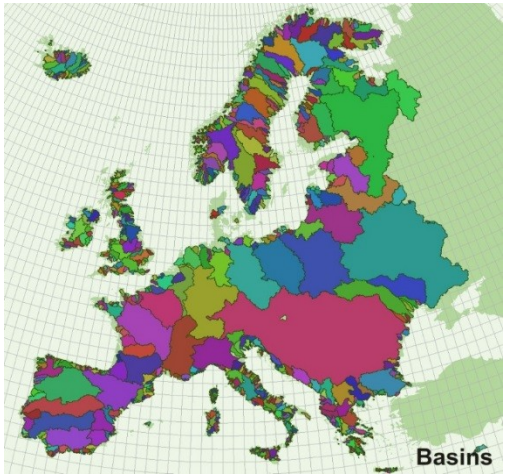


Cross-border concern

- Natural disasters do not stop at national borders
  - 20% of the EU citizens (115 million) live within 50 km from a border



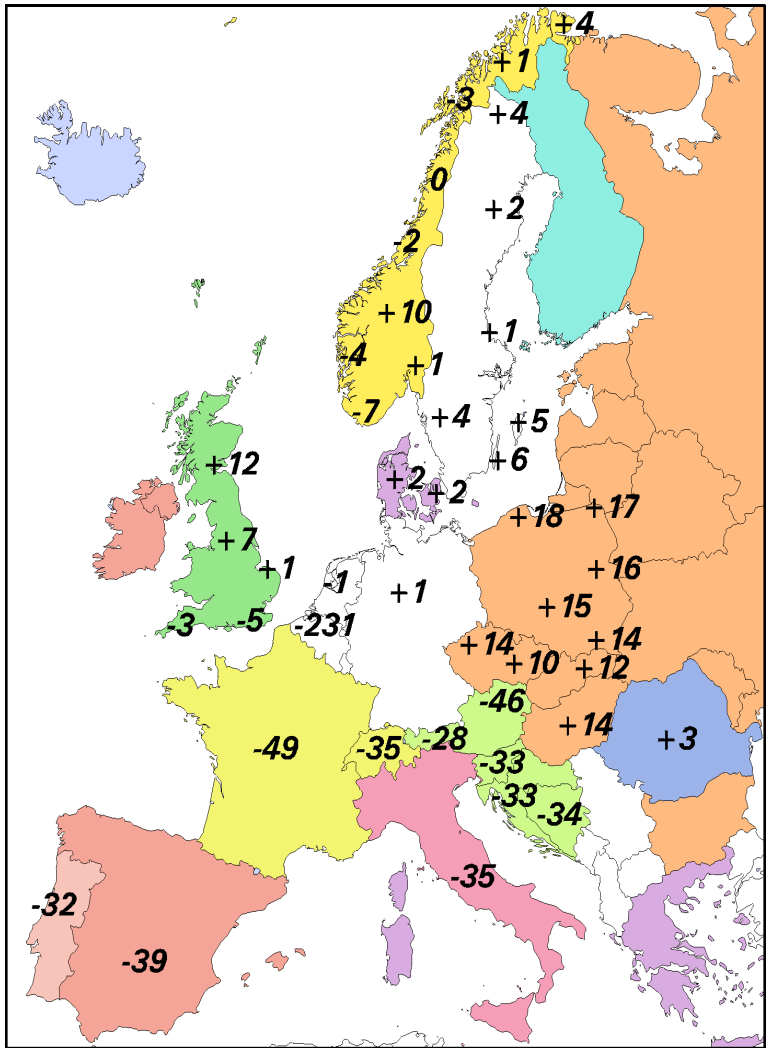
- 70% of all fresh water bodies are part of a trans-boundary basin

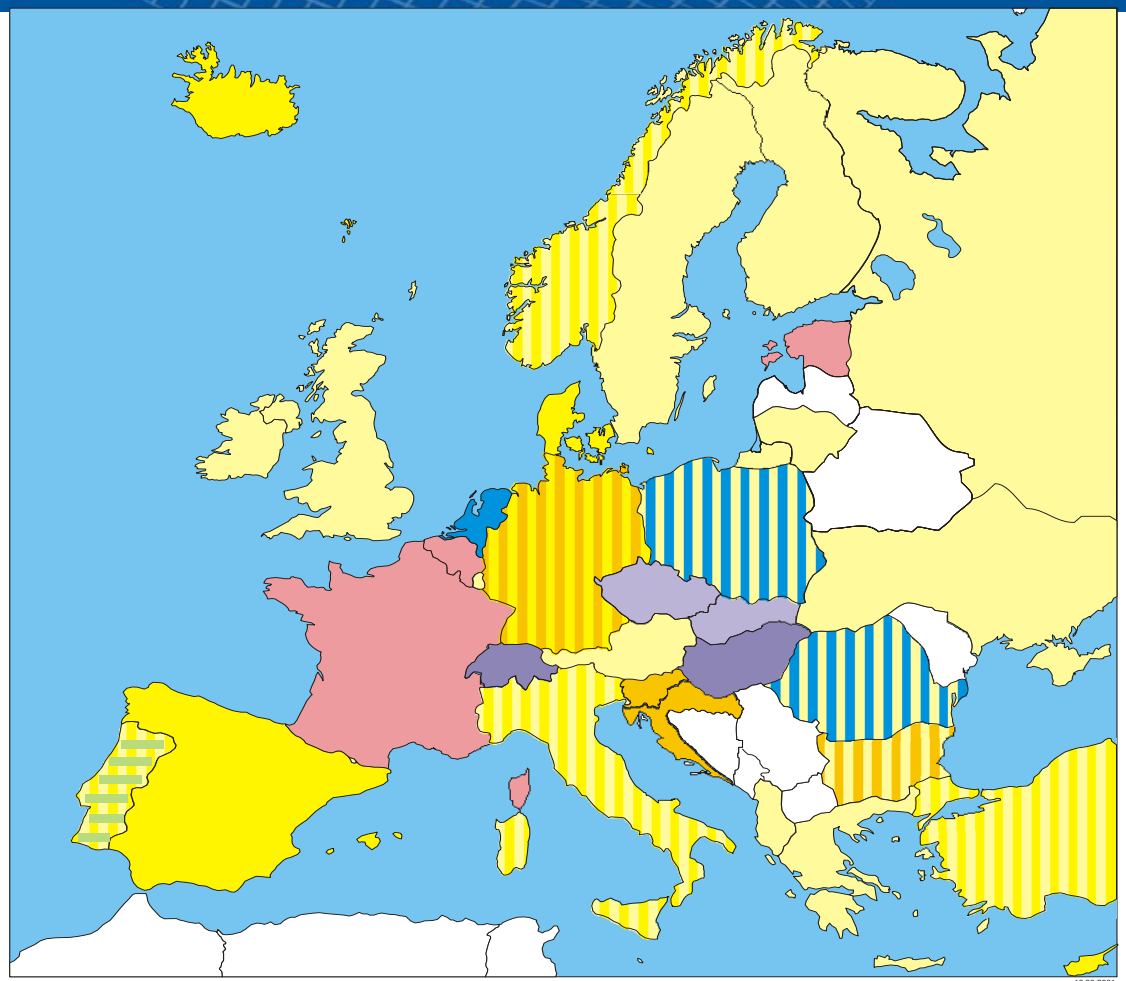


Images adopted from Cetl, V. 2013

LGC

Vertical and positional coordinate reference systems in Europe





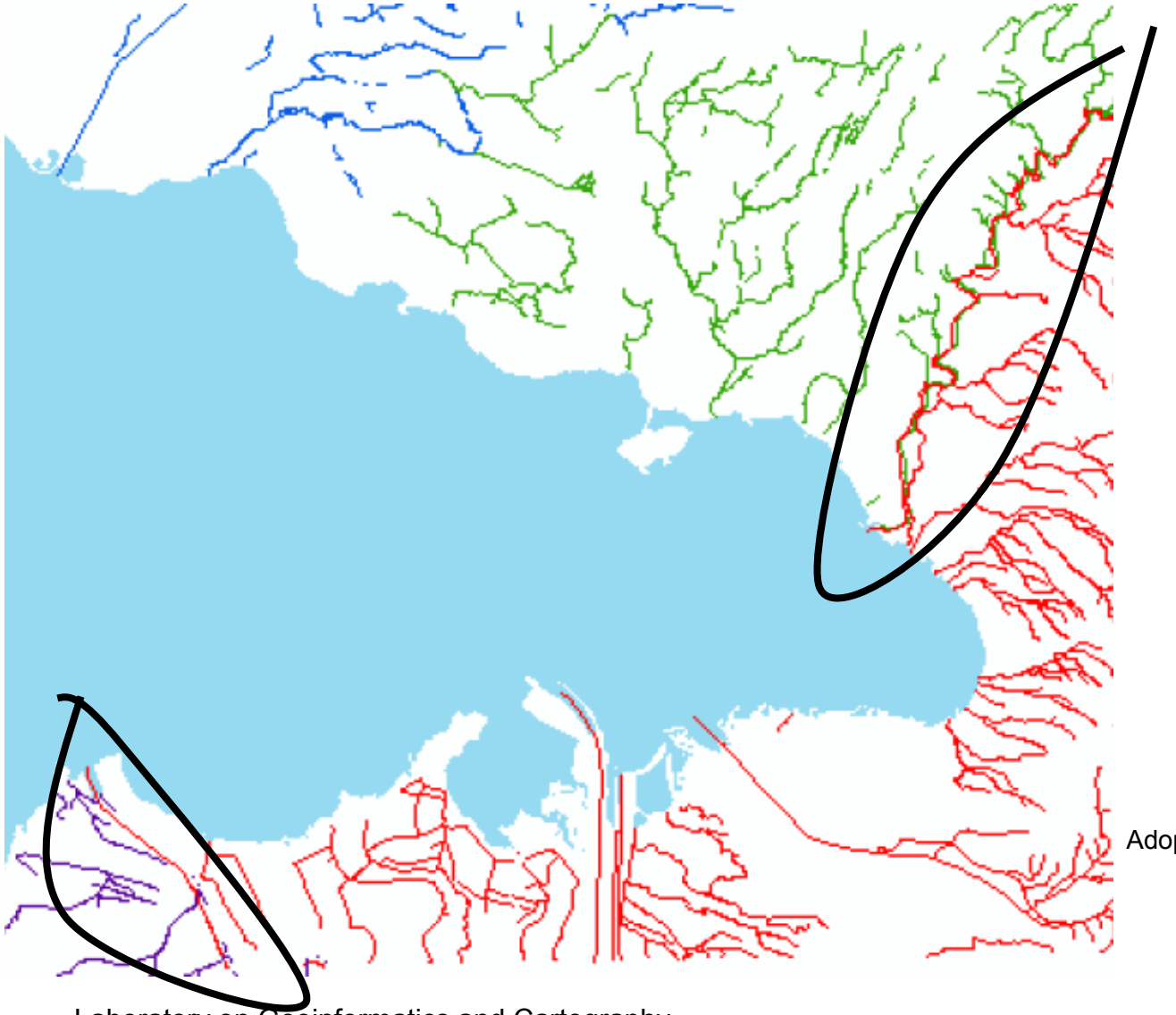
- Lambert Conformal Conic
- Oblique Conformal Conic
- Oblique Conformal Cylindric
- Oblique Stereographic
- Transverse Mercator
- Transverse Mercator (Gauss-Krüger-System)
- Transverse Mercator (UTM)
- Bonne

Images adopted from Cetl, V. 2013

Laboratory on Geoinformatics and Cartography

LGC

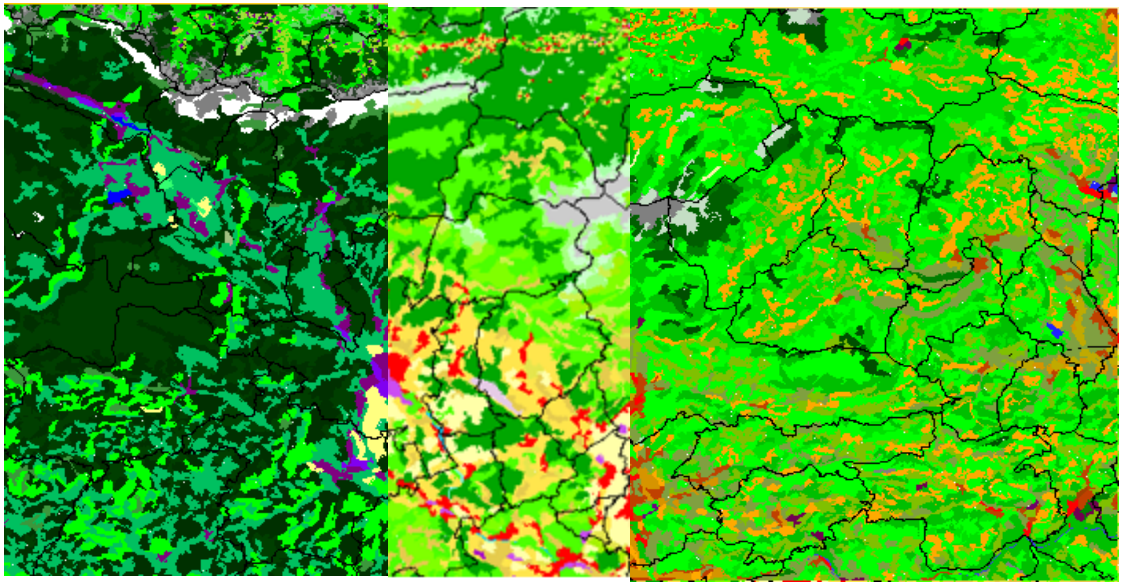
Consequences of spatial data islands

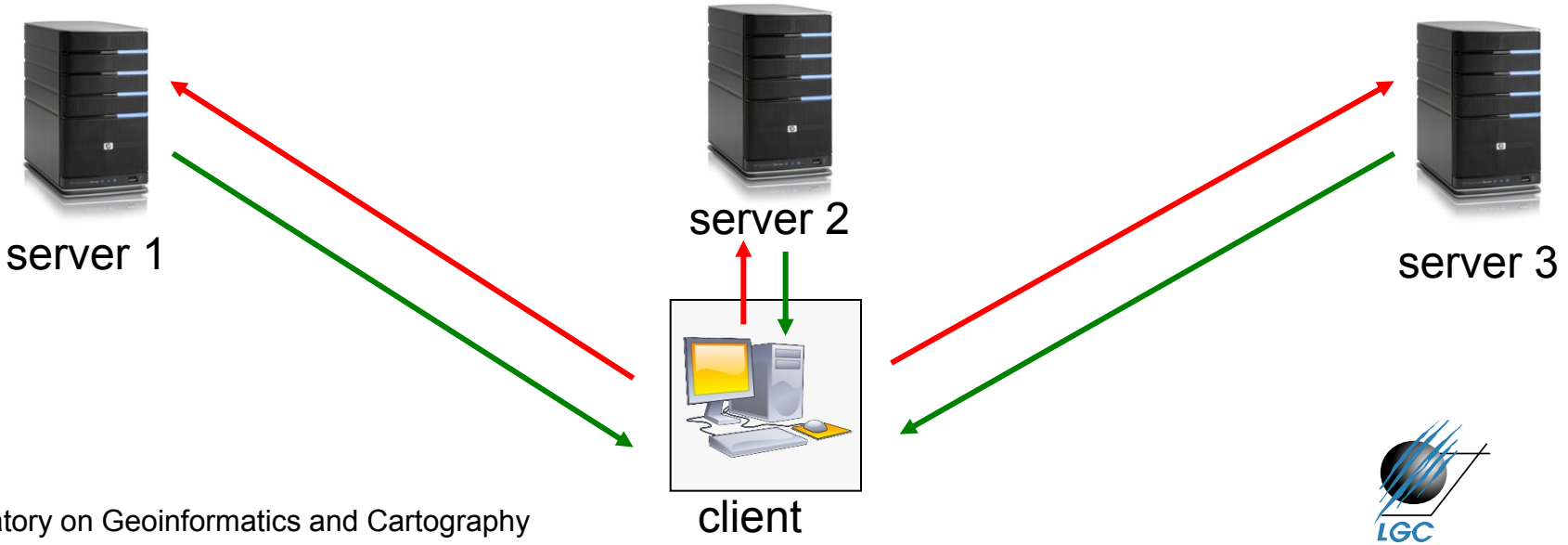


- Inconsistent data
  - geometrically
  - attribute
  -semantically
  - …

Adopted from: Fichtinger, Klien and Giger, 2009

Cartographic consequences





Data models in INSPIRE

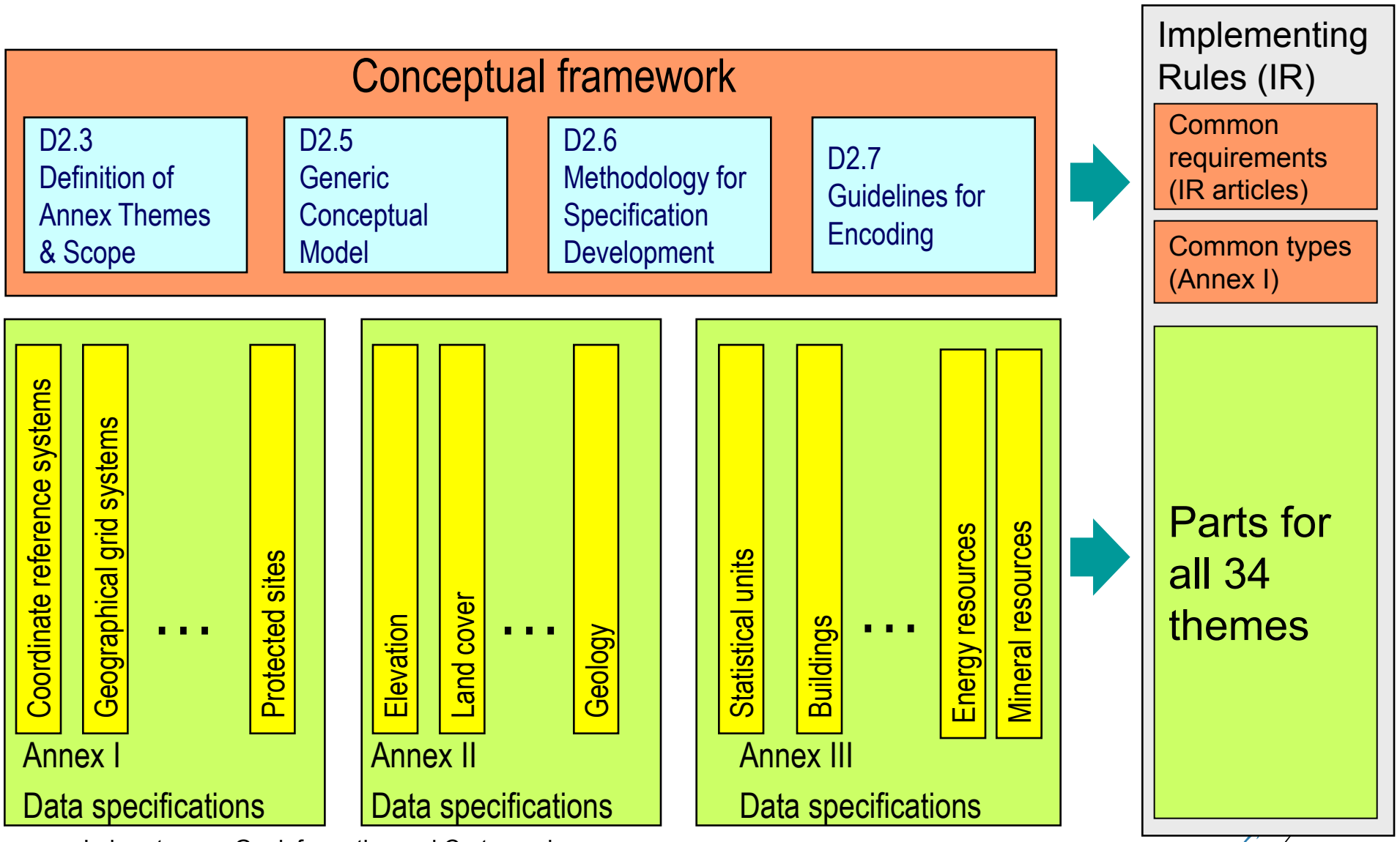
- Article 7: *"[…] technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets and services […]"*
  - What does that mean?

- Based on existing initiatives and international standards for the harmonization of spatial data sets

Addressing following aspects of spatial data

- A common framework for the unique identification of spatial objects, to which identifiers under national systems can be mapped in order to ensure interoperability between them;
- The relationship between spatial objects;
- The key attributes and the corresponding multilingual thesauri commonly required for policies which may have an impact on the environment;
- Information on the temporal dimension of the data;
- Updates of the data

Broader view on INSPIRE data models



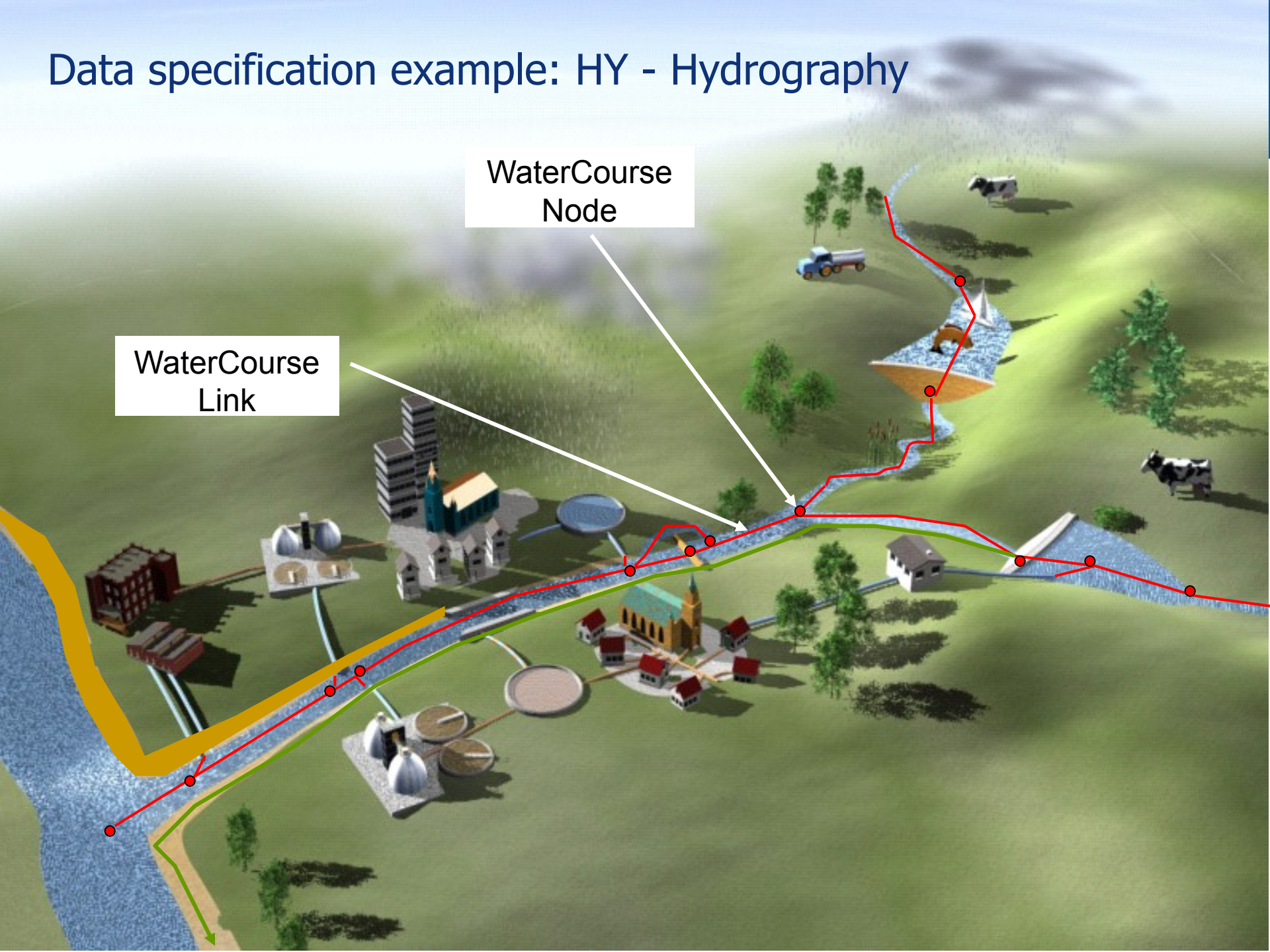
Documents for all INSPIRE data models

- **Implementing rules** (Commission Regulation 1089/2010 and 1253/2013)
  - Legally binding in all EU Member States
  - Defined according to the cost-benefit analyses

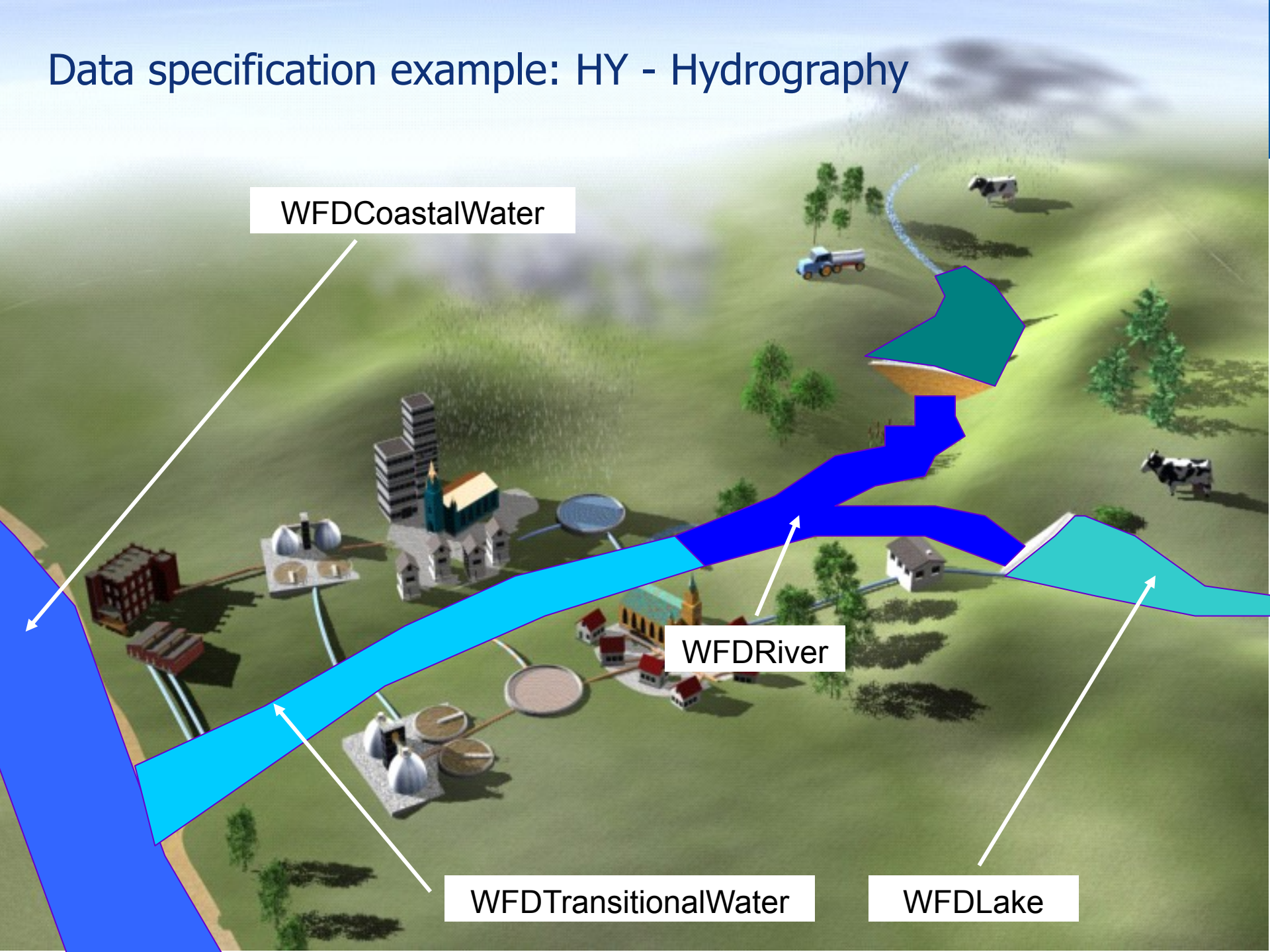
- **Technical Guidelines** (Data specifications) for all 34 spatial data themes
  - Technical basis for Implementing rules
  - Explanations and examples to guide you through the implementation process

Data specification example: HY - Hydrography

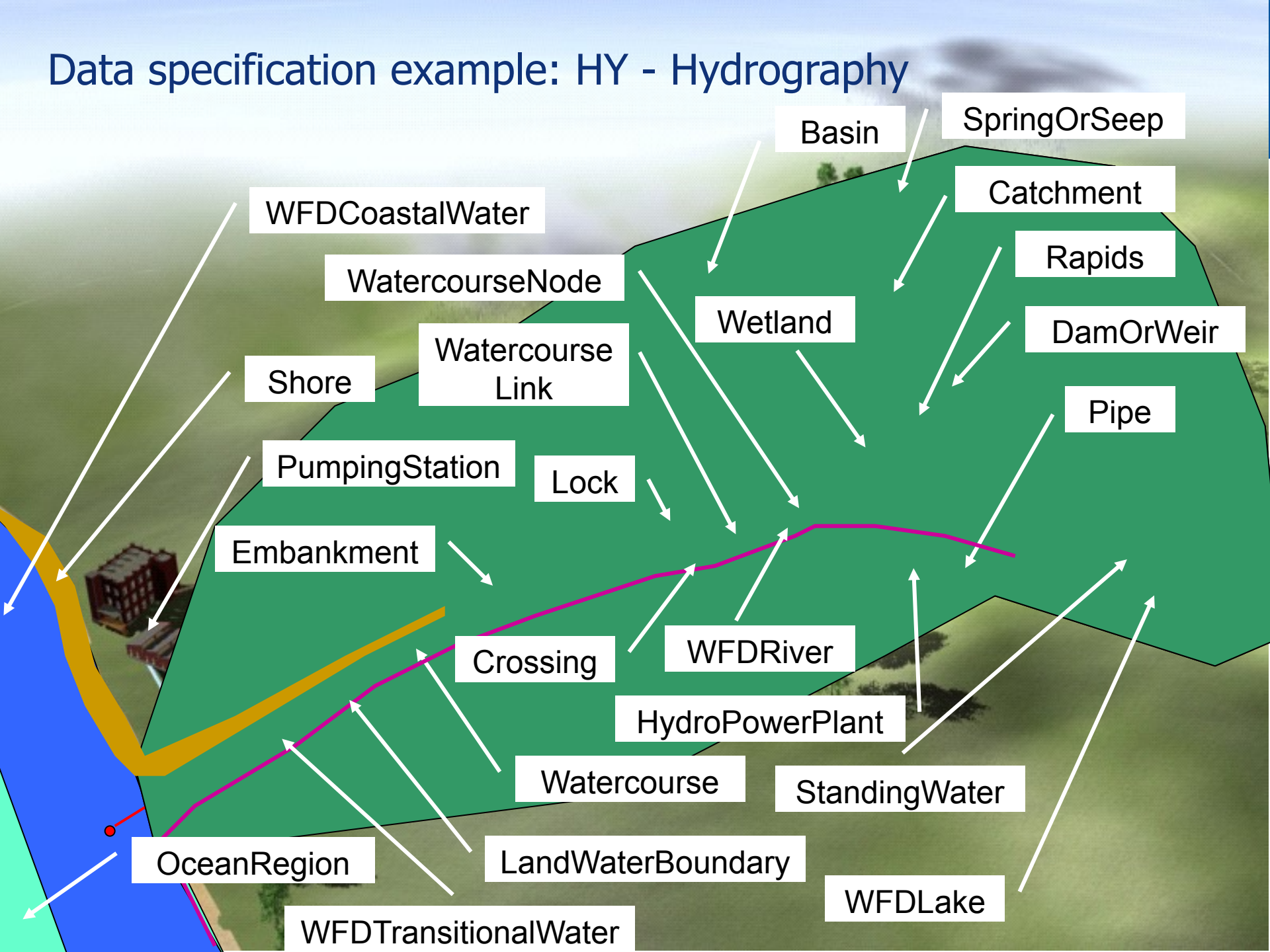
Data specification example: HY - Hydrography



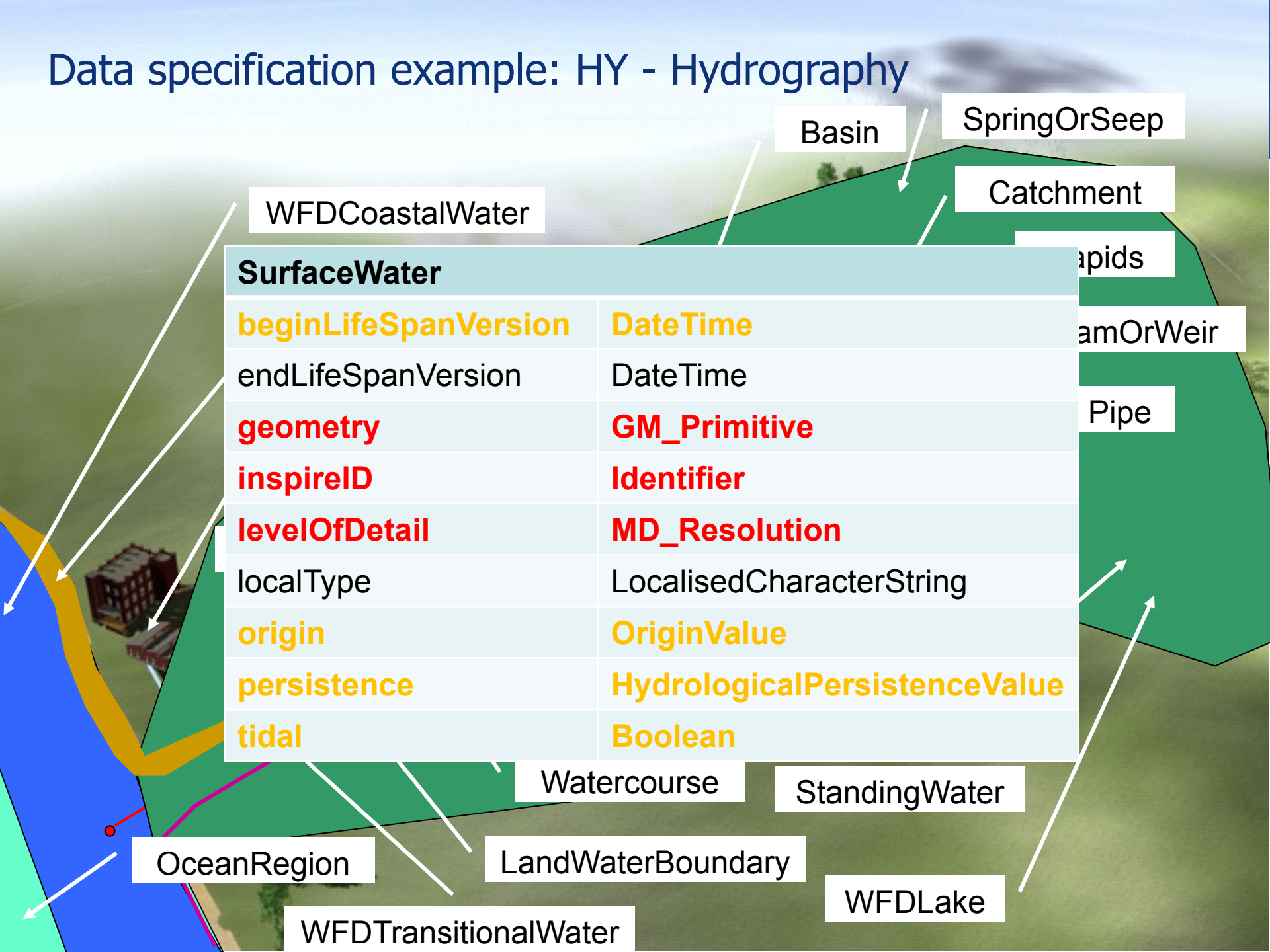
Data specification example: HY - Hydrography



Data specification example: HY - Hydrography

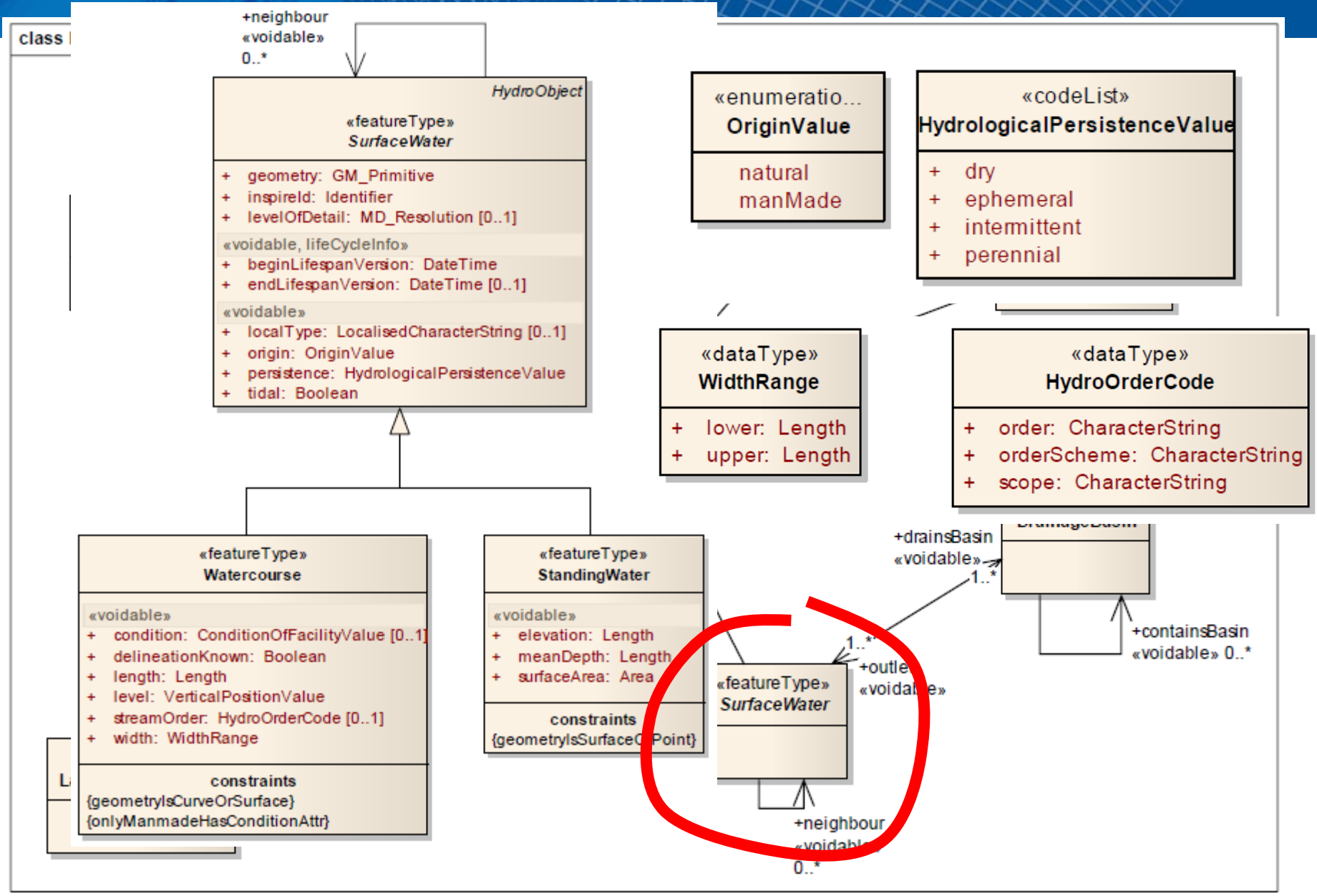


Data specification example: HY - Hydrography



SurfaceWater	
beginLifeSpanVersion	**DateTime**
endLifeSpanVersion	DateTime
geometry	**GM_Primitive**
inspireID	**Identifier**
levelOfDetail	**MD_Resolution**
localType	LocalisedCharacterString
origin	**OriginValue**
persistence	**HydrologicalPersistenceValue**
tidal	**Boolean**

Expression in the UML



Structure of a data specification (1/3)

D2.8.I.

Title
Creator
Date
Subject
Publisher
Type
Descriptic
Contributi
Format
Source
Rights
Identifier
Language
Relation
Coverage

Interoperability
General Executi

The challenges regarding
spatial information are cor
across the various levels of
to take measures of coordi
2007/2/EC of the Europea
establishing an Infrastructu
environmental policies, or p

INSPIRE will be based on t
the Member States. To su
addressing the following
interoperability of spatial da
data services, network se
reporting procedures.

INSPIRE does not require
Member States have to mak

Interoperability in INSPIRE
sources across the Europe
humans or machines. It is i
spatial data sets through n
either changing (harmonisi
publication in the INSPIRE
understanding and integrati
INSPIRE.

In order to benefit from th
established under internati
whenever possible.

To facilitate the implementa
to participate its specificatic
consensus building proces
industry, research, and go
Communities (SDIC) and Le
participated in the user
Specification Drafting Team
the technical documents of
tested the draft data spec
implementing rule on interop

[1] For Annex I data: within two
and extensively restructured
[2] The number of SDICs and LM
[3] Surveys on unique identifiers
[4] The Data Specification Drafti
France, Germany, Greece,
Environmental Agency
[5] The Thematic Working Gro
Republic, Denmark, Finland,
Spain, Sweden, Switzerland,
[6] Four documents describing c
details in the text.

Hydrography – Execut

The data specification for *Hydrograph*
information between member states. H
with the description of the sea, lakes,

This data specification is limited in bot
inland surface waters are subject to th
specification as far as geographically
(2006/60/EC): "surface water on the la
one nautical mile on the seaward side
territorial waters is measured, extendi
The remaining part of the waters will b
Oceanographic geographical features

This data specification does not includ
the Annex I theme *Transport Network*
the Annex II theme *Elevation*. Ground
of e.g. rivers running underground tha
within scope of this data specification
network.

The thematic scope of this data specif
reporting and modelling purposes. Thi
reporting and aid management of pan
hydrographic data fulfils a function in

The *Hydrography* theme is concerned
objects. It does not define attributes th
be considered in isolation from other I
legislation. Where work on such them
associations to be defined more fully i
be extended should further user requi

Considering the importance of the Wa
decided to include the geographic des
the physical objects and structures. Al
Management / restriction / regulation
be of such importance that it has deci
water bodies as an integral part of this
such as the European WISE and SEIS
extension with reporting obligations wi
Annex B.

The data specification has been prepa
national team of experts in the field dr
Netherlands, Spain, Sweden, United K
requires no additional data capture by
flexible as possible. In this way it is de

The data specification has been base
standards, the TWG has, amongst oth
EuroGeographics and the Internationa
breed" ICT techniques such as the Un
Language (GML) and Object Constrai

Comments on earlier versions of this
update those versions into this versior
selected participants to the Comments
specification has been discussed.

1 Scope

This document specifies a harmonis
defined in Annex I of the INSPIRE Di

This data specification provides the b
(1) of the INSPIRE Directive [Directi
implementation guidelines accompan

2 Overview

2.1 Name and acronyr

INSPIRE data specification for the the

2.2 Informal descriptic

Definition:

Hydrographic elements, including ma
including river basins and sub-basi
Directive 2000/60/EC of the Europea
a framework for Community action in

* OJ L 327,22.12.2000, p.1. Direct
15.12.2001, p.1.).

[Directive 2007/2/EC]

Description:

The theme "Hydrography" is a basic r
and uses.

For mapping purposes (to provide a r
relationships), it includes the represe
artificial. To fulfill reporting requireme
channel network; surface water bodie
transitional waters or coastal waters,
water bodies. Furthermore, a topologi
analysis and modelling.

Geographically, the theme "Hydrogra
basin districts as defined by WFD.

Further themes of annex I, II and III d
The main relations with other themes

- Annex I
  - Geographical Names
  - Administrative Units -
  - Transportation - wate
- Annex II
  - Elevation - concernir

3 Specification scopes

This data specification has only one scope, the general scope.

4 Identification information

Table 1 – Information identifying the INSPIRE data specification *Hydrography*

Title	INSPIRE data specification *Hydrography*
Abstract	Hydrography in the context of this data specification is involved with the de of the sea, lakes, rivers and other waters, with their phenomena hydrographic-related elements. For mapping purposes, it includes a representation of physical elements natural and artificial. For reporting requirements of EC water-related dire includes WFD surface water bodies. For spatial analysis and modelling, it a topologically-sound network of rivers and canals.
Topic categories	inlandWaters
Geographic description	This INSPIRE data specification covers spatial data sets which relate to where a Member State has and/or exercises jurisdictional rights. This INSPIRE data specification covers all inland surface waters. Coasta are also a subject of this specification as far as geographically defined in the of the Water Framework Directive (2006/60/EC): "surface water on the l side of a line, every point of which is at a distance of one nautical mile seaward side from the nearest point of the baseline from which the br territorial waters is measured, extending where appropriate up to the oute transitional waters".
Purpose	The purpose of this document is to specify a harmonised data specification spatial data theme *Hydrography* as defined in Annex I of the INSPIRE Direc The thematic scope of this data specification is towards providing a solid fra for mapping, reporting and modelling purposes. It is concerned with the ne bodies of water and relating structures and objects. However, each organisation will have different responsibilities from the next will influence the kind of data they collect and manage and use. In tu organisations may use simple models, others by necessity will have comp arrangements. This data specification is provided as a basic framework whi can adopt and if required – extend for themselves. The model is struc maximise reuse and the sharing of organisational data. *Spatial Objects (core – application specific)* This specification is mainly focussed on the "widely reused – widely ref segment of spatial objects. **It does not attempt to try and incorporat spatial object that might be used by any application**. Such objects may buoys, piers and other constructions etc. These are all "application specifi will be used/referenced by at least one organisation. *Associated "non-Geographic" data* Any "non geographic data" (the majority of the data holdings in any organi is also out of scope of this specification – such records may include "water "water quantity", "state of the environment" and so on. While associated spatial objects defined here, all these examples are closer to the applicatio the spectrum than generic use by a wide community, whether they rep geographic entity or non-geographic data.

Structure of a data specification (2/3)

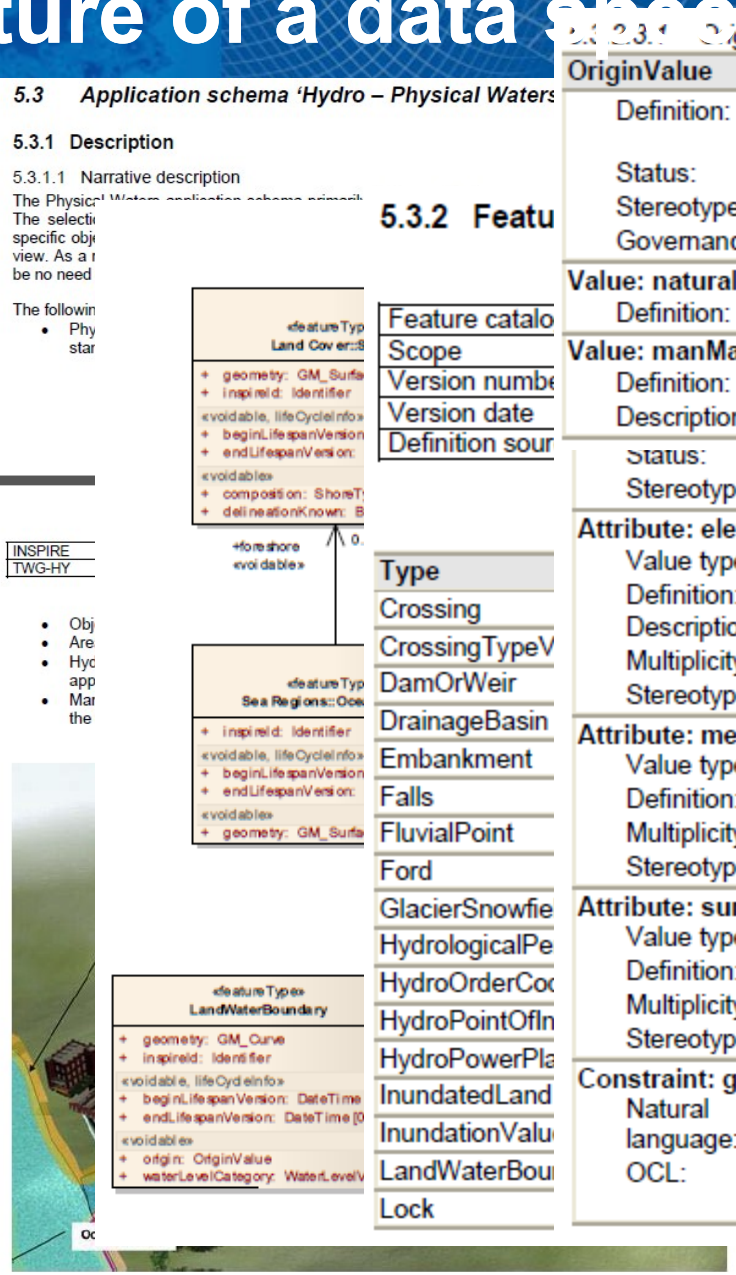


Figure 4 – Some elements of the physical waters and related objects (1)

OriginValue

Definition:	An enumeration type specifying a set of hydrographic 'origin' categorie man-made) for various hydrographic objects.
Status:	Proposed
Stereotypes:	«enumeration»
Governance:	May be extended by data providers.

Value: natural

Definition:	An indication that a spatial object is natural.

Value: manMade

Definition:	An indication that a spatial object is man-made.
Description:	SOURCE [DFDD].

Status:	Proposed
Stereotypes:	«featureType»

Attribute: elevation

Value type:	Length
Definition:	Elevation above mean sea level.
Description:	SOURCE [Based on EuroRegionalMap].
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: meanDepth

Value type:	Length
Definition:	Average depth of the body of water.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: surfaceArea

Value type:	Area
Definition:	Surface area of the body of water.
Multiplicity:	1
Stereotypes:	«voidable»

Constraint: geometryIsSurfaceOrPoint

Natural language:	Standing water geometry may be a surface or point
OCL:	inv: self.geometry.oclIsTypeOf(GM_Surface) self.geometry.oclIsTypeOf(GM_Point)

Structure of a data specification (3/3)

7 Data

This sectio
associated
Hydrograph

NOTE
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Data quality
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To ensure t
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Recommer

Chapter 8
information.

Table

Section

9 Delivery

9.1 Delive

Requirement 25

Requirement 26

EXAMPLE 1 Thr
pre-defined data se
direct access to th
objects based upon
following informatio
– the list of spa
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– and the quer
a query expre
where applica
– a description
through the D

EXAMPLE 2 Thr
transformations fror
is directly called by
that is not yet confo
Input data (mandato
– Source mode
input data is
– Target model
– Model mappi
transformatio

9.2 Encod

9.2.1 Encoding

10 Data Ca

Requirement 31

Objects are consic
1. They are part
the Water Fr
hydrographic
2. They are usec
3. They are ne
surroundings.
4. They are avail

Recommendatio

10.1 Data ca

10.1.1 Inundat

Excluded from inu
network. Included
form part of it un
'green rivers' and
purpose of floodin
at high water (wat

11.2 Default Style

Requirement 41 If an
corre
style

If no
INSF
be u

Table 1

Layer Name	HY.Physi
Style Name	HY.Physi
Style Title	Water bo
Style Description	Physical geometri watercou and the s border. P of 6 pixel without b
Symbology	<sld:N <se:I <sld <s <s <s portraye detail o lines wi filled b are depi superfic border.</

Feature Type	Style
	Persistence
	Man-made
StandingWaters	Default
	Persistence
	Man-made
LandWaterBoundary	Default
	Man-made
DrainageBasin	Default
RiverBasin	Default
WatercourseLink	Default

INSPIRE	Reference: INSPIRE_DataSpecification_HY_v
TWG-HY	INSPIRE Data Specification on *Hydrography* 2010-04-26

Annex A
(normative)

Abstract Test Suite

Any dataset conforming to this INSPIRE data specification shall meet all requirements specifie
document.

NOTE A common abstract test suite including detailed instructions on how to test each req
will be added at a later stage.

INSPIRE
TWG-HY

7.1.1
7.1.2
7.2.1
7.2.2
7.2.3
7.3.1
7.4.1

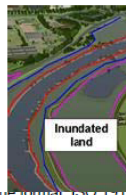
INSPIRE
TWG-HY

Requirement 27

9.2.1.1 Default E

Format name: 'Hydr
Version of the forma
Reference to the spe

INSPIRE
TWG-HY



Requirements vs. recommendations

Requirement 1	Any dataset claiming conformance with this INSPIRE data specification shall pass the requirements described in the abstract test suite presented in Annex A.

Recommendation 1	The reason for a void value should be provided where possible using a listed value from the VoidReasonValue code list to indicate the reason for the missing value.