



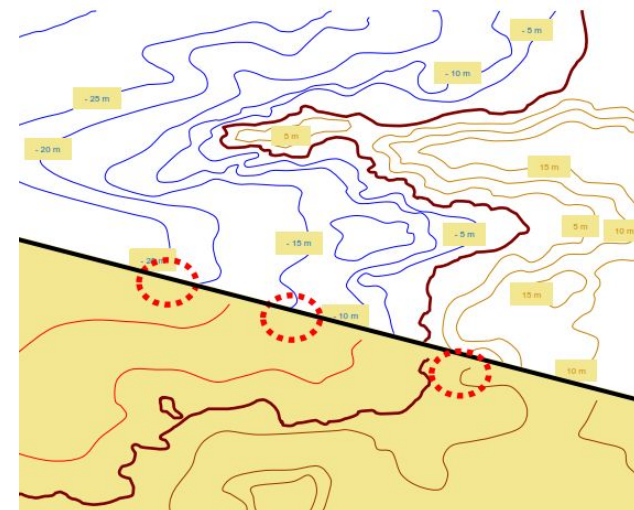
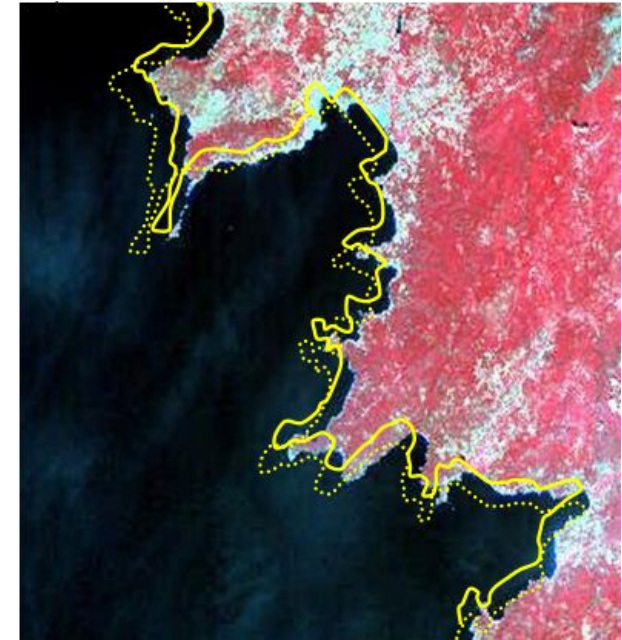
A Harmonização de dados geográficos no âmbito da Diretiva INSPIRE

Danilo Furtado
dfurtado@dgterritorio.pt



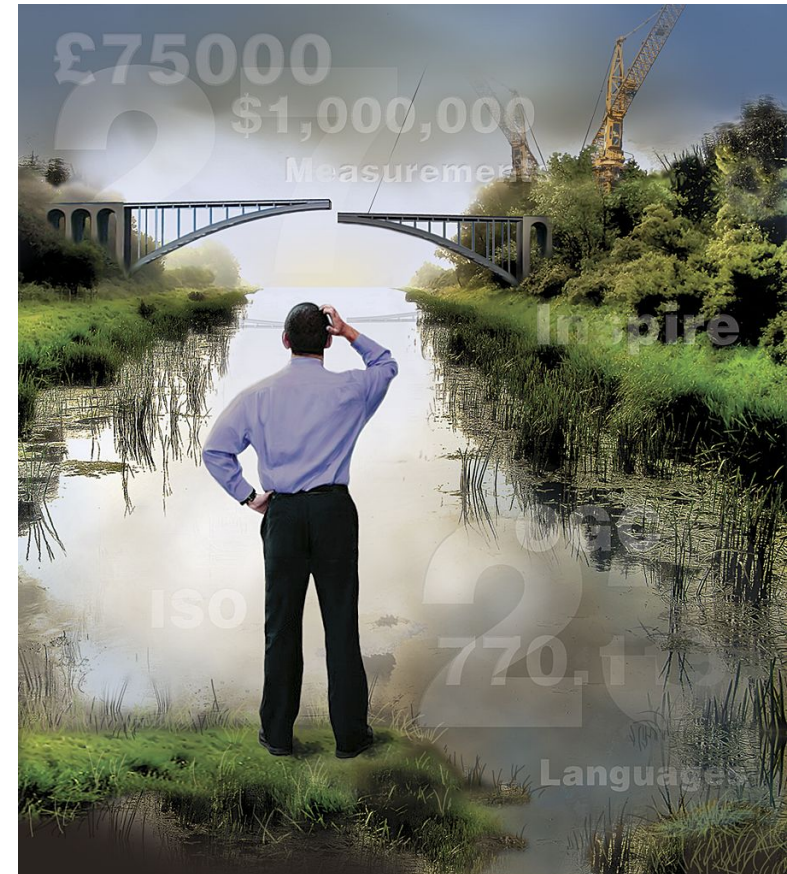
Harmonização de dados geográficos

- Problemas com os dados geográficos
 - Modelos de dados
 - Sistemas de coordenadas
 - Perfis de metadados
 - Duplicação na recolha da informação
 - Formatos dos dados incompatíveis
 - Fronteiras (geometrias inconsistentes)
 - Lacunas na informação disponível



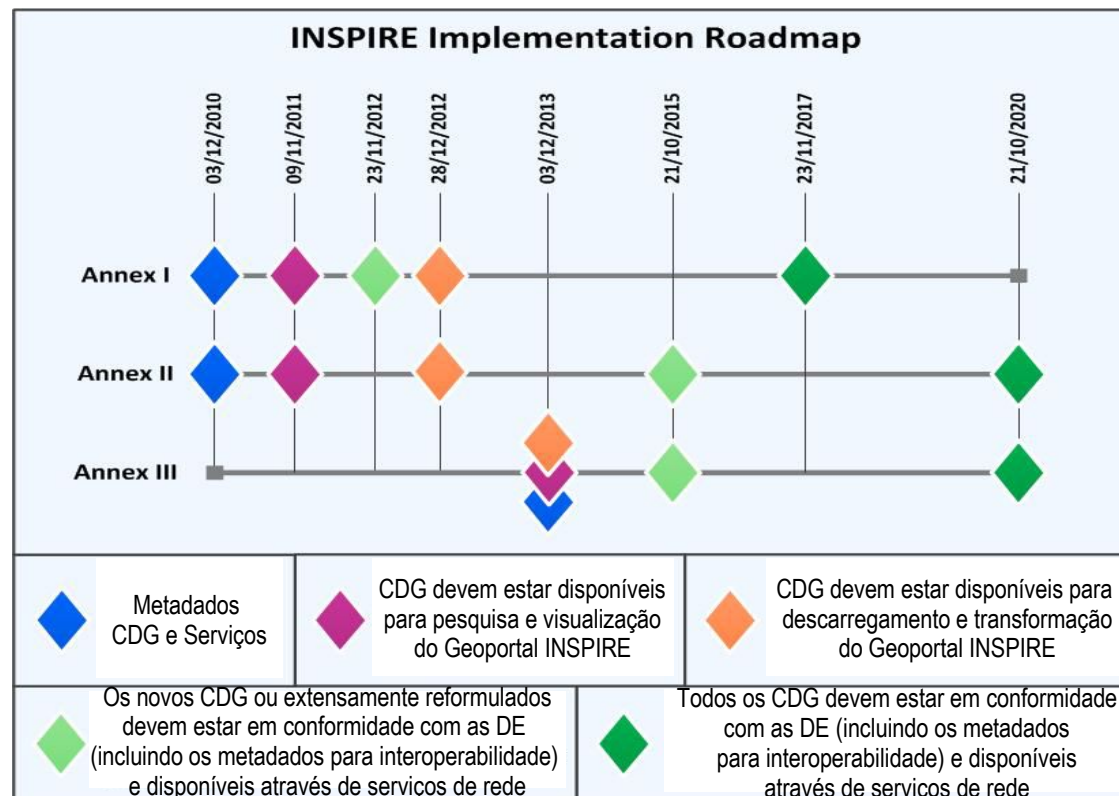
Harmonização de dados geográficos

- Directiva INSPIRE
 - Criação da Infraestrutura Europeia de Informação Geográfica
 - Disponibilizar aos utilizadores serviços integrados de informação geográfica
- Principais exigências
 - Metadados
 - Dados e Serviços interoperáveis
 - Serviços de Rede
 - Acesso e partilha de dados
 - Monitorização e *reporting*

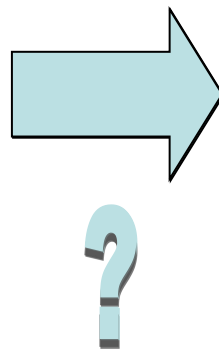


Harmonização de dados geográficos

- Fases da implementação da Directiva INSPIRE
 1. Documentação - criação e disponibilização de metadados
 2. Acessibilidade - por intermédio dos Serviços de Rede
 3. Harmonização - por forma a garantir a interoperabilidade dos CDG

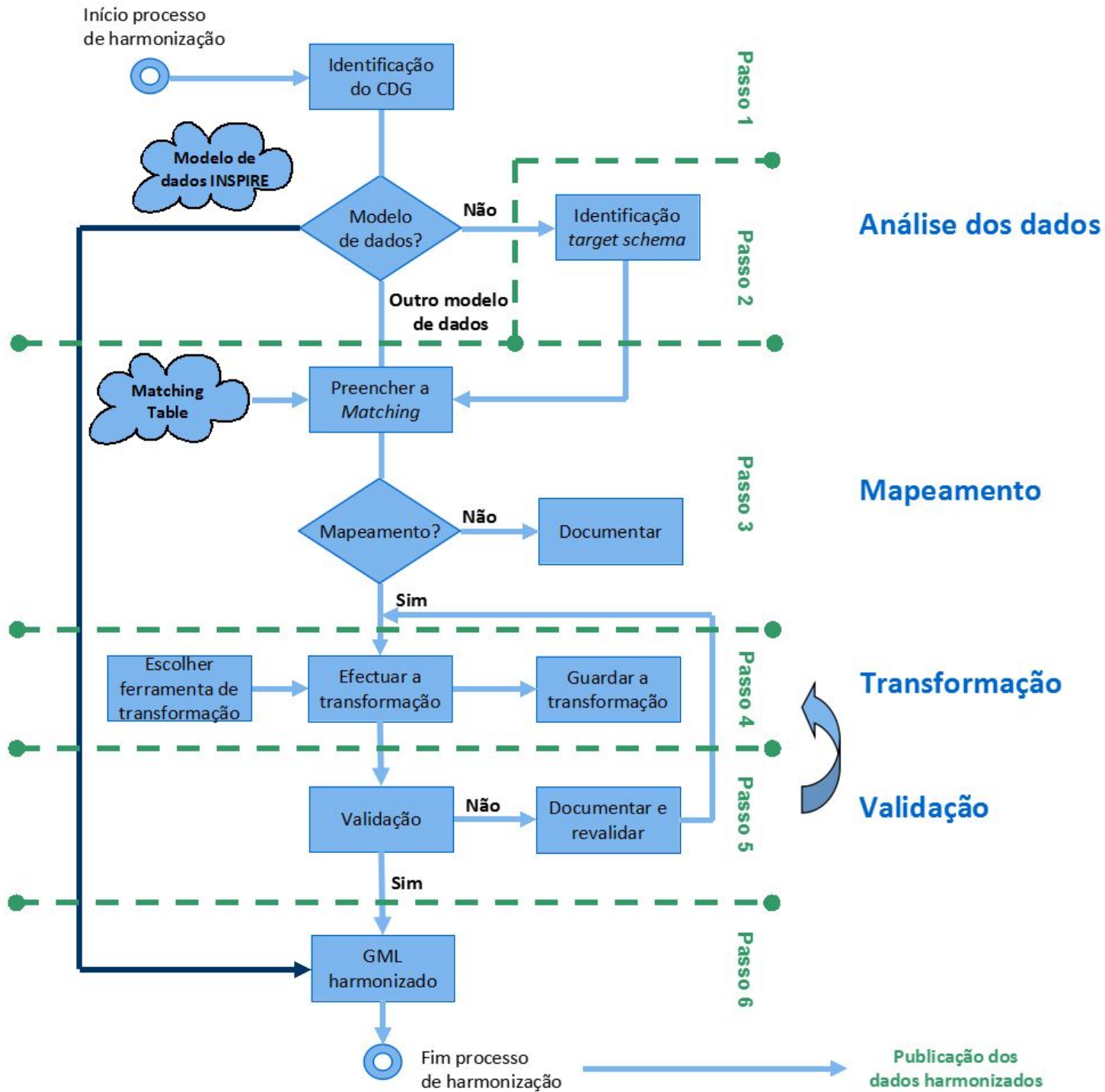


- Desafio
 - Organização dos dados



- Harmonização de dados na Directiva INSPIRE

“o processo que permite desenvolver especificações para conjuntos de dados, de modo a que seja possível aceder a estes dados através de serviços, numa representação que permite **combinar** esses dados com outros **dados harmonizados de forma coerente**”



- Site INSPIRE
 - Modelos UML (HTML, projecto EA)
 - XML schemas
 - Registers
 - Matching tables

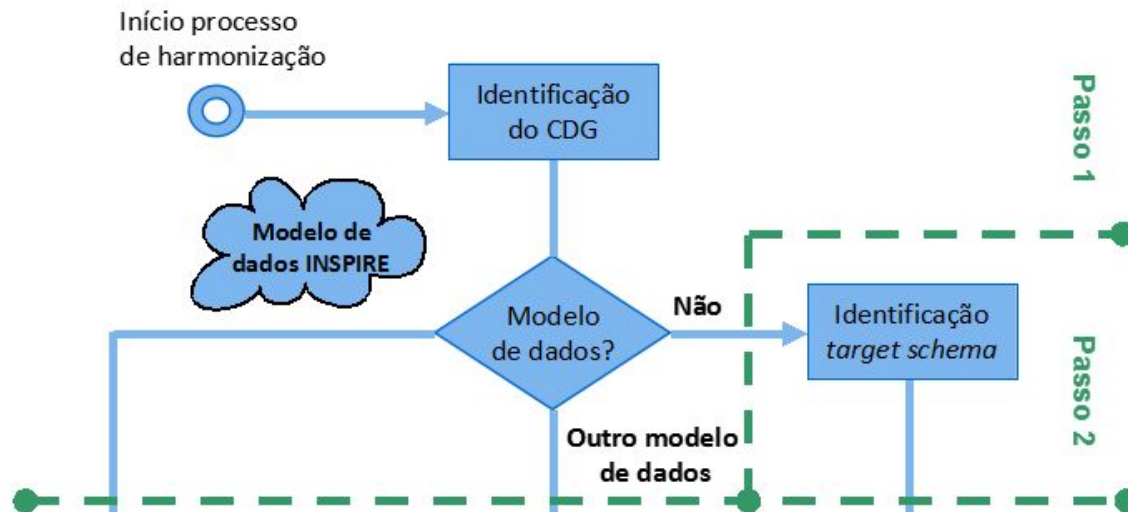
The screenshot shows the INSPIRE Data Specifications page. At the top, it says 'INSPIRE Infrastructure for Spatial Information in the European Community'. Below this is a navigation menu with options like 'Legislation', 'Who', 'Consultations', 'Testing', 'Roadmap', 'Library', 'News', 'Themes', 'Data Models', and 'xml schemas'. The main content area is titled 'Data Specifications' and contains a table of revisions. The table has columns for 'Revision', 'Corresponding TC and IRs', 'Status', 'Feature catalogue', 'HTML view', 'Mapping Tables', 'EA project / XMI', 'SVN', and 'GML & code lists'. The first row shows revision 461B, which is 'APPROVED' and corresponds to 'Implementing Rules (EU) No 1089/2010, No 102/2011, No 1253/2013 and the latest publicly available version of the data specifications of Annex I, II+III'. Below the table, there are sections for 'Show older versions', 'Feature catalogue', and 'UML models for Enterprise Architect (EAP, XMI)'. On the right side, there are search bars, a 'LOGIN / REGISTRATION' button, and a 'NEWS' section with recent updates.

<http://inspire.ec.europa.eu/index.cfm/pageid/2/list/datamodels>

Harmonização de dados geográficos

- **Passo 1:** Identificar e caracterizar a informação original (*source*)
- **Passo 2:** Identificar o modelo de dados INSPIRE

<http://inspire.ec.europa.eu/schemas/>



Análise dos dados

Index of /schemas

<u>Name</u>	<u>Last modified</u>	<u>Size</u>	<u>Description</u>
Parent Directory		-	
ac-mf/	2015-04-29 10:03	-	
act-core/	2015-04-29 10:03	-	
ad/	2015-04-29 10:03	-	
af/	2015-04-29 10:03	-	
am/	2015-04-29 10:03	-	
...			

- Especificações de Dados INSPIRE



INSPIRE
Infrastructure for Spatial Information in Europe

D2.8.1.4 INSPIRE Data Specification on Administrative units – Guidelines

Title	D2.8.1.4 INSPIRE Data Specification on <i>Administrative units</i> – Guidelines
Creator	INSPIRE Thematic Working Group Administrative units
Date	2010-04-28
Subject	INSPIRE Data Specification for the spatial data theme <i>Administrative units</i>
Publisher	INSPIRE Thematic Working Group Administrative units
Type	Text
Description	This document describes the INSPIRE Data Specification for the theme <i>Administrative units</i>
Contributor	Members of the INSPIRE Thematic Working Group Administrative units
Format	Portable Document Format (pdf)
Source	
Rights	public
Identifier	INSPIRE_DataSpecification_AU_v3.0.1.pdf
Language	En
Relation	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)
Coverage	Project duration

Theme Overview

[Executive Summary](#)

[Detailed description](#)

[Data content and structure](#)

[Data quality](#)

[Metadata](#)

[Delivery](#)

[Data capture](#)

[Portrayal](#)

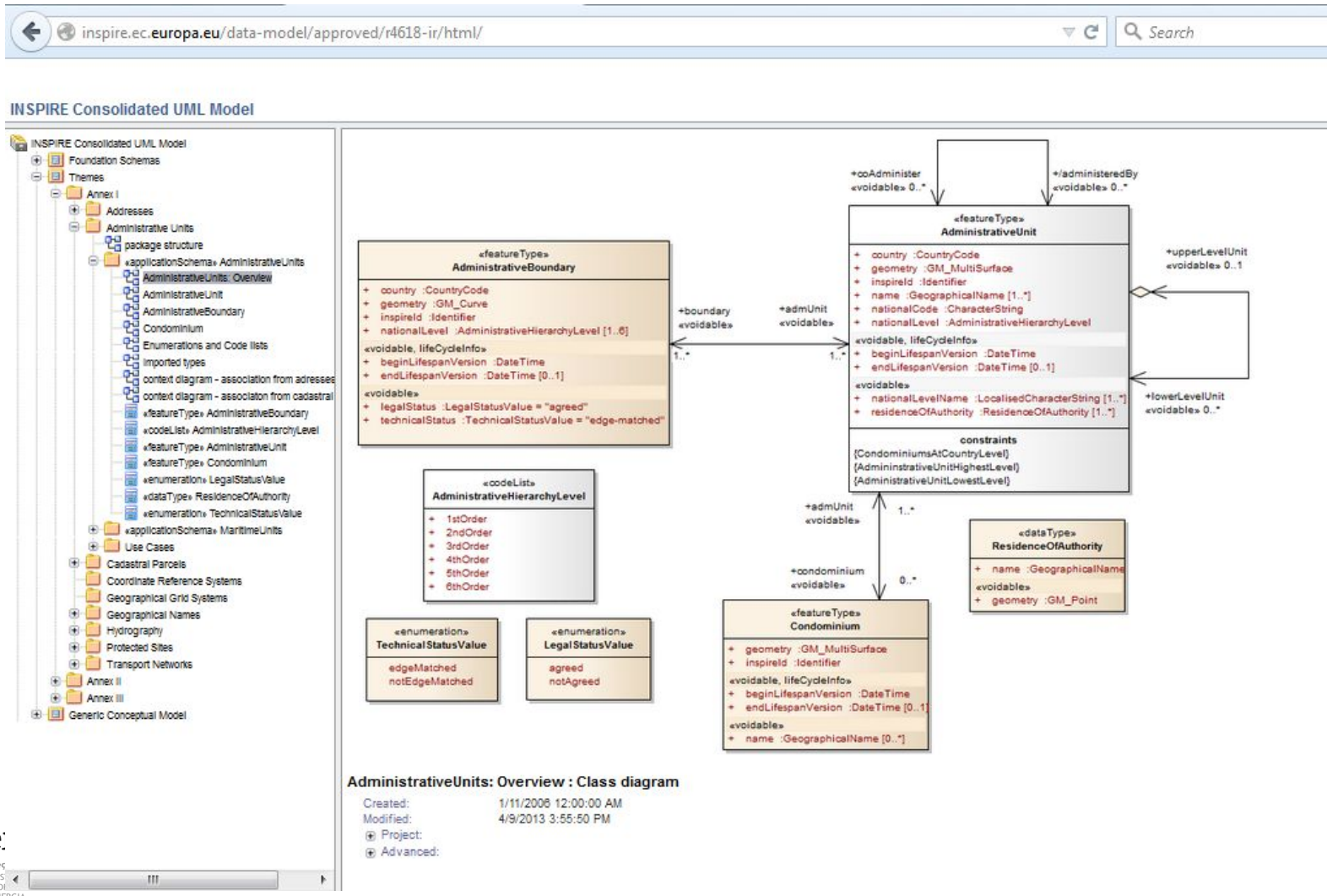
[Abstract Test Suite](#)

[Use cases](#)

[Code list values](#)

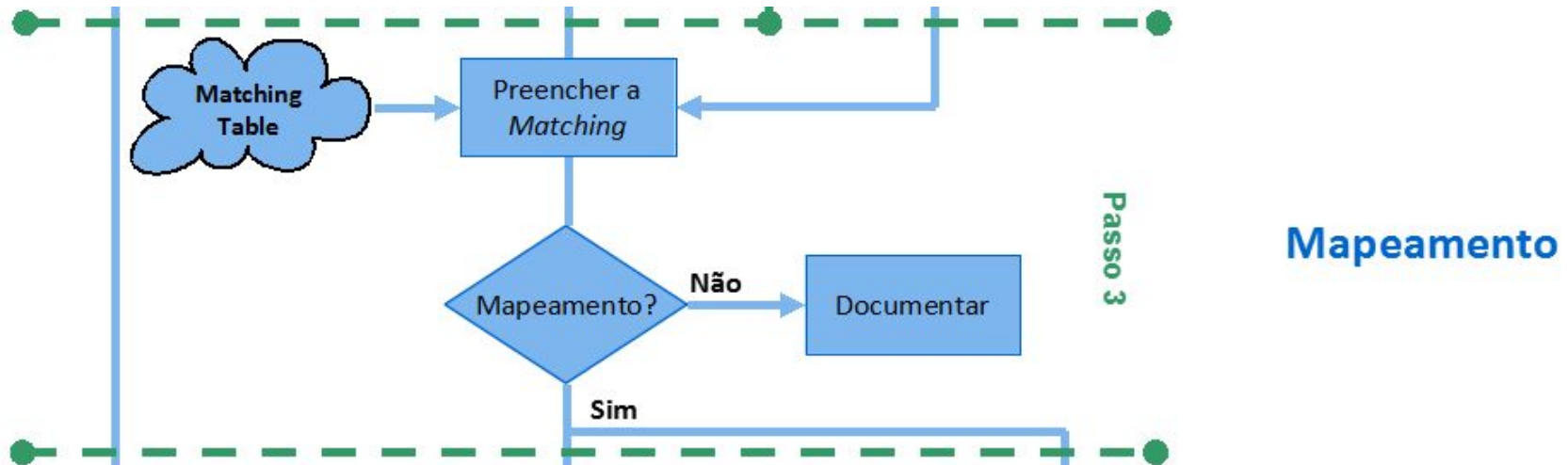
[Additional information](#)

- Diagramas UML



Harmonização de dados geográficos

- **Passo 3:** Comparar e documentar a informação inicial e final



Harmonização de dados geográficos

- **Passo 3:** Comparar e documentar a informação inicial e final
 - Matching table
 - Cada atributo do *source data* tem de ser mapeado para o atributo mais relevante do *target schema*.
 - Alguns atributos são do tipo "complexo" e por isso poderá ser necessário "expandir" a matching table.

The administrative unit						
14	AdministrativeUnit	-- Name -- administrative unit Unit of administration where a Member State has and/or exercises jurisdictional rights, for local, regional and national governance.				
15			beginLifespanVersion	-- Name -- begin lifespan Date and time	DateTime	1 voidable
16			country	-- Name -- country Type abbreviations: 'BE', 'FR', 'DE', 'EE'	CountryCode* BE* FR* DE* EE*	1
17			endLifespanVersion	-- Name -- end lifespan Date and time	DateTime	0..1 voidable
18			geometry	-- Name -- geometry	GM_MultiSurface	1
19			inspireId	-- Name -- inspire id Identifier	Identifier	1
20			name	-- Name -- name Official name	GeographicalName	1..*

Application Schema 'Base Types' (version 3.3rc3)						
Type	Documentation	Attribute Association role / Constraint	Attribute / Association role / Constraint	Values / Enumerations	Multiplicity	Voidable / Non-Voidable
SpatialDataSet	Identifiable collection of spatial data. NOTE The type SpatialDataSet is offered as a pre-defined type for spatial data sets.	identifier	Identifier of the spatial data set.	Identifier	1	
		metadata	Metadata of the spatial data set.	MD_Metadata	1	voidable
Identifier	External unique object identifier published by the responsible body, which may be used by external applications to reference	localId	A local identifier, assigned by the data provider. The	CharacterString	1	
		namespace	Namespace uniquely identifying the data source.	CharacterString	1	
		versionId	The identifier of the particular version of the	CharacterString	0..1	voidable

Harmonização de dados geográficos

- **Passo 4:** Definir a ferramenta a utilizar e efectuar a transformação
 - HALE
 - GeoBide
 - FME
 - GoPublisher



Transformação

Harmonização de dados geográficos

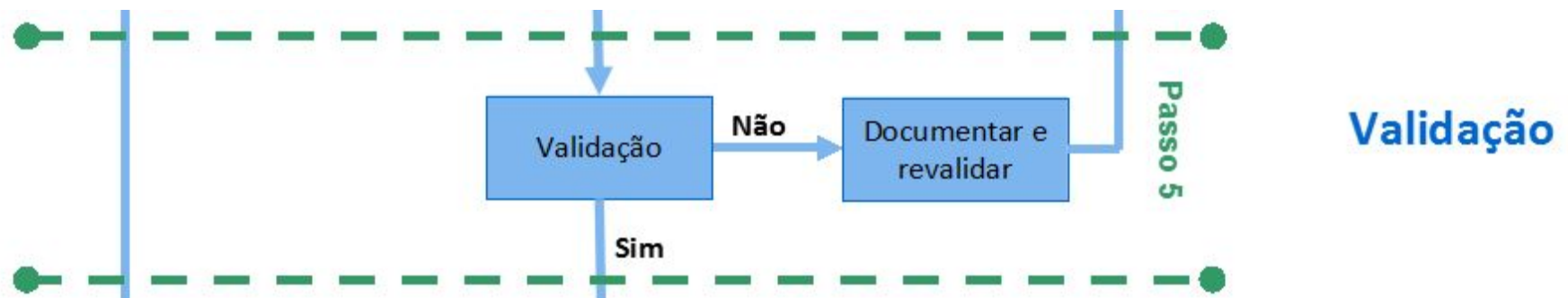
- **Passo 4:** Definir a ferramenta a utilizar e efectuar a transformação
 - HALE

The screenshot displays the HUMBOLDT Alignment Editor 2.8.0 interface. The 'Schema Explorer' shows the 'Source' schema with 'River' and 'Target' schema with 'Watercourse'. The 'Source Data' table shows the original data for 'River', and the 'Transformed Data' table shows the resulting data for 'Watercourse'.

Field	Value 1	Value 2
code	6223	6224
description	Contains Ordnance Survey data © Crown copyr	Contains Ordnance Survey data © Crown copyr
fid	_d1a6215e-3185-429f-b9b1-f160437e4f99	_bbaa24d8-6550-40f4-99b1-f01331b47c1b
geometry	+	+
identifier	3889100603630	3867900610250
name	river Coquet	River Coquet
width	15.0	28.0
Metadata	+	+
Identifier	8106d11a-54bc-42b9-b5b7-1df41698ba92	bafce997-ceed-4e34-8c30-aa3cd74a29e0

Field	Value 1	Value 2
description	Contains Ordnance Survey data © Crown copyr	Contains Ordnance Survey data © Crown copyr
geographicalName	no value	+
geometry	(CRS=OSGB 1936 / British National Grid) POLY	(CRS=OSGB 1936 / British National Grid) POLY
id	_d1a6215e-3185-429f-b9b1-f160437e4f99	_bbaa24d8-6550-40f4-99b1-f01331b47c1b
inspireId	+	+
length	848.2407036092494	711.0681988144904
name	no value	River Coquet
width	+	+
Metadata	+	+
Identifier	103576a3-e821-4ec0-889c-7e2df87ec9f1	fc0edeaf-4cb7-45ba-b935-a62aa7e3236d
SourceID	8106d11a-54bc-42b9-b5b7-1df41698ba92	bafce997-ceed-4e34-8c30-aa3cd74a29e0

- **Passo 5: Validação do GML**



- HALE
- Oxygen XML Editor
- XML Spy Editor

- **Passo 5: Validação do GML**
 - Abstract Test Suite (ATS), incluídas em todas as Especificações de Dados dos anexos.
 - XSD, GML e Schematron.

Theme Overview

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Data quality

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Delivery

Data capture

Portrayal

Abstract Test Suite

Use cases

Code list values

Additional information

Administrative Units

Page: 2 of 14 Automatic Zoom

Table 6. Overview of the tests within this Abstract Test Suite.

<i>Annex A (normative) Abstract Test Suite</i>	97
A.1 <i>Application Schema Conformance Class</i>	100
A.1.1 <i>Schema element denomination test</i>	100
A.1.2 <i>Value type test</i>	100
A.1.3 <i>Value test</i>	100
A.1.4 <i>Attributes/associations completeness test</i>	101
A.1.5 <i>Constraints test</i>	101
A.1.6 <i>Geometry representation test</i>	102
A.2 <i>Reference Systems Conformance Class</i>	102
A.2.1 <i>Datum test</i>	102
A.2.2 <i>Coordinate reference system test</i>	102
A.2.3 <i>View service coordinate reference system test</i>	103
A.2.4 <i>Temporal reference system test</i>	103
A.2.5 <i>Units of measurements test</i>	103
A.3 <i>Data Consistency Conformance Class</i>	104
A.3.1 <i>Unique identifier persistency test</i>	104
A.3.2 <i>Version consistency test</i>	104
A.3.3 <i>Life cycle time sequence test</i>	104
A.3.4 <i>Update frequency test</i>	105
A.3.5 <i>Administrative unit higher hierarchy test</i>	105
A.3.6 <i>Administrative unit lower hierarchy test</i>	105

- **Passo 5: Validação do GML**
- **ATS -- Annex A**
 - Implementation Rules
 - Technical Guidelines

Conformance Class	Tests
A.1 Application Schema Conformance Class	A.1.1 Schema element denomination test
	A.1.2 Value type test
	A.1.3 Value test
	A.1.4 Attributes/associations completeness test
	A.1.5 Abstract spatial object test
	A.1.6 Constraints test
	A.1.7 Geometry representation test
A.2 Reference Systems Conformance Class	A.2.1 Datum test
	A.2.2 Coordinate reference system test
	A.2.3 Grid test
	A.2.4 View service coordinate reference system test
	A.2.5 Temporal reference system test
	A.2.6 Units of measurements test
A.3 Data Consistency Conformance Class	A.3.1 Unique identifier persistency test
	A.3.2 Version consistency test
	A.3.3 Life cycle time sequence test
	A.3.4 Validity time sequence test
	A.3.5 Update frequency test
A.4 Data Quality Conformance Class	A.4.1 Data quality target results test
A.5 Metadata IR Conformance Class	A.5.1 Metadata for interoperability test
A.6 Information Accessibility Conformance Class	A.6.1 Code list publication test
	A.6.2 CRS publication test
	A.6.3 CRS identification test
	A.6.4 Grid identification test
A.7 Data Delivery Conformance Class	A.7.1 Encoding compliance test
A.8 Portrayal Conformance Class	A.8.1 Layer designation test
A.9 Technical Guideline Conformance Class	A.9.1 Multiplicity test
	A.9.1 CRS http URI test
	A.9.2 Metadata encoding schema validation test
	A.9.3 Metadata occurrence test
	A.9.4 Metadata consistency test
	A.9.5 Encoding schema validation test
	A.9.6 Coverage multipart representation test
	A.9.7 Coverage domain consistency test
A.9.8 Style test	

- **Passo 5: Validação do GML**

A.2 Reference Systems Conformance Class

Conformance class:

<http://inspire.ec.europa.eu/conformance-class/ir/au/rs>

A.2.1 Datum test

a) **Purpose:** Verify whether each instance of a spatial object type is given with reference to one of the (geodetic) datums specified in the target specification.

c) **Reference:** Annex II Section 1.2 of Commission Regulation No 1089/2010

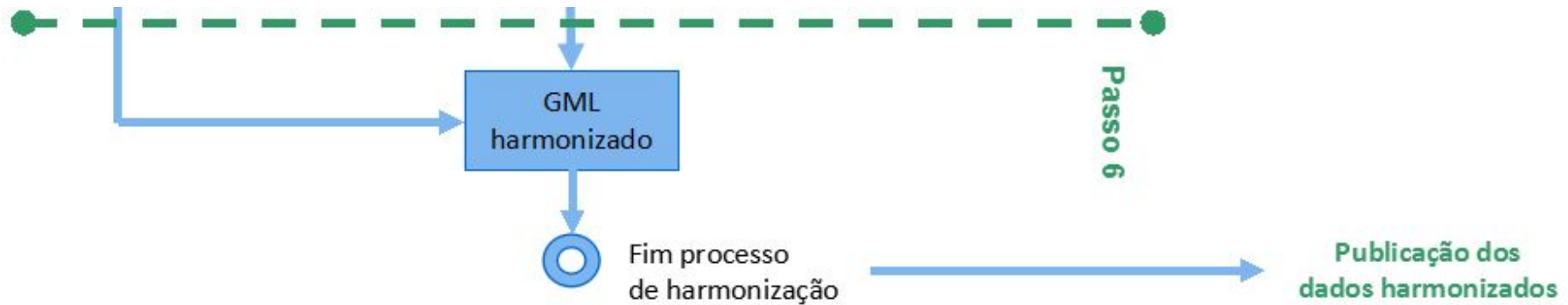
b) **Test Method:** Check whether each instance of a spatial object type specified in the application schema(s) in section 5 has been expressed using:

- the European Terrestrial Reference System 1989 (ETRS89) within its geographical scope; or
- the International Terrestrial Reference System (ITRS) for areas beyond the ETRS89 geographical scope; or
- other geodetic coordinate reference systems compliant with the ITRS. Compliant with the ITRS means that the system definition is based on the definition of ITRS and there is a well-established and described relationship between both systems, according to the EN ISO 19111.

NOTE Further technical information is given in Section 6 of this document.

Harmonização de dados geográficos

- **Passo 5: Publicação do GML**
 - MapServer
 - GeoServer
 - ArcGIS Server



- Algumas considerações:
 - Complexidade das Disposições de Execução e das Especificações de Dados.
 - Conhecimentos avançados sobre XML/GML, XSD, schematrons e UML.
 - Compreensão dos Modelos de Dados e dos correspondentes esquemas XSD.
 - A versão GML 3.2.1 exigida pelo INSPIRE não foi ainda adoptada por alguns *softwares* SIG (em estudo o **GML 3.3**).
 - Ainda não existe validador oficial para a componente de harmonização de dados.

A Harmonização de dados geográficos no âmbito da Diretiva INSPIRE

