



INSPIRE

Infrastructure for Spatial Information in Europe

Draft Structure and Content of the Implementing Rules on Interoperability of Spatial Data Sets and Services

Data Specifications Drafting Team and
Annex I Thematic Working Groups

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List of Acronyms and Abbreviations

CET	Central European Time
CRS	Coordinate Reference System
ETRS89	European Terrestrial Reference System 1989
ETRS-LAEA	ETRS89 Lambert Azimuthal Equal Area
ETRS-LCC	ETRS89 Lambert Conic Conformal
ETRS-TMzn	ETRS89 Transverse Mercator
EVRS	European Vertical Reference System
GCM	Generic Conceptual Model
GRS80	Geodetic Reference System 1980
IFCD	INSPIRE Feature Concept Dictionary
INSPIRE	Infrastructure for Spatial Information in the European Community
IR	Implementing Rule
LMO	Legally Mandated Organisation
NUTS	Nomenclature of Territorial Units for Statistics
SDIC	Spatial Data Interest Community
TWG	Thematic Working Group
UML	Unified Modeling Language
UTC	Coordinated Universal Time

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1 Introduction

This document contains the proposal of the INSPIRE Drafting Team for Data Specifications and the INSPIRE Annex I Thematic Working Groups (TWGs) for the structure and technical content of the Implementing Rules (IRs) on Interoperability of Spatial Data Sets and Services as required by the INSPIRE Directive (2007/2/EC). This document is published on the INSPIRE web site¹ on 2008-12-19 for public view and is open for comments by Spatial Data Interest Communities (SDICs) and Legally Mandated Organisations (LMOs), until 2009-02-20 (18:00 hrs CET). Only comments received by the deadline using the template for comments and the instructions provided on the private section of the SDICs and LMOs on the INSPIRE web site will be considered. At the end of this phase of stakeholder consultation, the Commission will elaborate a revised proposal and submit it to the Regulatory Committee as required by the Directive.

This document does not contain the actual text of the IRs, but instead presents a proposal for the structure of the IRs and the technical contents of the general parts of the IRs. Furthermore, it explains the rules for generating the content of the theme-specific parts of the IRs based on the INSPIRE data specification Guideline documents developed by the TWGs. Examples from different INSPIRE Annex I spatial data themes are included to illustrate the content of the IRs and its relationship to the Guideline documents.

This document will also provide guidance to SDICs and LMOs for the stakeholder consultation. A number of questions are included in the document to help ensure that the final draft version of the IRs meet the requirements of the stakeholders.

This document is publicly available as a 'non-paper', as it does not represent an official position of the Commission, and as such can not be invoked in the context of legal procedures.

The document is organised as follows: Section 1 is introductory to help readers understand the background and requirements without need to reference other documents. It is expected that in the final IRs this section will be removed or be strongly summarized. Section 2 presents the proposed structure of the IRs. Sections 3 to 7 contain proposals for the technical content of the IRs. For proposals for the technical content, this document refers to sections in the draft INSPIRE data specifications for the Annex I spatial data themes. There is one document on the Draft INSPIRE data specification for each Annex I spatial data theme, which are all structured in the same way.

1.1 Background

Directive 2007/2/EC of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)² came into force on the 15th May 2007.

The purpose of such an infrastructure is to assist policy-making in relation to policies and activities that may have a direct or indirect impact on the environment (*Recital 4 of the Directive*).

INSPIRE should be based on the infrastructures for spatial information that are created by the Member States (*Recital 5 of the Directive*). Such infrastructures should be designed to ensure that spatial data are stored, made available and maintained at the most appropriate level; 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; that it is possible for spatial data collected at one level of public authority to be shared between other public authorities; that spatial data are made available under conditions which do not unduly restrict their extensive use; that it is easy to discover available spatial data, to

¹ INSPIRE Website: <http://inspire.jrc.ec.europa.eu/>

² The text of the Directive in multiple languages is available at <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2007:108:SOM:EN:HTML>

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evaluate their suitability for the purpose and to know the conditions applicable to their use (*Recital 6 of the Directive*).

To achieve these aims, the Directive focuses in particular on five key areas of the “infrastructure for spatial information” (*Article 3 of the Directive*): metadata, the interoperability and harmonisation of spatial data and services for selected spatial data themes (as described in Annexes I, II, III of the Directive); network services and technologies; measures on sharing spatial data and services; and coordination and monitoring measures.

To ensure that the infrastructures for spatial information of the Member States are compatible and usable in a Community and trans-boundary context, the Directive requires that common IRs are adopted in a number of specific areas within the specified dates for adoption. The Chapter III of the Directive, Interoperability of spatial data sets and services, provides the requirements for the IRs laying down technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets and services.

The Commission is assisted in the process of adopting such rules by a Regulatory Committee composed by representatives of the Member States and chaired by a representative of the Commission (this is known as the Comitology procedure³). The Committee was established in June 2007.

Member States are required to bring into force national legislation, regulations, and administrative procedures necessary to comply with the Directive by the 15th May 2009 (*Article 24 of the Directive*).

The requirements of the Directive in relation to interoperability of spatial data sets and services, and explanations on how these requirements have been addressed in the process of developing the Annex I data specifications, are detailed below.

1.2 The Directive’s Requirements for the Interoperability of Spatial Data Sets and Services

The complete work to develop the IRs on Interoperability of Spatial Data Sets and Services is following specific development steps, each of which results in different documents:

- 1) the data specification development framework, providing four basic technical documents for the harmonised data specification development, including:
 - Definition of Annex Themes and Scope [DS-D2.3],
 - Generic Conceptual Model [DS-D2.5],
 - Methodology for the development of data specifications [DS-D2.6] and
 - Guidelines for the encoding of spatial data [DS-D2.7].
- 2) the draft data specification Guideline documents for individual spatial data themes of Annex I of the Directive, developed by the TWGs; and
- 3) the draft structure and content of the Implementing Rules on the Interoperability of Spatial Data Sets and Services (draft content of the IRs) related to the spatial data themes of Annex I of the Directive (sections 3-7 of this document)..

Based on these documents and the comments submitted by SDICs/LMOs during the consultation or in test reports, the final IRs on the Interoperability of Spatial Data Sets and Services will be developed.

All three sets of documents are interrelated. These documents together provide all the technical arrangements, from the general issues and common concepts (described in the data specification

³ An explanation of the process for the development and adoption of the Implementing Rules is contained in Section 3 of the Work Programme 2007-09 see http://inspire.jrc.ec.europa.eu/reports/transposition/INSPIRE_IR_WP2007_2009_en.pdf

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development framework) to theme-specific (described in the Guideline documents of the individual spatial data themes), the mandatory elements of which are proposed for inclusion in the IRs.

In the context of the interoperability of spatial data sets, the following articles from the Directive (2007/2/EC) are of major relevance and are quoted here for convenience reasons, with the description of the solutions provided in the draft content of the IRs:

Article 7(1):

Implementing rules laying down technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets and services, designed to amend non-essential elements of this Directive by supplementing it, shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 22(3). Relevant user requirements, existing initiatives and international standards for the harmonisation of spatial data sets, as well as feasibility and cost-benefit considerations shall be taken into account in the development of the implementing rules. Where organisations established under international law have adopted relevant standards to ensure interoperability or harmonisation of spatial data sets and services, these standards shall be integrated, and the existing technical means shall be referred to, if appropriate, in the implementing rules mentioned in this paragraph.

The documents of the data specification development framework are intended to facilitate the drafting process of the IRs and they provide a common framework for developing the various data specifications in a harmonised way. The broad aspect of the defined data interoperability components (defined in [DS-D2.5]) serves in achieving the interoperability of spatial data sets, especially stating the common requirements and recommendations on modelling and application schemas development, common terminology and common approaches for the data interoperability components.

The data interoperability components include:

- (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 adaptability,
- (G) Coordinate referencing 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.

In addition, the harmonisation process is supported by the establishment of the INSPIRE registers. These include the INSPIRE Glossary (including general terms and definitions) and the INSPIRE Feature Concept Dictionary⁴ (including spatial object types and definitions), both are established during the data specifications development. A number of further registers required are listed in [DS-D2.5]. This includes a code list register including the code lists specified in the IRs and in the Guideline documents and a register for identifier namespaces. Furthermore, the harmonisation process is supported by the common repository of UML models and the use of the generic conceptual model, including the generic network model.

⁴ The INSPIRE Registry is available at <https://inspire-registry.jrc.ec.europa.eu/>. Depending on the type of user, different access rights apply. At the moment the Registry contains the INSPIRE Glossary and the INSPIRE Feature Concept Dictionary.

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Article 7(3):

Member States shall ensure that all newly collected and extensively restructured spatial data sets and the corresponding spatial data services are available in conformity with the implementing rules referred to in paragraph 1 within two years of their adoption, and that other spatial data sets and services still in use are available in conformity with the implementing rules within seven years of their adoption. Spatial data sets shall be made available in conformity with the implementing rules either through the adaptation of existing spatial data sets or through the transformation services referred to point (d) of Article 11(1).

Article 7(3) should be addressed by the Member States. The feasibility of transformations will be tested as part of the Annex I data specification testing.

Article 7(4):

Implementing rules referred to in paragraph 1 shall cover the definition and classification of spatial objects relevant to spatial data sets related to the themes listed in Annex I, II or III and the way in which those spatial data are geo-referenced.

All spatial object types are mandatory elements of the draft content of the IRs. Spatial object types are defined by their definition and properties and they belong to an individual spatial data theme. All cross-theme issues and relationships are modelled such that the same spatial object type can be used in different application schemas. In addition, all definitions of the spatial object types (also referred to as "feature types") are collected in the INSPIRE Feature Concept Dictionary (IFCD).

The most common approach in geo-referencing is geo-referencing by coordinates that is described in more details in the appendix on reference systems, which includes both the coordinate reference systems and the temporal reference system.

In the Generic Conceptual Model, more information on linear referencing is introduced (as part of object referencing). Linear referencing can be used in different spatial data themes that use a network-based approach, like Transport networks or Hydrography.

Article 7(5):

Representatives of Member States at national, regional and local level as well as other natural or legal persons with an interest in the spatial data concerned by virtue of their role in the infrastructure for spatial information, including users, producers, added value service providers or any coordinating body shall be given the opportunity to participate in preparatory discussions on the content of the implementing rules referred to in paragraph 1, prior to consideration by the Committee referred to in Article 22(1).

In order to guarantee that INSPIRE is built on the infrastructures of spatial information of the Member States, a consensus building process with wide involvement of the stakeholders has been set-up. Having completed an open registration procedure as an SDIC or LMO⁵ the data users and providers together with representatives of industry, research and government provided reference materials, participated in the user requirement and technical surveys (unique identifiers, usage of the elements of the spatial and temporal schema), proposed experts for the Data Specification Drafting Team⁶ and the TWGs⁷, and expressed their views on the drafts of the technical documents of the data specification development framework, the draft Guideline documents and the draft content of the IRs.

Article 8(2):

The implementing rules shall address the following aspects of spatial data:

- (a) 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;*
- (b) the relationship between spatial objects;*

⁵ The number of SDICs and LMOs on 21/11/2008 was 276 and 162, respectively.

⁶ The Data Specification Drafting Team has been composed of experts from Austria, Belgium, Czech Republic, France, Germany, Greece, Italy, Netherlands, Norway, Poland, Switzerland, UK, and the European Environmental Agency

⁷ The TWGs of Annex I themes have been composed of experts from Belgium, Czech Republic, Denmark, France, Finland, Germany, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, UK, the European Commission, and the European Environmental Agency

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- (c) *the key attributes and the corresponding multilingual thesauri commonly required for policies which may have an impact on the environment;*
- (d) *information on the temporal dimension of the data;*
- (e) *updates of the data.*

Unique identification of spatial objects: This requirement has been addressed in the Generic Conceptual Model. All spatial object types of the spatial data themes in the Annexes I and II of the INSPIRE Directive shall receive a property of type "Identifier" (unless it is known that no requirement exists to identify or reference spatial objects of that type). The attribute of type "Identifier" is a mandatory element of the draft content of the IRs and is described in the Guidelines documents (as part of the application schemas and feature catalogue).

The draft content of the IRs may include additional specific requirements and recommendations for identifier management related to the specific spatial data theme.

Relationship between spatial objects: Different types of relationships between spatial objects exist:

- the relationships between spatial objects of the same spatial data theme;
- the relationships between spatial objects of the different spatial data themes, as the result of the cross-theme concepts and relationships, harmonisation and the principle of re-using the existing components;
- the concept of placeholders (spatial object type) is used to announce relationships with spatial objects that are not fully defined by the spatial data theme of Annex I of the INSPIRE Directive but which will be defined in detail during the data specifications development of the spatial data themes of Annex II and III of the Directive.

The nature of a relationship between spatial objects may be spatial, temporal and/or thematic.

Key attributes and relationships are mandatory part of the draft content of the IRs. In addition, the attributes and relationships are part of the feature catalogue included in the Guideline documents. Where applicable, multilingual code lists or thesauri are identified for providing the values for the attributes.

The temporal dimension of the data is defined in various ways, as following:

- life-cycle information of spatial objects;
- version of the spatial objects, including the information on date/time;
- using additional properties (attributes) to describe the specific and content-related temporal dimension of the spatial objects;
- using metadata elements at the spatial data set level or at the spatial object level;
- using temporal geometry or temporal topology.

The common approach to model the life-cycle information of spatial objects is used to describe the temporal properties of the spatial objects when they are introduced, removed or changed into the spatial data set, using the common date and time types.

Some spatial object types include additional attributes to describe specific content-oriented temporal characteristics.

The temporal dimension of data is included in draft content of the IRs as attributes or metadata; except the last option with regard to using the temporal geometry or the temporal topology that is not introduced in the draft content of the IRs related to the spatial data themes of Annex I of the Directive.

Updates of the data: Unique object identifiers and life-cycle rules play an important facilitating role in exchange of updates.

Article 8(3):

The implementing rules shall be designed to ensure consistency between items of information which refer to the same location or between items of information which refer to the same object represented at different scales.

The requirement for consistency between items of information which refer to the same location is reflected in the draft content of the IRs. Furthermore, where possible, this issue has been addressed by including constraints between spatial objects across different spatial object types or levels of detail in

the Guideline documents. The consistency rules and constraints are described in the draft content of the IRs in natural language.

Consistency rules or requirements are highly dependent on the user requirements, in some cases the same geometry type can be used regardless the scale (for example: point for addresses), in other cases the draft content of the IRs may include specific rules for the geometry representation related also to the requested level of detail.

Article 8(4):

The implementing rules shall be designed to ensure that information derived from different spatial data sets is comparable as regards the aspects referred to in Article 7(4) and in paragraph 2 of this Article.

The draft content of the IRs includes harmonised elements that were developed in the data specifications development process leading to the use of the spatial object types, attributes and value domains (as code lists and enumerations) and developed through the same principles of the data interoperability components.

Testing of the conformity of spatial data sets to the IRs and the metadata element Conformity can inform the users how well the spatial data set is conformant to the IRs.

Article 10.2:

In order to ensure that spatial data relating to a geographical feature, the location of which spans the frontier between two or more Member States, are coherent, Member States shall, where appropriate, decide by mutual consent on the depiction and position of such common features.

This is not addressed in the draft content of the IRs. However, illustrations and additional explanations in the Guideline documents serve to demonstrate the modelling of the cross-border issues.

1.3 How to read this document

The document uses several formatting styles to highlight requirements to be included in the IRs, for examples of how to generate the content of the theme-specific parts and for the questions for the stakeholder consultation.

References to other documents, in particular the Guideline documents provided for consultation, are formatted like this.

Requirement x Requirements to be included in the Implementing Rules are formatted like this.

Example x
Examples are formatted like this.

Question x Questions for the SDIC/LMO consultation are formatted like this.

Questions might refer to more than one spatial data theme. In this case, the placeholder “in the Thematic Appendices” is used in this document. In the commenting template, there will be a separate work sheet for each Thematic Appendix.

2 Proposed Structure of the Implementing Rules

The IRs shall be structured as is depicted in Figure 1.

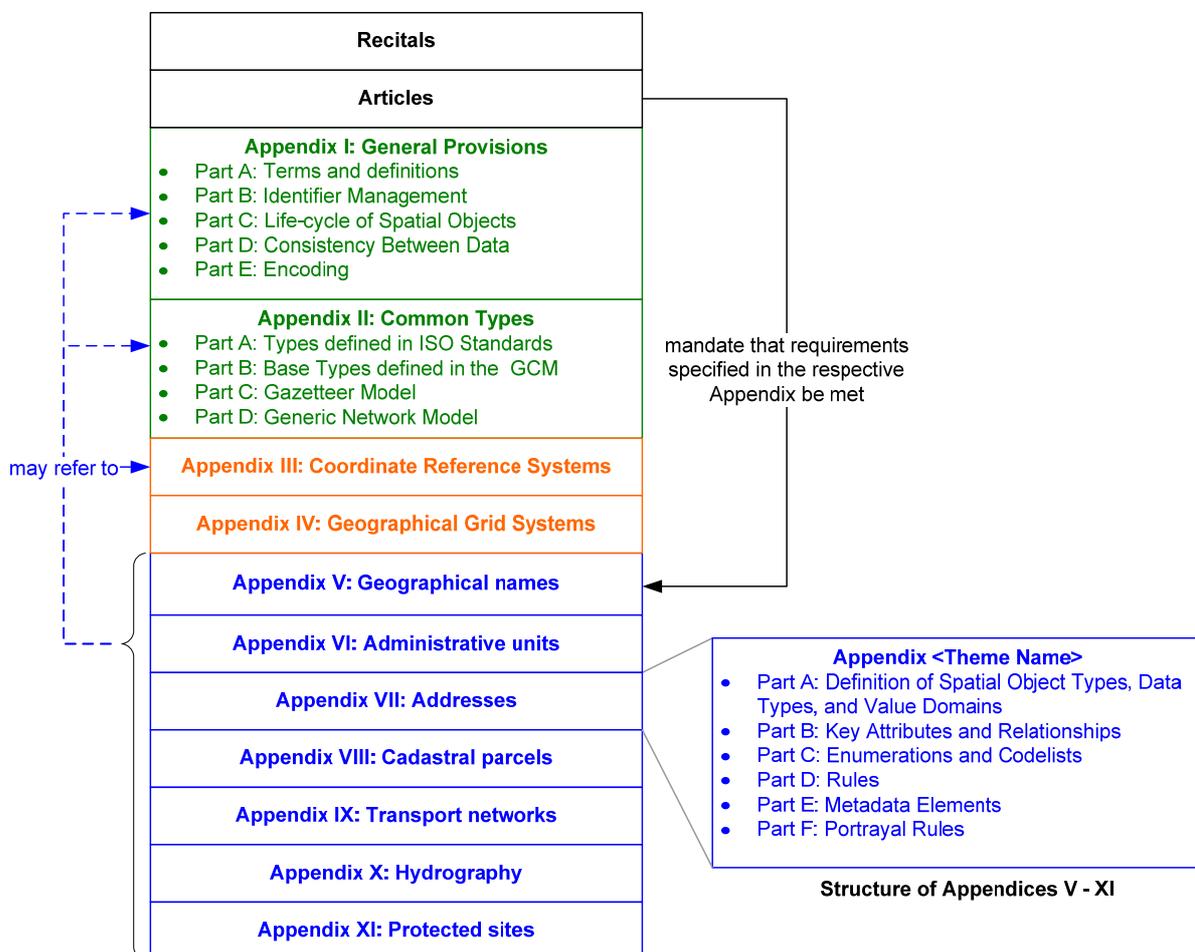


Figure 1. Proposed Structure of the IRs on Interoperability of Spatial Data Sets and Services

The *recitals* describe the requirements of the Directive regarding the interoperability of Spatial Data Sets and Services.

The *articles* mandate that data sets corresponding to one of the INSPIRE Annex I spatial data themes conform to the requirements specified in the respective Appendix (Appendices V to XI, shown in blue in Figure 1, hereafter: *Thematic Annexes*). The content of these Appendices is based on the Guideline documents created by the INSPIRE TWGs.

There are two general Appendices (Appendix I and II, shown in green in Figure 1) that may be referenced from the Thematic Appendices (shown as dashed blue arrows in Figure 1) as described below.

Appendix I contains general provisions and will be based on the Generic Conceptual Model [DS-D2.5]. It contains the following Parts:

- Part A: Terms and Definitions
- Part B: Identifier Management
- Part C: Life-cycle of Spatial Objects
- Part D: Consistency Between Data
- Part E: Encoding

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Appendix II includes descriptions of common types defined in several ISO standards and the Generic Conceptual Model. It contains the following Parts:

- Part A: Types defined in ISO Standards
- Part B: Base Types defined in the Generic Conceptual Model
- Part C: Gazetteer Model
- Part D: Network Model

Appendices III and IV (shown in orange in Figure 1) specify general requirements specified for the INSPIRE spatial data themes Coordinate reference systems and Geographical grid systems. These are not directly referenced from the articles, but can be referenced from Appendices V to VII. The content of these Appendices is based on the specifications created by the TWG on Reference Systems.

The *Thematic Appendices* (V to XI) contain the requirements for the INSPIRE Annex I spatial data themes Geographical names, Administrative units, Addresses, Cadastral parcels, Transport networks, Hydrography and Protected sites. These Appendices are based on the Guideline documents created by the INSPIRE TWGs. All of these Appendices are structured in the same way and include the following Parts:

- Part A: Definition of Spatial Object Types, Data Types, and Value Domains
- Part B: Key Attributes and Relationships
- Part C: Enumerations and Code lists
- Part D: Rules
- Part E: Metadata Elements
- Part F: Portrayal Rules

The Parts can, where applicable, reference Appendices I to IV.

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3 Proposed Content of Appendix I: General Provisions

This Appendix contains general provisions and will be based on the Generic Conceptual Model (GCM) [DS-D2.5].

It Appendix may be referenced from Parts D.1 to D.4 in the Thematic Appendices.

NOTE As the GCM has already undergone stakeholder consultation, content derived directly from the GCM will not be put to consultation again, here. Thus, no questions are included on these parts.

Part A: Terms and Definitions

The terms and definitions have been consolidated during the development of the data specification development framework. Most of the terms are published in the INSPIRE Glossary.

This Part shall be referenced from each of the Thematic Appendices. It shall include the following requirement.

Requirement 1	In addition to the definitions in the Article 3 of the Directive (2007/2/E), the following definitions shall apply.
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application schema

Conceptual schema for data required by one or more applications [ISO 19101]

code list

Open enumeration that can be extended during system runtime [ISO 19103]

conceptual model

Model that defines concepts of a universe of discourse [ISO 19101]

conditional attribute

Attributes that only have to be made available if they are contained in the spatial data sets maintained by the Member States.

data set

Identifiable collection of data [ISO 19101]

data type

A descriptor of a set of values that lack identity [ISO 19103]

enumeration

A data type whose instances form a fixed list of named literal values [ISO 19103 – modified]

NOTE Attributes of an enumerated type may only take values from this list.

external object identifier

Unique object identifier which is published by the responsible body, which may be used by external applications to reference the spatial object [DS-D2.5]

identifier

Linguistically independent sequence of characters capable of uniquely and permanently identifying that with which it is associated [ISO 19135]

layer

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Basic unit of geographic information that may be requested as a map from a server [Draft Implementing Rules for View Services]

life-cycle information

Set of properties of a spatial object that describe the temporal characteristics of a version of a spatial object or the changes between versions [DS-D2.5].

mandatory attribute

Attributes that have to be made available by the Member states.

register

Set of files containing identifiers assigned to items with descriptions of the associated items [ISO 19135]

spatial object type

A classification of spatial objects

NOTE In the conceptual schema language UML a spatial object type will be described by a class with stereotype <<featureType>>.

EXAMPLE Cadastral parcel, road segment or river basin are all examples of potential spatial object types.

style

A mapping from feature types and feature properties and constraints to parameterized symbols used in drawing maps [OGC Glossary].

Part B: Identifier Management

This Part is based on section 14 of the GCM [DS-D2.5].

It shall be referenced from each of the Thematic Appendices.

Requirement 2 The external object identifier for the unique identification of spatial objects shall not be changed during the life-time of a spatial object.

Part C: Life-cycle of Spatial Objects

This Part is based on section 9.7 of the GCM [DS-D2.5].

It shall be referenced from each of the Thematic Appendices.

Requirement 3 Different versions of the same spatial object shall always be instances of the same spatial object type.

EXAMPLE If a spatial object was wrongly classified (not in the right feature type), when correcting the mistake, a data provider must give this object a new identifier and not just consider it as new version of the same object.

Requirement 4 Different versions of the same spatial object shall not have different external object identifiers.

Part D: Consistency Between Data

This Part is based on section 22 of the GCM [DS-D2.5].

It shall be referenced from each of the Thematic Appendices.

Requirement 5 Spatial objects published in INSPIRE shall be consistent with other spatial objects published in INSPIRE that refer to the same location or are abstractions of the same phenomenon in the real-world represented at different scales.

Part E: Encoding

This part is based on the guidelines for the encoding of spatial data [DS-D2.7].

It shall be referenced from each of the Thematic Appendices.

Requirement 6 Every encoding rule used to encode spatial data shall conform to [ISO 19118]. In particular, it shall specify schema conversion rules for all spatial object types and all key attributes and relationships.

4 Proposed Content of Appendix II: Common Types

This Appendix includes descriptions of common types defined in a number of ISO standards and in the GCM.

If any of the types defined in this Appendix are used in the definitions of attributes and relationships in the Thematic Appendices, they shall be referenced there.

NOTE As the GCM (except for the Network Model) has already undergone stakeholder consultation, content derived directly from the GCM will not be put to consultation again, here. Thus, no questions will be included on these parts.

Part A: Types defined in ISO Standards

A.1 Types defined in [ISO 19103]

Requirement 7 For the types Area, Boolean, CharacterString, DateTime, Distance, Integer, Length, Measure, Sign and Velocity used in definitions of attributes and relationships of spatial object types or data types, the definitions given in [ISO 19103] shall apply.

A.2 Types defined in [ISO 19107]

Requirement 8 For the types GM_Curve, GM_MultiSurface, GM_Object, GM_Point, GM_Primitive, GM_Surface, TP_Edge and TP_Face used in spatial attributes or relationships of spatial object types or data types, the definitions given in [ISO 19107] shall apply.

A.3 Types defined in [ISO 19108]

Requirement 9 For the type TM_Period used in definitions of attributes and relationships of spatial object types or data types, the definitions given in [ISO 19108] shall apply.

A.4 Types defined in [ISO 19111]

Requirement 10 For the type SC_CRS used in definitions of attributes and relationships of spatial object types or data types, the definitions given in [ISO 19111] shall apply.

A.5 Types defined in [ISO 19115]

Requirement 11 For the types CI_Citation, CI_ResponsibleParty, EX_GeographicExtent and MD_Resolution used in definitions of attributes and relationships of spatial object types or data types, the definitions given in [ISO 19115] shall apply.

A.6 Types defined in [ISO 19139]

This Part is based on section 11.2 of the GCM [DS-D2.5].

Requirement 12 For the types PT_FreeText and LocalisedCharacterString used in definitions of attributes and relationships of spatial object types or data types, the definitions given in [ISO 19139] shall apply.

Part B: Base Types defined in the Generic Conceptual Model

B.1 Data Type Identifier

This Part is based on section 9.8.2 of the GCM [DS-D2.5].

Requirement 13 For the Identifier data type used to provide external object identifiers for unique identification of spatial objects, the definitions given in this Part shall apply.

The attributes and relationships of the Identifier data type are described in Table 1.

Table 1: Attributes and relationships of the Identifier data type

Attribute / Relationship	Definition	Type	Mandatory / conditional
localId	<p>A local identifier, assigned by the data provider. The local identifier shall be unique within the namespace, i.e. no other spatial object shall carry the same unique identifier.</p> <p>It is the responsibility of the data provider to guarantee uniqueness of the local identifier within the namespace.</p> <p>The localId shall only use the following set of characters: {"A" .. "Z", "a" .. "z", "0" .. "9", "_", ".", "-", ";", "}, i.e. only letters from the Latin alphabet, digits, underscore, point, comma, and dash are allowed.</p>	CharacterString	mandatory

Attribute / Relationship	Definition	Type	Mandatory / conditional
namespace	<p>The value of this attribute identifies the data source of the spatial object.</p> <p>The namespace shall only use the following set of characters: {"A" ... "Z", "a" ... "z", "0" ... "9", "_", ".", "-", ",", "}, i.e. only letters from the Latin alphabet, digits, underscore, point, comma, and dash are allowed.</p>	CharacterString	mandatory
versionId	<p>The identifier of the particular version of the spatial object. If the specification of a spatial object type with an external object identifier includes life-cycle information, the version identifier shall be used to distinguish between the different versions of a spatial object. Within the set of all versions of a spatial object, the version identifier shall be unique.</p> <p>The property shall be void, if the spatial data set does not distinguish between different versions of the spatial object. It shall be missing, if the spatial object type does not support any life-cycle information.</p> <p>The version identifier shall be a character string with a maximum length of 25 characters.</p>	CharacterString	conditional

B.2 Enumeration IndicativeLoD

This Part is based on section 9.8.5 of the GCM [DS-D2.5].

NOTE This is a new section introduced in the GCM in version 3.1.

Requirement 14 For the enumeration IndicativeLoD used for attributes describing a level of detail, the definitions given in this Part shall apply.

The enumeration IndicativeLoD specifies the following values (Table 2).

Table 2: Allowed values for the enumeration IndicativeLoD

Value	Definition
European	European level
National	National level
Regional	Regional level
Local	Local level

NOTE The specific resolution values associated with each level will be defined by each spatial data theme.

Part C: Gazetteer Model

This Part is based on section 9.9.2 of the GCM [DS-D2.5].

Requirement 15 For the spatial object types Gazetteer, LocationInstance and LocationType the definitions given in this Part shall apply.

Gazetteer (Gazetteer)

A gazetteer is a directory of instances of location types in a spatial reference system.

The attributes and relationships of the spatial object type are described in Table 3.

Table 3: Attributes and relationships of the spatial object type Gazetteer

Attribute / Relationship	Definition	Type	Mandatory / conditional
coordinateSystem	coordinate reference system used in the gazetteer for describing position	SC_CRS	mandatory
custodian	name of the organization responsible for maintenance of the gazetteer	CI_ResponsibleParty	mandatory
name	name of the gazetteer	PT_FreeText	mandatory
scope	description of the location types contained in the gazettee	PT_FreeText	mandatory
territoryOfUse	use geographic domain covered by the gazetteer	EX_GeographicExtent	mandatory

Location Instance (LocationInstance)

Identifiable place in the real world.

The attributes and relationships of the spatial object type are described in Table 4.

Table 4: Attributes and relationships of the spatial object type LocationInstance

Attribute / Relationship	Definition	Type	Mandatory / conditional
admin	organization responsible for defining the characteristics of the location instance	CI_ResponsibleParty	mandatory
alternativeGeographicIdentifier	other identifier for the location instance	CharacterString	mandatory
dateOfCreation	date of creation of this version of the location instance	Date	mandatory
geographicExtent	description of the location instance	GM_Object	mandatory
geographicIdentifier	unique identifier for the location instance	CharacterString	mandatory
locationType	location type of this instance	LocationType	mandatory
parent	location instance of a different location type, for which this location instance is a sub-division	LocationInstance	mandatory
gazetteer	gazetteer which includes this location instance	Gazetteer	mandatory
spatialObject	reference to a spatial object that is associated with the location and often the source for the location instance	AbstractFeature	conditional

Location Type (LocationType)

Classification scheme for location instances.

The attributes and relationships of the spatial object type are described in Table 5.

Table 5: Attributes and relationships of the spatial object type LocationInstance

Attribute / Relationship	Definition	Type	Mandatory / conditional
definition	the way in which location instances are defined	PT_FreeText	mandatory
identificationType	method of uniquely identifying location instances	IdentificationType	mandatory
name	name of the location type	PT_FreeText	mandatory
owner	name of organization or class of organization able to create and destroy location instances	CI_ResponsibleParty	mandatory
territoryOfUse	geographic area within which the location type occurs	EX_GeographicExtent	mandatory
spatialObjectType	spatial object type used as the defining characteristic of the location type, if applicable	FC_FeatureType	mandatory
parent	name of parent location type (a location type of which this location type is a sub-division)	LocationType	mandatory

Part D: Generic network model

This Part is based on section 9.9.3 of the GCM [DS-D2.5].

NOTE This is a new section introduced in the GCM in version 3.1.

Requirement 16 For the spatial object types and data types included in this Part, which are used in the definitions of attributes and relationships expressing network characteristics, the definitions given in this Part shall apply.

D.1 Spatial Object Types

Aggregated Link (AggregatedLink)

A network element which represents a continuous path in the network without any branches.

The element has a defined beginning and end and every position on the aggregated link is identifiable with one single parameter such as length.

The attributes and relationships of the spatial object type are described in Table 6.

Table 6: Attributes and relationships of the spatial object type AggregatedLink

Attribute / Relationship	Definition	Type	Mandatory / conditional
links	Ordered collection of links which constitute the route.	DirectedLink	mandatory

Area (Area)

An area is a 2-dimensional element in a network.

The attributes and relationships of the spatial object type are described in Table 7.

Table 7: Attributes and relationships of the spatial object type Area

Attribute / Relationship	Definition	Type	Mandatory / conditional
geometry	Represents the geometric extent of the area.	GM_Surface	mandatory

Grade Separated Crossing (GradeSeparatedCrossing)

An optional indicator of which network element is above and below when two elements intersect, if elevation coordinates are not present or cannot be trusted.

The attributes and relationships of the spatial object type are described in Table 8.

Table 8: Attributes and relationships of the spatial object type GradeSeparatedCrossing

Attribute / Relationship	Definition	Type	Mandatory / conditional
elements	The first element is the lower, the second element the upper network element.	Link	mandatory

Link (Link)

A link is a curvilinear network element that connects two positions and represents a homogeneous path in the network. The connected positions may be represented as nodes.

A Link is required to have a geometric representation.

The attributes and relationships of the spatial object type are described in Table 9.

Table 9: Attributes and relationships of the spatial object type Link

Attribute / Relationship	Definition	Type	Mandatory / conditional
centerlineGeometry	The geometry that represents the centerline of the link.	GM_Curve	mandatory
startNode	The optional start node for this link.	Node	mandatory
endNode	The optional end node for this link. The end node may be the same instance as the start node.	Node	mandatory

Network (Network)

A network is a collection of network elements. The reason for collecting certain elements in a certain network may vary (e.g. connected elements for the same mode of transport).

The attributes and relationships of the spatial object type are described in Table 10.

Table 10: Attributes and relationships of the spatial object type Network

Attribute / Relationship	Definition	Type	Mandatory / conditional
elements	The collection of elements in the network.	NetworkElement	mandatory

Network Connection (NetworkConnection)

Represents a logical connection between two network elements in different networks. The connection represents a possibility for the transported media (people, goods, etc) to change from one network to another.

The attributes and relationships of the spatial object type are described in Table 11.

Table 11: Attributes and relationships of the spatial object type NetworkConnection

Attribute / Relationship	Definition	Type	Mandatory / conditional
elements	Network elements in different networks.	NetworkElement	mandatory

Network Element (NetworkElement)

An abstract base class that represents an element in a transport network. Every element in a network shall provide some function that is of interest in the network.

The attributes and relationships of the spatial object type are described in Table 12.

Table 12: Attributes and relationships of the spatial object type NetworkElement

Attribute / Relationship	Definition	Type	Mandatory / conditional
id	The identity of the network element.	Identifier	mandatory
name	The name for the network element.	GeographicalName	conditional
connections	Connections to other networks at this network element.	NetworkConnection	mandatory
inNetwork	The networks in which a network element is a member.	Network	conditional

Network Property (NetworkProperty)

An abstract spatial object type that represents phenomena located at or along a network element. This base type provides general properties to associate the network-related phenomena (network properties) with the network elements.

In the simplest case (NetworkReference), the network property is applicable to the whole network element. In the case of a Link, the spatial reference may be restricted to part of the Link by using a linear reference.

If linear referencing is used, the target of the network reference shall be a link.

The attributes and relationships of the spatial object type are described in Table 13.

Table 13: Attributes and relationships of the spatial object type NetworkProperty

Attribute / Relationship	Definition	Type	Mandatory / conditional
id	The external object identifier of the network-related property in the source data set.	Identifier	mandatory
networkRef	Spatial reference of the network-related property. This attribute provides an indirect spatial reference based on a reference to an element of an underlying network. See Clause 13 for a discussion on modelling object references.	NetworkReference	conditional

Node (Node)

Represents a significant position in the network that, if it exists, always occurs at the beginning or ending of a link.

The attributes and relationships of the spatial object type are described in Table 14.

Table 14: Attributes and relationships of the spatial object type Node

Attribute / Relationship	Definition	Type	Mandatory / conditional
geometry	The location of the node.	GM_Point	mandatory

D.2 Data Types

Directed Link (DirectedLink)

Reference to a link qualified with the relevant directions of the link.

The attributes and relationships of the data type are described in Table 15.

Table 15: Attributes and relationships of the data type DirectedLink

Attribute / Relationship	Definition	Type	Mandatory / conditional
direction	Indicates, if the directed link agrees (positive) or disagrees (negative) with the positive direction of the link.	Sign	mandatory
link	The link.	Link	mandatory

Network Reference (NetworkReference)

A simple network reference to a network element.

The attributes and relationships of the data type are described in Table 16.

Table 16: Attributes and relationships of the data type NetworkReference

Attribute / Relationship	Definition	Type	Mandatory / conditional
element	The network element.	NetworkElement	mandatory

Simple Linear Reference (SimpleLinearReference)

A network reference that is restricted to part of a linear network element. The part is the part of the network element between the position along the network element between fromPosition and toPosition. Both attributes are expressions representing the distance from the start of the linear network element along its curve geometry.

The attributes and relationships of the data type are described in Table 17.

Table 17: Attributes and relationships of the data type SimpleLinearReference

Attribute / Relationship	Definition	Type	Mandatory / conditional
fromPosition	Distance from the beginning of the link from where the network property is applicable.	Length	mandatory
toPosition	Distance from the beginning of link until where the network property is applicable.	Length	mandatory

Question 1 Do you agree with the contents of this Part (Network Model)? If not, please specify.

5 Proposed Content of Appendix III: Reference Systems

A language-neutral name for computers for all reference systems and map projections is given between parentheses. This language-neutral name shall be used to refer to the corresponding coordinate reference system or map projection. The language-neutral name will not be translated.

Part A: Coordinate Reference Systems

This Part is based on section 2 of the Guideline document on Coordinate Reference Systems [DS-D2.8.I.1].

It may be referenced in Part D.5 in the Thematic Appendices to define the requirements on coordinate reference systems. If this Part is not referenced, the Thematic Appendix shall define its own requirements on coordinate reference systems.

Requirement 17 For the horizontal component, for the areas within the geographical scope of the European Terrestrial Reference System 1989 (ETRS89) shall be used.

Requirement 18 The International Terrestrial Reference System (ITRS) or other geodetic coordinate reference systems compliant with ITRS shall be used in areas that are outside the geographical scope of ETRS89.

Compliant with the ITRS means that the system definition is based on the definition of the ITRS and there is a well established and described relationship between both systems, according to [ISO 19111].

Requirement 19 The parameters of the GRS80 ellipsoid shall be used for the computation of latitude and longitude (ETRS89-GRS80) and for the computation of plane coordinates using a suitable mapping projection.

Requirement 20 For the vertical component, for the areas within the geographical scope of EVRS the European Vertical Reference System (EVRS) shall be used.

Requirement 21 When using both ETRS89 and EVRS the CRS used is a compound one and shall be designated as ETRS89/EVRS to allow unambiguous 3D geo-referencing.

Question 2 Do you agree with the contents of this Part (INSPIRE Coordinate Reference Systems)? If not, please specify.

Part B: Map Projections

This Part is based on section 3 of the Guideline document on Coordinate Reference Systems [DS-D2.8.I.1].

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It may be referenced in Part D.5 in the Thematic Appendices to define the requirements on map projections. If this Part is not referenced, the Thematic Appendix shall define its own requirements on map projections.

Requirement 22 The ETRS89 Lambert Azimuthal Equal Area (ETRS-LAEA) shall be used for purposes where true area representation is required.

Requirement 23 The ETRS89 Lambert Conformal Conic (ETRS-LCC) shall be used for conformal mapping at scales smaller or equal to 1:500,000.

Requirement 24 The ETRS89 Transverse Mercator (ETRS-TMzn) shall be used for conformal mapping at scales larger than 1:500,000.

Question 3 Do you agree with the contents of this Part (Map Projections)? If not, please specify.

Part C: Temporal Reference System

This Part is based on a section 10.1 of the GCM [DS-D2.5].

It may be referenced in Part D.6 in the Thematic Appendices to define the requirements on temporal reference systems. If this Part is not referenced, the Thematic Annex shall define its own requirements on temporal reference systems, if applicable.

Requirement 25 Date values shall be provided using the Gregorian Calendar. Time values shall be provided either using the Coordinated Universal Time (UTC) or as local time including their time zone as an offset from UTC.

Question 4 Do you agree with the contents of this Part (Temporal Reference System)? If not, please specify.

6 Proposed Content of Appendix IV: Geographical Grid Systems

This Appendix is based on the Guideline document on Geographical Grid Systems [DS-D2.8.1.2].

It may be referenced from Thematic Appendices to define the requirements on geographical grid systems. If this Appendix is not referenced, the Thematic Appendix shall define its own requirements on geographical grid systems.

Requirement 26 If a grid is used for reporting, the definitions given in this Appendix shall apply.

The grid is based on the ETRS89-LAEA coordinate reference system with the centre of the projection at the point 52° N, 10° E and false easting: $x_0 = 4321000$ m, false northing: $y_0 = 3210000$ m.

The grid is designated as Grid_ETRS89-LAEA5210. For identification of an individual resolution level the name is extended by identification of cell size in metres.

The origin of the grid coincides with the false origin of the ETRS89-LAEA coordinate reference system ($x=0$, $y=0$).

Grid points of grids based on ETRS89-LAEA must coincide with grid points of the grid.

The grid is defined as hierarchical one in metric coordinates in power of 10.

The resolution of the grid is 1m, 10m, 100m, 1000m, 10000m, 100000m.

The grid orientation is south-north, west-east.

Part A: Reference point

The reference point of a grid cell for grids based on ETRS89-LAEA is the lower left corner of the grid cell.

Part B: Grid cells coding system

A cell code is composed of the size of cell and the coordinates of the lower left cell corner in ETRS89-LAEA.

The Cell size in metres is formatted to "m" (metre) or "km" (kilometre) depending of cell size.

Example 1

10000 metres is changed to "10km".

To reduce the length of the string, values for easting and northing (in the ETRS89-LAEA they are named x and y) are divided by 10^n ("n" is number of zeros in the cell size value). With the given resolutions this means that the zeros are trimmed.

Example 2

Example: If the cell size is 1000 metres, the number of zeros in the end is 3 and the divider is $10^3 = 1000$.

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Example 3

Example of cell code: "1kmE4695N2599 "(identifies the 1km grid cell with coordinates of the lower left corner: x=4695000m, y=2599000m).

Question 5 Do you agree with the contents of this Appendix (Geographical Grid Systems)? If not, please specify.

7 Proposed Content of Thematic Appendices

The content of the Thematic Appendices (V to XI) will be generated based on the information contained in the Guideline documents. This section explains the rules on which this generation will be based.

Examples are given from different INSPIRE Annex I spatial data themes to illustrate the relationship between Guideline documents and the proposed content of the IRs.

A general rule applies to all *definitions* of spatial object types, data types, enumerations, code lists, attributes, relationships and values. While in the Guideline documents, these definitions often include notes, comments and examples, these elements will be removed in the text for the IRs.

Part A: Definition of Spatial Object Types, Data Types, and Value Domains

A language-neutral name for computers for all spatial object types, data types, and value domains is given between parentheses. This language-neutral name is used in Parts B to G to refer to the corresponding spatial object type, data type, or value domain. The language-neutral name will not be translated.

A.1 Spatial Object Types

Requirement 27 The spatial objects corresponding to INSPIRE Annex I spatial data theme <Theme Name> shall be exchanged and classified according to the following type definitions and conditions.

One definition shall be included for each spatial object type defined in the Guideline documents.

The definitions are based on the definitions of the spatial object types in section 5.1.2.1 (Spatial object types) of the Guideline documents.

Example 4

The spatial object types defined for the spatial data theme Cadastral Parcels [DS-D2.8.I.6] will be included in the IRs like this:

Cadastral Boundary (CadastralBoundary)

Cadastral boundary is a part of the outline of a cadastral parcel. One cadastral boundary can be shared by two neighbouring cadastral parcels.

Cadastral Index Set (CadastralIndexSet)

Intermediary areas used in order to divide national territory into cadastral parcels.

Cadastral Parcel (CadastralParcel)

Areas defined by cadastral registers or equivalent.

Question 6 Do you agree to the spatial object types to be included in the Thematic Appendices? If not, please specify.

Question 7 Do you agree to the definitions of the spatial object types to be included in the Thematic Appendices? If not, please specify.

A.2 Data Types

Requirement 28 For the following data types used in attributes or relationships of spatial object types or other data types, the definitions given in this subsection shall apply.

One definition shall be included for each data type defined in the Guideline documents.

The definitions are based on the definitions of the data types in section 5.1.2.2 (Data types) of the Guideline documents.

Example 5

The data types defined for the spatial data theme Addresses [DS-D2.8.1.5] will be included in the IRs like this:

Geometry Origin (GeometryOrigin)

Description of the object type and the method that were used to originally establish the geographic position of the address.

Locator Designator (LocatorDesignator)

A number or a sequence of characters which allows a user or an application to interpret, parse and format the locator within the relevant scope. The full identification of the locator could include one or more locator designators.

Locator Name (LocatorName)

A geographic name associated to a property identified by the locator.

Question 8 Do you agree to the data types to be included in the Thematic Appendices? If not, please specify.

Question 9 Do you agree to the definitions of the data types to be included in the Thematic Appendices? If not, please specify.

A.3 Enumerations

Requirement 29 For the enumerations used in attributes or relationships of spatial object types or data types, the definitions given in this subsection shall apply.

One subsection shall be included for each enumeration defined in the Guideline documents.

The definitions are based on the definitions of the enumerations in section 5.1.2.3 (Enumerations and codelists) of the Guideline documents.

Example 6

The enumerations defined for the spatial data theme Administrative Units [DS-D2.8.1.4] will be included in the IRs like this:

Type of Administrative Area (AdministrativeAreaType)

The type of administrative area describes the property of the area concerning its role within the national administrative structure.

Level of Administrative Hierarchy (AdministrativeHierarchyLevel)

Levels of administration in the national administrative hierarchy.

Level of Boundary (BoundaryLevelType)

Boundary levels in the national administrative hierarchy.

Status of Boundary (BoundaryStatusType)

Description of the (legal) status for (international) administrative boundaries.

Type of Coastline (CoastlineType)

Type of coastline.

Land Cover Type (LandCoverType)

Classification of an AdministrativeArea according to its land-water nature.

Meaning Of Line (MeaningOfLineType)

Classification of a boundary according to the land-water nature of the adjacent areas.

NUTS Level (NUTSLevelType)

NUTS levels.

Question 10 Do you agree to the enumerations to be included in the Thematic Appendices? If not, please specify.

Question 11 Do you agree to the definitions of the enumerations to be included in the Thematic Appendices? If not, please specify.

A.4 Code Lists

Requirement 30 For the code lists used in attributes or relationships of spatial object types or data types, the definitions given in this subsection shall apply.

One subsection shall be included for each code list defined in the Guideline documents.

The definitions are based on the definitions of the code lists in section 5.1.2.3 (Enumerations and code lists) of the Guideline documents.

Example 7

The code lists defined for the spatial data theme Addresses [DS-D2.8.1.5] will included in the IRs like this:

GeometryBasis (Addresses::GeometryBasis)

Description of what spatial object type the geographic position of the address was created or derived from.

GeometryMethod (Addresses::GeometryMethod)

Description of how and by whom the geographic position of the address was created or derived.

LocatorDesignatorType (Addresses::LocatorDesignatorType)

Description of the semantics (meaning) of the locator designator.

LocatorLevel (Addresses::LocatorLevel)

Indication of the level of detail to which the locator refers.

LocatorNameType (Addresses::LocatorNameType)

Description of the semantics (meaning) of the locator name.

Status (Addresses::Status)

Current position (validity status) of the address/address component within the lifecycle of the address/address component instance.

Question 12 Do you agree to the code lists to be included in the Thematic Appendices? If not, please specify.

Question 13 Do you agree to the definitions of the code lists to be included in the Thematic Appendices? If not, please specify.

Part B: Key Attributes and Relationships of the Spatial Object Types and Data Types

Requirement 31 Instances of spatial object types and data types shall include the key attributes and relationships to other types in accordance with the expected multiplicity set out in the Tables in this Part.

One table shall be included for each spatial object type or data type defined in the Guideline documents. This tables shall list all properties, i.e. attributes and relationships (navigable association roles), of the type, divided into two groups:

- Mandatory attributes, i.e. attributes that have to be reported by the Member states;
- Conditional attributes, i.e. attributes that only have to be reported if they are contained in the spatial data sets maintained by the Member States.

NOTE Even for mandatory attributes, values only have to be reported if they exist in the real world. If attributes have a minimum multiplicity of 0, this means that no value might exist in the real world, and hence that no value can be reported.

The tables present the following information:

- The first column contains the attribute or relationship name.
- The second column contains the definition of the attribute or relationship.
- The third column contains the data type or value domain of the attribute or relationship.

- The fourth column states whether the attribute is mandatory or conditional.

Example 8

The attributes and associations roles defined for the spatial data type Address in the Guideline document for the spatial data theme Addresses shall be included in the Thematic Appendix of the IRs like this:

Table x: Attributes and relationships of the spatial object type Address

Attribute / Relationship	Definition	Type	Mandatory / conditional
beginLifespanVersion	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.	DateTime	conditional
endLifespanVersion	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.	DateTime	conditional
geographicPosition	Description of the object type and the method that were used to originally establish the geographic position of the address.	GM_Point	mandatory
geometryOrigin	Description of what object type the geographic position of the address was originally established to locate, and the method used to create the geographic point.	GeometryOrigin	mandatory
identifier	External object identifier published by the responsible body, which may be used by external applications to reference the address or address component.	Identifier	mandatory
lastChange	The date at which real world changes results in changes of the attributes of the address or related address components.	DateTime	conditional
status	Current position (validity status) of the address within the lifecycle of the address instance.	Status	conditional
validFrom	Date and time the address object was/will be created in the real world.	DateTime	conditional
validTo	Date and time at which the address object ceased/will cease to exist in the real world.	DateTime	conditional

The information in the tables is based on sections 5.1.2.1 (spatial object types) and 5.1.2.2 (data types) in the Guideline documents.

The conditional attributes of a type are characterised in the Guideline documents by the stereotype «voidable». This stereotype expresses that an attribute or relationship of a spatial object is not present in the spatial data set, but may be present or applicable in the real world. For an attribute or relationship that is marked as «voidable», the value of *void* may be used as a value, which shall imply that the characteristic is not present in the spatial data set, but may be present or applicable in the real world. It is possible to qualify a value of void in the data with a reason, which can take one of the following pre-defined values:

- Unknown means that the correct value is not known to, and not computable by the data provider *for the specific spatial object*. However, a correct value may exist.
- Unpopulated: means that the correct value is not known to, and not computable by the data provider *for any of the spatial objects of that spatial object type within the spatial data set*. However, a correct value may exist.

Example 9

The same information presented in Example 8 is presented in the Guideline document for the spatial data theme Addresses like this:

5.1.2.1.1 Addresses.Address

Class: «featureType» Addresses.Address

(...)

Attribute: geographicPosition

Definition: Position of a characteristic point on the lowest level of address components that constitute the address feature expressed in coordinates in the chosen reference system.
 Comment: Information on the origins of the geographic position is described in the geometryOrigin data type.

Value type: GM_Point

Multiplicity: 1

Stereotypes:

Attribute: geometryOrigin

Definition: Description of what object type the geographic position of the address was originally established to locate, and the method used to create the geographic point.

Value type: GeometryOrigin

Multiplicity: 1

Stereotypes:

Attribute: identifier

Definition: External object identifier published by the responsible body, which may be used by external applications to reference the address or address component.

Comment 1: Identifier is an INSPIRE base type composed by a namespace, a local identifier and an optional (voidable) version identifier.

Example: An address instance from Denmark could carry this identifier:

Namespace: DK_ADR

Local identifier: 0A3F507B2AB032B8E0440003BA298018

Version identifier: 12-02-2008T10:05:01+01:00

	<p>Comment 2: The four requirements for unique object identifiers are: uniqueness, persistence, traceability, and feasibility.</p> <p>Comment 3: The primary purpose of this identifier is to enable links between various sources and the address components.</p> <p>Value type: Identifier</p> <p>Multiplicity: 1</p> <p>Stereotypes:</p>
Attribute: lastChange	<p>Definition: The date at which real world changes results in changes of the attributes of the address or related address components.</p> <p>Comment 1: This date will be changed if any of the address properties, such as status, is changed or if any of the properties of any of the AddressComponents that comprise the address are changed, or if any further AddressComponents are added to or removed from that address.</p> <p>Value type: DateTime</p> <p>Multiplicity: 1</p> <p>Stereotypes: «voidable»</p>
Attribute: status	<p>Definition: Current position (validity status) of the address within the lifecycle of the address instance.</p> <p>Comment: This status relates to the address and is not a property of the object to which the address is assigned (the addressable object).</p> <p>Value type: Status</p> <p>Multiplicity: 0..1</p> <p>Stereotypes: «voidable»</p>
Attribute: validFrom	<p>Definition: Date and time the address object was/will be created in the real world.</p> <p>Comment 1: It is recommended that this date is made mandatory for any address created after the Inspire Directive comes into force.</p> <p>Comment 2: This date can be set in the future for those instances where an address has been created and reserved by the appropriate authority for a property that may exist at a future date.</p> <p>Value type: DateTime</p> <p>Multiplicity: 1</p> <p>Stereotypes: «voidable»</p>
Attribute: validTo	<p>Definition: Date and time at which the address object ceased/will cease to exist in the real world.</p> <p>Value type: DateTime</p> <p>Multiplicity: 0..1</p> <p>Stereotypes: «voidable»</p>
Attribute: beginLifespanVersion	<p>Definition: Date and time at which this version of the spatial object was inserted or changed in the spatial data set.</p> <p>Comment 1: This date is recorded to enable the generation of change only update files.</p> <p>Value type: DateTime</p>

Multiplicity:	1
Stereotypes:	«voidable,lifeCycleInfo»
Attribute: endLifespanVersion	
Definition:	Date and time at which this version of the spatial object was superseded or retired in the spatial data set. Comment 1: This date is recorded primarily for those systems which "close" an entry in the gazetteer in the event of an attribute change.
Value type:	DateTime
Multiplicity:	0..1
Stereotypes:	«voidable,lifeCycleInfo»
(...)	

Question 14 Do you agree to the attributes and relationships to be included in the Thematic Appendices? If not, please specify.

Question 15 Do you agree to the definitions of the attributes and relationships to be included in the Thematic Appendices? If not, please specify.

Part C: Enumerations and Code lists

Requirement 32 Attributes or relationships of spatial object types or data types that have a code list type may only take values that are valid according to the INSPIRE code list register.

Requirement 33 Attributes or relationships of spatial object types or data types that have an enumeration type may only take values from the lists specified in the Tables in this Part.

One table shall be included for each enumeration defined in the Guideline documents. The table shall list the allowed values for this value domain. Each value is defined by:

- the first column contains an alphanumerical code;
- the second column contains a textual name for humans which may be translated in the different Community languages and a language neutral name for computers (the value expressed between parentheses);
- the third column contains the definition or the value.

This information is based on section 5.1.2.3 (Enumerations and code lists) in the Guideline documents, where enumeration values are presented in a similar way as attributes (see Example 9).

Example 10

The enumeration AdministrativeAreaType from the spatial data theme Administrative Units shall be included like this:

Table x: Allowed values for the enumeration AdministrativeAreaType

Code	Value	Definition
1	Main area (Main area)	The main area is the administrative area where the residence of authority is located.
3	Branch area (Branch area)	Areas which are geometrically separated from the main area (e.g. exclaves).
4	Special area (Special area)	Area having a specific function of scope (e.g. condominium, non-cadastre area, forest).

Question 16 Do you agree to the allowed values to be included for the enumerations listed in the Thematic Appendices? If not, please specify.

Question 17 Do you agree to the definitions of the allowed values to be included for the enumerations listed in the Thematic Appendices and to the proposed definitions? If not, please specify.

Part D: Rules

This subsections of this Part can be divided in two groups.

Parts D.1 to D.7 shall or may include references to the General Provisions defined in Appendix I. In some cases, these provisions can be extended or can be replaced by theme-specific rules. In the latter case, the rules have to specified in this Part.

Parts D.8 to D.10 define theme-specific rules and constraints.

D.1 Terms and Definitions

This section shall include a reference to Appendix I, Part A.

In addition, other terms relevant for the Thematic Appendix shall be defined here.

The definitions are based on section 2.5 (Terms and definitions) in the Guideline documents.

Question 18 Do you agree with the terms and definitions to be included in the Thematic Appendices? If not, please specify.

D.2 Identifier Management

This section shall include a reference to Appendix I, Part B.

In addition, other rules regarding identifier management relevant for the Thematic Appendix shall be defined here.

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The rules on identifier management are based on section 5.1.1.4 (Identifier management) in the Guideline documents.

Question 19 Do you agree with the rules on identifier management to be included in the Thematic Appendices? If not, please specify.

D.3 Life-cycle of Spatial Objects

This section shall include a reference to Appendix I, Part C.

In addition, this section shall state for each spatial object type which modifications (e.g. attribute changes, merging with another spatial object) may change the identity of a spatial object, i.e. when the existing spatial object is "retired" and a new spatial object with a new identifier is created.

The life-cycle rules are based on sections 5.1.1.7 (Temporality representation) and the definitions of spatial object types in the Guideline documents.

Question 20 Do you agree with the life-cycle rules to be included in the Thematic Appendices? If not, please specify.

D.4 Consistency Rules

This Part shall include a reference to Appendix I, Part D.

In addition, this section shall include all consistency rules (expressed in natural language) for the types defined in Parts A to C.

The consistency rules are based on section 5.1.1.3 (Consistency between spatial data sets) in the Guideline documents.

Question 21 Do you agree with the consistency rules to be included in the Thematic Appendices? If not, please specify.

D.5 Encoding

This section shall include a reference to Appendix I, Part E.

No additional theme-specific rules regarding encoding shall be defined here.

D.6 Coordinate Reference Systems

This section shall either include a reference to Appendix III, Parts A and B or define the coordinate reference system(s) to be supported for this spatial data theme.

The requirements on coordinate reference systems are based on section 6.1 (Spatial reference system) in the Guideline documents.

Question 22 Do you agree with the requirements on coordinate reference systems to be included in the Thematic Appendices? If not, please specify.

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D.7 Temporal Reference Systems

This section shall either include a reference to Appendix III, Part C or define the temporal reference system(s) to be supported for this spatial data theme.

The requirements on temporal reference systems are based on section 6.2 (Temporal reference system) in the Guideline documents.

Question 23 Do you agree with the requirements on temporal reference systems to be included in the Thematic Appendices? If not, please specify.

D.8 Geographical Grid Systems

This section shall only be included if applicable for the spatial data theme. It shall either include a reference to Appendix IV or define the geographical grid system(s) to be used for this spatial data theme.

NOTE Geographical grid systems are not used in any of the Guideline documents for the Annex I spatial data themes.

D.9 Constraints on Spatial Object Types, Data Types and Value Domains

This section shall include all constraints (expressed in natural language) for the types defined in Parts A to C.

The content of this Part is based on the constraints defined for the types listed in section 5.1.2 (Feature catalogue) in the Guideline documents.

Question 24 Do you agree with the constraints to be included in the Thematic Appendices? If not, please specify.

D.10 Data Quality Requirements

According to Art. 3(7) of the INSPIRE Directive, interoperability means "the possibility of spatial data sets to be combined [...] in such way that the result is coherent". When data from different sources are combined, coherency also means that the quality of the data is comparable. This could be reached through a set of minimum requirements on data quality.

During the discussions between the TWGs on cross-thematic issues, it was decided not to include minimum requirements on data quality in the Guideline documents.

The question below shall help to clarify if any minimum data quality requirements exist and if yes, what are the appropriate data quality elements and the corresponding data quality measures.

Question 25 Do you think that minimum data quality requirements should be included in the Thematic Appendices? If yes, please specify useful data quality elements and the corresponding data quality measures.

Part E: Metadata Elements

This Part specifies the mandatory and conditional theme-specific metadata elements for the spatial data theme.

These metadata elements are listed in a table (Mandatory and conditional theme-specific metadata for the theme <Theme Name>) in Section 8 (Data set -level Metadata) of the Guideline Documents.

Requirement 34 The metadata describing spatial data sets corresponding to the spatial data theme <Theme Name> shall comprise the metadata elements required by 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) for spatial data sets and spatial data set series as well as the theme-specific metadata elements specified in the Table in this Part.

Those metadata elements or groups of metadata elements shall be in accordance with the expected multiplicity and the related conditions set out in the Table.

When no condition is expressed in relation to a particular metadata element, that element shall be mandatory.

The table presents the following information:

- the first column contains the name of the metadata element;
- the second column contains the definitions of the metadata element;
- the third column specifies the multiplicity of a metadata element. The expression of the multiplicity follows the Unified Modelling Language (UML) notation for multiplicity, in which:
 - 1 means that there shall be only one instance of this metadata element in a result set,
 - 1..* means that there shall be at least one instance of this element in a result set,
 - 0..1 indicates that the presence of the metadata element in a result set is conditional but can occur only once,
 - 0..* indicates that the presence of the metadata element in a result set is conditional but the metadata element may occur once or more,
 - when the multiplicity is 0..1 or 0..*, the condition defines when the metadata elements is mandated,
- the fourth column contains a conditional statement if the multiplicity of the element does not apply to all types of resources. All elements are mandatory in other circumstances.

Example 11

The mandatory and conditional metadata elements from the spatial data theme Addresses shall be included like this:

Table x: Theme-specific metadata elements for the theme Addresses

Metadata elements	Definition	Multiplicity	Condition
Data character set	Full name of the character coding standard used for the data set.	0..*	Mandatory if different from ISO/EC 10646-1 code list
Metadata character set	Provides a description of the format of the data to be distributed.	0..*	Mandatory if different from ISO/EC 10646-1 code list

Question 26 Do you agree to the mandatory or conditional metadata elements to be included in the Thematic Appendices? If not, please specify.

Question 27 Do you agree to the definitions of the mandatory or conditional metadata elements to be included in the Thematic Appendices? If not, please specify.

Part F: Portrayal Rules

This Part specifies the rules applicable for portrayal of the spatial object types using an INSPIRE view service.

Requirement 35 If an INSPIRE view service supports the portrayal of spatial data sets corresponding to the spatial data theme <Theme Name>, it shall provide the layers specified in Part F.1.

Requirement 36 If an INSPIRE view service supports the portrayal of spatial data sets corresponding to the spatial data theme <Theme Name>, it shall support the default styles specified in Part F.2. If no user-defined style is specified in a portrayal request for a specific layer to an INSPIRE view service, the default style specified in this section for that layer shall be used.

Requirement 37 If an INSPIRE view service supports the portrayal of spatial data sets corresponding to the spatial data themes <Theme Name>, apart from the default styles specified in Part F.2, it shall also support the well-defined styles specified in Part F.3.

F.1 Layers

This part shall contain one table that contains one row for each layer specified in the Guideline documents.

The layer definitions are based on Section 11.1 (Layers) of the Guideline documents.

The table presents the following information:

- the first column contains the name of the layer;
- the second column contains the title of the layer
- the third column contains the spatial object type(s) that are provide the content of the layer.

Example 12

For the spatial data theme Administrative Units, a table listing the layers shall be included like this:

Table x: Layers for the spatial data theme Administrative Units

Layer Name	Layer Title	Spatial object type
AdministrativeUnitLowestLevel	Administrative Unit	AdministrativeUnitLowestLevel
AdministrativeUnitUpperLevel	Administrative Unit	AdministrativeUnitUpperLevel
AdministrativeBoundary	Administrative Boundary	AdministrativeBoundary
AdministrativeUnitArea	Administrative Unit Area	AdministrativeUnitArea
NUTSRegion	NUTS Region	NUTSRegion

Question 28 Do you agree to the layers to be included in the Thematic Appendices? If not, please specify.

F.2 Default Styles

This part shall contain one table that contains one row for each layer specified in the Guideline documents.

The definitions of the default styles for each layer are based on Section 11.1 (Layers) of the Guideline documents.

The table presents the following information:

- the first column contains the name of the layer;
- the second column contains a textual description of the default style to be supported by the View Service for the portrayal of the layer.

Example 13

For the spatial data theme Administrative Units, a table listing the default styles shall be included like this:

Table x: Default styles for the spatial data theme Administrative Units

Layer Name	Default Style
AdministrativeUnitUpperLevel	This style uses grey lines for the borders of the administrative units at upper levels and the geographicalName property for labelling (10pt arial).
AdministrativeUnitLowestLevel	This style uses grey lines for the borders of the administrative units at lowest level and the geographicalName property for labelling (10pt Arial).
AdministrativeBoundary	This style uses red lines for all boundaries and different stroke widths depending on the value of the boundaryLevel property: 4 px for level 1, 3 px for level 2, 2 px for level 3, and 1 px for all other levels.
AdministrativeUnitArea	This style uses grey lines for the borders of the administrative unit areas.
NUTSRegion	This style uses grey lines for the borders of for NUTS regions.

Question 29 Do you agree to the definitions of the default styles to be included in the Thematic Appendices? If not, please specify.

F.3 Well-Defined Styles

This part shall contain one table that contains one row for each well-defined style specified in the Guideline documents.

The definitions of the well-defined styles for each layer are based on Section 11.1 (Layers) of the Guideline documents.

The table presents the following information:

- the first column contains the name of the layer;
- the second column contains a textual description of the well-defined styles to be supported by the View Service for the portrayal of the layer.

Example 14

For the spatial data theme Administrative Units, a table listing the well-defined styles shall be included like this:

Table x: Well-defined styles for the spatial data theme Administrative Units

Layer Name	Well-defined Style
AdministrativeUnitLowestLevel	This style uses grey lines for the borders of the administrative units at lowest level and the unitCode property for labelling (10pt Arial).
AdministrativeUnitUpperLevel	This style uses grey lines for the borders of the administrative units at upper level and the unitCode property for labelling (10pt Arial).

Question 30 Do you agree to the well-defined styles to be included in the Thematic Appendices? If not, please specify.

Question 31 Do you agree to the definitions of the well-defined styles to be included in the Thematic Appendices? If not, please specify.

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